

The Paradox of Nuclear War Avoidance under Social Contract and Game Theories

Since the dawn of human civilization there has been conflict between people groups invariably leading to war. The need to defend and the desire to overcome the enemy have inspired human ingenuity to create increasingly terrible military weapons, defenses and strategies. In the time since the end of World War II, many nations have obtained nuclear weapons capabilities. Consequently, this has created cause for great alarm among all states, prompting them to band together under the hope of resolving the crisis of mutually assured destruction. In the past several centuries, the survivors of a long war traditionally settled their wartime losses by vowing to adhere to a social contract that rebalanced the powers of the world.¹ The legacy of the social contract concerning nuclear power between the United States and Japan was not simply a settlement for rebalancing powers. The world powers and developing states commenced a quest to prevent nuclear war and save humanity from this new terror. The Nuclear Non-Proliferation Treaty thus evolved from a request by the United Nations General Assembly that the nations form an agreement to prevent widespread distribution of nuclear weapons.² The propensity of nations to adhere to this, and similar social contracts, can be explained by a non-zero-sum game theory in which all ascribing nations can achieve valuable gains by cooperating and will meet fierce losses if any nation defects.

I. Social Contract Theory

After the dawn of the Nuclear Age in 1945, as technology progressed and spread, it became apparent that the various states would soon be able to wield weapons of assured destruction against one another. A crisis developed in which each state saw its possible demise at the hands of a future enemy state's nuclear weapon. The world fell into a status of nuclear anarchy in which no law or force could regulate or manage the worldwide accumulation and use

Lenz, C.

of nuclear weapons. In order to ensure the success of any nuclear peace treaty, it would be necessary for enemy states, both current and future, to commit to restraint. It would be necessary for this commitment to surpass both hate and fear. Such a commitment would require nations to sacrifice some of their sovereignty, even during war, to establish the higher purpose of avoiding nuclear war. A social contract is a pragmatic option where the contracting parties find it necessary and advantageous to form a stable system that will provide security amidst anarchic conditions of the Nuclear Age.³

In the absence of a world government, multinational treaties serve the purpose of implementing standards by which states can govern themselves in accord with the security needs of the collective. First, a social contract governing nuclear weapons brings nations with and without nuclear weapons capabilities together for multinational negotiations.⁴ These negotiations often evolve over the course of years and are revisited so the contract can adapt to evolving concerns and technologies. Long term negotiation results in long term communication and consequently, transparency. Such transparency is the ability of communicating parties to detect changes in the behavior, focus, intent, etc. of another nation. Therefore a state would find it difficult to hide any plans to engage in adverse behavior toward the other communicating parties.⁵ Although communication does not prevent adverse behavior, it can eliminate the element of surprise.⁶

Second, a social contract forces states to take responsibility for their share of nuclear instability and liability.⁷ By allowing states to negotiate a contract concerning their interests, allowing nations to come to an agreement which reflects their values and needs, and establishing consequences for nonconforming conduct, a social contract can aid in the deterrence of the use of nuclear weapons. The contracting states would be forced to take responsibility for establishing

Lenz, C.

the provisions of the contract. States would therefore negotiate and agree upon the very sanctions that would be implemented in response to their nonconforming actions.⁸

Responsibility in contract formation would therefore reinforce compliance with the contract.⁹

Third, since nuclear weapons effectively make military defensive forces and strategies inconsequential, they are currently the world's ultimate offensive weapon. This weapon therefore has the propensity to reinforce offensive strategies such as blackmail.¹⁰ Without a social contract requiring cooperative deterrence at the risk of sanctions, nuclear blackmail becomes a real possibility, e.g., North Korea.¹¹ Furthermore, by providing for an affirmative defense to nuclear blackmail, a social contract can be an effective tool for influencing the nuclear disarmament of nations whose main purpose in obtaining nuclear weapons was to avoid blackmail or threats of territorial, regime or population domination from stronger enemy forces (whether conventional or nuclear), e.g., Israel.¹² This is because once the threat of nuclear blackmail is removed, the purpose for procuring a nuclear arsenal is also removed. Because a nuclear arsenal is expensive to maintain, poorer nations find it cost effective to not proliferate absent the threat of nuclear blackmail.

Fourth, a social contract will no doubt set up a standard of acceptable uses and non-uses of nuclear weapons.¹³ This presupposes that the purpose of the social contract will aid in the safety of nations through the control of nuclear weapons. Such a contract would no doubt contain standards of use and consequences for non-compliance.¹⁴ An example of a standard of use of nuclear weapons is found in the NPT. The NPT prohibits non-nuclear states from attempting to acquire nuclear weapons,¹⁵ and nuclear weapons states (NWS) from attempting to help a non-nuclear state acquire nuclear weapons.¹⁶

Lastly, such a contract enumerating standard uses may aid in the process of decreasing

Lenz, C.

nuclear weapons and disarming NWS over time.¹⁷ Assuming the goal of such a contract is to establish the stability of nuclear security among the states, such a goal would inevitably come to include a process that would facilitate nuclear disarmament or at least the dormancy of nuclear military operations. This end goal is assumed at present due to the trend in popular thinking that nuclear confrontation is best avoided when the honest parties willingly disarm.¹⁸

A. Social Contracts between States.

Social contracts have long provided standards for war and peace, among other international issues. Social contracts regarding standards for war include the Hague Convention (1899), Geneva Convention (1864, last revision 1949), and North Atlantic Treaty Organization (NATO) (1949). Social contracts that have specifically provided for peaceful resolutions to conflicts between states include the Warsaw Pact (1955), Congress of Vienna (1814-1815), League of Nations (1919-1946), and the United Nations (U.N.) (1945-Present). And social contracts that have specifically dealt with regulating the state's use of conventional and nuclear weapons include the Strategic Arms Limitation Treaties (SALT I & II) (1971, 1972-79)/Strategic Arms Reduction Treaty (START I & II) (1991, 1993), Comprehensive Nuclear Test Ban Treaty (CTBT) (1996), and the Nuclear Non-Proliferation Treaty (NPT) (1968).¹⁹

B. The Problem of Sacrificing Sovereignty

In forming a social contract, it is necessary for nations to trade sovereign rights for protection against nuclear weapons. Under a social contract where safety is the binding goal, national security and the security of nations must be balanced. States must maintain their military defenses while ensuring that any activities occurring within their borders, whether state or otherwise, do not impede upon the national security of contracting nations.²⁰ Therefore the state, by contracting, loses its sovereign right to explore defense mechanisms, or tolerate or

Lenz, C.

remain willfully blind to the activities within its borders that are restricted in the social contract or can otherwise put other nations at risk of a breach in security.²¹

If nations are unwilling to sacrifice some of their sovereign rights under a social contract, they must resolve to contend with nuclear lawlessness. Without a social contract to specify the agreed upon proper uses and restrictions of nuclear weapons, such decision would be left to the separate nations.²² Therefore, a social contract serves as a nuclear deterrent.

