Appendix: The Disadvantage of Nuclear Superiority

Abby Fanlo and Lauren Sukin*

February 10, 2023

*Abby Fanlo, Ph.D., Independent Researcher; Lauren Sukin, Assistant Professor of International Relations, Department of International Relations, London School of Economics and Political Science

Appendix A: The Effect of Inferiority

Here, we present the results of our models with inferiority, rather than superiority, as the main independent variable. This allows us to assess whether the probability of victory for the inferior state increases as the disparity between the arsenal sizes of the states in the dyad increases. Because victory is not zero-sum—for example, both states in a dyad can win a crisis—the effect of nuclear inferiority is distinct from the effect of nuclear superiority. Figures 1 and 2 show that inferior states are more likely to lose when they have similar arsenal sizes as their opponents. However, the probability of victory for the inferior state shifts from negative to positive as the disparity between arsenal sizes increases. These findings match our theoretical predictions.

Figure 1: Difference in Probability of Victory for Inferiority vs. Superiority

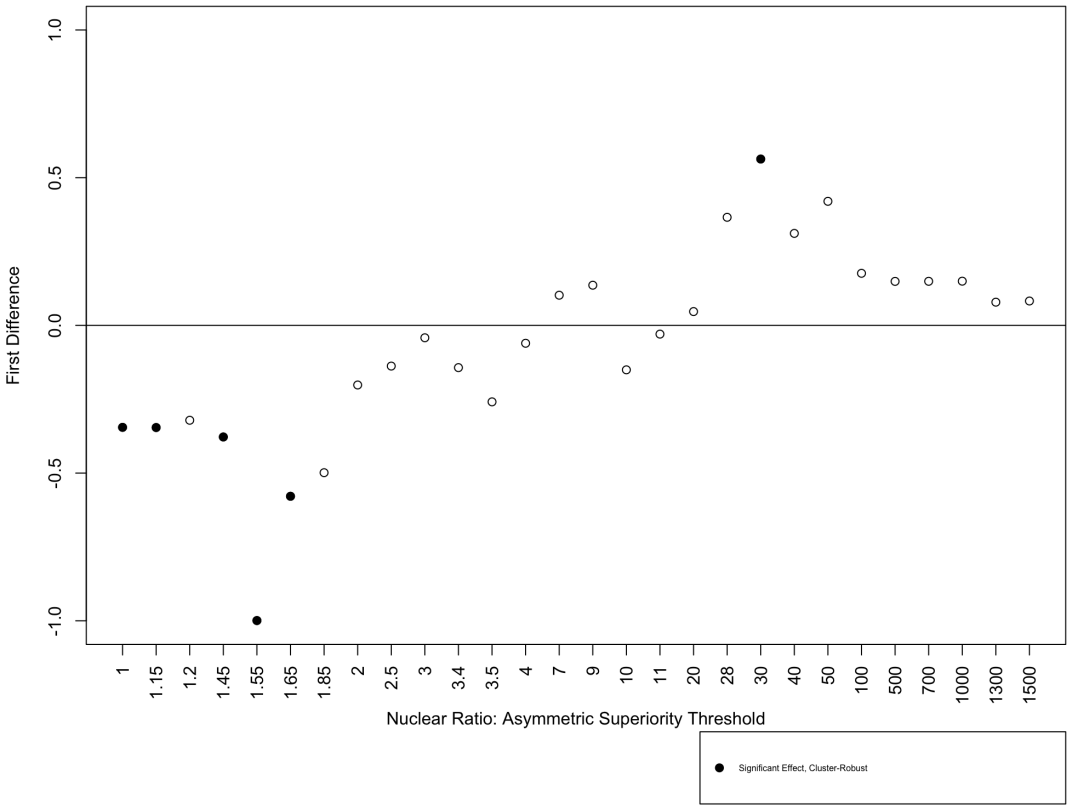
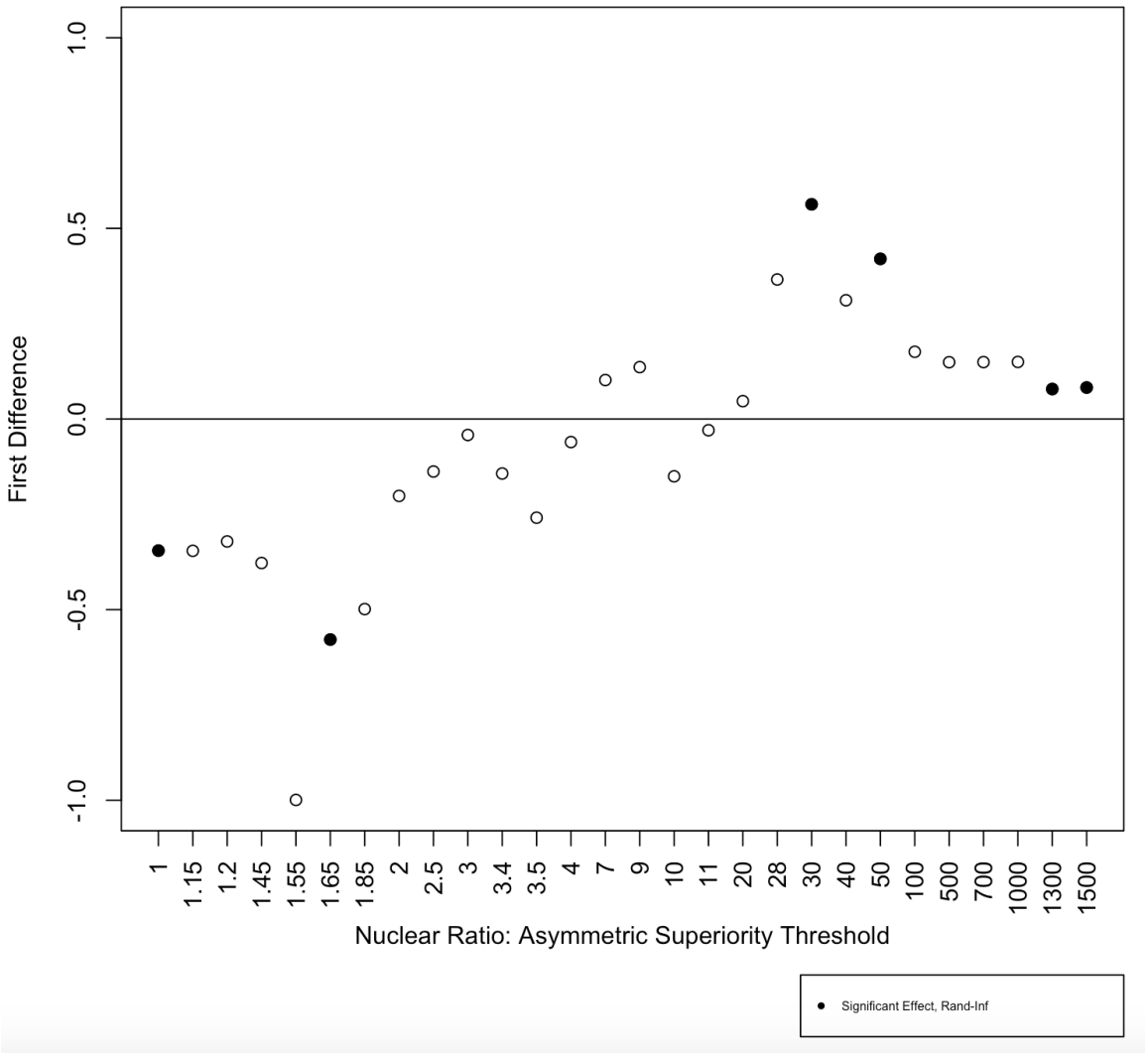


Figure 2: Difference in Probability of Victory for Inferiority vs. Superiority, Significance Via Randomization Inference



Robustness Checks: Appendices B - H

In the following appendices, we conduct a series of tests to assess the robustness of our main findings. In Appendix B, we introduce controls for Side A's and Side B's stakes in the crisis. In Appendices C, D, E, F, and G, we run the original models after changing the dataset to account for varied understandings of certain cases. Finally, in Appendix H, we test the robustness of our findings to using the nuclear ratio as the main independent variable instead of our new, binary superiority variable.

Appendix B: Controlling for High Stakes

In this robustness check, we include a dichotomous control variable that indicates whether Side A faces high stakes in the crisis. We also include an indicator for whether Side B faces high stakes. Coding of the stakes variable is explained in the description of Table **??**. According to our theory, stakes is a post-treatment variable, since we argue that asymmetrically inferior states should generally only select into crises when they have high stakes.

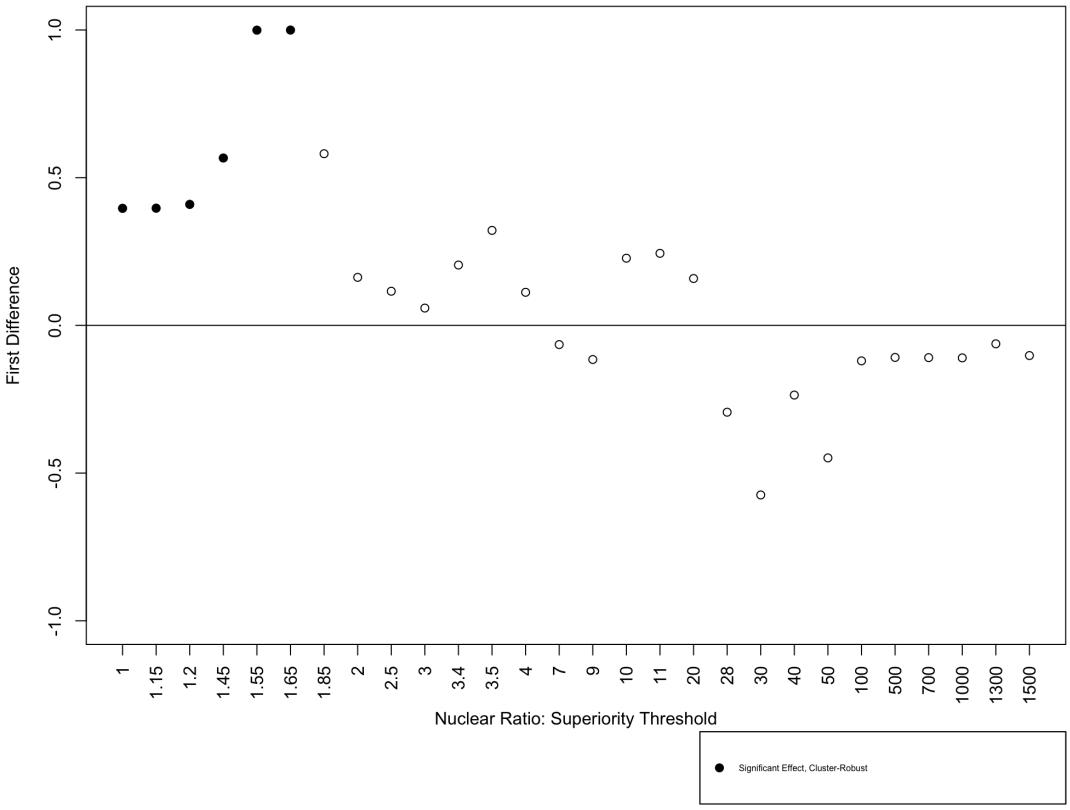
As a result, this is a highly imperfect test. The inclusion of a post-treatment variable biases the results towards zero.[1] However, we can use this feature as a rough way to check our mechanism. Our theory suggests nuclear superiority will have no effect or will have a negative effect at high levels of arsenal disparity. After controlling for stakes, however, any negative effect should disappear. Controlling for a post-treatment variable will bias the effect of superiority towards zero.

