Chicken Pax Atomica:
The Cold War Stability of Nuclear Deterrence

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Nuclear weapons, long considered the bête noire of human existence are examined in this article to ascertain if the heinous effects they threaten ultimately serve to promote deterrence between pairs of states. The findings suggest that nuclear weapons did have a significant impact on conflict when present on both sides of dyadic disputes during the Cold War. In such symmetrical nuclear pairs conflict levels are quantitatively shown to be reduced, suggesting that the conflict inhibiting qualities of these weapons long espoused by nuclear optimists are legitimate.

"The reputation of power *is* power."
-- Thomas Hobbes

Nuclear weapons promote interstate peace. The statement seems counter-intuitive initially, as the reader grapples with the seemingly divergent concepts of nuclear weaponry and peace. Yet since their creation in 1945 nuclear weapons have not been the bane of human existence many feared they would become. Indeed such weapons have not been used in conflict since the end of World War II and a number of scholars have theorized that the destructive potential displayed by these weapons has ensured peace between the great powers ever since (Gallois 1961; Sandoval 1976; Waltz 1981; Bueno de Mesquita and Riker 1982; Mearsheimer 1990; Weltman 1995). Others are not as sanguine, suggesting that the spread of nuclear weapons is something to be actively and vigorously curtailed (Morgenstern 1959; Ikle 1960; Doty 1960; Nye 1981; Bailey 1991; Spector 1990, 1995; Kraig 1999). Still others have called for the complete abolition of nuclear weapons (Gilpin 1962; Schell 1982, 1984; Ellsberg 1992). This article tests the claims of the first group of scholars, sometimes referred to as nuclear optimists, to ascertain if the presence of nuclear weapons led to any reduction in conflict between pairs of states during the years of the Cold War.

The basic notion put forward by the nuclear optimists that overwhelming military strength pacifies enemies is not a new concept. The ancient military strategist Sun Tzu (1963: 67) argued for the necessity of evasion when one's opponent had overwhelming force saying that when this was the case: "avoid him." Indeed nuclear pairs of states clearly appear to have avoided one another in terms of armed conflict, as there has never been a case of interstate warfare between two nuclear powers. But why? This article's central question is simple but critical to our understanding: Does the presence of nuclear weapons retard conflict escalation between pairs of states?

1. NUCLEAR OPTIMISM

The possible pacifying effect of nuclear weapons[1] on interstate relations has been heralded most strongly by neorealist Kenneth Waltz. Waltz put forward the view that the spread of nuclear weapons is not necessarily a threat to world security. Waltz (1981), among others (Gallois 1961; Sandoval 1976; Bueno de Mesquita and Riker 1982; Mearsheimer 1990; Weltman 1995), argues that "the measured spread of nuclear weapons is more to be welcomed than feared." Waltz theorizes that the gradual spread of nuclear weapons will promote peace and reinforce international stability because nuclear weapons induce caution between nuclear adversaries. This leads to the seemingly extreme conclusion that, in fact, "more may be better."

Though Waltz may be the loudest voice of nuclear proliferation optimism, support for the potential pacifying effect the spread of nuclear weapons might induce has existed almost as long as the weapons have. Jacob Viner (1946) was the first to openly argue for the potential peace nuclear weapons might bring. Viner (1946) theorized that the spread of nuclear weaponry throughout the world would make conflict less likely between states because of the high price of military victory. Arthur Less Burns (1957) elaborated on Viner's theory, arguing that in the absence of a sudden technological breakthrough, the spread of nuclear weapons could stabilize international relations. Morton Kaplan (1957, 52) concurred with Viner and Burns, stating that as long as a "surprise knockout blow was technically impossible" nuclear weapons dispersed among a large number of states would ensure a more peaceful world.

The 1960s brought additional advocacy for proliferation optimism. F.H. Hinsley (1963: 354-55) wrote that nuclear weapons "constitute for the first time a true deterrent, one that will never be relied upon so long as it exists – and this is likely to be forever." French General Peter Gallois (Dulles and Crane 1964: 215) added his support, arguing that "If every nuclear power held weapons truly invulnerable to the blows of the other, the resort to force by the one to the detriment of the other would be impossible." At the same time, Richard Rosecrance (1963) suggested that worries about the strategic consequences of nuclear proliferation were exaggerated. Rosecrance (1963: 188) argued: "The nth country 'problem may not turn out to be a problem." James Rosenau (1969, 103) added six years later: "If the threat of minor war makes the two greatest states redouble their efforts in tandem to prevent major war, it is even conceivable that nuclear dispersion could have a net beneficial impact."

The 1970s brought Robert Sandoval's (1976) porcupine theory of nuclear proliferation. According to this theory, states even with modest nuclear capabilities would "walk like a porcupine through the forests of international affairs: no threat to [their] neighbors, too prickly for predators to swallow" (Sandoval 1976: 19). It was only after all of this that Kenneth Waltz (1981) added his theories to those of the nuclear optimists, suggesting that the mere presence of nuclear weapons leads to extreme caution, thereby decreasing the likelihood of conflict as more states acquire them.

Following Waltz, additional scholars have weighed in as nuclear proliferation optimists.

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[1] A nuclear weapon is an apparatus whose explosive energy is a derivative of fission, fusion, or a combination the two nuclear processes. Nuclear fission is the splitting of the nucleus of an atom into two or more parts. Nuclear fusion joins light isotopes of hydrogen, usually deuterium and tritium, which liberates energy and neutrons (Cochran et al., 1984).

