Chapter 6

War Exhaustion and the Stability of Arms Treaties

Summary: Why are some arms treaties broken while others remain stable over the long term? This chapter argues that the changing credibility of launching preventive war is an important determinant of arms treaty stability. If preventive war is never an option, states can reach settlements that both prefer to costly arms construction. However, if preventive war is incredible today but will be credible in the future, a commitment problem results: the state considering investment must build the arms or it will not receive concessions later on. Thus, arms treaties fail under these conditions. The chapter then applies the theoretical findings to the Soviet Union's decision to build nuclear weapons in 1949 and Iran's ongoing nuclear program today. In both instances, war exhaustion made preventive war incredible for the United States, but lingering concerns about future preventive war caused both states to pursue proliferation.

The previous chapters established an inefficiency puzzle regarding nuclear weapons. Namely, a range of non-proliferation settlements exist that 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?

This chapter explores the robustness of that result under a more dynamic setting. 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 accepts 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 immediately and in the future, but the rising state knows that the promise of later 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.

This chapter provides such a causal mechanisms, focusing 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. Some pundits treat Iran's desire to obtain nuclear weapons as proliferation for the sake of proliferation, as though Iran is singularly obsessed with obtaining nuclear weapons for some inexplicable reason. However, as the main theoretical chapter demonstrated, if Iran merely wishes to improve 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.

War exhaustion has contributed to proliferation in the past as well. Immediately following World War II, the Soviet Union faced a similar window of opportunity. At the time, Washington would have liked to buy off Moscow and avoid a nuclear-powered Eastern Bloc. However, Stalin could not trust that those concessions would continue once American war exhaustion wore off. Thus, the credible threat of preventive war in the future compelled the Soviet Union to join the nuclear club in 1949 while the United States was still vulnerable.

This chapter has four additional sections. It begins by laying out the microfoundations for war exhaustion. Next, it modifies the model from Chapter 3 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. The chapter finishes by highlighting important theoretical issues that affect the results but are common to this type of model.

6.1 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.

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

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), controlling for a state's performance in the previous conflicts, finds a non-linear relationship. 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. He cites aversion to conflict in France post World War I and in the United States post-Korean War; neither country wished to immediately reenter a state of war due to the toll of fighting. In fact, theories of war exhaustion say nothing about the overall expectation about the likelihood of future conflict. Rather, exhaustion says that, *ceteris paribus*, the costliness of continuous war ought 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 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 largely unexplored, so how one should create such controls is unclear.[3]

[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 Waltz's assertion about miscalculation 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

A second approach deemphasizes the resolve aspects of fighting multiple wars and instead looks at the practical issues. Treisman (2004) notes that when negotiating with two parties over separate issues, fighting over the less important issue leaves the state with fewer military resources to combat the more important issue. So a state may appease the less important rival to prepare for conflict with the more important rival. This chapter picks up the analysis after that conflict has occurred. While war consumes resources in the short term, a state can reinvest in its military capacity and improve its posture in coercive bargaining relationship over the less important issue.

As such, the next section works around the complexities of all geopolitical post-war shocks found in the empirical literature 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, a commitment problem results. The rising state jumps at the opportunity to proliferate during the declining state's moment of vulnerability despite the inefficient result.

6.2 Modeling War Exhaustion

6.2.1 Actions and Transitions

The interaction maintains the same overall framework as the basic model from Chapter 3. The game begins with R not having developed the weapon. In such a pre-shift period, D begins by making an offer $x_t \in [0, 1]$ for t. 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 t. Rejecting leads to pre-shift war, which ends the game. 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, where $p_R \in [0, 1)$, $c_R > 0$, and $c_D(t) > 0$ for all t. 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

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).

same game-ending pre-shift war; advancing locks in the offered division for the period and transitions the game into post-shift periods.

Post-shift periods are likewise nearly identical to the original model. Here, D offers $y_t \in [0, 1]$. R now just accepts or rejects. Accepting locks in the payoff pair y_t and $1 - y_t$ for the period and repeats the post-shift interaction in the next period. Rejecting leads to a game-ending post-shift war; R earns $p'_R - c_R$ and D earns $1 - p'_R - c_D(t)$, where $p'_R \in (p_R, 1]$ and $c_D(t)$ is the same cost function as the pre-shift state of the world.