In fact, when we use cluster-robust standard errors and control for high stakes, we find that the negative effect associated with asymmetric superiority is insignificant. We do not present a test using randomization inference, however, because there is insufficient variation. In all cases in our data, with the exception of France in the Berlin Wall crisis, asymmetrically inferior states also have high stakes, as our theory would predict. This lack of variation causes the randomization inference procedure to break down. Moreover, extrapolating from France in the Berlin crisis alone

1. Rosenbaum 1984; Angrist and Pischke 2008.

is inappropriate, particularly given the complications with the crisis discussed in the main paper. The lack of variation also means we cannot test the effect of an interaction between the stakes and superiority variables.

Figure 3: Difference in Probability of Victory for Superiority vs. Inferiority, Controlling for Stakes



Appendix C: France in the Berlin Wall Crisis

In this robustness check, we discard from our models the two directed-dyads that included France in the Berlin Wall Crisis—(FRN-USSR) and (USSR-FRN). We do this for two reasons. First, France had 0 nuclear weapons at the time of the crisis, although it possessed the ability to construct nuclear weapons. The scope of our dataset is crises between nuclear states, but France's nuclear status is debatable at this stage. Second, the outcome of the Berlin Wall crisis for France was not independent of the outcome for the United States (In Appendix D, we re-estimate our models after dropping all directed-dyads with this non-independence issue from the data). The results of this particular robustness check support our main findings. Superior states have a statistically significant advantage at low levels of arsenal disparity, but this advantage disappears and is even reversed at high levels of arsenal disparity.

Figure 4: Difference in Probability of Victory for Superiority vs. Inferiority, Dropping France in Berlin Wall

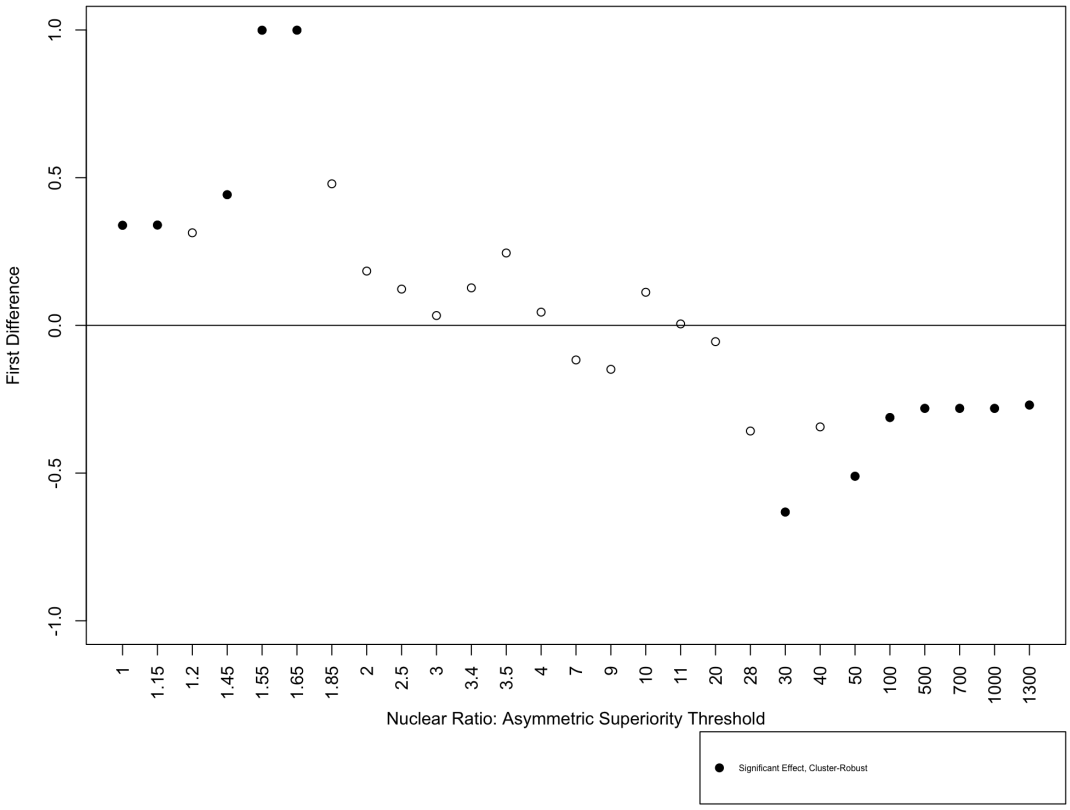
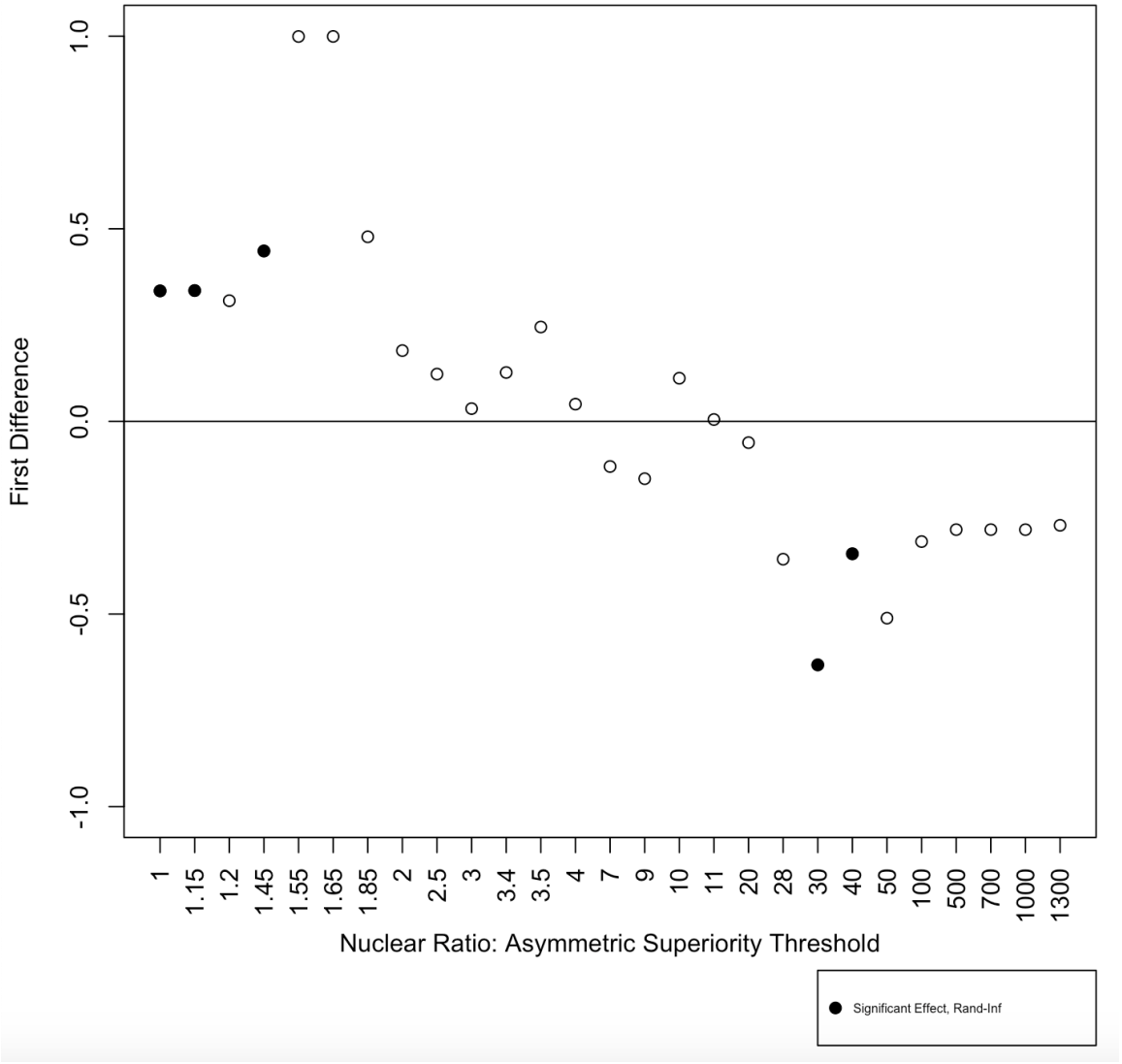


Figure 5: Difference in Probability of Victory for Superiority vs. Inferiority, Dropping France in Berlin Wall (Rand. Inf)



Appendix D: Collapsing Alliances

In some crises, there are multiple states on the same side with the same goals. For example, in the Berlin Wall crisis, the United States, United Kingdom, and France were all on one side, in opposition to the Soviet Union. The allied states all wanted the partition to remain and did not want to comply with the Soviet Union's demands for a new agreement. In the ICB dataset, there are separate dyads representing the crisis between the Soviet Union and each of these Western allies. These dyads should not necessarily be treated as separated observations in an empirical analysis, however. First, the size of the United States arsenal, or at least the combined size of the U.S. and the allies' arsenals, was relevant in crisis bargaining between the Soviet Union and the United Kingdom or France. Second, the outcome of the crisis for either of these dyads was not independent from the outcome of the crisis between the United States and the U.S.S.R. If the U.S. emerged victorious, then the United Kingdom and France would as well, since all three states had the same goals.

