Chapter 5

War Exhaustion and the Stability of Arms Treaties

The previous chapters established an inefficiency puzzle regarding nuclear weapons. Namely, there usually exists a range of non-proliferation settlements which both sides prefer to proliferation, and those settlements are sustainable over time. Why can't the states locate one such agreement and share the surplus?

We explore the robustness of that result under more dynamic settings in this chapter. One possible roadblock to butter-for-bombs agreements is if the rising state doubts whether nuclear weapons will be available in the future. Suppose, for the moment, that the rising state will suddenly lose the ability to proliferate tomorrow. Bargaining tension arises. Imagine the rising state opts not to proliferate today. Then the declining state can offer the rising state's reservation value for war *without* nuclear weapons for the rest of time. The rising state must accept these offers since its only alternative (war) is not any more attractive. So the rising state must have nuclear weapons tomorrow to secure any concessions in the future.

Moving back a step, this inevitability forces the rising state to proliferate today. The declining state would like to buy off the rising state, but the rising state knows that the promise of future concessions is inherently incredible. Thus, a commitment problem induces the rising state to invest in nuclear weapons.

The above intuition explains why bargaining might break down, but it does so in a trivial manner. A rising state's ability to proliferate does not exogenously vanish from one day to the next. A non-trivial explanation for

proliferation would *endogenously* explain why the rising state will be unable to proliferate in the future. In other words, the rising state's limitations must form due to actions the states take within the context of their strategic environment.

Over the next two chapters, we provide two such causal mechanisms. In this chapter, we focus on situations in which the declining state's desire to prevent varies over time. If this desire fluctuates greatly, the states find themselves in the aforementioned commitment problem. When the declining state is weak, it wishes it could promise continued concessions into the future. However, the moment the declining state's appetite for war returns, it will inevitably cut off concessions. Anticipating this, the rising state ignores the declining state's promises and proliferates while its rival is vulnerable. The result is inefficient but unavoidable.

Putting the theory into context, consider Iran's dilemma today. Conventional wisdom treats Iran's desire to obtain nuclear weapons as proliferation for the sake of proliferation, as though Iran is hellbent to obtain nuclear weapons for some inexplicable reason. However, as the main theory chapter demonstrated, if Iran is interested in merely improving its bargaining position vis-a-vis the United States, then the parties should bargain their way to a nonproliferation settlement. In turn, understanding Iran's desire to proliferate is no trivial matter.

Taking a step back, though, structural factors have left Iran frustrated. At the moment, the United States is in a delicate geopolitical position. After roughly a decade of fighting in both Afghanistan and Iraq, Americans are coping with a bout of war exhaustion–the unwillingness to engage in future conflict after suffering through prior conflict. This war exhaustion creates a window of opportunity for Iran. Conceivably, American war exhaustion will eventually wear off, at which point the United States will launch preventive war if Iran continues down the path of proliferation. In the meantime, however, Iran is free to acquire nuclear weapons unimpeded. Due to the aforementioned commitment problem, Iran must proliferate to receive concessions in the future even though mutually preferable outcomes exist.

This chapter has four additional sections. We begin by laying out the microfoundations for war exhaustion. Next, we modify the model from Chapter 2 to include the dynamics of war exhaustion. If war exhaustion wears off sufficiently quickly, the rising state proliferates due to the commitment problem. The following section relates the model's findings to the Soviet Union's decision to proliferate immediately after World War II and the ongoing crisis

with Iran. We conclude by highlighting important theoretical issues that affect the results but are common to this type of model.

5.1 What Is War Exhaustion?

Political science research into war exhaustion dates back to at least Richardson (1960, 232), who wrote that "a long and severe bout of fighting confers immunity on most of those who have experienced it; so that they no longer join in fights." The idea is straightforward: war is costly, and every incremental unit of effort a state pours into conflict is increasingly costly.[1] Thus, a long and costly fight makes a state wearier of joining another fight soon thereafter.

Empirical research on war exhaustion fails to demonstrate consistent effects either on the system level or national level. In particular, Levy and Morgan (1986) and Garnham (1986) fail to reject the null hypothesis that war makes a state less likely to go to war in the near future. Pickering (2002) finds a non-linear relationship if we factor in a state's performance in the previous conflict. Meanwhile, Ostrom and Job (1986) see a decrease in the likelihood of militarized interstate disputes following prior conflict, while Feaver and Gelpi (2004, 77-85) note that longer wars further temper military action. Lian and Oneal (1993) find evidence that U.S. public opinion plays a strong factor here, as presidents receive weaker rally 'round the flag bonuses during periods of exhaustion.

However, in his empirical analysis, Garnham is careful not to equate large-n aggregate results with individual level behavior, and cites aversion to conflict in France post World War I and in the United States post-Korean War. In fact, theories of war exhaustion say nothing about our overall expectation about the likelihood of future conflict. Rather, exhaustion tells us that, *ceteris paribus*, we should expect the costliness of continuous war to eventually force a state into submission. Applying the theory empirically is difficult due to the *ceteris paribus* qualifier. Other effects could conspire to make war more likely and cancel out exhaustion's effect in practice.[2] For

[1] That is, in formal language, the first and second derivatives of the function that maps war effort into costs are strictly positive.

[2] Wagner (2007, 17-21) provides a useful analogy. Waltz (1979, 168) claims that bipolar worlds lead to fewer conflicts due to the lower probability of miscalculation is lowest under these circumstances. But even if we assume that Waltz's assertion about miscalculation

example, increased industrial investment for war could make future wars *less* expensive if the state suffered few casualties in the original conflict. Careful empirical methods can resolve these issues by including control variables or factoring in selection effects. But theoretical work in non-dyadic bargaining theory remains woefully inadequate, so how one should create such controls is unclear.[3]

In the next section, we work around the complexities of all geopolitical post-war shocks by isolating the effects of war exhaustion on arms agreements. If the declining state cannot deter the rising state today but will deter the rising state tomorrow, the rising state jumps at the opportunity despite the inefficient result.

5.2 Modeling War Exhaustion

To understand the causal logic at work, this section introduces an extension to the model from Chapter 2. We split it into three parts. First, we introduce the changes to the model. We then describe its equilibria and relate those equilibria to the previous results. Lastly, we use a numerical example to illustrate why the commitment problem forces the rising state to proliferate in equilibrium.

is true, for his conclusion to hold, it must also be the case that miscalculation only causes war among great powers and no other factors that could cause war increase in a world of bipolarity.

[3]One might wonder why a state would allow itself to grow war exhausted in the first place if it leads to unfortunate consequences. As the phrase implies, one must have been at war–and for a significant amount of time–to suffer from war exhaustion. However, war exhaustion is consistent with preexisting dyadic models of war. In the next section's model, war exhaustion creates a commitment problem which ultimately leads to a loss in utility for the declining state. But this is equivalent to saying that the original war is costly. Whereas we traditionally understand the cost of war as the loss of life and destruction of property, this expanded interpretation allows the cost to also incorporate the negative externalities of war. Thus, conflict can remain optimal despite the possibility of war exhaustion. In the analysis section, we will see that this is especially so when the *ex ante* expectation of war exhaustion is unlikely (as was the case with the Iraq War) or the original conflict is of much greater importance at the time (as was the case with World War II).

5.2.1 Actions and Transitions

The interaction maintains the same overall framework as the basic model from Chapter 2. That is, the world is either in a pre-shift state or a post shift state. In the pre-shift state, D begins by making an offer $x_t \in [0,1]$ for the period. R can accept, reject, or build in response. Accepting ends the period, and R and D receive x_t and $1-x_t$ respectively for the period. Rejecting leads to pre-shift war, an absorbing state. R receives $p_R - c_R$ for the rest of time, while D receives $1-p_R-c_D(t)$ for the rest of time. Note that D's war payoff is different from the original model, as the cost is a function of the period.

If R builds, it pays a cost $k > 0$. D observes R's decision and chooses whether to prevent or advance to the next period. Preventing leads to the same pre-shift war absorbing state, while advancing locks in the offered division for the period and transitions the game into the post-shift state of the world.

Likewise, the post-shift state of the world is nearly identical to the original model. Here, D still offers $x_t \in [0,1]$. R now just accepts or rejects. Accepting locks in the payoff pair x_t and $1-x_t$ for the period and repeats the post-shift state in the next period. Rejecting leads to post-shift war, an absorbing state; R earns $p'_R - c_R$ and D earns $1-p'_R-c_D(t)$, where $c_D(t)$ is the same cost function as the pre-shift state of the world.

To analyze our subject of interest, we assume that $c_D(t) > c_D(t+1)$ for all $t = 1, ..., \bar{t}$ and equal to some strictly positive constant for all $t > \bar{t}$.[4] Intuitively, this means that D's war exhaustion wears away through the first $\bar{t}$ periods and disappears entirely at period $\bar{t}+1$ and forward. In turn, war becomes increasingly attractive for D as time progresses up until a particular point.