To analyze the subject of interest, restrict attention to parameter spaces in which $c_D(t) > c_D(t+1)$ 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.[5]

6.2.2 Equilibrium

Since this is a dynamic game of complete information, subgame perfect equilibria remains the appropriate solution concept.

To begin, finding optimal strategies in pre-shift states of the world requires first knowing how the states will behave in post-shift states. As Lemma 6.1 asserts, play is identical here despite the introduction of war exhaustion:

Lemma 6.1. *Regardless of D's war exhaustion, if R builds and D does not prevent, D offers $y_t = p'_R - c_R$ in every post-shift period and R accepts in every SPE.*

This chapter's appendix contains the proof. Intuitively, due to war's inefficiency, D prefers making an acceptable offer. Note that $y_t = p'_R - c_R$ 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.

Now for the pre-shift stage. To avoid triviality, consider two important restrictions on the parameter space:

[4]The results presented would be similar if war exhaustion wore off non-deterministically.

[5]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. This chapter considers an alternative interpretation in the case study about the Soviet Union.

Restriction 6.1. *(Changing Credibility of Preventive War) A period $t^* \geq 2$ exists 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 3, 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, Proposition 3.1 states the equilibrium strategies; D's threat to intervene compels R not to build. Intuitively, if D is *very* willing to prevent, then marginal additions to the cost of preventive war do not alter its credible threat of intervention. In the second case, the remainder of Chapter 3's propositions contain the solution; R receives concessions only if the cost to build is sufficiently cheap. Intuitively, if D is *very* unwilling to prevent, then any addition to the cost of war will have no effect on the incredibility of prevention. Either way, war exhaustion has no substantive impact on the game's outcomes. Thus, this chapter restricts the discussion to the middle cases the assumption describes.

More subtly, Restriction 6.1 implies that the commitment problem described in this chapter only applies to situations in which R can develop the weapons technology relatively quickly. Note that the model fixes the length of a period as the time it takes R to shift power. If R is technologically incompetent, the functional length of a period is very long. In turn, D's war exhaustion is more likely to wear off before a full period passes, thereby ensuring that the credibility of preventive war never changes.

Additionally, 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.

Restriction 6.2. *(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 for D to 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 known results 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 arms deal commitment problem to surface.

Now to the propositions:

Proposition 6.1. *(Identical to Proposition 3.2.) 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 SPE. 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 3.2's underlying logic was that R considered the extent of the power shift to be "too cold" to be worthwhile. In turn, R could not credibly threaten to build and thus could not extract any concessions from D. Note that R's preference here is independent of D's decision to prevent. Indeed, regardless of whether D responds with preventive war, R would still rather accept no concessions when $p'_R - p_R < \frac{k(1-\delta)}{\delta}$. The formal proof is nearly identical and thus omitted.

However, the commitment problem enters when the costs are lower:[6]

Proposition 6.2. *If* $p'_R - p_R > \frac{k(1-\delta)}{\delta}$ *and the above assumptions hold, R builds and D does not prevent in some period t in every SPE regardless of the value of* 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

[6]From this point forward, the results make the same additional restrictions from Chapter 3 to focus on substantively interesting cases. First, restrict k such 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, 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 3, 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.

in future periods. Knowing this–and knowing that any deal made in that period will only last for that period–R builds.

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 Restriction 6.1. 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 after power has shifted, 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 6.2, so R builds in period $t^* - 1$ if the game is in the pre-shift state of the world.[7]

Step (3) ensures that building occurs at some point on the equilibrium path of play. This is the same as showing 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

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

destroys the entire surplus. So building must occur.[8]

Before moving on, a couple remarks about the model are in order. First, D cannot buy off R at period t^*. To see why, note that when R chooses whether to build, the size of today's offer is irrelevant–R will earn that amount for the period regardless of its decision to shift power.[9] 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, R is in the parameters for Proposition 6.1 and therefore would not have built even in original model from Chapter 3.

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.