Previous work on this topic from[2] and[3], however, analyzed these crises as separate dyads. For the sake of comparability, in our main empirical analysis, we follow their lead. As a robustness check, however, we remove the Berlin Wall crisis directed-dyads for the United Kingdom and France. We assume the United States and Soviet Union directed-dyads (US-USSR) and (USSR-US) fully represent the crisis between the Western allies and the Soviet Union. In other words, the relative sizes of the U.S. and Soviet arsenals are considered the only relevant nuclear ratios for determining the outcome of the Berlin Wall crisis. We also remove the United Kingdom and Soviet Union directed-dyads in the Berlin Deadline crisis. Figures 6 and 7 show the results after implementing these changes, which support the main findings and even strengthen them, since superiority has a significant, negative effect beyond a threshold of 28.

2. Kroenig 2013.
3. Sechser and Fuhrmann 2013.

Figure 6: Difference in Probability of Victory for Superiority vs. Inferiority, Collapsing Alliances

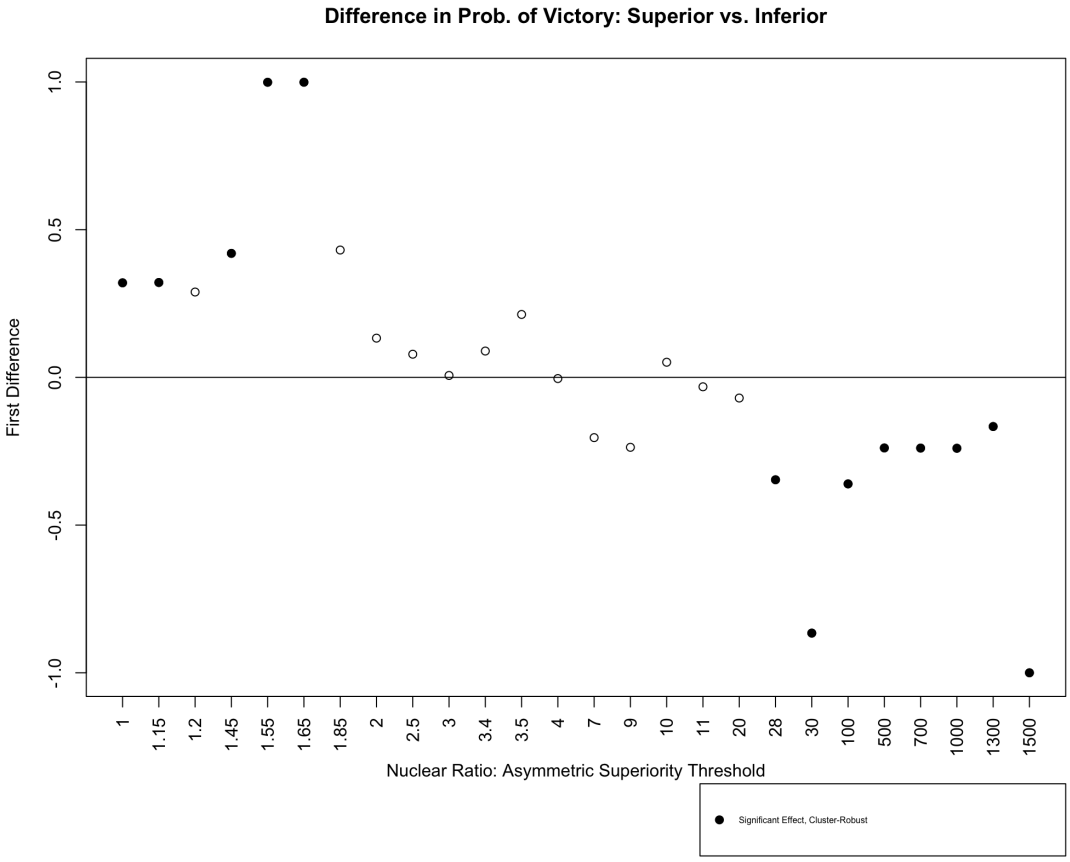
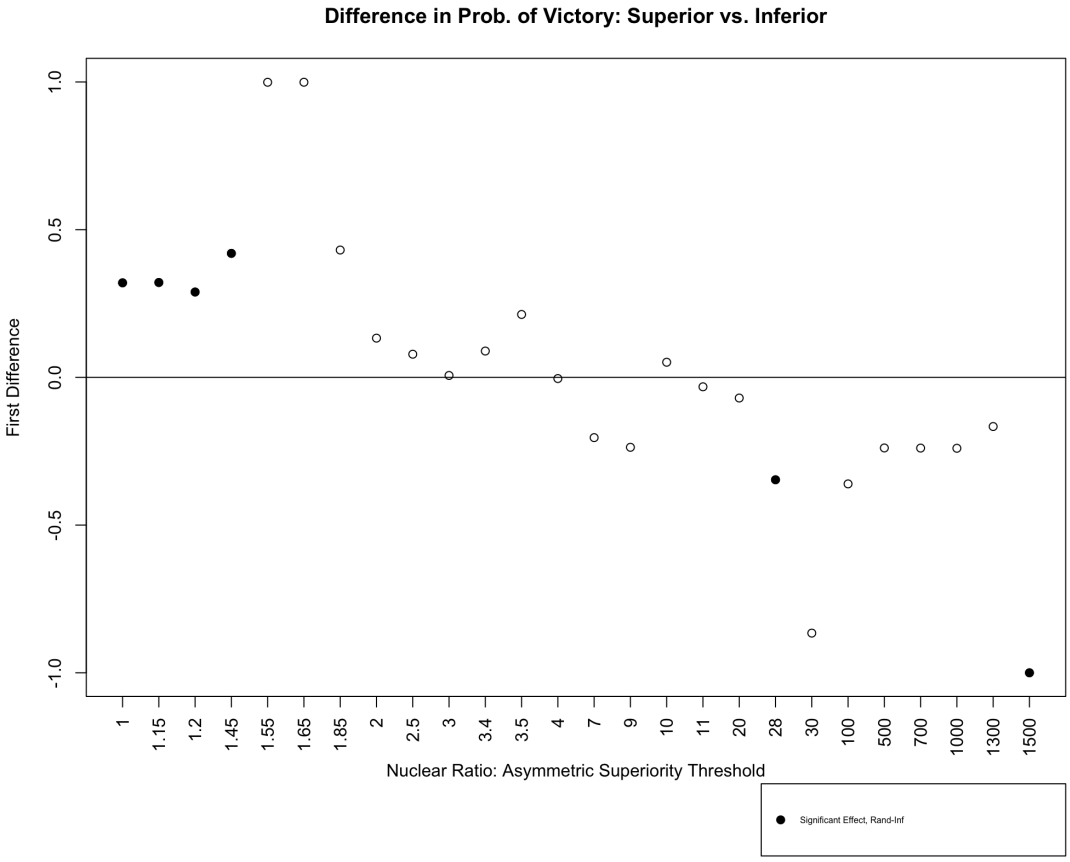


Figure 7: Difference in Probability of Victory, Collapsing Alliances (Rand. Inf)



In addition to the Berlin Wall and Berlin Deadline crises, there are multiple nuclear states on the same side in the Suez Nationalization crisis, Six Day War, War of Attrition, and Yom Kippur War. In these four crises, however, we do not believe that the allied states had the same goals. For example, in the Suez Crisis, the United States hoped to avoid a large-scale conflict in the Middle East, while the United Kingdom wanted to maintain European control over the Suez Canal and associated corporate entities. When allied states do not have the same goals, the outcome of the crisis for one dyad in the alliance *is* independent from the outcome for other dyads. The nuclear balance between individual states may also be more relevant than in cases where allies have the same goal. Thus, for the four crises listed above, we do not collapse the alliances into a single set of directed-dyads. In the next Appendix, however, we address concerns that the United States and/or the Soviet Union may not have been relevant actors in some of these crises.

Appendix E: Dropping Potentially Non-Nuclear Crises

The existence of a nuclear crisis between particular states may be debatable in a few cases. First, one could argue that the Six Day War should not be considered a nuclear crises between the US and USSR nor between the USSR and Israel. On one hand, while the US supported Israel during this conflict, and the Soviets supported the Arab states, the risk of superpower confrontation may have been low. Additionally, though the Soviets supported Israel's enemies, one could argue that Moscow's clients were directly involved in a crisis with Israel - but the Soviet Union itself was not. On the other hand, (Kroenig 2013) and (Kroenig 2018) treat the 1967 war as a nuclear crisis between the US and USSR and between the USSR and Israel. The ICB data from (Brecher et al. 2021) also considers the US and USSR to be key actors in this crisis. Moreover, the Soviets did issue formal demands at the UN for Israel's withdrawal from Arab lands on June 5 and 7-8, and even threatened to intervene militarily if Israel went farther in the Golan on June 10.[4]

Second, one might also ask if the War of Attrition should be considered a nuclear crisis between the USSR and Israel. (Kroenig 2013) and (Kroenig 2018) treat it as a nuclear crisis between the USSR and Israel, and the ICB data from (Brecher et al. 2021) also considers the USSR to be a key actor in this crisis. Moreover, during the War of Attrition, the USSR and Israel directly clashed. In March 1969, Soviet missile batteries were installed near the Suez Canal, and Israel responded by bombing these sites on March 24.[5] Then, on April 19, 1969, Israeli and Soviet military personnel clashed.

Third, the existence of a USSR vs. Israel nuclear crisis in the Yom Kippur war is also debatable. However, the (Brecher et al. 2021) documentation of this crisis reveals that the Soviets did, in fact, threaten unilateral intervention to stop Israel's advance on the West Bank of the Suez Canal on October 24, 1973. While the US and USSR certainly dealt primarily with each other during this crisis, the Soviets directly threatened intervention if Israel did not do certain things, suggesting the crisis had a USSR vs. Israel aspect.

4. See Golan 1990, 12-13.
5. See the summary of the War of Attrition in the crisis summaries from (Brecher et al. 2021).

Finally, one might argue that the Congo-II and Nicaragua MiG-21s crises did not include a nuclear element. In the Congo crisis, however, the Soviets accused the United States of "aggressive intervention" after the U.S. dispatched paratroopers to rescue foreign hostages being held by Soviet-backed rebels, suggesting the risk of confrontation between the nuclear superpowers.[6] In the Nicaragua crisis, reports emerged that the Soviet Union had shipped MiG-21s, nuclear capable fighter planers, to the Sandinista regime. According to (Brecher et al. 2021), U.S. officials began making analogies to the Cuban Missile Crisis, suggesting that - at least for certain people in the U.S. government - the crisis had a nuclear element.