Note that nothing in the model strictly ties the interpretation to war exhaustion. Indeed, the model generally speaks to any situation in which preventive war becomes exogenously more attractive for the declining state over time. And later in this chapter, we will consider an alternative interpretation in the case study about the Soviet Union.

[4]One may wonder how the interaction would work if war exhaustion wore off non-deterministically. The next chapter provides the solution, though in the context of black market arms dealers.

5.2.2 Equilibria

Since this is a dynamic game of complete information, we still search for stationary Markov perfect equilibria. Here, the states of the world are the product of an indicator function for the pre-shift/post-shift state and a cost of war $c_D(t)$.

First, to find optimal strategies in pre-shift states of the world, we must know how the states will behave in post-shift states. As Lemma 5.1 asserts, play is identical here despite the introduction of war exhaustion:

Lemma 5.1. *Regardless of D's war exhaustion, if R builds and D does not prevent, D offers $x_t = p'_R - c_R$ in every post-shift period and R accepts in every stationary MPE.*

This chapter's appendix contains the proof. Intuitively, due to war's inefficiency, D prefers making an acceptable offer. Note that $\text{D}x_t = p'_R - c_R$ ensures that D receives the entire surplus regardless of its current cost of war. Consequently, D cannot improve its outcome, and thus this is an equilibrium.

We may now analyze the game as a whole. To avoid triviality, we make two important assumptions:

Assumption 5.1. *(Changing Credibility of Preventive War) There exists a period $t^* \geq 2$ such that $p'_R > p_R + \frac{c_D(t)+c_R}{\delta}$ for all $t \geq t^*$ and $p'_R < p_R + \frac{c_D(t)+c_R}{\delta}$ for all $t < t^*$.*

The rationale is that all other cases are uninteresting, follow straight from propositions found in Chapter 2, and render D's changing war exhaustion inconsequential. If no such critical period t^* existed, then either D's threat to prevent would be credible throughout the interaction or D's threat to prevent would be incredible throughout the interaction. In the first case, we would refer to Proposition 2.1 for equilibrium strategies; in the second case, we would refer to the remainder of Chapter 2's propositions. Either way, war exhaustion has no substantive impact on the game's outcomes. Thus, we restrict our attention to the middle cases described in the assumption.

Note that t^* simply represents the first period in which D can credibly threaten preventive war. Thus, it must be that $t^* \geq 2$; if $t^* = 1$, then D can always credibly threaten preventive war.

Assumption 5.2. *(Rapid Changes to War Exhaustion) In period $t^* - 1$, preventive war is sufficiently attractive; that is, $c_D(t^* - 1) > 1 - p_R - \delta(1 - p'_R + c_R)$.*

This assumption is critical to generating the results below. If war exhaustion fades away slowly, it becomes possible (though not certain) that D could credibly buy off R during the waning days of its war exhaustion by offering so much that R would have to accept under the threat of preventive war. Under these conditions, the flow of goods can satisfy D since it allows D to steal the surplus from R not building.

In interpreting the substantive meaning, the assumption is analogous to what we know about preventive war: large, rapid, exogenous shifts in power create a commitment problem (Powell 1999, 115-148; Powell 2006). The difference is that the model here requires large, rapid shifts in D's cost of preventive war for the commitment problem to surface.

We are now ready for the the propositions.

Proposition 5.1. *(Identical to Proposition 2.2.) If* $p'_R - p_R < \frac{k(1-\delta)}{\delta}$*, D offers* $x_t = p_R - c_R$ *in every pre-shift period in the unique stationary MPE. R accepts these offers and never builds.*

Despite the addition of war exhaustion to the model, the substantive result remains the same when the cost of weapons is too great. This result should be unsurprising. Proposition 2.2's underlying logic was that the rising state considered the extent of the power shift to be "too cold" to be worthwhile. Note that the rising state's preference here is independent of the declining state's decision to prevent. Indeed, regardless of whether the declining state responds with preventive war, the rising state would still rather accept no concessions when $p'_R - p_R < \frac{k(1-\delta)}{\delta}$.

We omit the proof since the proof for Proposition 2.2 provides sufficient intuition. The only difference in actions occurs off the equilibrium path. Under Proposition 5.1, there exists a critical period after which D still prevents if R builds in the pre-shift state of the world. However, D does not prevent if R builds before that critical period. Even so, R best responds to an offer $x_t = p_R - c_R$ by accepting because building is not worth the cost. This gives D the entire surplus, ensuring that D has no profitable deviation.

Moving forward, we make a few additional assumptions about the parameter spaces similar to the ones we made in Chapter 2. First, we assume that $k > \delta(p'_R - c_R)$; this is the value for k which ensures that D prefers engaging in butter-for-bombs agreements to taking as much as it can upfront and allowing R to shift power. Second, we also fix k such that $k \in (\frac{\delta(p'_R - p_R - c_D - c_R)}{1-\delta}, \frac{\delta p'_R - p_R}{1-\delta} + c_R)$. As in Chapter 2, these parameters ensure

that R prefers accepting 0 and successfully building to war in any pre-shift period and D prefers making minimalist butter-for-bombs offers during the pre-shift periods to fighting a war at any of those points.

We are ready to prove the existence of the commitment problem:

Proposition 5.2. *If $p'_R - p_R > \frac{k(1-\delta)}{\delta}$ and the above assumptions hold, R builds and D does not prevent in every stationary MPE regardless of the value of $\bar{t}$.*

The intuition reflects the credible commitment problem described in this chapter's introduction. At a critical period, R understands that it will receive no concessions in the future if it does not build and it will receive great concessions if it does. Because $p'_R - p_R > \frac{k(1-\delta)}{\delta}$, the difference in payoffs makes the investment worthwhile. D cannot credibly commit to buy off R, and so building occurs in equilibrium.

This chapter's appendix covers the formal proof. The sketch is straightforward, however, and involves three steps: (1) show that R earns more by entering the non-exhausted state in the post-shift state than it does from entering in the pre-shift state, (2) show that R optimally builds in the critical period $t^* - 1$ if it has not already, and (3) show that war does not occur before or during $t^* - 1$. These three steps are sufficient to demonstrate that successful investment always occurs in equilibrium.

Step (1) holds from Assumption 5.1. If R reaches period t^*, its cost of war $c_D(t^*)$ ensures that D has a credible threat to prevent should R build. This threat continues to hold in all subsequent periods. In turn, D offers R no concessions (or $x_t = p_R - c_R$) and R accepts. On the other hand, if R enters period t^* in the post-shift state of the world, D offers R its improved reservation value for war ($x_t = p'_R - c_R$) and R accepts in all subsequent periods.

Step (2) follows from holding the extent of the power shift such that $p'_R - p_R > \frac{k(1-\delta)}{\delta}$. In period $t^* - 1$, if the states are still in the pre-shift state of the world, R earns $(1-\delta)x_{t^*-1} + \delta(p'_R - c_R) - (1-\delta)k$ for building (assuming D does not prevent) and $(1-\delta)x_{t^*-1} + \delta(p_R - c_R)$ for accepting. Since $(1-\delta)x_{t^*-1}$ appears in both payoffs, the size of D's offer in period t^*-1 is irrelevant to R's decision, so D cannot possibly bribe R with concessions upfront. In turn, R builds if:

$$(1-\delta)x_{t^*-1} + \delta(p'_R - c_R) - (1-\delta)k > (1-\delta)x_{t^*-1} + \delta(p_R - c_R)$$

$$p'_R - p_R > \frac{k(1-\delta)}{\delta}$$

This holds for Proposition 5.2, so R builds in period $t^* - 1$ if the game is in the pre-shift state of the world.[5]

Step (3) ensures that building occurs at some point on the equilibrium path of play. We can show this by demonstrating that war does not occur before $t^* - 1$. But R benefits more from building than rejecting an offer, and D never puts itself in a situation where it prevents in equilibrium, since this destroys the entire surplus. So building must occur.

Before moving to a numerical example, a couple of remarks about the model are in order. First, note that D cannot buy off R at period t^*. To see why, note that when R chooses whether to build or not, the size of today's offer is irrelevant–R will earn that amount for the period regardless of its decision to shift power.[6] As a result, R must base its investment decision purely on difference in payoffs in future periods. Thus, if the future gains from bargaining more than cover the cost, R must invest. If not, then R is in the parameters for Proposition 5.1 and therefore would not have built even in original model from Chapter 2.