6.3 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. It starts with the Soviet Union's decision to proliferate in the immediate aftermath of World War II. While often considered a trivial choice given the nature of Cold War tensions, bargaining theory shows that the strategic considerations ran deeper. Afterward, the focus turns to Iranian intransigence in the wake of American wars in Afghanistan and Iraq. With those examples in mind, the section then investigates how the war exhaustion argument applies more broadly to instability

[8]The exact timing of investment depends on the extent to which D can recoup its offer if R builds. If D cannot recoup anything as is the case in this setup, investment is immediate; R knows that D will offer it nothing in period $t^* - 1$ if it has not already built, so D cannot credibly sustain cooperation beforehand. If D can recoup a sufficiently large share of the offer, the interaction is efficient through periods 1, ..., $t^* - 1$. Thus, nonproliferation is possible until the now-or-never dynamic puts the commitment problem into focus.

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

of domestic leadership preferences.

Following Chapter 4's case study philosophy, this section broadly focuses on whether three conditions hold. First, the declining state (the United States) must prefer buying off the rising state to allowing the rising state to proliferate; this avoids the nonproliferation outcome of Proposition 3.4. Second, the declining state's cost of preventive war sufficiently decreases as a function of time; this ensures that Restrictions 6.1 and 6.2 hold. And third, the rising state must believe it will receive fewer concessions at a later date without nuclear weapons; this means the rising state fears the commitment problem the model traced. The model indicates that these conditions lead to proliferation.

6.3.1 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, the potential for antagonism can lead to conflictual behavior even if both sides wish to avoid it. While Washington and Moscow successfully avoided war, butter-for-bombs agreements mean that this distrust alone cannot outright explain why the Soviet Union proliferated in 1949.

To that end, research on the Soviet decision to proliferate so far focuses on the United States' choice 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 (Sagan and Waltz 2003, 56-59; Gaddis 1982, 149). 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, the butter-for-bombs model from Chapter 3 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 3.1; that the weapons were worth the investment merely tells us that the interaction does not fit the "too cold" parameters of Proposition 3.2. Surely, the United States would have preferred offering a butter-for-bombs settlement to forcing the Soviets to proliferate; nuclear weapons were still enormously expensive at the time, leaving plenty of surplus for the United States to capture if negotiated succeeded.[10] Instead, bargaining failed, Moscow obtained a nuclear weapon, and hope of resolving Cold War tensions would be brushed aside until the 1980s.

This section argues 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; American restraint during the Berlin Blockade but acceptance of war during the Cuban Missile Crisis illustrate the United States' evolving willingness to fight. Second, as Western intelligence infiltrated the previously undisturbed the Soviet Union, the material cost of preventive war diminished 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 the opportunity remained open.

Some historical background is in order, beginning with the breakdown in cooperation between the United States and the Soviet Union at the end of World War II. During the war, Washington worked to build ties with Moscow. Indeed, the Soviet Union received the second most aid from the Lend-Lease Program after the United Kingdom, and the U.S. offered the Soviets disproportionately large voting shares in the International Monetary Fund and World Bank during the Bretton Woods conference (Mikesell 1994, 22-23; Stone 2011, 54-56).

While tensions between the allies remained below the surface in the immediate aftermath of the war, the conflict became evident in the next couple

[10]To wit, American proliferation just a few years earlier required 130,000 (the size of America's automobile industry at the time) to construct the first nuclear weapon (Hugues 2002, 9). While secrets stolen from the Manhattan Project eased the Soviet effort, the Soviet Union lost the nuclear race in the first place due to an inferior industrial base. This meant that the Soviet Union had to pay a greater cost in diverting industrial resources to the Soviet bomb project.

years. Moscow pressed for war reparations from Germany and began dismantling German factories to ship useful parts back to the Soviet Union (Naimark 1995, 141-204). At the time, Stalin was uncertain whether the Soviet Union could hold onto its territorial gains; reparations ensured at least some long-lasting benefit from the post-war advantage (Stone 1996, 27-28). This presented a problem for Washington, which wanted to return its troops home as soon as possible. Doing that would require rebuilding the German economy to self-sufficiency; reparations had the opposite effect. Lucius Clay, governor of American-occupied Germany, halted payments from the Western allies' sectors in May 1946 (Reynolds 2006, 276). But this had a spiral effect, causing Stalin to further distrust the Americans. From here, it became clear that the time of cooperation was over.