Thus, for all these cases, we keep these observations in the main analysis. However, Figures 8 and 9 report the results from a robustness check that drops both the US vs. USSR dyads in the Six Day War, both the USSR vs. Israel dyads in the Six Day War, War of Attrition, and Yom Kippur War, both the US-USSR dyads in the Congo II crisis, and both the US-USSR dydas in the Nicaragua MiGs-21s crisis. The results contradict our main finding; nuclear superiority now has a significant, positive effect on the likelihood of victory at highly asymmetric levels of superiority. The findings suggest these eliminated cases partially drove our main findings. However, for the reasons described above, there is reason to treat them as nuclear crises. Moreover, dropping these dyads eliminates 12 observations, including all the cases of nuclear superiority at the 1300:1 or 1500:1 thresholds. Thus, the results cannot assess the impact of nuclear superiority in cases of extreme asymmetry.

6. (Brecher et al. 2021).

Figure 8: Difference in Probability of Victory for Superiority vs. Inferiority, Dropping Some Potentially Non-Nuclear Cases

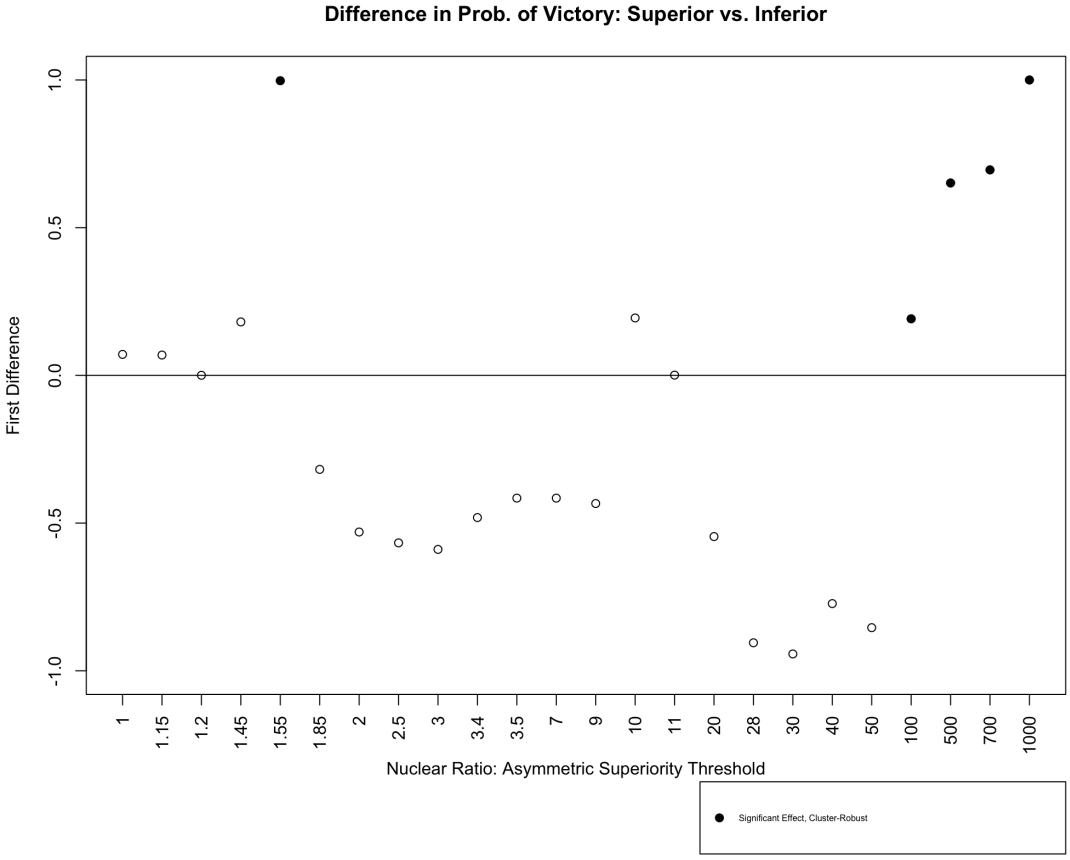
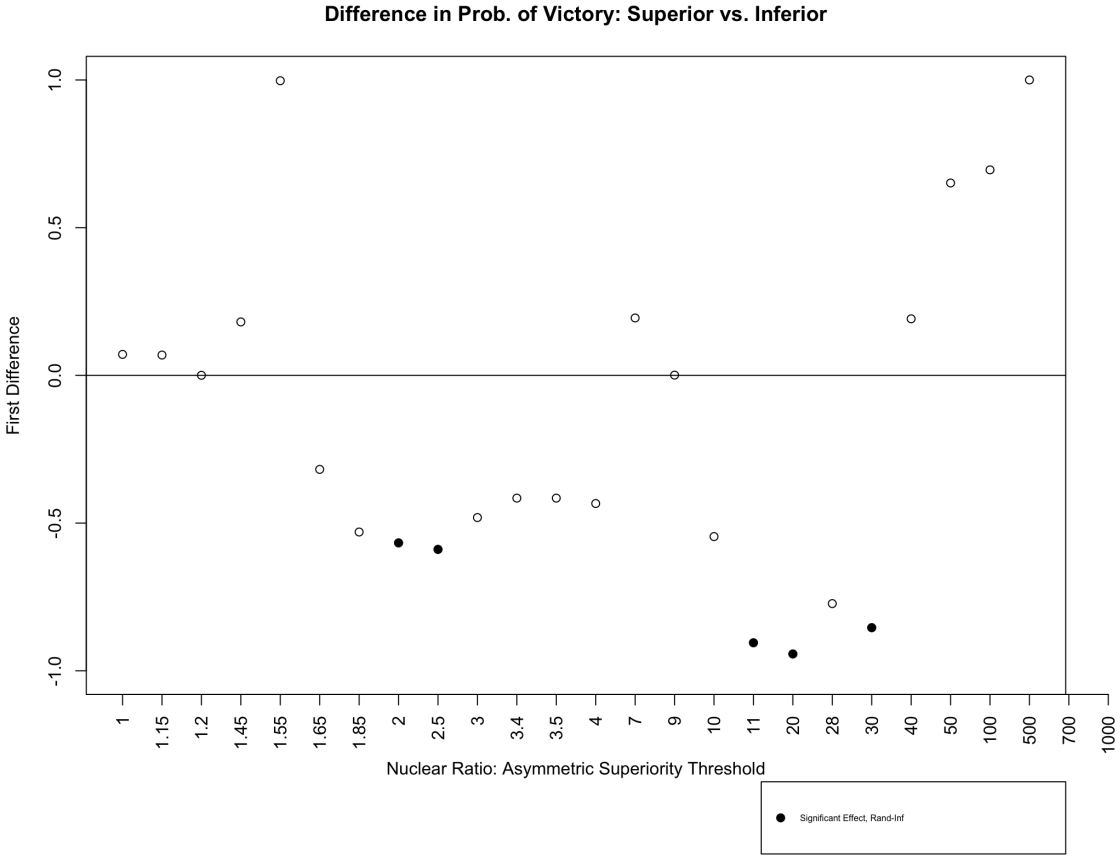


Figure 9: Difference in Probability of Victory, Dropping Some Potentially Non-Nuclear Cases (Rand. Inf)



Appendix F: Recoding Two Outcomes to Reflect Historical Record

In this robustness check, we make two changes to the ICB coding of outcomes. Specifically, we first recode the Korean War as a stalemate, rather than a victory for the Soviet Union. This change is in line with previous work on this topic.[7] Second, we recode the Berlin Wall crisis as a draw for all dyads involved, rather than a Soviet victory. This changes reflects the understanding of several historians of the crisis. According to the ICB crisis summary, the crisis ended for France and the United Kingdom when Khrushchev withdrew his demands for a German peace treaty by years-end. Similarly, Trachtenberg 1999 argues that the Western Powers' primary goal in the Berlin Wall crisis was to maintain the status quo in West Berlin - not to impact what occurred in East Berlin. When Khrushchev withdrew his demands, it solidified a status quo in West Berlin that the United States supported.[8] Additionally, Betts 1987 argues that the United States achieved more of their goals than the Soviets did during the Berlin Wall Crisis.

While the change to the Korean War outcome is in line with our hypotheses, the asymmetrically inferior state involved in the Berlin crisis (France) did not face high stakes from backing down to Soviet demands.[9] Thus, our theory would not necessarily predict a draw in this case. With these changes, the main empirical findings are strengthened, demonstrating that nuclear superiority has a positive, significant effect on victory at low to middle levels of superiority - but a negative, significant effect on victory at high levels of superiority. On balance, we believe these changes accurately reflect the historical record. In our primary empirical analysis, however, we used the original ICB codings for comparability with other work on crises.

7. Kroenig (2013) does the same, but he also recoded the Soviet Union as the victor in the 1969 border crisis. ICB coded the Sino-Soviet crisis as a stalemate, since China did not make concessions in the negotiations that ultimately ended the crisis. Moreover, the role that nuclear weapons played in the crisis is debated. While some scholars have argued that Soviet nuclear superiority helped bring China to the negotiating table, newer work has suggested that U.S. diplomacy and other background geostrategic factors, such as the ongoing SALT Talks, played a larger role. Thus, we do not adopt Kroenig's change on the outcome of this crisis. However, we provide a robustness check that utilizes Kroenig's codings in Appendix G. See: Cho 2018; Sechser and Fuhrmann 2017.