Second, note that this prevents D from buying R's compliance forever by offering deep concessions upfront, since both sides can look down the game tree and see that bargaining will eventually break down. Thus, the inevitability of the closing window prohibits efficient outcomes, even if t^* is quite large. Indeed, the value of t^* is irrelevant to whether proliferation occurs in equilibrium. In this light, t^* merely indicates when the commitment problem comes into focus.

5.2.3 Numerical Example

To illustrate why bargaining breaks down due to war exhaustion, consider the following numerical example. For simplicity, suppose war exhaustion lasts exactly one period. Thus, we set $c_D(1) = .3$ and $c_D(t) = .1$ for all $t \geq 2$. Let the baseline parameters be the same as in the numerical example from Chapter 2, or $p_R = .2$, $p'_R = .5$, $c_R = .1$, $\delta = .9$, and $k = 1$.

[5]Note that even if we allowed for quid-pro-quo bargaining so that D could tie concessions today to non-investment, investment would still occur in equilibrium for sufficiently large δ.

[6]This assumes that D will not prevent if R builds, which indeed must true on the equilibrium path of play.

Suppose the states reach period 2 in the pre-shift state of the world. If D offers $x_t = p_R - c_R = .1$ and R builds, D earns $1 - p_R - c_D = 1 - .2 - .1 = .7$ for preventing and $(1-\delta)(1-x_t)+\delta(1-p'_R+c_R) = (1-.9)(1-.1)+.9(1-.5+.1) = .63$ for advancing to the post-shift state. Therefore, D prevents if R builds after receiving no concessions. In turn, R accepts if D offers $x_t = p_R - c_R = .1$. These payoffs remain the same for all future periods.

Now consider how this endgame affects bargaining during the exhausted pre-shift state of the world. Exhaustion only lasts for the first period. Therefore, the most R can receive as a bribe is $(1 - \delta)(1) = .1$. If R accepts this bribe, it earns .1 for the exhausted state and $\delta(p_R - c_R) = .9(.2 - .1) = .09$ for all non-exhausted periods, for a total of .19. In contrast, R could build in response, receive $(1 - \delta)(1) = .1$ for the exhausted period, $\delta(p'_R - c_R) = .9(.5 - .1) = .36$ in total for all non-exhausted periods, and pay a cost $(1 - \delta)k = (1 - .9)1 = .1$ as an investment. In sum, R earns .36 for this outcome. D will not prevent, as $1 - p_R - c'_D = 1 - .2 - .3 = .5$ is less than receiving nothing for the exhausted state and $\delta(1 - p'_R + c_R) = .9(1 - .5 + .1) = .54$ in total for all non-exhausted periods.

However, this causes D to lower its exhausted pre-shift offer to $x_t = 0$. Accepting is not optimal, since R earns more from war. But building and earning $\delta(p'_R - c_R) - (1 - \delta)k = .9(.5 - .1) - (1 - .9)1 = .26$ is better than rejecting and earning $p_R - c_R = .2 - .1 = .1$, so R builds. D is already offering R nothing in the exhausted period, so D cannot improve its payoff. As such, D offers $x_t = 0$ in the exhausted period, and R builds. In the post-shift periods, D offers $x_t = p'_R - c_R = .5 - .1 = .4$ and R accepts.

Before advancing to the analysis section, it is worth comparing the results from the war exhaustion model to Chapter 2's original model. First, regardless of war exhaustion, the the primary determinant of the outcome is the cost of proliferation relative to its benefit. Regardless of the presence of a commitment problem, if the rising state never finds nuclear weapons worth the investment, the states will never have to worry about bargaining over proliferation. Second, preventive war now only deters the rising state from proliferating in the most extreme of circumstances that Assumption 5.1 covers. For more moderate shifts of power, the rising state proliferates before the declining state recovers from war exhaustion. The commitment problem kicks in here, as the declining state would like to promise the rising state concessions into the future but cannot make such a commitment credible. Lastly, butter-for-bombs settlements remain possible even as the declining state's cost of preventive war changes. However, for those settlements to be

credible, the extent of the power shift must again fall outside of Assumption 5.1's parameters.

5.3 Illustrating the Mechanism: Iran Today and the Origins of the Cold War

To illustrate how war exhaustion sabotages butter-for-bombs bargains, this section looks at two case studies. First, we analyze Iranian intransigence in the wake of American wars in Afghanistan and Iraq. The Soviet decision to proliferate, often considered trivial given the nature of Cold War tensions, also highlights the importance of changing preventive war dynamics in explaining the spread of nuclear weapons. We then investigate how war exhaustion argument applies more broadly to instability of domestic leadership preferences.

As we analyze the case studies, we trace the causal mechanism of the model. In particular, we must show that the following three conditions hold: (1) the declining state (the United States) would prefer buying off the rising state than allow the rising state to proliferate, (2) the declining state's cost of preventive war decreases as a function of time, and (3) the rising state believes it will receive fewer concessions at a later date without nuclear weapons. These conditions lead to the commitment problem described in the previous section.

5.3.1 Iran

December of 2003 was a strategic and diplomatic high point for the United States. Earlier in the year, the American-led invasion of Iraq was a resounding success, eliminating a perceived security threat from the international community. On December 13, American special forces captured Saddam Hussein, who had been hiding in a spider hole. Six days later, Muammar Gaddafi announced that Libya would adhere to the Nuclear Non-Proliferation Treaty, which it had signed in 1968. Soon thereafter, Libya also signed the Chemical Weapons Convention and generally pledged to end all weapons programs that drew the ire of the West.

Proponents of the Iraq War quickly drew a causal connection from Iraq to Libya. The United States had set a clear precedent: weapons of mass destruction programs would not be tolerated. Moreover, with the resoundingly

successful invasion of Iraq, the U.S. had credibly demonstrated its capabilities and resolve.

Less publicly, Iran also took notice.[7] The 1979 Iranian Revolution had frozen diplomatic relations between the United States and Iran. The terrorist attacks on September 11, 2001 and sudden American interest in Afghanistan acted as an exogenous shock to the relationship. Whereas the United States originally supported the Taliban's rise to power in the mid-1990s, Iran had provided active assistance to anti-Taliban groups from the beginning. September 11 opened the door for American-Iranian cooperation, even if as merely a marriage of convenience. Indeed, although NATO did the heavy lifting during the invasion of Afghanistan, most of the coalition was in fact Iran's preexisting alliance (Parsi 2012), which the U.S. had joined with Iran's permission. After the successful invasion, American and Iranian diplomats met quietly to discuss the future of Afghanistan. The results were positive. Yet, as the ice appeared to thaw, President George W. Bush's declaration soon thereafter that Iran was part of an "axis of evil" sent diplomatic relations back to square one.[8]

After the Iranian Revolution, the United States completely removed its formal diplomatic presence in Tehran. That remained the status quo in 2003, with the U.S. instead deferring its interests to the Swedish attache. But America's increasingly aggressive (and successful) foreign policy concerned the Iranian leadership. Wanting to stay proactive and test the waters after the axis of evil comment, the regime dispatched Tim Guldimann, Swedish ambassador to Iran, to Washington D.C. on May 4, 2003. Ambassador Guldimann held a document that shocked the Bush administration: a "roadmap" for normalizing relations.[9] Iran was willing to negotiate *everything*, including weapons of mass destruction, dismantling al-Qaeda, recognition of Israel, and support of Hezbollah, Hamas, and Islamic Jihad were

[7]Two related works by Parsi (2007, 243-257; 2012, 1-8) provide a useful background of American/Iranian diplomacy in the immediate aftermath of the Iraq War.

[8]Ironically, many in Iran had hoped the Republicans would win the 2000 U.S. presidential election, under the theory that the relationship had historically been worse with Democrats. This led to a missed opportunity to resolve the conflict during President Bill Clinton's waning years, as Clinton had been open to talks with Iran (Ansari 2006, 176-178).

[9]Given the domestic political rivalry between the United States and Iran, the fact that the states conducted negotiations in secret should not be surprising. However, the original document has since been leaked and can be found at http://www.washingtonpost.com/wp-srv/world/documents/us_iran_1roadmap.pdf

all up for discussion. Tehran's demands in return were minimal: normalized diplomatic relations and a prisoner swap of anti-Iranian forces held in Iraq for al-Qaeda officials held in Iran.

There are many reasons to believe that the message was sincere. Mouhammad Khatami, a moderate, was president at the time. Khatami had pushed for better relations with the United States since he came into office in 1997, and his party drafted the message. But perhaps more importantly, Supreme Leader Ayatollah Ali Khamenei signed off on it. At the time, Iran did not appear intransigent; the Bush administration had burned the bridge in 2002, not Iran. Ambassador Guldimann believed the offer was sincere, writing in proposal that he received the "impression that there is a strong will of the regime to tackle the problem with the U.S. now and to try it with this initiative." And, in deciding on how to ultimately respond to the message, concerns about insincerity were not pivotal.