However, the logic of butter-for-bombs bargaining dictates that even the most antagonistic of states have incentive to bargain with one another.[11] Without bargaining frictions, states ought to resolve the conflict and avoid the deadweight loss cost of nuclear weapons. So even if American/Soviet tensions began as a matter of distrust (Kydd 2005), that does not explain why the Cold War powers could not develop some sort of *ad hoc* resolution.

What else explains the lack of agreement? One critical factor was American war exhaustion immediately following World War II. The rush to send troops home created a manpower problem. Some divisions lost all their soldiers with specialized training (Quester 2000, 74). Needless to say, tanks without any tank drivers are not useful. This left the United States in a moment of strategic vulnerability. The Soviet Union held a substantial 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). Indeed, NSC-68 advised that a preventive nuclear assault on the Soviet Union would not compel Moscow to surrender, but the Soviets would "dominate most or all of Eurasia" (Sagan and Waltz 2003, 56-57).

To some extent, the discrepancy 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. This meant that Soviet soldiers had a natural numbers advantage in Europe. Worse, the Truman administration tried to push to keep the United States armed and proactive after the war ended.

[11]In fact, closer ideal points can make butter-for-bombs agreements less likely; more similar ideal points imply higher perceived values of k, which leads to the "too cold" equilibrium.

Yet the domestic political situation in the United States simply was not conducive to this policy (Friedberg 2000, 98-107). Republicans accordingly took control of the House and Senate on a policy of demobilization and lower taxes, at the expense of military preparedness. Following the electoral defeat, Truman gave in, allowed the military balance in Europe to decay and reduced defense expenditures.[12] The Truman administration did not act naively here; a few years later, the NSC-68 warned that if war broke out in Western Europe, the Red Army would be able to "overrun Western Europe, with the possible exception of the Iberian and Scandinavian Peninsulas; to drive toward the oil-bearing areas of the Near and Middle East; and to consolidate Communist gains in the Far East." Yet the defense budget cuts persisted due to the lack of domestic political will.

Similar electoral problems meant that the United States could not expect help from the United Kingdom, either. Winston Churchill, British political hero of World War II, expounded the virtues of preventive war against the Soviet Union (Quester 2000, 47-48).[13] However, the Labour party defeated the Conservatives in the 1945 Parliamentary election, after victory in Europe but before victory in Japan. 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). Churchill had to settle in as leader of the opposition.

The discrepancy between short-term military realities and long-term inevitabilities compelled the Soviet Union to take on a more aggressive policy.

[12]The United States had a similar underprovision of nuclear weapons following Hiroshima and Nagasaki (Hewlett and Anderson 1962, 624-633). However, this was not a matter of capabilities. Instead, the U.S. decided not to engage in further conflict and consequently let the nuclear program go into temporary disarray (Quester 2000, 57-61). Many scientists left the project, having decided that "their mission had been accomplished" (Hewlett and Anderson 1962, 625). The U.S. also lacked sufficient bombers to to deliver an all-out assault, and U.S. planners worried about Soviet anti-aircraft defenses regardless (Quester 2000, 82-85).

[13]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 be easily redistributed to the Germans, in case Britain needed German soldiers for the offensive. See Reynolds 2006 (249-251).

Washington engaged Moscow in good faith following the end of World War II. However, worried that the United States would ultimately marginalize the Soviet Union, Moscow pursued an expansionist policy in Eastern Europe. When the U.S. realized Soviet intentions, Washington began a more antagonistic approach. But without domestic resolve for more conflict abroad, the American response was weak.

The Berlin Blockade and subsequent Berlin Airlift provide the ideal illustration of this exhaustion around the time of Soviet proliferation. At the end of war, 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. Yet, in dividing Germany, Washington 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.