8. See Trachtenberg 1999, Chapter 8.

9. We provide robustness tests that drop the France-USSR Berlin Wall dyad (Appendix C).

Figure 10: Difference in Probability of Victory for Superiority vs. Inferiority, Recoded Outcomes

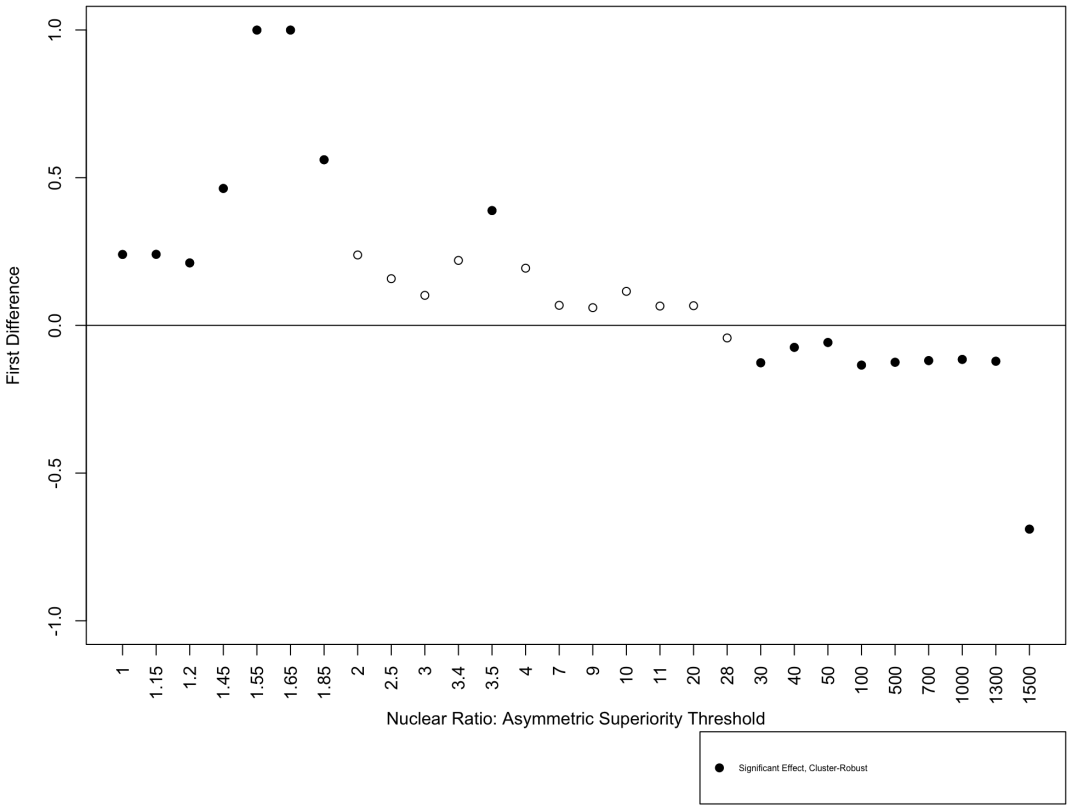
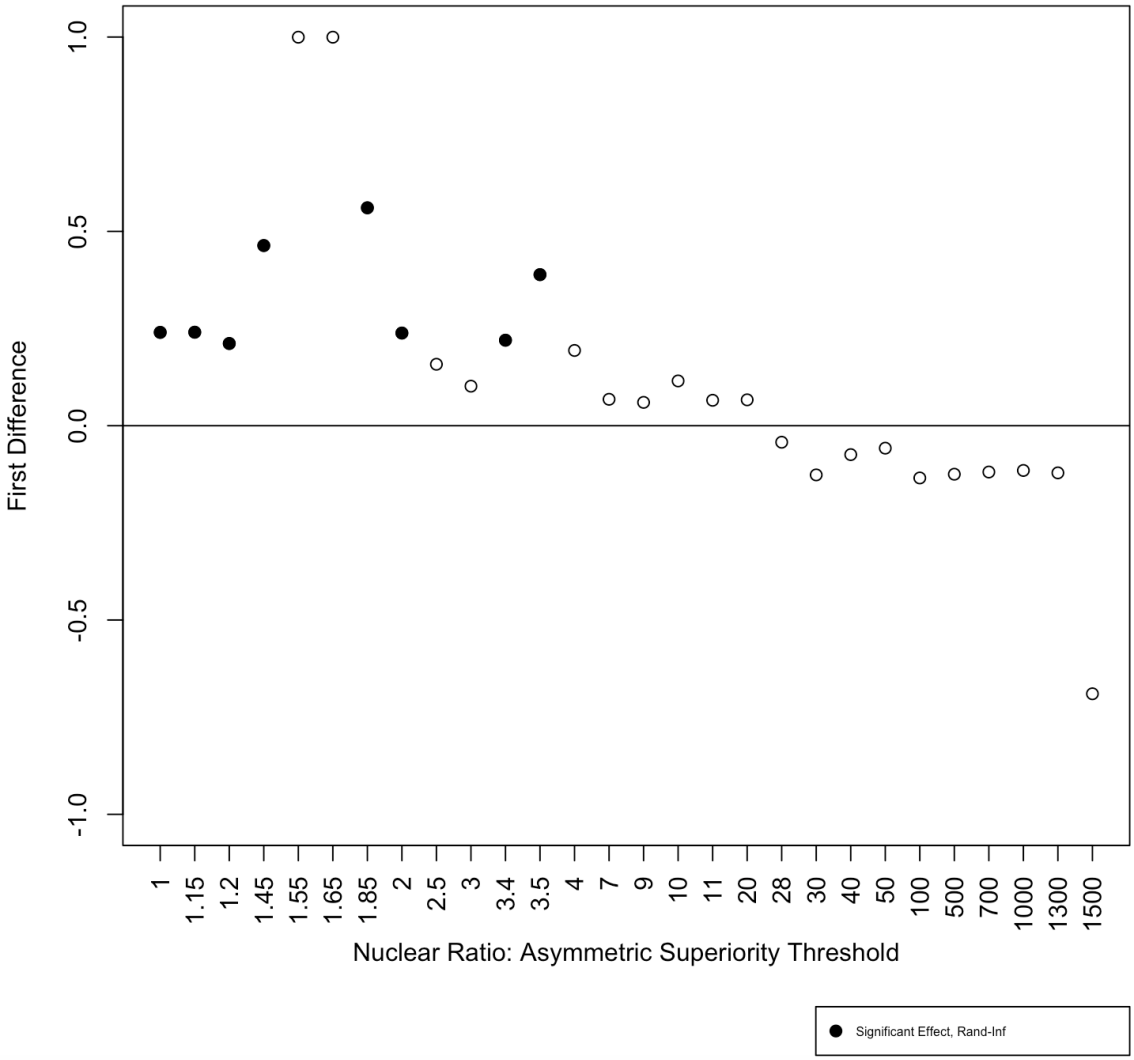


Figure 11: Difference in Probability of Victory, Recoded Outcomes (Rand Inf.)



Appendix G: Kroenig 2013 Outcome Codings

In this robustness check, we adopt Kroenig's outcome codings for the ICB data from Kroenig (2013). In contrast to ICB, Kroenig codes the Korean War as a stalemate. Kroenig also codes the Ussuri River crisis as a victory for the Soviet Union, rather than a stalemate. The findings from these models again illustrate that nuclear superiority provides a statistically significant advantage over opponents with similarly-sized arsenals. However, the effect of nuclear superiority is insignificant or negative in asymmetric crisis-dyads.

Figure 12: Difference in Probability of Victory for Superiority vs. Inferiority, Kroenig Outcomes

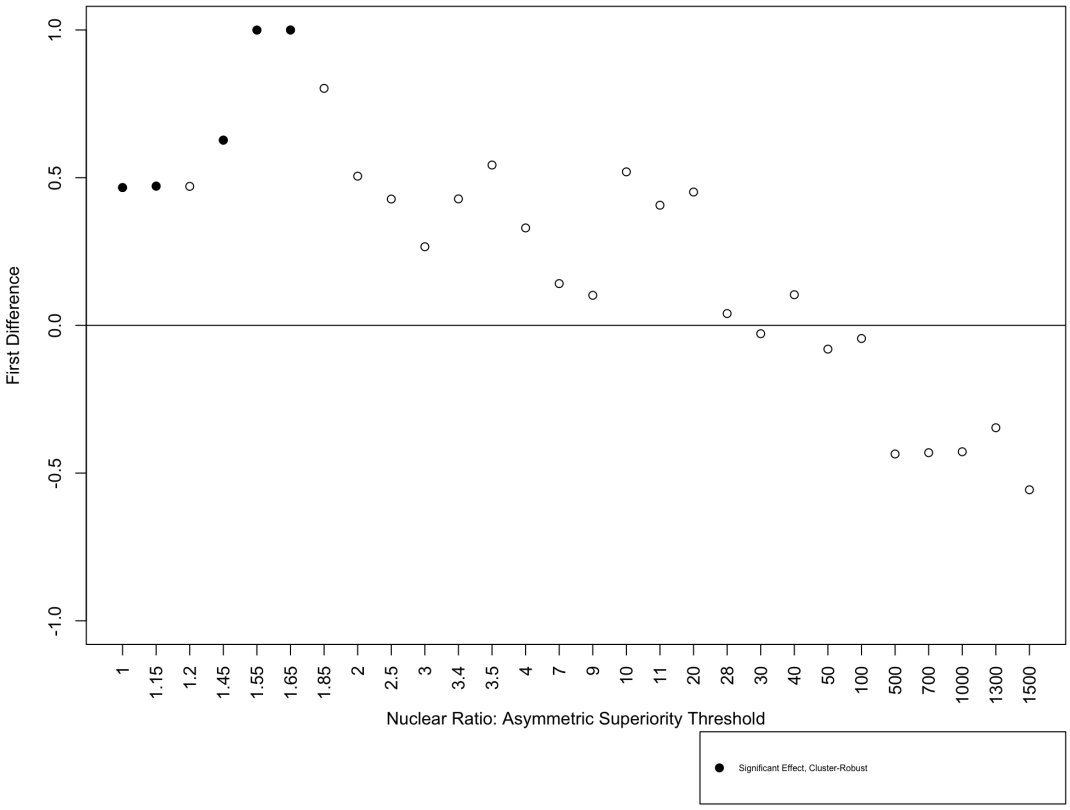
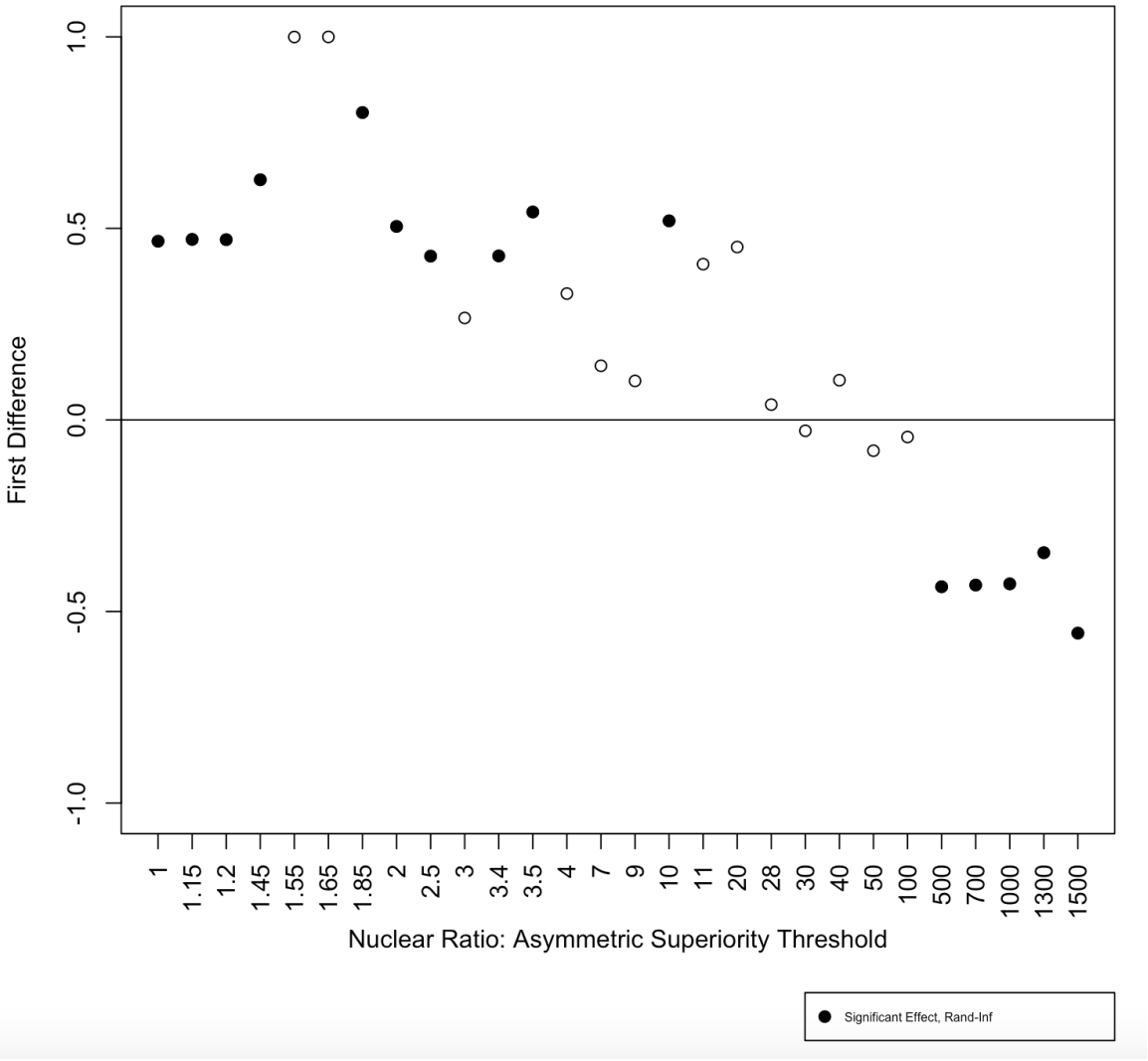