Yet, officials from the Bush administration did not rebuff Iran's outreach–they simply ignored it. The United States was at its height of geopolitical power in the war on terror at the time. Just two days earlier, Bush had declared "mission accomplished" in Iraq in the now-infamous speech on the U.S.S. Abraham Lincoln. Officials reasoned that further force could lead to the same sort of concessions without having to acknowledge the Iranian regime. So the Bush administration admonished the Swedish ambassador for even engaging in the affair, ostensibly for exceeding his role as intermediary. Iran was stunned.

Six years later, America's mistake was evident. In 2003, the U.S. surrounded Iran with troops on the eastern border in Afghanistan and troops on the western border in Iraq. But by 2008, the long insurgency and civil war in Iraq had deteriorated America's appetite for war. Optimism about the fate of Afghanistan had similarly waned.

Iran's political position–both domestically and internationally–had taken a turn for the worse as well. Five months after the May 2003 fiasco, the United Kingdom, France, and Germany convinced Iran to sign the Paris Agreement, which extended the NPT's Additional Protocol to Iran. But as the United States faced mounting casualties in Iraq, the house of cards soon fell. Iran reopened its centrifuges for uranium enrichment in 2004.

On the domestic front, moderate elements of the Iranian regime paid a heavy cost for championing the failed overture to Bush. On June 24, 2005, Mahmound Ahmadinejad won a landslide victory in the Iranian presidential election after the Guardian Council banned some reformist candidates from

Timeline of Important Events in Recent U.S./Iran Relations

9/2001	Iran assists in planning invasion of Afghanistan
1/29/2002	George W. Bush declares Iran a part of the "axis of evil"
3/20/2003	Invasion of Iraq begins
5/2/2003	Bush declares "mission accomplished" in Iraq
5/4/2003	Iran dispatches Swedish ambassador to Washington
8/2003	Insurgency in Iraq begins; Jordanian embassy and U.N. headquarters bombed
10/21/2003	Iran signs the Paris Agreement
12/13/2003	Saddam Hussein captured near Tikrit
12/19/2003	Libya ends nuclear weapons program
6/24/2005	Mahmound Ahmadinejad elected President of Iran
8//8/2005	United Kingdom declares violation of Paris Agreement
1/10/2007	Bush announces "the surge" in Iraq
11/4/2008	Barack Obama elected President of the United States
3/20/2009	Obama releases Nowruz greeting
3/22/2009	Ayatollah Khamenei responds to Nowruz greeting

the ballot. This began a string of diplomatic failures (Solingen 2012, 35). Subsequent outreach from all five permanent members of the United Nations Security Council (including quiet action from the reluctant United States), which included entry into the World Trade Organization, all went unheeded. And the Iranian nuclear weapons program–an afterthought during the lead-up to the Iraq War–started making serious headway toward a functioning bomb. The Obama administration has tried restarting negotiations with Iran, but American peace feelers has mostly fallen on deaf ears–just as Iran's did in 2003.

Why did Iran's posture changed so greatly over the course of six years? A trivial explanation notes how the United States' strength faltered with the quagmires in Iraq and Afghanistan. Preventive war against Iran was a reasonable threat in 2003; following mounting U.S. losses abroad, it became a stretch. Thus, Iran has become increasingly obstinate as the United States' threat to intervene has diminished.

However, the baseline model from Chapter 2 shows such an argument fails to address the inefficiency puzzle of costly weapons. Even if Iran could credibly threaten to develop weapons today, it should not want to if the cost of proliferation is significant. Instead, the United States, as the declining

power, should induce Iranian compliance by offering significant concessions immediately. Iran should then accept these concessions, as the additional concessions it would receive by proliferating would not cover the cost of nuclear weapons. Although these concessions might not be as significant as what Iran was willing to give up in 2003, they should still be enough to appease Tehran.

Indeed, the United States has triumphed proactive diplomacy. President Barack Obama's electoral victory in November 2008 set the stage, and the new president wasted little time to begin rapprochement. On March 20, 2009, the White House released a Nowruz greeting to celebrate the Persian New Year. The action was remarkable for a number of reasons: the video appeared without warning on YouTube so Iranian civilians could hear the uncensored message; portions addressed the Iranian regime directly; the original video contained Farsi subtitles; and Obama referred to Iran as *Islamic Republic of Iran*, Iran's official title and a moniker that Bush had not used.

Substantively, the message appeared to be an olive branch. Obama complemented Iranian culture throughout and did not engage in any saber-rattling. Instead, he adopted to promote "mutual respect" and extended an invitation for Iran to join the international community:

> *The United States wants the Islamic Republic of Iran to take its rightful place in the community of nations. You have that right– but it comes with real responsibilities, and that place cannot be reached through terror or arms, but rather through peaceful actions that demonstrate the true greatness of the Iranian people and civilization. And the measure of that greatness is not the capacity to destroy, it is your demonstrated ability to build and create.*

Obama ended by offering "renewed exchanges" between the two countries and "greater opportunities for partnership and commerce." This signaled a complete reversal from the Bush administration's policies.

The manner of Iran's response was equally surprising. Iranian President Mahmoud Ahmadinejad initially remained silent on the issue. Rather, Khamenei appeared as the voice of Iran two days later. His message was measured and skeptical. Change was the theme of the speech:

> *Where is the change? What has changed? Clarify this to us. What changed? Has your enmity toward the Iranian nation changed?*

> *What signs are there to support this? ... They talk of change, but there are no changes in actions. We have not seen any changes. If you tell the truth, and there are changes, where are these changes? Why can we see nothing? I would like to say this to everyone. U.S. officials should also know that the Iranian nation cannot be fooled, or scared.*
>
> *Changes in words are not adequate; although we have not seen much of a change there either. Change must be real. I would like to say this to U.S. officials, that this change that you talk about is a real necessity; you have no other choice, you must change.... You must change, but this change cannot be in words only. It should not come with unhealthy intentions. You may say that you want to change policies, but not your aims, that you will change tactics. This is not change. This is deceit.*[10]

Other than the change in administrations, Khamenei was correct. Although geopolitical conditions had changed since Iran's initial peace offering to the Bush administration in 2003, the underlying conditions for discord had not: the Iranian ideal point and the American ideal point were just as distant in 2009 as they were in 2003. Obama's change in tactics merely reflected the United States' vulnerable position. The new American president rode to electoral campaign focused on fixing the floundering economy and resolving the ongoing wars in Afghanistan and Iraq. Political support for yet another war was not apparent.

Even so, why didn't Iran accept the temporary truce with open arms? The threat of *future* preventive war provides the answer. Looking to the past, Israel has had remarkable success stopping previous would-be proliferators. In 1981, Operation Opera permanently paralyzed the Iraqi nuclear program, as a fleet of Israeli bombers laid waste to the Iraq's reactor in Osirak. Sixteen years later, Operation Orchard saw similar success, as another crew of bombers disabled Syria's nascent nuclear activities. In both cases, Israel fully completed its objectives and suffered no casualties.

In contrast, preventive war against Iran would not come so easy. The Iraqi and Syrian reactors had been left out in the open. Learning from

[10]For a transcript of Khamenei's speech, see http://www.juancole.com/2009/03/osc-khameneis-speech-replying-to-obama.html. Parsi (2012, 62-68) details Obama's Nowruz greeting and Khamenei's subsequent response.

the past, Iran wisely placed its nuclear experiments in secure bunkers.[11] An Israeli-style assault would be unable to conclusively end the Iranian program. Indeed, a "successful" assault might only block the facilities' entrances, and Iran would assuredly retaliate by proxy through Hezbollah and Hamas.[12] As a result, true preventive war would require some sort of ground campaign and would therefore be exponentially more costly.

Due to these obstacles, Israel has looked to the United States for direct military intervention. But the scars from Afghanistan and Iraq have left the American public wary of further war. Moreover, a third war in that region of the world would only further fuel Islamic moderates' suspicions that the United States has a general animosity toward Muslims. Put simply, the United States could not credibly threaten preventive war against Iran.

In turn, Khamenei concluded that the American olive branch and American war weariness would have identical life spans. War exhaustion from Afghanistan and Iraq gave Iran a now-or-never window of opportunity. Iran understood that it could proliferate unimpeded while the United States suffered from war exhaustion. Even after the U.S. recovered, future American presidents would have to give Iran a longer leash or risk confronting a nuclear power in the Middle East.

Iran's alternative was far riskier. While Obama's peace offering might have lasted a few years, Khamenei had to wonder how future interactions with the U.S. would play out once Americans were more prepared to fight another war. The proliferation option would have certainly gone off the table, and the U.S. would have likely pursued a strongarm approach similar to the Bush administration in 2003.