C. International Negotiations and Mediations to Maintain a Social Contract

International negotiations and mediation have, in large part, maintained social contracts that have the purpose of preventing nuclear war. Whether such a social contract is between only NWS, or both NWS and non-NWS, mediations and negotiations have been used to deter and avoid nuclear confrontation in an effort to secure compliance with the NPT.²³ Mediations and negotiations between two or more NWS that seek to facilitate peaceful conflict resolution must center on how and why war is not the best alternative to a negotiated agreement, and how the interests and needs of the parties may be met through agreement rather than war.²⁴ An example of this idea is the Geneva Summit (1955), in which the leaders of the U.S., U.K., Soviet Union and France convened to establish better communication and ease international tensions.²⁵ Conversely, when a NWS deals with a non-NWS, in order for the “weaker” non-NWS to gain an equal playing position, the non-NWS might obtain or bluff having obtained nuclear weapons as did North Korea on October 9, 2006.

1. The United States and the Soviet Union in the Cold War

In studying the negotiations between the U.S. and the Soviet Union during the Cold War in the context of social contracts and nuclear war avoidance, we should first understand the difference between conventional and nuclear war avoidance strategies. Between nations with

Lenz, C.

only conventional weapons, a state must harness enough military might to persuade an aggressor that war would not achieve its goals.²⁶ This deterrent effect is complete after the aggressor conducts an analysis of military size, weapons, leader ambitions, etc.²⁷ However, with nuclear weapons, the deterrent effect is simple and is based on an analysis of the ability to withstand the destructive effect of a nuclear force.²⁸ Therefore, when a NWS deals with another NWS, the deterrence is effective immediately, as in the Cold War.

The Cold War is one of the few examples of confrontation between two NWS in which the involved states believed nuclear war was a real possibility. Historians claim that the Cuban Missile Crisis was the point at which the U.S. and Soviet Union came nearest to a nuclear exchange/confrontation.²⁹ During this confrontation, the leaders of the U.S. and the Soviet Union were in direct contact, and were fervently negotiating a resolution.³⁰ The aftermath of this crisis resulted in various negotiations on nuclear disarmament and specific efforts to improve communication and relations between the states including SALT I³¹ and II and the NPT.

Both states quickly retreated from conflict to negotiations because both states feared mutually assured destruction (MAD). This fear encouraged promptness and flexibility in developing solutions so as to avoid nuclear war through mutual cooperation.³² Although both nations were poised to attack, each was persuaded to negotiate peace rather than maintain any possible military advantage from sustaining their attack positions.³³ Therefore, in the case of the Cuban Missile Crisis, the Soviet Union was not willing to undergo nuclear war in order to establish world domination,³⁴ as evidenced by its willingness to negotiate in order to end this tense crisis.³⁵ In this picture of nuclear war avoidance, both states were deterred from nuclear war through the fear that if they did not resolve their conflict through negotiations, tension would result in nuclear war and total destruction of each state's cities, military forces, etc. would

Lenz, C.

ensue.³⁶ Although both nations were able to destroy the other with nuclear weapons, both states chose to sacrifice this important tactical ability for the sake of peace.³⁷ This is an illustration of effective deterrence wherein the price of nuclear war was too costly to pursue due to its immense ability to destroy.

2. Multi-Party negotiations on Disarming

Multi-state negotiations with Iran and North Korea on disarmament have provided insight into the availability of nuclear power as a bargaining tool for use with wealthy NWS for the procurement of aid and security provisions. Iran has sought economic aid through bargaining. The state is geographically situated between several NWS's that can offer security to Iran by providing nuclear weapons or security incentives. If regional NWS's provide security for Iran, that may provide incentive to Iranian leadership to follow North Korea in abandoning the NPT.³⁸ Currently, Iran remains a party to the NPT, while North Korea abandoned the NPT in 2003.³⁹

a. Iran

In 2006, Iran resumed its uranium enrichment program.⁴⁰ While this program is in compliance with the NPT, such a program provides the necessary foundation for a nuclear weapons program.⁴¹ Therefore, even though Iran's uranium enrichment program is now used to manufacture fuel for a peaceful nuclear energy program, the same uranium enrichment program could be used to manufacture fuel for nuclear weapons.⁴² Some western states, including the U.S., have maintained their belief that Iran is using its uranium enrichment program to cover up a nuclear weapons program, thus adding to the Iranian uranium enrichment program's controversy.⁴³ Since 2006, Iran has proceeded with its program, claiming the need to provide a more efficient energy source to the oil-rich nation.⁴⁴ Nations who are suspicious of Iran's program are concerned about risks to their own security if Iran does use its uranium enrichment

Lenz, C.

program to develop a covert nuclear weapons program.⁴⁵

In order to resolve the conflict between Iran and opposition to its uranium enrichment program, the EU3 (UK, France, Germany), and subsequently, the EU3+3 (adding U.S., Russia, and China) was formed to attempt negotiations with Iran.⁴⁶ Before negotiations were to take place, Iran was required to stop its uranium enrichment program, which Iran felt would weaken its bargaining position.⁴⁷ The EU3+3 parties made various offers of supplying nuclear energy including cooperation between Iran and the various EU3+3 states to fully integrate Iran in the world economy and high-tech fields, from which Iran had been previously excluded due to U.N. sanctions regarding non-compliance with the IAEA and U.N. inspections of Iran's uranium enrichment program.⁴⁸ Both attempts at negotiations fell apart due to the belief on both sides that the other was not committed to compromising to find a mutually acceptable agreement, nor seriously interested in finding a diplomatic solution.⁴⁹

b. North Korea

In 2003, North Korea withdrew from the NPT after the breakdown of the Agreed Framework between the United States of America and the Democratic People's Republic of Korea (Agreed Framework).⁵⁰ The Agreed Framework was an agreement between the U.S. and North Korea which set up a framework for replacing specific North Korean nuclear power plants with light water reactor power plants which are not as easily converted into nuclear weapons programs.⁵¹ In 2006, North Korea announced a successful nuclear weapons test.⁵²

Since North Korea's withdrawal from the NPT,⁵³ North Korea, South Korea, China, Japan, Russia and the U.S. have engaged in the Six-party Talks concerning the security concerns over North Korea's determination to build its nuclear weapons program.⁵⁴ These talks have occurred in six "rounds" from 2003 to 2007.⁵⁵ These rounds produced little progress considering

Lenz, C.