Figure 13: Difference in Probability of Victory, Kroenig Outcomes (Rand Inf.)



Appendix H: Nuclear Ratio

The results shown in Table 1 demonstrate that the nuclear ratio, measured on a 0 to 1 scale, has a positive effect on the probability of victory when using the Appendix F outcome re-codings or the outcome codings from Kroenig 2013. As the ratio between the size of a state's nuclear arsenal and the size of its opponent's arsenal increases, the probability that the state wins a crisis also increases. However, the effect of the nuclear ratio is not statistically significant when using the original ICB outcome codings.

Table 1: Effect of Nuclear Ratio on Probability of Victory

	Victory:		
	(Appendix F Re-Codings)	*(ICB Codings)*	*(Kroenig's Codings)*
Nuclear Ratio	10.756*	3.089	6.625*
	(5.630)	(3.365)	(3.866)
Proximity	6.307**	3.163***	2.984**
	(2.961)	(1.178)	(1.166)
Polity	0.182***	0.076	0.033
	(0.065)	(0.059)	(0.053)
Capabilities	−4.085	3.037	−2.499
	(4.755)	(3.527)	(4.065)
2nd Strike	3.890	3.215**	3.239**
	(2.749)	(1.406)	(1.415)
Population	0.00000	−0.00000	0.00000
	(0.00000)	(0.00000)	(0.00000)
Violence	1.533**	0.521*	0.546
	(0.641)	(0.277)	(0.334)
Security	−9.117	−13.012**	−9.182
	(13.196)	(5.934)	(6.901)
Constant	−15.030***	−6.094***	−6.531***
	(5.791)	(1.659)	(1.973)
Note:			*p<0.1; **p<0.05; ***p<0.01

The descriptive statistics provided in this paper suggest using the nuclear ratio yields a flawed picture of the relationship between superiority and victory, however. Table **??** indicates states with vastly inferior and slightly superior nuclear arsenals tend to win crises or end up in draws, which means that the relationship between the nuclear ratio and victory should look like a wave. At the lowest levels of the overall ratio, such as 1:4000 or 1:1000, the probability of victory will be high, but this probability will decline as the ratio approaches 1:1. As the ratio grows from 1:1 to around 10:1, the probability of victory will increase, before falling again as the ratio approaches 1000:1. Since there are more cases of low to medium levels of superiority in the data, or rough symmetry, than vast asymmetry, the overall effect of the nuclear ratio may be positive. Nevertheless, those results would not tell the full story.

Therefore, we create a dichotomous measure that captures changes in the degree of superiority a state has over its opponent. This measure essentially breaks up the directed-dyad-year observations into three categories: vast asymmetric inferiority of State A (predict victory or draw), symmetry of States A and B (no clear pattern predicted), and vast asymmetric superiority of State A (predict loss or draw). Our results confirm that states with vast superiority over their opponents rarely achieve victory in crises.

Appendix I: Crises between Nuclear & Non-Nuclear State

Below, we provide summary statistics for crises between a nuclear power and a non-nuclear state. In some ways, these cases represent the ultimate asymmetric crises. Nuclear states have infinitely more nuclear weapons than non-nuclear states. However, our theory posits that vastly inferior states can deter superior opponents by showing their resolve to use their nuclear weapons. Vastly inferior states that have nuclear weapons can threaten to inflict significant amounts of damage on the superior state. The damage from a nuclear attack would be unacceptable to superior states, given that their core interests are not at stake during crises with vastly inferior opponents. Because a non-nuclear state cannot threaten this kind of damage, it may not be able to prevent a superior opponent from winning the crisis.

Thus, it is not clear that our theory should apply to these cases. More specifically, because non-nuclear states cannot threaten the same level of damage that an asymmetrically inferior nuclear state can, our theory does not imply that non-nuclear states will necessarily prevail in crises the way that asymmetrically inferior ones might.

The role of nuclear weapons in crises between nuclear and non-nuclear states may also be different than the role of nuclear weapons in crises between nuclear states. The nuclear taboo is particularly salient when an opponent does not possess nuclear weapons at all. In some cases, nuclear states have made explicit commitments not to use nuclear weapons against non-nuclear states. As a result, nuclear threats may not occur in crises with non-nuclear opponents, or nuclear threats may not be credible in such crises.

Interestingly, however, we find some evidence that nuclear powers do not enjoy a consistent advantage in crises with non-nuclear powers. Table 2 demonstrates that nuclear powers fail to achieve their goals fully in 56% of crises with non-nuclear states. While nuclear states are 28% more likely to achieve victory than their non-nuclear opponents, and 17% less likely to suffer total defeat than their non-nuclear opponents, nuclear states are not more likely to achieve victory than to fail. These findings suggest that total nuclear superiority does not make victory more likely than failure in a crisis.

This finding is not driven by the stakes mechanism we propose in the paper, however. Tables 3 and 4 break down the outcomes for each side by stakes[10], while 5 reports the difference in means. When both sides have high stakes or only the non-nuclear state has high stakes, the nuclear state is about as likely to achieve victory as it is to fail. The nuclear state is less likely to achieve victory than to fail if it has high stakes, but the non-nuclear state does not, or if neither has high stakes. These findings suggest that cases where the non-nuclear state has high stakes are not driving the draws, stalemates, and compromises. There is some other reason why nuclear states fail to achieve their goals more than half the time. This finding is unsurprising, however. As stated above, our hypotheses rely on the ability of the asymmetrically inferior state to inflict significant damage on its superior opponent, so our theory should not necessarily apply to these cases.

10. High stakes indicates that the states' faced a political threat, a territorial threat, a threat of grave damage, or an existential threat - according to ICB - in the crisis.

Table 2: Outcomes of Nuclear vs. Non-Nuclear Crises

		Did Not Achieve Goals Fully			
	Victory	Compromise	Stalemate	Defeat	None
Outcome for Nuclear State	0.44	0.28	0.21	0.07	0.00
Outcome for Non-Nuclear State	0.16	0.26	0.21	0.25	0.12
Diff-in-Means	0.28	0.03	-0.01	-0.17	-0.12

Table 3: Mean Outcome for Nuclear State in Crisis with Non-Nuclear State, by Stakes

		Did Not Achieve Goals Fully			
	Victory	Compromise	Stalemate	Defeat	None
Both High Stakes	0.46	0.23	0.23	0.08	0.00
Only Nuclear State High Stakes	0.27	0.40	0.33	0.00	0.00
Only Non-Nuclear State High Stakes	0.51	0.21	0.19	0.09	0.00
Neither High Stakes	0.36	0.39	0.18	0.07	0.00

Table 4: Mean Outcome for Non-Nuclear State in Crisis with Nuclear State, by Stakes

		Did Not Achieve Goals Fully			
	Victory	Compromise	Stalemate	Defeat	None
Both High Stakes	0.12	0.15	0.31	0.42	0.00
Only Nuclear State High Stakes	0.13	0.07	0.27	0.07	0.47
Only Non-Nuclear State High Stakes	0.19	0.34	0.20	0.27	0.00
Neither High Stakes	0.16	0.25	0.16	0.16	0.27

Table 5: Difference btw Mean Outcome for Nuclear vs. Non-Nuclear States, by Stakes

		Did Not Achieve Goals Fully			
	Victory	Compromise	Stalemate	Defeat	None
Both High Stakes	0.35	0.08	-0.08	-0.35	0.00
Only Nuclear State High Stakes	0.13	0.33	0.07	-0.07	-0.47
Only Non-Nuclear State High Stakes	0.33	-0.13	-0.01	-0.19	0.00
Neither High Stakes	0.20	0.14	0.02	-0.09	-0.27

The tables in this section of the Appendix include an outcome labeled *none.* When the ICB data is converted to a dyadic format,[11] certain actors are added. For example, the ICB dataset considers the Soviet Union the only actor in the Able Archer exercise, and the United States the only actor in the Cienfuegos Submarine Base crisis, but the dyadic version of ICB includes these cases as crises between the Soviet Union and the United States. Similarly, the ICB dataset treats the Taiwan Straits IV case as a crisis solely between China and Taiwan, and the Nicaragua MiGs-21s crisis as between the US and Nicaragua, but the dyadic dataset also includes the United States and Soviet Union, respectively. We followed previous work and included these additional actors in our nuclear crisis dataset.[12] For crises between nuclear and non-nuclear states, there are also several cases where the dyadic version of ICB introduced actors that were not in the original ICB dataset. For example, the first Cod War is treated as a crisis between the United Kingdom and Iceland, but the dyadic version also includes a dyad between the Soviet Union and the United Kingdom.