Consequently, Iran and the United States found themselves in the situation the model of war exhaustion describes. If the United States could credibly commit to maintaining warm relations with Iran well into the future, bargaining would run smoothly today. However, Iran must worry that

[11]Iran had first-hand knowledge of preventive assaults. At the beginning of the Iran-Iraq War, the Iranian air force tried and failed to destroy the Osirak reactor. Iranian intelligence may have supplied Israel with photographs of Osirak prior to Israel's successful strike less than a year later and offered the Israeli pilots safe harbor in case something went wrong (Sick 1991, 207; Parsi 2007, 107).

[12]Consequently, attempts to delay Iran's proliferation aspirations have been through other means. Four Iranian nuclear scientists have been assassinated, likely by Mossad. The Stuxnet virus–probably a collaboration between Israel and the United States–directly targeted and disabled Iranian uranium enrichment computers. See Reiter 2005 for an argument on how such attempts could merely entrench nuclear aspirations.

the United States will want to renegotiate the terms once the American populace becomes less weary of another war in the Middle East. As such, Iran logically behaves intransigent today and continues on its nuclear path even as Obama offers everything that Iran sought in 2003.

Popular alternative theories to that try to explain Iran's intransigence are questionable in this light. To begin, some treat Iran as an automaton hellbent on proliferation. Thus, no negotiations can take place between the United States and Iran. But this is clearly an inaccurate interpretation of the conflict between the two parties; if Iran were hellbent on proliferating for the sake of proliferating, Tehran would not have attempted its outreach in 2003.[13] Perhaps Iran became hellbent on proliferating after Bush ignored the olive branch. But if so, we must still explain why Obama's attempt at reconciliation failed. The presence of the commitment problem provides a causal mechanism.

Regional political aspirations offer no better explanation. If Iran believed nuclear weapons were critical to obtaining regional hegemony, the basic model in Chapter 2 indicates that Iran could obtain those types of concessions without the use of force and leave all parties better off. Perhaps Iraq's temporary enfeeblement presented Iran with a window of opportunity to secure nuclear weapons before a new Iraqi regime could mount resistance. But this is essentially an appeal to the war exhaustion, with Iraq replacing the United States as the declining state.[14] Thus, the theory still holds and accounts for the timing of Iran's nuclear ambitions.

Another explanation appeals to selectorate theory.[15] The media often portray Iran's ruling coalition as vehemently anti-American. Indeed, the audience of Khamenei's response to Obama's Nowruz message twice interrupted the Ayatollah with "death to America" chants. Conventional wisdom in turn suggests that Iran's refusal to join the "community of nations" falls back on domestic politics–Khamenei cannot back off of his policy position without losing control of the government, and therefore geopolitical inefficiency per-

[13]Of course, the war exhaustion mechanism also fails to explain the May 2003 letter. However, unlike many competing explanations, it is agnostic in this regard.

[14]Of course, Iraq's enfeeblement dates back to the end of the Persian Gulf War. This is consistent with the war exhaustion story, as Saddam Hussein did not face a clear path to military recovery from 1991 to 2003. The states do not face the commitment problem until the declining state becomes more capable of intervening.

[15]On selectorate theory, see Bueno de Mesquita et. al. 2004. Takeyh (2006) provides an overview of Iranian political factions.

sists.

The anti-American selectorate argument is questionable for three reasons. First, and most prominently, it also fails to explain why Iran was willing to negotiate in 2003 but then suddenly stopped sometime thereafter. If a deal with the United States would have decapitated the Iranian regime in 2003, Tehran certainly not have gone out of its way to reach a deal with President Bush. Anti-American rhetoric in the interim years did not increase noticeably beyond the twenty-year mean, so it is not as though Khamenei became further entrenched in his position. If anything, the domestic political climate in Iran has shifted to a more moderate point following the 2009 Iranian presidential election and the subsequent green revolution.

Second, a butter-for-bombs style agreement between the United States and Iran would be consistent with official Iranian policy. Even as nuclear scientists in Iran have moved forward with the proliferation process, the Iranian government has continuously insisted that it is developing peaceful nuclear technology in accordance with Article V of the NPT. To wit, Khamenei declared that nuclear weapons ran contrary to Islamic principles in a fatwa from August 2005.[16] In this light, successful proliferation would require the Iranian regime to flip-flop on stated policy. We should think of non-proliferation as domestic the status quo, not the other way around.

Third, even if the winning coalition of the current regime believes that Iran is currently seeking a nuclear weapon and accepts this as being reasonable policy, Khamenei could always sell a diplomatic reversal as a victory for Iran. Successful proliferation still leaves Iran at odds with the United States. But if Khamenei secured concessions from the U.S., he could then claim complete victory in the diplomatic showdown–the United States backed down *because* of Tehran's cunning bargaining tactics. Achieving endgame goals through a sharp tongue and prudent threats appears to be a much better signal of foreign policy competence than coercing the U.S. with an extremely expensive bomb into conceding virtually the same result. Thus, if the Iranian regime worried about appeasing domestic audiences, we would expect Iran to enter talks with the United States. Yet, intransigence persists.

A final alternative explanation suggests that Khamenei seeks nuclear weapons as a form of regime insurance. The United States would be hard-pressed to assist in overthrowing the Iranian regime if doing so risked a nuclear reprisal. Such a threat is real. Both domestic and international chal-

[16]See Kartal and Ohls for a model of costly signaling that analyzes Khamenei's fatwa.

lengers could plausibly threaten Iran's current ruling coalition. Moreover, the U.S. came to a tacit understanding with Gaddafi at the end of 2003 and the beginning of 2004 but abandoned him in favor of the National Transition Council during the 2011 civil war. Presumably, the United States would abandon a butter-for-bombs agreement if a viable and West-friendly resistance movement began. Nuclear weapons, in theory, could mitigate American meddling.

However, this dynamic is equivalent to a power shift as Chapter 2 originally modeled it. That is, the rising state (Iran) receives a better outcome than the declining state (the U.S.) if the rising state has nuclear weapons. Indeed, the only requirements for the original butter-for-bombs result to hold is that bargaining is constant sum and that nuclear weapons improve the proliferator's bargaining position. Given that a revolution could suddenly spring up and be good for the United States but bad for Iran, those above assumptions hold. In effect, the model implicitly accounts for "regime assurance" by increasing the value of p'_R so that p'_R includes gains from direct coercive bargaining and a more stable regime. Recall that when states reach butter-for-bombs agreements, the rising state receives $p'_R - c_R - \frac{k(1-\delta)}{\delta}$, which is increasing in p'_R. So if nuclear weapons provide regime assurances, this implies that the U.S. ought to be willing to offer even more attractive concessions upfront so as to mitigate its inability to credibly commit to not support the rebelion. And, again, Khamenei could then turn around and use those concessions to buy off further domestic support and avoid a messy revolution entirely.

Finally, if Iran is seeking to proliferate solely to improve its security vis-a-vis the United States, we run into the problem of a self-fulfilling prophecy. If the relationship between the United States and Iran is purely based on distrust, then proliferating is a poor solution to the problem. That is, if the United States is actually the conflictual type, proliferation would appear to only exacerbate the conflict and accelerate the United States' decision to go to war. In contrast, if the United States is the cooperative type, then nuclear weapons provide little benefit to Iran but come at a great cost. Without a viable alternative to the Khamenei in place, the United States would have to spend a considerable amount of money and commit a substantial number of troops to secure Iran.[17] Put simply, war with Iran would not come cheap.

[17]For comparison, the logistical problems in Iraq would pale in comparison to the problems in Iran. Iraq is roughly 170,000 square miles; Iran is more than 600,000. Iraq has a

Consequently, it is difficult to see how nuclear weapons provide much relief for Iran against the United States if there is no real conflict between the two states.

The commitment problem described in this chapter once again resolves the discrepancy. Iran was willing to negotiate in 2003 because, despite the possibility that the United States might be conflictual, Iran did not have any better alternatives. The long-term underlying structural factors between 2003 and 2009 did not change. However, the United States was not in a position to threaten Iran in the short-term. As such, anticipating that the U.S. would revert back to being conflictual, Iran ignored Obama's attempt at diplomacy and pursued a long-term solution to its security.

How the situation between the United States and Iran will ultimately end remains uncertain. Israel remains a wild card, and one which this section has largely overlooked. On one hand, Israel is not suffering the same war exhaustion that plagues the United States. On the other hand, a potential Israeli attack must address the same logistical challenge an American attack would–namely, that an Osirak-style assault would only provide a temporary solution. Moreover, the Israeli army is less equipped than the U.S. for a large-scale ground invasion, which partially explains why Israel's leaders have looked to the United States for assistance.