North Korea's nuclear weapons test in late 2006. However, during the third phase of the fifth round, North Korea agreed to end its nuclear weapons program in exchange for fuel aid and improved relations with Japan and the U.S.⁵⁶ In this interplay, North Korea refused to negotiate peace until it had achieved a successful nuclear weapons program.⁵⁷ This heightened North Korea's bargaining power.⁵⁸ Therefore, the nuclear weapons program equalized the playing field between North Korea and the remaining five parties.⁵⁹ This illustrates that when a NWS deals with a nation without nuclear weapons, in order for the weaker party to gain an equal playing position, it must manufacture or bluff a manufacture of nuclear weapons as did North Korea.⁶⁰ This obtaining or bluff thereof has the purpose of strengthening the negotiating position of the non-NWS in order to gain more from negotiations with the NWS. In order for this strategy to be effective, the NWS must be willing and able to raise its reservation price to accommodate the raised non-NWS's demands.⁶¹ Even then, a negotiating NWS must beware not to be taken advantage of and not to encourage future use of this strategy.

II. Game Theory: Mutual Cooperation, Mutual Defection, Unilateral Defection

Under Game Theory, a social contract that brings the states together under a common goal of avoiding nuclear war and standards for achieving that goal will effectively deter nuclear war so long as the gains of deterring nuclear war outweigh the perceived gains of entering into nuclear war.⁶² Several game theories, when compared, illustrate this point. The "Prisoner's Dilemma" illustrates how two states can both benefit from cooperating to avoid nuclear war, whereas if one state-player defects, the other state-player will suffer immensely. Conversely, under the theory of "Stag Hunt,"⁶³ multiple, interdependent state-players may realize larger gains by working together to avoid nuclear war than by entering into nuclear war. Additionally, the game of "Chicken" demonstrates the deterrent effect the possibility of nuclear war when

Lenz, C.

compared to any gains a state-player may hope to realize by entering into nuclear war.

Furthermore, Game Theories can be either zero-sum or non-zero-sum. In a zero-sum game, when the gains and losses of each party are added, they equal zero, such that only one player can win because a win for one player means a necessary loss for the other. However, in a non-zero-sum game, all parties can win together, or lose together because the players are interdependent and have more to gain by working together.

In order to apply Game Theory to the strategic situation of nuclear war, the theory must be applied to the possible outcomes determined by rational and methodical behaviors.⁶⁴ The controlling presumption in Game Theory is that when a state pursues its interests, the state's tactics will be logical.⁶⁵ When Game Theory is applied to multi-player games, like "Stag Hunt", as compared to two-player games, like "Prisoner's Dilemma," the probability that one state will defect is higher while the cooperating states' ability to punish the defector is lower.⁶⁶ This is because where more players are involved; more variables (in events, in leadership philosophies, etc.) are introduced into the game, which increases the chance of defection based on reaction to the variables or interaction between the players.⁶⁷ The cooperating states are less able to punish the defector because defection by one would burden all cooperators such that it would be more beneficial for each state to defect and retaliate against a defector unilaterally rather than bear the cost of cooperating.⁶⁸

As applied to multiple states with nuclear weapons where defection means nuclear war: where more states have nuclear weapons, nuclear war is more likely due to the increase of chances for conflict between the NWS, and the increased chance that, given a set of variables, defection to nuclear war will be seen as unilaterally beneficial to a NWS.⁶⁹ Furthermore, where one state defects and engages in nuclear war, the state(s) attacked by nuclear force would benefit

Lenz, C.

by also defecting and retaliating against the original defector, rather than cooperating by not retaliating with nuclear force.⁷⁰ Therefore, defection is less likely to be contained or punished.⁷¹ If many parties defect, implementing sanctions for defection can make cooperation seem less worthwhile because there would be less security in cooperation than in defection.⁷²

A. Game Theory Applied to Conventional and Nuclear War

Game Theory applied to the possibility of conventional warfare will be drastically different from games applied to the possibility of nuclear war.⁷³ In comparing nuclear war Game Theory to conventional wars, it becomes evident that many contributing state actors make it difficult to imagine or predict the outcome of the war.⁷⁴ The lessons learned from WWI and WWII include: the importance of maintaining the balance of power in the world and the various regions; and the importance of opposing a state that gains too much power.⁷⁵ However, these lessons do not apply to nuclear war because the consequences of nuclear war are so terrible and the stakes much higher.⁷⁶ The lessons derived from the World Wars are obsolete pertaining to nuclear war because a balance of power is irrelevant to the indefensibility against such a decisive weapon.⁷⁷ However, where the offensive threat of MAD is considered a “defensive” mechanism, nuclear weapons easily balance power, regardless of the size of the involved states’ nuclear arsenals.⁷⁸ There is no defense mechanism or strategy that would enable a state to survive a nuclear attack. Therefore, states must either avoid nuclear war at all costs to avoid MAD, or be willing to undergo total destruction. The first scenario creates a “win-win” situation in which both states will survive, and the later creates an absurd “lose-lose” situation in which each state chooses to destroy the other knowing it too will be destroyed.

B. Non-Zero-Sum Game Theory Applied to Nuclear War

In order to be deterred, nuclear war must be viewed as a non-zero-sum game theory.⁷⁹

Lenz, C.

Meaning that, by not engaging in nuclear war, the acting state(s) have more to gain than by engaging in such warfare. Non-zero-sum is a game theory that presumes that states are interdependent on one another in areas of economics and politics in such a manner that they are unable to purely pursue their own interests in a manner that disregards their affect on other states.⁸⁰ Zero-sum game theory is based on the opposite presumption: that states are independent of one another and their leaders will pursue the interests of their states without regard for the effects on other states.⁸¹ Given the economic interdependence of states, the zero-sum theory cannot be accurately applied to the world.⁸² Therefore, it must be inferred that nuclear war will affect all interconnected states. Social contract theory supports this idea in that it is based on the belief that many nations can cooperate to result in a win-win scenario where all nations have something to gain by avoiding nuclear war.

Therefore, states must realize that upon engaging in nuclear war, one cannot “win” since winning would require the impossible mode of warfare in which one must defend itself and simultaneously impede the enemy’s ability to defend.⁸³ Because wide-scale nuclear defenses are impractical if not impossible, nuclear war capitalizes on the inability of the enemy state to defend itself from attack.⁸⁴ In order for nuclear weapons to successfully deter escalation to nuclear war, a state needs only to have second-strike capabilities,⁸⁵ that is, the ability to survive a first attack, and return the attack in such a manner as to negate the gain that the first attacker was attempting to obtain.⁸⁶

The theory of deterrence is not a strategy of warfare.⁸⁷ In other words, a relatively small nuclear arsenal will provide a sufficient deterrent effect to a state possessing a large nuclear arsenal. This is because with nuclear weapons, the weapon itself is the deterrent, whereas with conventional weapons, the quantity of weapons is the deterrent.⁸⁸ For example, during the Cold

Lenz, C.