With trust breaking down, the West developed a plan to rebuild Germany's economy on its own. However, the Soviets sought substantial war reparations. Currency manipulation was a major issue; unbacked Soviet printings had so completely devalued the Reichsmark that cigarettes became a *de facto* currency (Turner 1987, 24). As such, the Western economic reconstruction plan began with the introduction of the Deutsche Mark. For Moscow, this amounted to economic warfare (Miller 2000, 31-33). Realizing that East-West cooperation in the German occupation was over, the Soviet Union blockaded West Berlin beginning June 24, 1948. Without shipments of basic necessities from the East or the West, Moscow 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 (Holloway 1994, 256).[14] While not insurmountable–the United States could mobilize back to World War II levels–this created a stumbling block for accelerated war

[14]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).

against the Soviet Union.

Nonetheless, if ever there was an opportunity 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. Moscow would have been hard-pressed to push the issue past Berlin given the shadow of the American nuclear arsenal. Moreover, the blockade represented a direct violation of the occupation agreement. A military confrontation was justifiable.

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 whether an airlift could sustain West Berlin, Clay responded "absolutely not."[15] Rather, the airlift represented a lack of viable alternatives at the time. Simpler alternatives, such as sending convoys on the highway with a military escort, created more risk of Soviet intervention and full-scale war. In the end, Washington did not want to leave anything to chance.[16] Thus, the airlift 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 while not being as provocative as military convoys.

In hindsight, though, the decision was brilliant. West Berlin survived for 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 least-bad 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. Indeed, it is hard to imagine the United States in a worse position than that of 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:

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

[16]See Schelling 1960 (199-201).

> [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)

Washington thus had to rely mostly on open-source information (Goodman 2007, 8), which hardly helped given the issue at hand.

Making matters worse, U.S. intelligence was undergoing a bureaucratic shuffle at the time. Wartime called for an extremely powerful intelligence organization; peacetime no longer needed that necessary evil. As such, the Office of Strategic Services disbanded. But this led to a power vacuum. Competing bureaucratic organizations fought to succeed the OSS, leaving the United States without streamlined intelligence (Ziegler and Jacobson 1995, 14-21). The Central Intelligence Agency would not consolidate bureaucratic power for a few years.

Details on the Soviet nuclear program were correspondingly sparse both in terms of time and location. 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).[17] Even after the Soviets tested their first bomb in 1949, the United States still had yet to develop an effective system to monitor test explosions. Low-level flyover used against Nazi Germany (Ziegler and Jacobson 1995, 1-10) were not practical against the Soviet landmass. Scientists instead conceived of a seismic detector. Unfortunately, the United States had too few bombs available to accurately test the device (Ziegler and Jacobson 1995, 14) and worried about the environmental externalities. Washington would eventually obtain strong intelligence from Germany, but not until 1955, six years too late (Gordin 2009, 83).

Consequently, 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,

[17]This led to a second-order problem: the United States never believed that preventive war was urgent, since Washington consistently held the belief that the Soviet Union would need more time to build a bomb. But even in a counterfactual world in which Washington knew about the short time line, preventive war was still not an option for the reasons outlined here.

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
6/21/1948	Deutsche Mark introduced
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
4/14/1950	NSC-68 issued
6/25/1950	Korean War begins
10/25/1951	Churchill's Conservative party retakes majority
8/1/1955	First U-2 flight
10/1962	The Cuban Missile Crisis

especially since a land war in Asia is one of the classic blunders. Given these constraints, the United States' remaining option was to drop nuclear bombs on the entire Soviet Union. But Truman ultimately vetoed this idea as well for moral reasons.[18] A few years later, Eisenhower reached a similar conclusion when contemplating whether to eliminate the Soviet Union before Moscow amassed a large nuclear stockpile (Gaddis 1982, 149).

So preventive war was not an option for the United States in 1949. By itself, this is 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.[19] The Korean War began in 1950. America's

[18]There were also practical problems. In 1948, the United States had a minuscule arsenal of thirty nuclear weapons and only fifty B-29 bombers to deliver them (Gaddis 1987, 109). Even if the United States could have accelerated nuclear weapons production, the bombers were slow. Destroying targets deep in Soviet territory would have been impossible (Harrington 2012, 81).