That said, a temporary solution may be sufficiently attractive for Israel. After all, *temporary* American war exhaustion is at the heart of the commitment problem. Israel could consider stalling Iran's nuclear program for long enough to allow the United States to recover. However, it still remains unclear how effective an aerial bombing would be and whether it would be worth suffering retaliation from Hamas and Hezbollah. And note that given the presence of this uncertainty, Iran's nuclear intransigence is rational.[18]

Additionally, the process of building a nuclear weapon itself is uncertain and is not present in the model presented in this chapter. Sanctions also create a similar form of indeterminacy. Nevertheless, the logic of the commitment problem remains apparent even with this added uncertainty. As Iran develops nuclear technology, the time to a deliverable nuclear weapons becomes clearer. Outside observers–just like Iranian intelligence–cannot be sure that Iranian nuclear scientists will be able to finish the program before the United States' war exhaustion wears off. But if Iran believes that

population of about 31 million; Iran's is roughly 75 million.

[18]We consider a model with this type of uncertainty in Chapter 8.

its chances of squeezing through the window of opportunity are sufficiently high, it must take the risk and pursue a nuclear bomb, thereby shunning American diplomacy in the meantime.

5.3.2 The Soviet Union

The Soviet Union became the second member of the world's nuclear club on August 29, 1949. Why the Soviets viewed proliferation as attractive is evident. The United States and Soviet Union had just begun the Cold War, and the race for geopolitical supremacy was on. Nuclear weapons provided the Soviet Union with inherent security and stabilized the communists' grasp over Eastern Europe. Although nuclear technology was far more expensive back then, the investment was reasonable given the issues at stake.

Existing work on the origins of the Cold War focus primarily on whether the United States or Soviet Union actually had reason to be antagonists. Researchers have not arrived at a consensus (Kydd 2005, 80-83). However, Kydd shows that the potential for antagonism can lead to conflictual behavior even if both sides wish to avoid it. While Washington and Moscow successfully avoided war, we cannot outright explain why the Soviet Union proliferated due to the potential for butter-for-bombs agreements.

To that end, research on the Soviet decision to proliferation so far focuses on the United States' decision not to launch preventive war; after all, the U.S. held a nuclear monopoly at the time and could have potentially and forcibly ended the Cold War before the Soviet Union could obtain a nuclear deterrent. Ultimately, the general consensus is that war would have been too costly and ineffective to be worthwhile. Thus, the U.S. stood pat and allowed the nuclear monopoly to become a nuclear duopoly.

Given that preventive war was not a viable option, however, the butter-for-bombs model from Chapter 2 poses a new question: why didn't the United States bargain its way out of the nuclear escalation during the Cold War? That preventive war was too costly to be worthwhile merely tells us that the interaction does not fit the "too hot" parameters of Proposition 2.1; that the weapons were worth the investment merely tells us that the interaction does not fit the "too cold" parameters of Proposition 2.2. Surely, the United States would have preferred offering a butter-for-bombs settlement to forcing the Soviets to proliferate. Instead, bargaining failed, Moscow obtained a nuclear weapon, and hope of resolving Cold War tensions would be brushed aside until the 1980s.

In this section, we argue that two complementary factors led to the breakdown of bargaining; both fit the causal mechanism this chapter's model illustrates. First, American and British war exhaustion made immediate preventive war against the Soviet Union an impossibility in the short term but not the long term. Second, as Western intelligence penetrated the Soviet Union, the material cost of preventive war was diminishing over time. Combined, these factors kept the United States from credibly committing to concessions over the long term, which in turn forced the Soviet Union to proliferate while of opportunity remained open.

The Berlin Blockade and subsequent Berlin Airlift provide the ideal illustration of American war exhaustion around the time of Soviet proliferation. At the end of World War II, the allies divided Germany into four occupation zones. Although Berlin fell squarely in the Soviet sector, Western allies shared the western half of the city. West Berlin relied on imports for its basic food and energy needs.

However, in dividing Germany, the U.S. failed to secure land access to Berlin through the Soviet zone; the U.S. would try to rectify this one month after victory in Europe, but the Soviets limited the West to a single rail line (Miller 2000, 6-7). But the Soviet Union soon cut that off, too. Wanting to unify city, the Soviets blockaded West Berlin beginning June 24, 1948. Without shipments of basic necessities from the east or the west, the Soviet Union aimed to starve West Berlin into submission within a matter of weeks.

Decision-makers in Washington lamented the seemingly unwinnable situation. Withdrawal was unacceptable. The chances of negotiation a solution with Moscow appeared slim, given that the Soviet Union began the crisis in the first place. Moreover, Western propaganda partially tied American and British hands, as elites had expressed sympathy for Russians and touted Stalin's trustworthiness throughout during World War II.[19] While not insurmountable, this created a stumbling block for accelerated war against the Soviet Union.

Yet, if ever there was a time to challenge the Soviets militarily, this was it. The United States held a nuclear monopoly at the time; the first successful Soviet test was still more than a year away. Moreover, the blockade represented a direct violation of the occupation agreement. A military con-

[19]See Gaddis 1972 (32-62) for the evolution of America's perception of the Soviets from 1941 to 1944. Churchill, in particular, once commented that by trusting Stalin he was not making the same mistake Chamberlain made in trusting Hitler (Yergin 1977, 65).

frontation was justifiable, and Moscow would have been hard-pressed to push the issue past Berlin given the shadow of the American nuclear arsenal. The Soviet Union held the tactical advantage on the ground at the time, outnumbering allied soldiers in Berlin 18,000 to 6,500 with an additional 300,000 in near proximity (Tusa and Tusa 1988, 173). However, to some extent, this was a residual from World War II. Whereas the Red Army had fought mostly against Nazi Germany, the United States fought a two-theater war. Thus, the U.S. could have resolved the power asymmetry by simply redeploying its troops.

But the United States could not expect help from the United Kingdom. Winston Churchill, British political hero of World War II, expounded the virtues of preventive war against the Soviet Union (Quester 2000, 47-48).[20] However, the Labour party defeated the Conservatives in the 1945 Parliamentary election, after victory in Europe but before victory in Japan. Churchill had to settle in as leader of the opposition. Despite his successes during the war, British civilians had lost their appetite for conflict and believed Clement Attlee's Labour party would better implement domestic reforms (Jenkins 2001, 789-794; Berinsky 2009, 201).

Ultimately, President Harry Truman ordered a massive airlift, the most conservative option available. Washington did not believe the airlift would have any substantive effect on the political situation; to wit, when a reporter asked Lucius Clay, governor of American-occupied Germany, whether an airlift could sustain West Berlin, Clay responded "absolutely not."[21] Rather, the airlift represented a lack of viable alternatives at the time. In the end, U.S. policy aimed to minimize the chances of war–accidental or deliberate–at all costs (Tusa and Tusa 1988, 173-174; Harrington 2012, 86). Delivering essential supplies through the air would keep West Berlin running and stall for time.

In hindsight, though, the decision was brilliant. West Berlin survived for

[20] At the end of the war in Europe, Churchill commissioned a contingency plan, entitled *Operation Unthinkable*, which called for a surprise attack on the Soviets on July 1, 1945. Advisors ultimately scrapped the idea as infeasible; the best Britain could hope for was fleeting change in Poland, as an invasion of Russia would have been prohibitively difficult for the reasons outlined below. Still, when collecting German arms, Churchill required British troops organize the weapons in a manner such that they could easily be redistributed to the Germans, in case Britain needed German soldiers for the offensive. See Reynolds 2006 (249-251).

[21] Quoted in Harrington 2012 (101). See Harrington (99-118) for an overview of American pessimism.

more than ten months thanks to the non-stop deliveries. Moscow eventually lifted the blockade on May 12, 1949. The result was a propaganda coup for the United States and a devastating loss for the Soviet Union, as the blockade entrenched West Germans against the communist regime. Nevertheless, at the time, the Airlift was a shot in the dark, a second-best option given that war exhaustion mandated a peaceful outcome.

As reluctant as the United States was to engage over the Berlin Blockade, the cost to halt the Soviet nuclear weapons program would have been exponentially larger. Poor intelligence was a major factor.[22] Indeed, it is hard to imagine the United States in a worse position than it was in 1946. During World War II, the United States focused its intelligence efforts on Nazi Germany and Japan. This left an embarrassing gap at the end of the war:

> [T]he Workers' Paradise was "denied territory" in intelligence parlance: there were *zero* American ground agents in the Soviet Union. In 1949 the CIA began a five-year program to recruit and train former Soviet citizens to be air-dropped back on Soviet territory to serve as informants. Almost all of them were arrested immediately and unceremoniously shot. (Gordin 2009, 82)

Making matters worse, U.S. intelligence was undergoing a bureaucratic shuffle at the time, with the Office of Strategic Services being phased out and the Central Intelligence Agency being phased in. Details on the Soviet nuclear program were correspondingly sparse. As policymakers in the United States debated whether to initiate preventive war, estimates of Moscow's nuclear timetable were notoriously vague and pushed the best-guess back to 1953 (Holloway 1994, 220). The United States would eventually obtain strong intelligence from Germany, but the U.S. did not receive this information until 1955, six years too late (Gordin 2009, 83).