War, the U.S. had a nuclear arsenal of over 2000 nuclear warheads, and was successfully deterred from engaging in nuclear war with the Soviet Union's estimated sixty to seventy nuclear warheads.⁸⁹ A relatively small number of nuclear warheads has this deterrent effect because the effects of one detonation are so severe.⁹⁰

III. Why did Past Social Contracts Fail or Succeed?

In order to explain why past Social Contracts have failed, when failure is less likely under non-zero-sum theory based on nuclear deterrence, we should understand the weaknesses of failed social contracts. Where conventional weapons are involved, the social contract between nations serves to maintain the balance of power.⁹¹ Where conventional warfare is involved, balance of power is maintained or shifted based on maintaining or shifting alliances.⁹² When power becomes unbalanced, nations form alliances to insure their survival under the belief that the allying states must go to war in order to realize their common interests.⁹³ Therefore, allying nations have an incentive to cooperate.⁹⁴ Many social contracts are made immediately following a major war that was caused by a hegemonic leader that unbalanced the world powers.⁹⁵ The League of Nations is an example of this. It was formed at the end of World War I, but was determined a failure at the onset of WWII and was formally replaced by the U.N. at the end of WWII.⁹⁶

WWI created strong bonds between allies due to the belief in the inherent evil of the opposing forces.⁹⁷ However, after a war such as WWI, alliances are ready for a lasting peace, and greatly desire to avoid future war in order to repair the individual state economies from the costs of war.⁹⁸ As post-war nations reacquire normalcy in peace, and younger generations come to power, memories and fear of past hegemony subsides.⁹⁹ The new generation in power implements changes in technology, values, needs and interests and new issues and differences

Lenz, C.

can erupt between allies.¹⁰⁰ Such a social contract requires that the enemy states be reinstated into the social contract in order for the winning powers to sanction and restrain the enemy force (i.e. as was intended with Germany post WWII).¹⁰¹

Importantly, these are reasons for the failure of social contracts applicable to *conventional* warfare, where a balance of power can be established to prevent the world from needing to quell the dominance of a single state.¹⁰² This is unlike a social contract for the deterrence of *nuclear* war. Where nuclear weapons are involved, the goal is not to balance powers by forming alliances under a social contract.¹⁰³ The goal is to agree that regardless of differences, all parties must suppress the destructive power of nuclear weapons so that the lives of all are not jeopardized. Since there are multiple NWS, conventional war has been greatly limited in that parties must be careful not to become desperate, or force the other into such desperation so as to use a nuclear weapon as a decisive weapon.¹⁰⁴ Once such a level of desperation is reached, the deterrent effect of nuclear weapons has diminished because the temptation to use nuclear force becomes too high (i.e. U.S. wanting to encourage Japan to surrender and prove military might to the Soviet Union by engaging in nuclear conquest against Japan.¹⁰⁵) The purpose of a social contract such as the NPT then is not to bind nations to one another, but to bind states to the commitment to resolve conflicts in a manner that does not include the use of nuclear weapons.¹⁰⁶ This commitment is not based on amiability but on the common value placed on life, regardless of political differences.

A. Game Theory Explains the Success of Nuclear Deterrent Treaties

Game Theory suggests that social contracts will fail when the probability of defection is diminished due to the lack of enforceability of peace maintaining mechanisms.¹⁰⁷ Lasting peace did not ensue after WWI due to the fact that the social contract, the League of Nations, did not

Lenz, C.

result in the enforcement of the balance of powers, restraints upon past hegemonies and adherence to the established standards of behavior.¹⁰⁸ Social contracts dealing with nuclear weapons, in order to be effective, should therefore ensure enforcement of standards of behavior and nuclear acts established in the social contract in order to avoid nuclear confrontation based on a lack of information or mistake.¹⁰⁹ Because nuclear powers can only be balanced by these established norms, a balance of powers based on military strength would cause a social contract to fail.¹¹⁰ A social contract dealing with nuclear war deterrence must establish a game of “chicken” wherein no possible gain is worth the cost of nuclear war because even an attempted gain comes with such a high probability of annihilation.¹¹¹

B. How the NPT is Different from the Social Contracts that Failed

As one of the most influential and widely accepted social contracts concerning nuclear weapons, the NPT was formed to strengthen the fragile deterrence of nuclear war that existed during the Cold War.¹¹² As the various states became capable of acquiring their own nuclear weapons, the chance for nuclear weapons use, whether by purpose or mistake, further necessitated a social contract controlling the use of such weapons.¹¹³ Social contracts that deal with maintaining peace from conventional warfare fail because they attempt to maintain peace by restricting the state’s defense and ability to “win” war.¹¹⁴ That is, states defect from such social contracts because they place a higher value on their military power than maintaining a peace that for whatever reason, they feel is less important. Conversely, in a social contract which maintains peace from nuclear warfare, defection based on issues of military defense are non-issues because peace is based on deterrence and strength is not contrived from establishing a larger arsenal (despite the arms race which ensued between the U.S. and the Soviet Union during the Cold War).¹¹⁵ Therefore, nuclear weapons are not a military tool, but instead a political

Lenz, C.

tool.¹¹⁶ This is because nuclear deterrence is not based on military might; it is based on the use of nuclear weapons as a tool of political persuasion to achieve a better settlement than war. As discussed above, North Korea and Iran have both used nuclear weapons and energy programs as political tools to improve their leverage in international relations and to gain economic benefits.¹¹⁷

C. How Nuclear Weapons Reinforce the NPT

Aside from maintaining a framework for effectiveness and success, the NPT will not fail if its provisions can be enforced so as to maintain the rules and standards of behavior facilitating the non-proliferation of nuclear weapons.¹¹⁸ Furthermore, a social contract concerning nuclear war is likely to succeed due to the deterrent effect of nuclear weapons themselves.¹¹⁹ The success of contracts regarding nuclear deterrent strategies, like the NPT, is not reliant upon on the balance of power, the threat of anarchy or a security dilemma, since nuclear peace provides its own incentives.¹²⁰ Such social contracts then are unnecessary for the actual purpose of maintaining deterrence; however, they strengthen deterrence by providing extra incentives, providing a forum for communication and transparency, and they further derivative goals such as disarmament.