However, the dyadic data does not include information on the outcomes of crises. Therefore, for actors who were not in the original ICB dataset, outcomes are not available- and are labeled ”none” in the tables. One way to interpret this is to assume that these states did not fully acheive their goals in this crisis, which is how this outcome is categorized in the tables. States that are not included in the original ICB data did not have clear goals in the crisis. The lack of clear goals in a crisis contributes to the exclusion of actors from the original ICB dataset; only the actors most directly involved in a crisis are included. Often, states that are included in the dyadic data, but that are excluded the non-dyadic data, are coded as such because they became indirectly involved in crises in order to assist their allies. The crisis may then not involve their own interests, outside of the joint interests of the alliance.

On the other hand, if not having goals in the first place eliminates the possibility of achieving them, it should also eliminate the possibility of failing to achieve them. Moreover, states that were not considered part of the crisis originally, but who were allied with one of the original actors, may have had the same goals as the ally.

11. Hewitt 2003; Hewitt et al. 2020
12. Kroenig 2013.

Appendix J: Superiority Ratios in Symmetric and Asymmetric Crises

The exact ratio of the superior state's arsenal to the inferior state's arsenal for every crisis is shown in the following figures.

Figure 14: Nuclear Ratios in Symmetric Crises

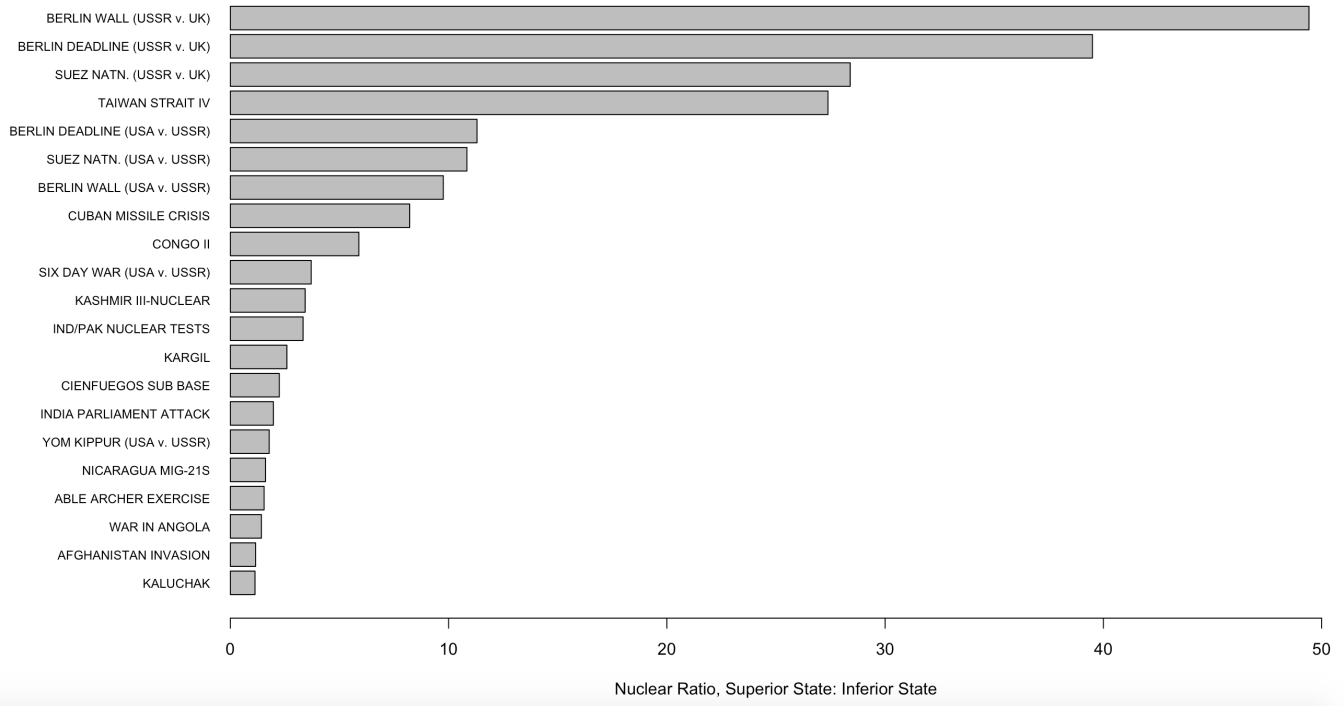
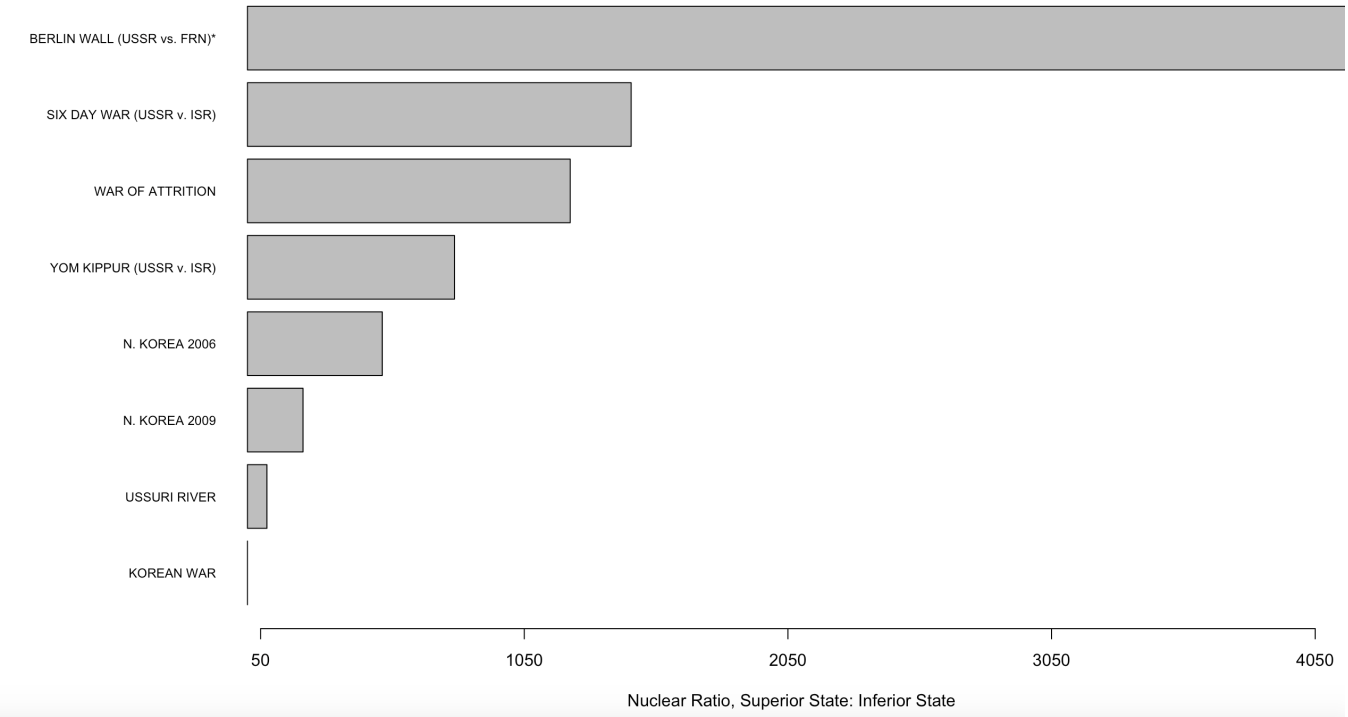


Figure 15: Nuclear Ratios in Asymmetric Crises



Appendix K: Alternate Binary Superiority Measure

Here we test a simpler, binary measure of superiority, where superiority is the condition where one state possesses a second-strike capability and a nuclear arsenal at least thrice the size of its opponent's arsenal. This operationalization reflects a stylized standardization of the capabilities that are presumed to be sufficient for one state to be confident that it could adequately damage the other side's nuclear arsenal in a first strike or respond with nuclear capabilities in a second strike. This operationalization of superiority reflects the fact that nuclear targeting often assigns multiple nuclear weapons per target.[13] It also recognizes that nuclear strategists have long emphasized the necessity of survivable capabilities that ensure retaliatory abilities. Using both logit models and randomization inference models, with and without the inclusion of a measure of stakes, and using both the original ICB outcome measures and the re-coded versions from Kroenig 2013, we find no effect of superiority on the likelihood of victory.