[19]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

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. But dollars and votes tell a compelling story. The Korean War revitalized America's deflated defense budget, allowing Truman to begin implementing NSC-68's recommended policies (Jervis 1980). Meanwhile, on the domestic political front, former Supreme Allied Commander Dwight D. Eisenhower won the 1952 U.S. presidential election. Cold War tensions 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.

By 1962, however, the United States was certainly prepared to engage the Soviet Union in preventive war. On October 14, 1962, the CIA discovered medium-range ballistic missile installations in Cuba, beginning the Cuban Missile Crisis. At the time, President John F. Kennedy believed that the missiles were not yet operational and thus a prime target for a preventive strike.[20] Although Kennedy prudently opted to blockade Cuba to buy time to find a diplomatic solution, he believed the probability of war with the Soviet Union ranged from one-in-three to one-in-two (Bundy 1988, 453).[21] This is in direct contrast to how the Truman administration handled the Berlin Blockade, taking every possible measure to avoid conflict.[22]

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.

[20]In reality, Soviet commanders had tactical nuclear weapons–capable of striking Florida–available without needing launch codes from Moscow (Allison 2012, 11). However, as a matter of establishing willingness to fight, Kennedy's beliefs trump strategic realities.

[21]The estimated risk of nuclear war was substantially smaller, though (Gaddis 1997, 269).

[22]Of course, a surgical preventive strike was possible in Cuba because of U-2 aerial photography. The U.S. did not have this luxury in the late 1940s to stop the Soviet Union from first acquiring nuclear weapons. Still, Kennedy knew that a strike on Cuban soil would inevitably kill Soviet troops and consequently spark a greater conflict with the Soviet Union. Kennedy was nevertheless willing to run this risk.

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. Meanwhile, the Lockheed U-2 spy plane took first flight on August 1, 1955. By June 1956, the aircraft was providing reliable 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 in 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–it was an insurance policy designed to guarantee concession in the presence of Washington's commitment problem.

Before moving forward, it is worth discussing the robustness of this theoretical application in the presence of endogenous intelligence institutions. Chadefaux (2011) makes a related critique worth comparing. 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 perfect information–that is, the United States' intelligence programs are transparent–the commitment problem returns if the states have imperfect information.

Unfortunately, obtaining perfect information is impossible here. Chadefaux focuses on military power investment, which leaves a imprint. 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 fu-

ture. Therefore, even though intelligence gathering is an endogenous choice, the United States was not in position to resolve the commitment problem.

6.3.2 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.[23] 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.[24]

[23]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.

[24]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

Following 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 Swiss attache. But America's increasingly aggressive (and successful) foreign policy concerned the Iranian leadership. After Iran spent couple years of deliberately misleading IAEA weapons inspectors (ElBaradei 2011, 112-117), Tim Guldimann, Swiss ambassador to Iran, arrived in Washington D.C. on May 4, 2003 with a shocking document: a "roadmap" for normalizing relations.[25] Iran was willing to negotiate *everything*: weapons of mass destruction, dismantling al-Qaeda, recognition of Israel, and support of Hezbollah, Hamas, and Islamic Jihad. 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; his party had allegedly 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

Democrats. This led to a missed opportunity to resolve the conflict during President Bill Clinton's waning years. Clinton had been open to talks with Iran (Ansari 2006, 176-178), but the only "breakthrough" consisted of a couple public acknowledgments (Sick 2001, 146-147).

[25]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

regime. So the Bush administration admonished the Swiss ambassador for 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 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 3 shows such an argument fails to address the inefficiency puzzle of costly weapons. Even if Iran could credibly threaten to develop weapons today, bargaining should render proliferation unnecessary. Indeed, the United States, as the declining power, should induce Iranian compliance by offering significant concessions imme-

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
5/1/2003	Bush declares "mission accomplished" in Iraq
5/4/2003	Iran dispatches Swiss 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

diately. 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.

To that end, the United States has tried 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 complimented 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.*[26]

Other than the change in administrations, Khamenei appeared correct. Although geopolitical conditions had changed since Iran's initial peace offering to the Bush administration in 2003, the underlying conditions for discord

[26]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.

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 an 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.[27] 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 the past, Iran wisely placed its nuclear experiments in secure bunkers.[28] 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 likely retaliate by proxy through Hezbollah and Hamas.[29] 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.