Where nuclear deterrence is the goal, the contracting states must focus on mutual cooperation rather than balance of power.¹²¹ This focus is automatic when certain changes come about which alter offensive and defensive strategies; payoffs; the ability to assess the actions of others, and thereby reactions to them; and the ability to predict the actions of others.¹²² In order to apply a game theory to a specific social contract, these factors must be assessed to determine the outcome of the game.¹²³

1. Change in Offensive and Defensive Strategies

Lenz, C.

Nuclear weapons have drastically altered offensive and defensive military tactics.¹²⁴ A nuclear warhead can be launched against a state as either the offensive strategy of an aggressor, or the defensive plan of the attacked. Because the behavior of engaging in nuclear combat can be either an offensive or defensive strategy, there is no ambiguity as to the effect of threatening or being threatened. When both the offensive and defensive portions of conflict result in the same event, options are limited as to the best way to proceed.¹²⁵ While it may be better to strike first than to wait to be struck, holding out on a first-strike may result in both parties to the confrontation waiting to be struck first (i.e. Cuban Missile Crisis).¹²⁶ In this event, non-zero sum game theory explains that both parties can gain more by cooperating than by defecting.¹²⁷ However, if one believes the other will defect, it may attempt to defect first.¹²⁸ In this event, both parties have lost more than they intended to gain. The defector can now expect a retaliatory strike, while the cooperator has just endured a nuclear strike and must decide whether to retaliate and how. The defecting party has escalated the event into one that may result in substantial loss for both parties if the retaliation continues. Additionally, the defector's escalation may result in weakened nuclear deterrence in the future if future actors can justify their actions to defect based on the initial escalation to defection.¹²⁹

2. Change in Payoffs for Not Engaging in War

Cooperation is based on payoffs and results from an assessment of gains from mutual cooperation, exploiting or being exploited and competition.¹³⁰ Therefore, where non-cooperation is more costly or where cooperation is more profitable, parties will cooperate.¹³¹ Furthermore, where a state's vulnerability and exploitability diminishes, it is more likely to cooperate.¹³² This includes the event in which cooperation is the catalyst to decreased vulnerability (e.g. peace treaties).¹³³ This is most apparent in social contracts concerning nuclear weapons because all

Lenz, C.

states are vulnerable to a nuclear attack since there is no defense to such an attack.¹³⁴ However, when states operate under a mutual agreement not to engage in nuclear war, an illusion of diminished vulnerability is created (the NPT is an example of this effect). Once such a social contract is established, states will generally not resort to exploitation or defection so long as the state is convinced that the contract actually provides security, and will continue to do so.¹³⁵ Conversely, when a state decides that it has been exploited while cooperating under the contract, it may well defect if it believes it can gain more by defecting.¹³⁶

3. The Ability to Determine Changes in the Behavior of Other States

Communication and multilateralism under a social contract often go hand-in-hand.¹³⁷ Nations in a social contract must trust one another's motives in order for cooperation to occur.¹³⁸ Communication provides transparency and thereby decreases the probability of a surprise defection.¹³⁹ This is because communication resolves misunderstandings and increases the confidence in improved relations.¹⁴⁰ However, communication may result in states being exploited by empty threats of the possibility of nuclear war as tactics of negotiation (i.e. negotiations with North Korea concerning the disarming of its nuclear weapons program¹⁴¹).¹⁴² Nonetheless, communication enables states to determine the actions of others and enables thoughtful responses because their communicated messages, points and interests are likely to give insight into possible motives or future points of contention etc.¹⁴³

4. Ability to Predict the Actions of Other States

Increased communication and transparency is directly related to the ability of states to predict the actions of others.¹⁴⁴ These predictions influence whether a state will be more inclined to cooperate or defect.¹⁴⁵ If a state predicts the other will defect, then the state may also defect. Likewise, if a state predicts the other will cooperate, the cooperation will most likely be

Lenz, C.

mutual.¹⁴⁶ However, if a state predicts the other will cooperate due to a weakness not allowing it to defect, the state may engage in blackmail or defection since there is no fear of retaliation.¹⁴⁷ This is possible where a NWS is engaged in a conflict with a non-NWS. Many developing nations have sought control of nuclear weapons in order to avoid such exploitation (e.g. Israel is an example of this).¹⁴⁸ Additionally, the U.N. has been successful in obtaining support from the NWS for the protection of non-NWS from such exploitation.¹⁴⁹

While all of the above factors weigh into a determination of how and whether parties engage in nuclear conflict, the use of nuclear weapons can be best guided by a social contract that sets forth guidelines for use and non use, standards of behavior and sanctions for attempting to defect.

D. Military Power Becomes Equivalent to Powerlessness

Military power or powerlessness are influential factors in determining the need for a social contract in order for nations to protect themselves from susceptibility to MAD by nuclear war.¹⁵⁰ The fact that there is no defense to nuclear war creates deterrence based on the fear of annihilation.¹⁵¹ The ability to deter nuclear war requires that all states wielding the awesome force understand, and believe, that whomever they attack, will counter attack and may not stop attacking until the functionality of both states is obliterated.¹⁵² This must be realized even in the face of temptation, provocation and occasion to use the force.¹⁵³

The problem with nurturing a MAD theory is that when a state threatens nuclear war, the credibility of the threat is questioned.¹⁵⁴ Such a threat, if acted upon, requires the threatening actor to initiate a conflict, the outcome of which cannot be controlled by either party.¹⁵⁵ Generally such a threat would be met with a request for negotiation (e.g. international negotiations with North Korea after its nuclear weapons test on October 9, 2006). However, a

Lenz, C.

nuclear conflict resulting from such a threat would most likely be the result of the parties' mutual attempts to gain control over one another through a series of actions which exhibit the willingness of both parties to risk loss of control.¹⁵⁶ Nuclear war can be deterred after a threat of nuclear war or competition of risk-taking, only if people believe that nuclear war is a possibility, regardless of whether it is or not.¹⁵⁷ Thus, MAD and such related game theories continue to explain nuclear war deterrence based on possibilities of war, even when the threat of nuclear war lacks credibility.