Thus, unlike Israel's precision strikes in Iraq and Syria, preventive war against the Soviet Union would have required a full scale invasion. Americans simply had no desire to engage in back-to-back great power wars. Given these constraints, the United States' remaining option was to nuke all of the Soviet Union. But Truman ultimately vetoed this idea as well for moral reasons

[22]See Debs and Monteiro 2012 for a detailed discussion of the intelligence barriers to preventive war.

Timeline of Important Events in U.S./U.S.S.R Nuclear Relations

5/8/1945	Allied victory in Europe
7/5/1945	Winston Churchill's Conservative party defeated
9/2/1945	Allied victory in Japan
9/18/1947	Central Intelligence Agency established
6/24/1948	Berlin Blockade begins
6/28/1948	Berlin Airlift begins
5/12/1949	Berlin Blockade ends
8/29/1949	First successful Soviet atomic test
6/25/1950	Korean War begins
10/25/1951	Churchill's Conservative party retakes majority

(Debs and Monteiro 2013).[23]

So far, we have only seen that preventive war was not an option for the United States in 1949. By itself, this is necessary but insufficient to explain the Soviet's decision to proliferate given that butter-for-bombs agreements should resolve the bargaining problem. However, both sources of American reluctance to prevent were diminishing over time. This placed the United States in the commitment problem described in the model from this chapter, which in turn forced the Soviets to proliferate.

First, American exhaustion from World War II declined as the calendar pushed well beyond 1945.[24] The Korean War began in 1950. America's intervention sent a mixed message. On one hand, the U.S. fought a proxy regime that was much weaker than the Soviet Union. On the other hand, Korea was not an existential threat to the United States and of arguably less value than Berlin. Meanwhile, on the domestic political front, Dwight D. Eisenhower won the 1952 U.S. presidential election. Cold War tensions

[23]There were also practical problems, as the American arsenal at the time was not large enough to destroy such a vast territory. See Debs and Monteiro 2013. And, even if such an arsenal could have been produced, U.S. nuclear bombers were slow. Destroying targets deep in Soviet territory would have been impossible (Harrington 2012, 81).

[24]It is worth noting that the Soviet Union was suffering from war exhaustion at the time as well; the Soviets had suffered roughly twenty times more military casualties than the United States. Indeed, Moscow had no desire to turn the Berlin Blockade into the Berlin War (Harrington 2012, 77-78). However, for the purposes of the commitment problem, Soviet war exhaustion had little impact on the strategic interaction. Proliferating acts as a *fait accompli* to the declining state. It is up to the declining state to launch preventive war to stop it, which the United States was unwilling to do at the time. The rising state maintains an inherent advantage in this regard.

also propelled Churchill back into his seat as Prime Minister, largely due to his foreign policy credentials (Kavakli 2012). In the counterfactual world in which the Soviet Union did not proliferate, perhaps the United States and United Kingdom were not ready for preventive war in the early 1950s, but they were certainly *more* ready than just five years earlier.

Second, the intelligence gap was quickly closing. The CIA firmly established itself within Washington's bureaucracy by the start of Eisenhower's term in office. Although the first round of Soviet espionage ended in absurd failure, future programs would successfully infiltrate the Soviet miliary and intelligence service. And the mid-1950s saw the debut of the U-2 aircraft, capable of providing aerial surveillance of Cold War foes.

With that in mind, consider the counterfactual world of 1960 in which the Soviet Union had not proliferated. The United States would have had crisp intelligence sources informing Washington of Soviet nuclear installations and a clearer timeline to first Soviet atomic bomb. Political will for intervention would have been higher than the immediate aftermath of World War II. Thus, the Soviet Union would have had to reconsider its proliferation plans in the shadow of possible preventive war. At that point, any concessions the United States might have offered earlier would have vanished from the table, and Moscow would have regretted not proliferating in the 1940s. In this light, Soviet proliferation is sensible.

Before moving forward, Chadefaux (2011) makes a related critique worth discussing here. In the basic bargaining model of war (Fearon 1995), an exogenous power shift creates a commitment problem which leads to preventive war. However, Chadefaux shows that the states can resolve the commitment problem by merely endogenizing the power shift. As such, the causal mechanism for conflict is *not* the power shift but rather a state's inability to credibly control it.

In the context of the argument here, one might note that military intelligence is endogenous. Thus, if improved intelligence decreases the cost of preventive war and creates a commitment problem, then the United States could resolve the issue by not improving its intelligence. While this intuition is correct if the states have complete information–that is, the United States' intelligence programs are perfectly transparent–the commitment problem returns if the states have imperfect information.

Unfortunately, obtaining complete information is impossible here. Chadefaux focuses on military power investment, which leaves a imprint, so rival states can readily verify compliance. In contrast, intelligence operations by

secretive by their very nature. The Soviet Union could not trust the United States to keep its intelligence apparatus in disrepair for the foreseeable future. Therefore, even though intelligence gathering is an endogenous choice, the United States was not in position to resolve the commitment problem.

5.3.3 Domestic Politics and the Robustness of Treaties

Throughout this book, we have analyzed nuclear proliferation as though states are unitary actors. However, the model from this chapter has a straightforward interpretation on how domestic politics can affect international outcomes. The perceived cost of preventive war could vary from individual leader to individual leader. If such variance occurs exogenously, more peaceful leaders find themselves in the commitment problem above– they would like to buy off the potential proliferator, but the inability to ensure that future leaders will continue those concessions leads to nuclear investment.[25]

Such exogenous variation is plausible. Foreign policy rarely determines the outcome of U.S. presidential elections, as economic policy predominates the voter's decision making process. In the absence of an ideal candidate, voters can rationally accept inferior foreign policy as a tradeoff for stronger economic competency.

On the other hand, robust treaties that lock-in the flow of benefits to a potential potential proliferation regardless of future circumstances resolve the commitment problem. In essence, robust treaties are "sticky" in the sense that future leaders (or the state itself, in the unitary actor framework) cannot easily break the terms.[26] Under this logic, even though a leader might wish to overturn the treaty, past negotiations tie his or her hands. Thus, the lack of robust treaties in the war exhaustion model is a critical hidden assumption; indeed, Proposition 5.2 fails if we relax it in this manner.

Unfortunately, our discipline does not yet fully understand the determinants of stickiness, especially in security matters. Fortna (2003) and Mattes (2008) find that careful territorial restrictions insure states against shocks which might otherwise cause war. For our purposes here, land redistribution forces the declining state into accepting less attractive status quos in the future. In particular, while the declining state is suffering from war exhaustion,

[25]See Wolford (2007; 2012) for two related crisis bargaining models with endogenous leader transitions.

[26]See Simmons 2000 for a review of how treaties restrict future state actions.

it could make a deep territorial concession to the rising state. After war exhaustion wears off, the declining state would have a difficult time reacquiring that land in practice, since it would have to forcibly overturn the peace to retake the area. This is in contrast to the model, which does not allow the rising state to simply ignore an offer and thereby defer the war decision to the declining state.

Yet economic and diplomatic concessions appear remarkably fluid. If the declining state literally buys off the rising state by writing a check for some amount every year, the declining state can easily terminate those concessions by simply not transferring the money. Because the concessions are not sticky, the rising state has very little recourse.

The conflict between the U.S. and Iran (and Israel and Iran) is not over territory but policy. In the document sent to the Bush administration in 2003, Iran explicitly sought to obtain mutual respect with the U.S., end sanctions, secure war reparations from Iraq, gain access to peaceful nuclear technology without disruption, a prisoner exchange, and obtain American assistance in capturing anti-Iranian terrorists (Parsi 2007, 341). Of these, the United States could easily annul all but the prisoner exchange Iranian access to nuclear science. Given the non-robust bargaining environment, long-term U.S. assurances fall flat and sabotage cooperative negotiations.

In contrast, bargaining between the United States and the Soviet Union had a territorial component. After all, Washington could have conceded Berlin to Moscow during the Blockade. Even after the exhaustion from World War II wore off, the U.S. could not have feasibly reobtained Berlin without crossing a tripwire into war. Thus, the concession is sticky.