[27]Chapter 8 discusses Operation Opera in greater detail.

[28]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).

[29]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.

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 prepared to fight another war. The proliferation option would have certainly gone off the table. Iran would then have to rely on America's word to live up to its end of the bargain. But Iran had reason to be skeptical. Former President Ali Akbar Rafsanjani warned that treaties were worthless after Iraq violated its chemical weapons (Jones 1998, 41; Sick 2001, 134-135). And memories of the Bush administration's strongarming were alive and well.

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 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.

Most of the common alternative theories to that try to explain Iran's intransigence are questionable in this light. To begin, regional political aspirations offer no better explanation. If Iran believed nuclear weapons were critical to obtaining regional hegemony, the basic model in Chapter 3 indicates that Iran could obtain those types of concessions without building arms 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 explanation, with Iraq replacing the United States as the declining state.[30] Thus, the theory still holds and accounts for the timing of

[30]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.

Iran's nuclear ambitions.

Next, some treat Iran as an automaton unwilling determined to proliferate no matter the carrots or cost. Thus, no negotiations can take place between the United States and Iran. Much of Tehran's public communication relays the rigidity of its bargaining position. However, analysts must be careful not to take cheap talk at face value. Perhaps Iran is truly irreconcilable for no discernable reason. Perhaps Iran is irreconcilable due to the commitment problem described in this chapter. Or perhaps Iran is feigning irreconcilability to obtain a better bargain (Schelling 1966). Regardless of Tehran's true motivation, Washington would hear similar cheap talk declarations.

While separating commitment-based explanations from leverage-based ones is difficult, Tehran's outreach in 2003 provides evidence that Iran is not completely irreconcilable.[31] Perhaps Iranian proliferation became non-negotiable after Bush ignored the olive branch. But this ultimately leads back to a story of commitment; Obama's attempt at reconciliation falls on deaf years because Tehran worries that the United States will return to a hardline position once the American population becomes more acceptant of another war.

Relating to induced indivisibility, another explanation appeals to selectorate theory.[32] 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 (Sherill 2012), and therefore geopolitical inefficiency persists.

The anti-American selectorate argument is questionable for four reasons. First, it overestimates the role of Ahmadinejad as a policy maker. Presidents of Iran hold little to no power over foreign policy. Internationally, the president is a figurehead; domestically, he runs the bureaucracy and acts as a buffer between citizens' wrath and the Ayatollah. While Khatami led the push to reopen negotiations with the United States in 2003, the plan would have carried no weight without the Ayatollah's blessing. And recall that

[31]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.

[32]On selectorate theory, see Bueno de Mesquita et. al. 2004. Takeyh (2006) provides an overview of Iranian political factions. For domestic politics based explanations of proliferation, see Sagan 1997, 63-73.

Ahmadinejad originally won the presidency in 2005 after the ruling council removed moderates from the ballot.

Second, and most prominently, it also fails to explain why Iran was willing to work with the U.S. a few years prior but then suddenly stopped sometime thereafter. If a deal with the United States would have decapitated the Iranian regime in the early 2000s, Tehran certainly would 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. Reaching an agreement with the United States would eliminate a key reformist platform position.

Third, 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, Iran has long claimed an Islamic imperative against weapons of mass destruction (Giles 2003; Sick 2001, 133-134), and Khamenei declared that nuclear weapons ran contrary to Islamic principles in a fatwa from August 2005.[33] In this light, successful proliferation would require the Iranian regime to flip-flop on stated policy. Put simply, non-proliferation is the domestic status quo, not the other way around.

Fourth, 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 Washington, he could then claim complete victory in the diplomatic showdown; that is, 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 similar results. Thus, if the Iranian regime worried about appeasing domestic audiences, we would

[33]See Kartal and Ohls 2011 for a model of costly signaling that analyzes Khamenei's fatwa.

expect Iran to enter talks with the United States. Yet, intransigence persists.

Moving to the next alternative explanation, if Iran is seeking to proliferate solely to improve its security vis-a-vis the United States, the problem becomes 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 a 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 a 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.[34] Put simply, war with Iran would not come cheap. Consequently, it is difficult to see how nuclear weapons provide much relief for Iran against the United States if no real conflict exists between the two states.