E. Globalization Creates Incentive to Cooperate and Avoid War

Given the modern trends of economic and social globalization, people are accustomed to understanding their state as a single player among many.¹⁵⁸ States have become dependent upon one another for economic support, though they remain focused on their independent interests.¹⁵⁹ In order for economic stability and personal prosperity to occur, peace is a necessary stabilizing mechanism.¹⁶⁰ Therefore, states are more agreeable to entering into social contracts that would likely create stability among the many states.¹⁶¹ This is in effect a game theory in which the parties cooperate with one another for fear of the harmful result to both if they do not.¹⁶² The citizens of the many states seem to largely agree that nuclear non-proliferation is necessary to quiet the possibility of a nuclear war, by resorting to pre WWII conventional warfare.¹⁶³ Such social contracts allow states to obtain a "balance" of nuclear power by collectively restricting one another from using nuclear weapons, and collectively enforcing such an agreement.¹⁶⁴

IV. Conclusion

Since the first use of nuclear weapons in 1945, the world has recognized nuclear weapons as a terrible and uncontrollable power. The morbidity of the effects of such a weapon has struck all subsequent generations with the disheartening fear of a future such confrontation on any

Lenz, C.

scale. This fear is a driving force to stable peace because such a fear has deterred nuclear war even in the most tense of times. In an effort to create a stronger deterrence, many nations have agreed to the Nuclear Non-Proliferation Treaty, which proposes to contain nuclear weapons and control their distribution and use. Such social contracts seeking nuclear non-proliferation require the various states to recognize the common problem of the nuclear breach of security that stems from establishing and maintaining nuclear weapons arsenals. Furthermore, such contracts require the states to recognize one another, collectively, as partners in the quest for obtaining global security from nuclear war. The fear of nuclear war has bonded the states of the world through social contracts as never before, and thereby, the world has entertained one of the longest large-scale¹⁶⁵ peace times in the history of war.

¹ This paper refers to large-scale world wars, rather than small-scale nationalist or civil wars and sectarian violence.

² Nuclear Non-Proliferation Treaty para. 4, Jul 1, 1968, 21 U.S.T. 483, 729 U.N.T.S. 161.

³ See, Thomas Hobbes, *Leviathan* (J.C.A. Gaskin ed., Oxford University Press 1998) (1651).

⁴ Amir Azaran, *Where art thou? The Nonproliferation Treaty and Bargaining: Iran as a Case Study*, 6 Chi. J. Int'l L. 415, 424 (2005).

⁵ Robert Jervis, *From Balance to Concert: A Study of International Security Cooperation*, 38 World Pol. 58, 72 (1985).

⁶ Although the United States and Japan had been negotiating peace prior to the Japanese attack on Pearl Harbor, it is commonly argued by prominent historians that the attack was hardly a surprise. See, Stetson Conn, Rose C. Engelman & Byron Fairchild, *Guarding the United States and Its Outposts*, 175-76, 178-79 (Stetson Conn ed., U.S. Army, 2000); Roger A. Stolley, *Pearl Harbor Attack No Surprise*, 12 J. Historical Rev. 119, 119-121. However, this is not meant to imply that a surprise attack between negotiating states is not possible. A surprise attack is less likely. Such seems to have been the case between the United States and Japan before the attack on Pearl Harbor, as the break down of negotiations was a sign of impending attack.

⁷ Peter R. Beckman, *Sociology and Nuclear Weapons: A View from Outside*, 7 Soc. F. 7, 13-14 (1992).

⁸ *Id.*

⁹ *Id.*

¹⁰ Michael R. Kraig, *Nuclear Deterrence in the Developing World: A Game-Theoretic Treatment*, 36 J. of Peace Res. 141, 143.

¹¹ *Id.*

¹² *Id.* at 153.

¹³ Conclusion of effective international arrangements to assure non-nuclear-weapon States against the use or threat of use of nuclear weapons, G.A. Res. 47/50, U.N. Doc. A/RES/47/50 (Dec. 9, 1992).

¹⁴ Robert O. Keohane & Joseph S. Nye, Jr., *Two Cheers for Multilateralism*, 60 Foreign Pol. 148, 153-54 (1985).

¹⁵ Treaty on the Non-Proliferation of Nuclear Weapons, Art. 2, *opened for signature* Jul 1, 1968, 21 U.S.T. 483, 729 U.N.T.S. 161.

¹⁶ *Id.* at Art. 1.

¹⁷ Abe Nobuyasu, *Existing and Emerging Legal Approaches to Nuclear Counter-Proliferation in the Twenty-first Century*, 39 N.Y.U. J. Int'l L. & Pol. 929 (2007).

¹⁸ Assoc. Press, *Nuclear Powers Promise to Disarm*, BBC News, May 2, 2007, <http://news.bbc.co.uk/1/hi/world/americas/732790.stm>.

-
- ¹⁹ See, Andrea Michie, *The Provisional Application of Arms Control Treaties*, 10 J. of Conflict and Security L. 345 (2005).
- ²⁰ Dr. Surakiart Sathirathai, *Peace and Security: The Challenge and the Promise*, 41 Tex. Int'l L.J. 513, 523 (2006).
- ²¹ *Id.*
- ²² Jervis, *supra* note 6, at 58.
- ²³ Negotiations with Iran after its implementation of its uranium enrichment program was deemed to be prohibited under the NPT under UN Security Council Resolution 1737 (imposing sanctions on Iran for failing to halt uranium enrichment).
- ²⁴ Jan Pronk, Statement to the Security Council January 11, 2005, "Check Against Delivery" ¶ 1, UN News Centre April 7, 2008, available at <http://www.un.org/News/dh/sudan/infocusnewsudan.asp?NewsID=846&SID=23>.
- ²⁵ James Reston, *Big Four Conference Opens Today; West's Chiefs Complete Strategy on Germany, Disarming, Security*, N.Y. Times, July 18, 1955, at 1.
- ²⁶ Kenneth N. Waltz, *Nuclear Myths and Political Realities*, 84 Am. Pol. Sci. Rev. 731, 737 (1990).
- ²⁷ *Id.*
- ²⁸ *Id.*
- ²⁹ See, A Newshour with Jim Lehrer Transcript: 'Thirteen Days,' Online Newshour, Feb. 22, 2001, available at http://www.pbs.org/newshour/bb/media/jan-june01/thirteen_2-22.html.
- ³⁰ J. Edgar Williams, *Cold War Diplomatic Negotiations: A Personal Recollection*, 2 Am. Dipl. 1 (1997), available at http://www.unc.edu/depts/diplomat/AD_Issues/amdipl_3/williams2.html.
- ³¹ Treaty Between The United States of America and The Union of Soviet Socialist Republics on the Limitation of Strategic Offensive Arms (SALT I), U.S.-U.S.S.R., May 26, 1972, 23 U.S.T. 3463, available at <http://www.state.gov/t/ac/trt/5191.htm>.
- ³² Kenneth A. Oye, *Explaining Cooperation under Anarchy: Hypotheses and Strategies*, 38 World Pol. 1, 19 (1985).
- ³³ Robert Powell, *The Theoretical Foundations of Strategic Nuclear Deterrence*, 100 Am. Pol. Sci. Rev. 75, 82 (1985).
- ³⁴ Waltz, *supra* note 27.
- ³⁵ *Id.*
- ³⁶ This is the basis of Mutually Assured Destruction (MAD).
- ³⁷ Powell, *supra* note 34, at 83.
- ³⁸ Daniel Poneman, *Nuclear Policies in Developing Countries*, 57 Int'l Aff. 568, 584 (1981).
- ³⁹ Gustavo R. Zlauvinen, *Nuclear Non-proliferation and Unique Issues of Compliance*, 12 ILSA J. Int'l & Comp. L. 593 (2006); Steve E. Miller, *Proliferation Gamesmanship: Iran and the Politics of Nuclear Confrontation*, 57 Syracuse L. Rev. 551 (2007).
- ⁴⁰ Matthew Chance & Associated Press, *Iran 'to keep enrichment program'*, CNN, Feb 28, 2006, available at <http://www.cnn.com/2006/WORLD/meast/02/28/iran.nuclear/index.html>.
- ⁴¹ Azaran, *supra* note 5.
- ⁴² Massimo Calabresi, *Iran's Nuclear Threat*, Time, Mar 8, 2003, available at <http://www.time.com/time/world/article/0,8599,430649,00.html>.
- ⁴³ Associated Press, *New Nuke Material Found in Iran*, The Jerusalem Post, Nov 14, 2006, available at <http://www.jpost.com/servlet/Satellite?apage=2&cid=1162378397110&pagename=JPost%2FJPArticle%2FShowFull>.
- ⁴⁴ See, Calabresi *supra* note 43.
- ⁴⁵ Jerusalem Post, *supra* note 44.
- ⁴⁶ Azaran, *supra* note 5.
- ⁴⁷ Symposium, *A nuclear Iran: Legal Implications of a Preemptive National Security Strategy*, 57 Syracuse L. Rev. 551 (2007).
- ⁴⁸ Associated Press, *EU 3 wants to make Iran dependent on western nuclear fuel supply: German expert*, Islamic Republic News Agency, Oct 15, 2005, available at <http://www.globalsecurity.org/wmd/library/news/iran/2005/iran-051015-irna02.htm>.
- ⁴⁹ Miller, *supra* note 40, at 592.
- ⁵⁰ Zlauvinen, *supra* note 40.
- ⁵¹ Agreed Framework of 21 October 1994 Between the United States of America and the Democratic People's Republic of Korea, U.S.-N.Korea, Nov. 2, 1994, 34 I.L.M. 603.
- ⁵² Jamie McIntyre, et al., *North Korea Claims Nuclear Test*, CNN, October 9, 2006 available at <http://www.cnn.com/2006/WORLD/asiapcf/10/08/korea.nuclear.test/>.
- ⁵³ See, Assia Dosseva, *North Korea and the Non-Proliferation Treaty*, 31 Yale J. Int'l L. 265 (2006).