13. In damage estimates, Kroenig 2018 presumes that states would assign up to three nuclear weapons to each target.

Table 6

	Dependent variable:			
	Original ICB Outcomes		Kroenig's Outcomes	
Superiority◎	0.110	−0.338	0.662	0.489
	(1.416)	(1.407)	(1.323)	(1.475)
	Rand. p-0.484		*Rand. p*-0.306	
Stakes		−1.832*		−1.152
		(1.071)		(0.904)
Proximity	2.671***	3.595***	1.845**	2.261**
	(0.958)	(1.239)	(0.930)	(1.045)
Polity	0.115*	0.164**	0.100*	0.124*
	(0.063)	(0.071)	(0.056)	(0.068)
Capabilities	6.904**	8.456***	4.765*	5.184
	(2.723)	(2.828)	(2.694)	(3.220)
Second Strike	3.378**	5.109**	2.929***	3.515**
	(1.549)	(2.104)	(1.092)	(1.607)
Population	−0.00000	−0.00000**	−0.00000	−0.00000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Violence	0.483*	0.545**	0.435	0.435
	(0.275)	(0.255)	(0.287)	(0.268)
Security	−13.044**	−19.957**	−8.057*	−10.667
	(5.996)	(8.155)	(4.638)	(6.773)
Constant	−6.019***	−6.527***	−5.548***	−5.470***
	(1.555)	(1.736)	(1.560)	(1.687)

Note: ◎ = State possesses a second-strike capability and an arsenal 3x larger than its opponent's.
*p<0.1; **p<0.05; ***p<0.01

Appendix L: Regression Tables

Tables 7 and 8 report the regression results that are represented in Figure **??**, a regression of crisis victory on superiority across different superiority thresholds.

Table 7: Effect of Superiority on Crisis Victory, by Threshold

	Dependent variable:													
	(1)	(1.15)	(1.2)	(1.45)	(1.55)	(1.65)	(1.85)	(2)	(2.5)	(3)	(3.4)	(3.5)	(4)	(7)
Superiority	2.689*	2.690*	2.603	3.868*	21.324***	21.634***	3.656	1.804	1.371	0.508	1.234	1.929	0.476	−0.881
	(1.541)	(1.561)	(1.827)	(2.112)	(2.229)	(2.365)	(3.018)	(2.618)	(2.656)	(2.270)	(2.252)	(2.451)	(2.328)	(2.360)
Parity		−8.055**	2.365**	3.624**	3.214*	3.236*	1.845	1.638	1.625	1.487	1.067	1.018	0.312	−0.185
		(3.228)	(1.150)	(1.452)	(1.904)	(1.903)	(1.935)	(1.706)	(1.722)	(1.502)	(1.426)	(1.499)	(1.462)	(1.500)
Proximity	3.244***	3.240***	3.389***	3.250***	19.642***	19.452***	2.810**	2.650***	2.635***	2.646***	2.861**	3.117**	2.736**	2.530**
	(0.979)	(0.990)	(1.091)	(1.104)	(1.347)	(1.328)	(1.143)	(0.922)	(0.967)	(0.974)	(1.112)	(1.320)	(1.113)	(1.006)
Regime	0.060	0.060	0.063	0.042	0.006	−0.013	0.025	0.069	0.078	0.094	0.092	0.093	0.110*	0.118**
	(0.063)	(0.063)	(0.067)	(0.068)	(0.078)	(0.098)	(0.086)	(0.080)	(0.072)	(0.063)	(0.062)	(0.063)	(0.062)	(0.059)
Capabilities	3.253	3.241	3.702	1.572	−0.796	−1.853	0.846	4.243	5.131	6.920**	5.560**	4.765**	6.495**	8.246***
	(2.956)	(3.009)	(3.239)	(3.069)	(3.150)	(4.248)	(4.418)	(4.071)	(3.827)	(3.266)	(2.621)	(2.321)	(2.590)	(3.087)
2nd Strike	3.299**	3.290**	3.372**	3.683**	3.157**	2.858*	3.142**	3.636**	3.864**	4.139**	3.493**	3.246**	3.463**	3.593**
	(1.455)	(1.486)	(1.512)	(1.715)	(1.557)	(1.482)	(1.542)	(1.554)	(1.631)	(1.646)	(1.502)	(1.358)	(1.428)	(1.529)
Population	−0.00000	−0.00000	−0.00000	−0.00000	−0.00000	−0.00000	−0.00000	−0.00000*	−0.00000*	−0.00000**	−0.00000	−0.00000	−0.00000	−0.00000*
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Violence	0.514*	0.514*	0.519*	0.528*	0.528*	0.502*	0.513*	0.494*	0.501*	0.492*	0.501*	0.512*	0.485*	0.455
	(0.269)	(0.272)	(0.277)	(0.292)	(0.274)	(0.272)	(0.265)	(0.269)	(0.270)	(0.287)	(0.273)	(0.277)	(0.286)	(0.290)
Security	−13.421**	−13.389**	−13.957**	−15.792**	−13.225*	−11.915*	−12.743*	−15.530**	−16.797**	−18.613**	−14.457**	−13.142**	−13.569**	−14.152*
	(5.999)	(6.121)	(6.341)	(7.721)	(7.187)	(7.139)	(7.475)	(7.232)	(7.587)	(7.614)	(6.748)	(6.229)	(6.587)	(7.415)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 8: Effect of Superiority on Crisis Victory, by Threshold

	Dependent variable:													
	(9)	(10)	(11)	(20)	(28)	(30)	(40)	(50)	(100)	(500)	(700)	(1000)	(1300)	(1500)
Superiority	−1.175	1.457	0.354	−0.484	−4.862	−6.211*	−3.082	−5.303	−2.502	−2.194	−2.197	−2.202	−0.734	−0.370
	(2.638)	(3.266)	(3.732)	(4.685)	(3.199)	(3.524)	(3.007)	(3.395)	(3.601)	(3.660)	(3.661)	(3.661)	(2.880)	(3.124)
Parity	−0.276	1.171	1.084	0.347	−1.089	−1.892	−0.934	−1.372	−0.091	0.007	0.004	0.001	−0.045	−1.365
	(1.546)	(1.755)	(1.694)	(2.210)	(1.594)	(1.627)	(1.536)	(1.464)	(1.644)	(1.655)	(1.656)	(1.657)	(1.500)	(1.507)
Proximity	2.383**	2.961**	2.607**	2.485**	2.169**	1.829*	2.331**	2.552**	2.423**	2.592***	2.592***	2.591***	2.607***	2.635***
	(1.114)	(1.404)	(1.146)	(1.064)	(1.013)	(1.045)	(1.099)	(1.232)	(0.977)	(0.973)	(0.973)	(0.973)	(0.951)	(1.020)
Regime	0.114*	0.109	0.096	0.102	0.077	0.067	0.099	0.112*	0.093	0.103	0.103	0.103	0.111*	0.120*
	(0.061)	(0.075)	(0.074)	(0.072)	(0.059)	(0.053)	(0.062)	(0.068)	(0.066)	(0.065)	(0.065)	(0.065)	(0.063)	(0.064)
Capabilities	8.403***	5.934**	6.848*	7.557	12.598***	13.366***	9.820***	12.134***	8.683***	8.762***	8.765***	8.768***	7.394***	6.992***
	(2.959)	(2.409)	(3.598)	(4.814)	(4.354)	(4.565)	(3.125)	(3.996)	(3.113)	(3.292)	(3.287)	(3.281)	(2.252)	(1.951)
2nd Strike	3.526**	3.797**	3.523**	3.588*	4.801**	4.896**	3.715**	3.666**	3.454**	3.535**	3.535**	3.536**	3.467**	3.691**
	(1.486)	(1.787)	(1.762)	(1.893)	(2.195)	(2.251)	(1.580)	(1.659)	(1.439)	(1.456)	(1.453)	(1.451)	(1.395)	(1.550)
Population	−0.00000*	−0.00000	−0.00000	−0.00000	−0.00001*	−0.00001*	−0.00000*	−0.00001*	−0.00000*	−0.00000*	−0.00000*	−0.00000*	−0.00000*	−0.00000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Violence	0.445	0.528*	0.464*	0.473*	0.486*	0.474*	0.496*	0.617**	0.528**	0.527**	0.527**	0.527**	0.470*	0.554*
	(0.288)	(0.287)	(0.261)	(0.253)	(0.260)	(0.263)	(0.262)	(0.305)	(0.250)	(0.254)	(0.254)	(0.254)	(0.263)	(0.308)
Security	−13.942*	−15.928**	−15.383**	−14.578**	−18.973**	−19.054**	−14.366**	−14.383**	−12.896**	−13.379**	−13.381**	−13.382**	−13.280**	−12.805**
	(7.211)	(8.030)	(7.032)	(6.902)	(7.970)	(8.391)	(5.981)	(6.446)	(5.862)	(5.921)	(5.909)	(5.895)	(5.476)	(5.436)

Note: *p<0.1; **p<0.05; ***p<0.01

References

Angrist, Joshua, and Jörn-Steffen Pischke. 2008. *Mostly harmless econometrics: An empiricist's companion.* Princeton University Press.

Betts, Richard. 1987. *Nuclear Blackmail and Nuclear Balance.* Brookings Institution.

Brecher, Michael, Jonathan Wilkenfeld, Kyle Beardsley, Patrick James, and David Quinn. 2021. "International crisis behavior data codebook, version 14."

Cho, Hyun-Binn. 2018. "Tying the Adversary's Hands: Provocation, Crisis Escalation, and Inadvertent War." PhD diss., University of Pennsylvania, Department of Political Science.

Golan, Galia. 1990. *Soviet Policies in the Middle East: From World War Two to Gorbachev.* Vol. 2. CUP Archive.

Hewitt, Joseph. 2003. "Dyadic-Level International Crisis Data (version 2.0), International Crisis Behavior Project."

Hewitt, Joseph, Michael Brecher, Jonathan Wilkenfield, Kyle Beardsley, Patrick James, and David Quinn. 2020. "Dyadic-Level International Crisis Data (version 13), International Crisis Behavior Project."

Kroenig, Matthew. 2013. "Nuclear Superiority and the Balance of Resolve: Explaining Nuclear Crisis Outcomes." *International Organization* 67, no. 1 (January): 141–171.

———. 2018. *The Logic of American Nuclear Strategy: Why Strategic Superiority Matters.* Bridging the gap. New York, NY: Oxford University Press.

Rosenbaum, Paul R. 1984. "The consequences of adjustment for a concomitant variable that has been affected by the treatment." *Journal of the Royal Statistical Society: Series A (General)* 147 (5): 656–666.

Sechser, Todd, and Matthew Fuhrmann. 2013. “Crisis Bargaining and Nuclear Blackmail.” *International Organization* 67 (1).

———. 2017. *Nuclear Weapons and Coercive Diplomacy.* Cambridge University Press.

Trachtenberg, Marc. 1999. *A Constructed Peace: The making of the European settlement, 1945-1963.* Vol. 79. Princeton University Press.