So why didn't the United States engage in Berlin-for-bombs anti-proliferation diplomacy? One possibility is that the United States had two audiences–the Soviet Union and Western Europe–and could not satisfy both simultaneously. To appease the Soviet Union, the United States needed to concede Berlin or other portions of Europe. Yet, in doing so, the U.S. would send the message to Western Europe that it was an unreliable ally. Western European allies were adamant about staying in Berlin (Harrington 2012, 80-81). If the United States were to back down in this situation, it would signal to the West that portions of Europe were expendable. As a result, Washington could not simultaneously appease Moscow while saving face with its friends. Since non-sticky concessions were insufficient to resolve the commitment problem, the Soviet Union pursued a nuclear arsenal during the period of American weakness.

5.4 Conclusion

This chapter analyzed the stability of butter-for-bombs agreements when the declining state's ability to launch preventive war varies over time. Although there exist settlements that leave both sides better off than had the rising state proliferated, the declining state cannot credibly commit to continue giving concessions after its war exhaustion wears off. Consequently, the rising state must invest in nuclear weapons during the declining state's moment of vulnerability to enforce future concessions later on.

Substantively, we investigated the usefulness of the commitment problem theory in explaining Iranian and Soviet nuclear proliferation. Waning war exhaustion (and improving American intelligence in the Soviet case) ensured that the United States would have a credible threat to initiate preventive war. As a result, the Soviet Union and Iran had to pursue nuclear weapons during this window of American vulnerability to ensure their security in the future.

The model has important implications for how the United States handles Iran. At present, the American political discourse focuses on whether Iran will accept a negotiated settlement. If the commitment problem holds, then Iran will not. However, this is due to the United States' inability to commit to continued concessions. Yet the policy debate within the United States assumes that any long-term commitment Washington makes is inherently credible. Perhaps this is so, but the United States must work on conveying that message to Iran.

Moving forward, a potential criticism of this model is that war exhaustion wears away deterministically over time. This leads to the inexorable dilemma in period t^* that forces the rising state to proliferate to keep the flow of concessions coming. We may then wonder if the commitment problem disappears if the declining state's credible threat to intervene terminates nondeterministically. The next chapter addresses this type of question in the context of unreliable international arms dealers, who may vanish from the black market at an unforeseen moment. We will see that the commitment problem remains as long as the rising state is very likely to lose the ability to proliferate. Thus, the results presented in this chapter are partially robust to nondeterministic shifts in war exhaustion.

5.5 Appendix: Proof of Proposition 5.2

The appendix covers two proofs: Lemma 5.1 and 5.2.

5.5.1 Proof of Lemma 5.1

Consider equilibrium play in beginning period $\bar{t}+1$. From this period forward, D's cost of war $c_D(t)$ is equal to some strictly positive constant. Each of these periods is therefore an identical state of the world. Consequently, Lemma 2.1 applies, since this interaction after $\bar{t}$ is identical to the model from Chapter 2. So D offers $x_t = p'_R - c_R$ and R accepts.

Since every post-shift period before $\bar{t}+1$ is a unique state of the world, we use proof by induction for the remaining periods. Consider optimal play in period $\bar{t}$ as the base step. R's continuation value for accepting an offer equals $p'_R - c_R$ D's continuation value for having an offer accepted is $1 - p'_R + c_R$. Thus, R accepts if:[27]

$$(1-\delta)x_t + \delta(p'_R - c_R) \geq p'_R - c_R$$
$$x_t \geq p'_R - c_R$$

Note that D's payoff is decreasing in x_t if R accepts, so its optimal acceptable offer equals $p'_R - c_R$. D earns $1 - p'_R + c_R$ for this action. If D makes an unacceptable offer, R rejects and D earns less than $1 - p'_R$, a strictly smaller amount. Therefore, in equilibrium, D offers $p'_R - c_R$ and R accepts.

For the induction step, consider an arbitrary period before $\bar{t}+1$. Suppose R's continuation value for accepting an offer equals $p'_R - c_R$ and D's continuation value for having an offer accepted is $1 - p'_R + c_R$. The following is the unique equilibrium strategies for each such period: D offers $x_t = p'_r - c_R$ and R accepts $x_t \geq p'_r - c_R$ and rejects $x_t < p'_r - c_R$. The proof follows identically to the base case. □

5.5.2 Proof of Lemma 5.2

To prove Proposition 5.2, we use three lemmas which together imply the proposition. These lemmas follow the three steps informally introduced earlier in the chapter.

[27]Per usual, we assume R accepts when in different for the purposes of this proof. However, this is a result, not an assumption.

Lemma 5.2. *Suppose the states enter period t^* in the pre-shift state of the world. Then D offers $x_t = p_R - c_R$ in all future periods and R accepts.*

Proof: Suppose the states enter period $\bar{t}+1$ in the pre-shift state of the world. Then Proposition 2.1 holds.[28] D's value for the remainder of the game equals $1 - p_R + c_R$ while R's is $p_R - c_R$.

If $t^* = \bar{t}+1$, we are done. If not, we must use proof by induction. Take the base step of period $\bar{t}+1$. Following Proposition 2.1, consider R's optimal response to some offer $x_{\bar{t}+1}$. R earns $p_R - c_R$ if it rejects. If it accepts, it earns $(1-\delta)x_{\bar{t}+1} + \delta(p_R - c_R)$. If R builds, because $\bar{t}+1 > t^*$, D prevents, and R earns $p_R - c_R - (1-\delta)k$. This is strictly worse than rejecting. Thus, R accepts if:

$$(1-\delta)x_{\bar{t}+1} + \delta(p_R - c_R) \geq p_R - c_R$$

$$x_{\bar{t}+1} \geq p_R - c_R$$

So, in equilibrium, R accepts if $x_{\bar{t}} \geq p_R - c_R$ and rejects if $x_{\bar{t}} < p_R - c_R$.

Now consider D's offer decision. Since D's payoff is strictly increasing in $x_{\bar{t}}$ if R accepts, D's optimal acceptable offer equals $p_R - c_R$. D earns $1 - p_R + c_R$ for this choice. In contrast, it earns less than $1 - p_R$ for making an unacceptable offer, which is strictly less. So D offers $x_{\bar{t}} = p_R - c_R$, and R accepts.

For the induction step, suppose R's continuation value equals $p_R - c_R$ and D's continuation value equals $1 - p_R + c_R$. Then we must show that in period $t \geq t^*$ D offers $x_t = p_R - c_R$ and R accepts. But showing this is identical to showing the base step, so this holds. □

Lemma 5.3. *Suppose the states enter period $t^* - 1$ in the pre-shift state of the world. Then R builds and D does not prevent.*

Consider R's response to x_{t^*-1}. Note that by Assumption 5.1, D will not prevent in period $t^* - 1$. If R builds, it therefore earns $(1-\delta)x_{t^*-1} + \delta(p'_R - c_R) - (1-\delta)k$. If R accepts, by Lemma 5.2 it earns $(1-\delta)x_{t^*-1} + \delta(p_R - c_R)$. Proposition 5.1 covered the instance where accepting is greater than building in this instance, so R prefers building. The remaining option is to reject, which yields R $p_R - c_R$. But, again, the parameter space ensures that R prefers building to receiving its war payoff.

[28] This subgame is the same game as the model from Chapter 2.

Now consider D's options. No matter is offer, R builds and D does not reject. Since D's payoff is strictly decreasing in x_{t^*-1}, its optimal offer is therefore $x_{t^*-1} = 0$. So D offers 0, R builds, and D does not prevent. □

Lemma 5.4. *War does not occur in every pre-shift periods* $t = 1, ..., t^* - 1$.

There are only two ways war can occur in a pre-shift period: R rejects D's offer or D prevents. Assumption 5.1 shows that if $c_D(t) > 1 - p_R - \delta(1 - p'_R + c_R)$, then D prefers advancing to preventing in period t. But note that Assumption 5.1 also gives that $c_D(t^* - 1) > 1 - p_R - \delta(1 - p'_R + c_R)$. Given that $c_D(t)$ is strictly decreasing from 1 to $\bar{t} - 1$, it must be the case that $c_D(t) > 1 - p_R - \delta(1 - p'_R + c_R)$ holds for all $t < t^*$. Thus, D can never prevent in equilibrium during these periods, since advancing is a profitable deviation.

All that is left to show is that R can never reject in equilibrium. The assumption that $k < \frac{\delta p'_R - p_R}{1-\delta} + c_R)$ implies that R earns more from a successful power transition than from rejecting D's offer. From the above, we know that D will not prevent if R builds. Thus, R can profitably deviate from rejecting to building. □

Thus, in any equilibrium, R must build before period t^*. All that remains is to verify that an equilibrium exists. However, this is trivial, since the existence of a unique equilibrium outcome after period t^* in the pre- and post-shift states of the world means the unsolved portion of the game is finite. So an equilibrium exists, and investment must occur in it.