-
- ⁵⁴ Morse Tan, *North Korean Nuclear Crisis: Past Failures, Present Solutions*, 50 St. Louis U.L.J. 517 (2006).
- ⁵⁵ Pan Letian, ed., *6-party talks: 2nd phase, 5th round*. Xinhua (Dec. 18, 2006) available at http://news.xinhuanet.com/english/2006-12/18/content_5503201.htm.
- ⁵⁶ Associated Press, *Rice hails N Korea nuclear deal*, BBC News, Feb. 13, 2007, available at <http://news.bbc.co.uk/2/hi/asia-pacific/6358797.stm>.
- ⁵⁷ Associated Press, *DPRK to conduct nuclear test against U.S. hostile policy*, Xinhua, October 3, 2006, available at http://news.xinhuanet.com/english/2006-10/03/content_5167518.htm.
- ⁵⁸ Peter Soku Yuh, *Nuclear Diplomacy: Negotiating Peace on the Korean Peninsula*, 1 Loy. U. Chi. Int'l L. Rev. 103 (2004).
- ⁵⁹ Kraig, *supra* note 11, at 142.
- ⁶⁰ Helen M. Cousineau, *The Nuclear Non-Proliferation Treaty and Global Non-Proliferation Regime: A U.S. Policy Agenda*, 12 B.U. Int'l L.J. 407, 416 (1994).
- ⁶¹ When negotiations of non-proliferation occurs between non-NWS and NWS, and the non-NWS refuses to agree not to proliferate, and subsequently manufactures nuclear weapons for the sake of having nuclear weapons rather than to use as a bargaining chip in negotiations, the world should become alarmed. This may be an indicator of many things. Hopefully it is not an indication of the non-NWS willingness to use nuclear weapons.
- ⁶² See, e.g., Gregory S. Kavka, *Hobbesian moral and political theory* (1986).
- ⁶³ Jean-Jacques Rousseau's game theory "stag hunt." See, Brian Skyrms, *The Stag Hunt and Evolution of Social Structure* (2004).
- ⁶⁴ Duncan Snidal, *The Game Theory of International Politics*, 38 World Pol. 25, 27 (1985)
- ⁶⁵ *Id.*
- ⁶⁶ Oye, *supra* note 33, at 19-20.
- ⁶⁷ *Id.* at 19.
- ⁶⁸ *Id.* at 20.
- ⁶⁹ *Id.*
- ⁷⁰ The benefit of defection in this context is that defection would result in retaliatory nuclear strike which may raise the cost of "winning" too high for the initial aggressor to continue. See, Robert Jervis, *The Madness beyond MAD. Current American Nuclear Strategy*, 17 PS 33, 35-36 (1984).
- ⁷¹ Oye, *supra* note 33.
- ⁷² This was the case when sanctions were imposed on Germany at the close of WWI. The Germans became convinced that sanctions were too burdensome on Germany which enticed them to defect from peace and engage in WWII regardless of the consequences, real and possible, of another war.
- ⁷³ Waltz, *supra* note 27, at 741.
- ⁷⁴ *Id.* at 734.
- ⁷⁵ *Id.* at 735.
- ⁷⁶ *Id.*
- ⁷⁷ *Id.*
- ⁷⁸ Eileen Patterson, *Defense Transformation: Facing an Asymmetrical World*, 2 Los Alamos Res. Q. 13, 13-15 (2003), available at http://www.lanl.gov/quarterly/q_sum03/pdfs/larq_7-03_deftrans.pdf.
- ⁷⁹ Waltz, *supra* note 27, at 732.
- ⁸⁰ Snidal, *supra* note 65, at 39.
- ⁸¹ *Id.*
- ⁸² *Id.*
- ⁸³ Powell, *supra* note 34.
- ⁸⁴ The Strategic Defense Initiative, proposed by Pres. Reagan in 1983, if successful would have made defending a nuclear attack possible and therefore would have eliminated MAD.
- ⁸⁵ Waltz, *supra* note 27, at 741.
- ⁸⁶ *Id.* at 732.
- ⁸⁷ *Id.* at 732.
- ⁸⁸ *Id.* at 741.
- ⁸⁹ *Id.* at 734.
- ⁹⁰ *Id.*
- ⁹¹ Jervis, *supra* note 6, at 60.
- ⁹² Waltz, *supra* note 27, at 741.
- ⁹³ Jervis, *supra* note 6, at 61.