The commitment problem described in this chapter once again resolves the discrepancy. Iran was willing to negotiate in the early 2000s 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.

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 challengers 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 Libyan 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.

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

The regime assurance theory seems plausible, though butter-for-bombs bargaining highlights an important caveat. Nuclear weapons remain inefficient here, but the declining state's inability to credibly commit to nonintervention in the event of a crisis compels the rising state to build anyway. However, concessions reasonably offer some amount of regime assurance; rising states could use the additional benefits to buy off competing factions or improve internal security services. If these concessions have a large enough impact, then the declining state can endogenously tailor its offers to resolve the commitment problem. But if concessions leave little impact, bargaining might break down.

To conclude, how the situation between the United States and Iran will ultimately end remains uncertain. Israel is 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 given the distance between Israel and Iran and the logistical problems that entails. Israel must also weigh the risk of retaliation from Hamas and Hezbollah. And note that given the presence of this uncertainty, Iran's nuclear intransigence is rational.

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 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.

6.3.3 Domestic Politics and the Robustness of Treaties

Thus far, this book has analyzed nuclear proliferation using the unitary actors assumption. 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.[35]

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.[36] 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 6.2 fails with such treaties.

Unfortunately, political scientists do 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 the 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, 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.

[35]Wolford (2012) makes a similar argument about the outbreak of war. See also Wolford 2007.

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

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, it 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 and 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 nonproliferation 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.

A second and related issue points to signaling problems with the Soviet Union exclusively. A decade later, proponents of the domino theory argued that the United States needed to stand firm in Vietnam for Washington to signal strength to Moscow (Chatagnier 2012). Failure to do so would lead to further challenges down the line, as in the chain store paradox (Selten 1978; Kreps and Wilson 1982; Walter 2006). This concern was especially salient

after the failure of appeasement with Hitler less than a decade before (May 1975, 33). Again, this forces the United States to simultaneously pursue two mutually exclusive policies, ensuring that at least one will fail.

6.4 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, this chapter 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 eventually obtain 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.

Moving past commitment problems, the remainder of this book looks into information-based explanations for proliferation. The next chapter begins with imperfect information while the following chapter investigates incomplete information.

6.5 Appendix

The appendix covers two proofs: Lemma 6.1 and Proposition 6.2.

6.5.1 Proof of Lemma 6.1

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 identical. Consequently, Lemma 3.1 applies, since this interaction after $\bar{t}$ is identical to the model from Chapter 3. So D offers $x_t = p'_R - c_R$ and R accepts in the unique SPE.

Every post-shift period before $\bar{t}+1$ has a unique cost value, so consider proof by induction for the remaining periods. Take 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:[37]

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

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 from the base case. □

6.5.2 Proof of Proposition 6.2

Three lemmas which together imply Proposition 6.2. These lemmas follow the three steps informally introduced earlier in the chapter.

Lemma 6.2. *Suppose the states enter period t^* before a power shift has occurred. Then D offers $x_t = p_R - c_R$ in all future periods and R accepts.*

Proof: Suppose the states enter period $\bar{t}+1$ prior to a power shift. Then Proposition 3.1 holds.[38] D's value for the remainder of the game equals $1 - p_R + c_R$ while R's is $p_R - c_R$.

If $t^* = \bar{t}+1$, the proof is done. If not, consider proof by induction. Take the base step of period $\bar{t}+1$. Following Proposition 3.1, 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,

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

[38]This subgame is the same game as the model from Chapter 3.

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 the task is to 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 6.3. *Suppose the states enter period $t^* - 1$ prior to a power shift. Then R builds and D does not prevent.*

Consider R's response to x_{t^*-1}. Note that by Restriction 6.1, 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 6.2 it earns $(1-\delta)x_{t^*-1} + \delta(p_R - c_R)$. Proposition 6.1 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.

Now consider D's options. No matter the 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 6.4. *War does not occur in 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. Restriction 6.1 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 Restriction 6.1 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 restriction 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, 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^* ensures that the game before that point is functionally a game with t^* periods. So an equilibrium exists, and investment must occur in it.