⁹⁴ *Id.* at 60.

⁹⁵ *Id.*

⁹⁶ While the leaders of the nations met to discuss strategy and the end of WWII, the wartime conferences were not activities of the League of Nations. The WWII conferences were held under the auspices of the United Nations which the Allied Powers had agreed to formally establish at the Arcadia Conference (1941) in the Declaration by the United Nations on January 1, 1942. See, Townsend Hoopes & Douglas Brinkley, *FDR & the Creation of the U.N.* (1997). At the Tehran Conference (1943), the League of Nations's assets and programs were absorbed by the U.N. See, Associated Press, *League of Nations Ends, Gives Way to New U.N.*, Syracuse Herald-American, April 20, 1946, at 12.

⁹⁷ Jervis, *supra* note 6, at 60-61.

⁹⁸ *Id.* at 61.

⁹⁹ *Id.* at 60.

¹⁰⁰ *Id.* at 61-62.

¹⁰¹ *Id.* at 61.

¹⁰² *Id.* at 59.

¹⁰³ Waltz, *supra* note 27, at 741.

¹⁰⁴ *Id.* at 739.

¹⁰⁵ Gar Alperovitz, *The Decision to use the Atomic Bomb and the Architecture of the American Myth*, 214-15 (1996).

¹⁰⁶ Jim Stanton, *Building a Real Partnership: the Need for Social Contract*, Soc. Econ. & L.J. (SEAL) (2000)

available at <http://www.efc.be/cgi-bin/articlepublisher.pl?filename=JS-SE--S-1.html>.

¹⁰⁷ Oye, *supra* note 33, at 20.

¹⁰⁸ *Id.*

¹⁰⁹ *Id.*

¹¹⁰ Jervis, *supra* note 71, at 36.

¹¹¹ *Id.* at 35.

¹¹² Lawrence S. Wittner, *Does the Nuclear Proliferation Treaty have a Future?*, History News Network, Mar. 21, 2005, available at <http://hnn.us/articles/10767.html>.

¹¹³ Oye, *supra* note 33, at 20.

¹¹⁴ Waltz, *supra* note 27, at 741.

¹¹⁵ *Id.*

¹¹⁶ *Id.*

¹¹⁷ *Id.*

¹¹⁸ Keohane, *supra* note 15, at 153-154.

¹¹⁹ David S. Yost, *Analysing International Nuclear Order*, 83 Int'l Aff. 549, 574 (2007).

¹²⁰ Jervis, *supra* note 6, at 79.

¹²¹ Jervis, *supra* note 6, at 62.

¹²² *Id.*

¹²³ *Id.*

¹²⁴ Waltz, *supra* note 27.

¹²⁵ Jervis, *supra* note 6, at 63.

¹²⁶ *Id.*

¹²⁷ This is non-zero-sum game theory.

¹²⁸ This is Robert Axelrod's Prisoner's Dilemma. See, Robert Axelrod, *The Evolution of Cooperation* (Basic Books, 1984) (2006).

¹²⁹ Rasmus Tenburgen, *Principled Negotiation and the Negotiator's Dilemma – Is the “Getting to Yes” Approach too “Soft”?*, Inst. for Leadership Dev.: Interdisc. Res. Seminar on Negotiation, Harv. U., May 2001, 5. available at <http://www.ifld.de/Education/Material/Negotiation%20Essay.pdf>.

¹³⁰ Jervis, *supra* note 6, at 64.

¹³¹ Jervis, *supra* note 6, at 64-65.

¹³² *Id.* at 69.

¹³³ *Id.* at 70.

¹³⁴ Dept. of Defense, *Report of the Defense Science Board Task Force on Preventing and Defending Against Clandestine Nuclear Attack*, 32, June 2004, available at <http://www.fas.org/irp/agency/dod/dsb/attack.pdf>.

¹³⁵ Jervis, *supra* note 6, at 70-71.

¹³⁶ See, e.g., The Prisoner's Dilemma.

¹³⁷ Francisco Rojas Aravena, *The United Nations and Cooperative Multilateralism*, U.N. Chron. (2000), available at http://findarticles.com/p/articles/mi_m1309/is_1_37/ai_64830830.

¹³⁸ Jervis, *supra* note 6, at 75-76.

¹³⁹ *Id.* at 72.

¹⁴⁰ *Id.* at 72-74.

¹⁴¹ By departing from the NPT and testing a nuclear bomb, North Korea showed the world that it had nuclear weapons capabilities, which could be used in a future confrontation. However, North Korea has not expressly threatened imminent nuclear war.

¹⁴² Jervis, *supra* note 6, at 72-74.

¹⁴³ *Id.* at 75-76.

¹⁴⁴ *Id.* at 72-74.

¹⁴⁵ *Id.* at 76.

¹⁴⁶ *See, e.g.*, Robert Axelrod, *Evolution of Cooperation* (1984).

¹⁴⁷ Jervis, *supra* note 6, at 77.

¹⁴⁸ Kraig, *supra* note 11, at 153.

¹⁴⁹ E. L. M. Burns, *The Nonproliferation Treaty: Its Negotiation and Prospects*, 23 Int'l Org. 788, 803-04 (1969).

¹⁵⁰ Waltz, *supra* note 27, at 733.

¹⁵¹ *Id.* at 743.

¹⁵² Richard A. Falk, et al., *Strategic Deterrence and Nuclear War*, 76 Am. Soc. Int'l L. Proc. 23, 27 (1982).

¹⁵³ *Id.*

¹⁵⁴ Powell, *supra* note 34, at 77.

¹⁵⁵ *Id.* at 76.

¹⁵⁶ *Id.*

¹⁵⁷ Waltz, *supra* note 27, at 733.

¹⁵⁸ Snidal, *supra* note 65, at 25.

¹⁵⁹ *Id.*

¹⁶⁰ Jervis, *supra* note 6, at 59.

¹⁶¹ *Id.*

¹⁶² This is also known as the game theory "Stag Hunt."

¹⁶³ Burns, *supra* note 150, at 807.

¹⁶⁴ Jervis, *supra* note 6, at 59.

¹⁶⁵ While I realize that conflicts such as Darfur, Sierra Leone, Palestine, Iraq, Afganistan, the Balkans, Somalia, etc. occur regularly, these are small-scale nationalist conflicts rather than the large-scale world wars which have been avoided since the end of WWII (to which this paper refers).