Bruce Bueno de Mesquita and William Riker (1982) contend that nuclear proliferation serves the interests of peace. Martin van Creveld (1993) asserts that "nuclear weapons prevent the regional states that have them from fighting each another." John Weltman (1995: 219) theorizes that "the spread of nuclear weapons ... to new powers will tend over time to induce caution and moderate conflict." In fact, nuclear proliferation optimists mostly agree that the presence of nuclear weapons generates caution in military and political decision-makers irrespective of the geographic location, system of governance, or the political culture of the countries in question (Freedman 1988).

Indeed all weapons, as Robert Jervis (1989) has argued, change the status of states in ways that make them more or less secure. For example, as Waltz (1995) notes, "If weapons are not well suited for conquest, neighbors have more peace of mind." Likewise, nuclear weapons arguably produce their own effects by providing a strong deterrent against aggression (Hinsley 1963; Lavoy 1995; Weltman 1995). Nuclear weapons' deterrent value rests on their ability to punish (Gray 1979, 1990; Waltz 1990). Nuclear weapons provide a state with the ability to damage or destroy things the aggressor holds dear to such an extent that gains the aggressor had hoped to achieve are outweighed (Waltz 1990; Gray 1998). It is believed that this strong punitive aspect of nuclear weapons is what makes them such a powerful deterrent against state aggression (Sandoval 1976; Gray 1979, 1990, 1998; Waltz 1990; Van Creveld 1993; Lavoy 1995).

2. PAX ATOMICA

During the Cold War, the overwhelming destructive capabilities of the nuclear weapons arsenals of the United States and the Soviet Union provided each of these two superpowers with a strong deterrent against military conflict between themselves. A like peace would not have existed in an international system void of such weapons according to a number of scholars (Gaddis 1990; Mearsheimer 1990; Waltz 1990; Lavoy 1995; Weltman 1995; Gray 1998; Payne 1998a, 1998b). The uncertainties of a world made up merely of states with access to conventional weapons are increased because conventional warfare, unlike a nuclear conflagration, can be perceived as winnable. For this reason, the likelihood of warfare between states increases "because the uncertainties of their outcomes (wars) make it easier for the leaders of states to entertain illusions of victory at supportable cost" (Waltz 1990: 58).

The US-Soviet relationship is particularly important because it represents the longest symmetrical nuclear relationship in the history of the world. It is additionally unique because, despite the roughly equal military standing between the two states during the Cold War period, the United States and the Soviet Union never directly engaged in warfare. The lack of interstate warfare during the Cold War has been attributed to the presence of nuclear weapons (Jervis 1989; Gaddis 1990; Mearsheimer 1990; Waltz 1990, 1993; Glaser 1998; Harkavy 1998; Payne 1998a, 1998b). Indeed the nuclear era seems to be peerless in modern history because of this absence of great power conflict. Stephen Cambone and Patrick Garrity (1994-95: 77) note: "The past five decades have marked a unique period in human history (at least since the establishment of the modern state system in 1648), in which war between the dominant powers has not occurred and in which one of those powers actually conceded and dissolved itself peacefully."

3. CRISES AND NUCLEAR WEAPONS

The general effect of nuclear weapons on crises has been to widen the gap between the value of the interests in conflict and the potential costs of the war. The separation between potential costs and potential outcomes was not as wide, or at least not as clear to prospective combatants, in the years prior to the nuclear age. The destructive power nuclear weapons pose is clear. Overall, the perceived impact of nuclear weapons on crisis situations basically has been twofold: first, it is generally assumed that nuclear weapons lead states to behave in a more prudent and constrained fashion, and second it has been argued that nuclear weaponry provides a tacit raising of the "provocation threshold", thereby lengthening the crisis escalation "ladder" adversaries must climb before arriving at interstate warfare (Kahn 1960).

4. GAMES OF CHICKEN

The way that actors perceive the costs and benefits of a crisis will have an impact on their behavior during the crisis. The structure of the situation will affect the incentives to persist in, or seek a way out of, the confrontation. If the situation is perceived as being extremely dangerous, as is the case in games of Chicken, the actors involved are likely to exercise more caution than they might if the crisis is seen as relatively cost-free. It is also possible that a perception of danger will increase the search for mutual accommodation.

With this in mind it is now useful to examine the two types of dyadic crisis interaction known as Chicken and Prisoner's Dilemma. The main difference between the two is that in Prisoner's Dilemma mutual non-cooperation brings about the second worst outcome as seen by decision makers, while in Chicken mutual non-cooperation brings about the worst outcome. The differing outcomes of Prisoner's Dilemma and Chicken are displayed in Figure One. In Prisoner's Dilemma, the only way a side loses completely is if it cooperates and its adversary does not (producing a 5,0 or 0,5 outcome). This makes cooperation a tenuous goal. In games of Chicken, however, cooperation is promoted because persistent non-cooperation will bring about a loss for both sides (0,0). Because nothing is gained by persistent non-cooperation, one or both sides often choose to swerve thereby ending the conflict completely. Conflicts between nuclear states are considered to be games of Chicken as non-cooperation would bring about the potential destruction of both competitors.

	Prisoner's Dilemma	
	Cooperate	Defect
Cooperate	3,3	0,5
Defect	5,0	1,1

	Chicken	
	Swerve	Straight
Swerve	3,3	1,5
Straight	5,1	0,0

Figure 1. Prisoner's Dilemma and Chicken

In their review of international conflicts, Snyder and Diesing (1977) note that conflicts, when portrayed as games, can be characterized as being either symmetric or non-symmetric. Their finding of interest is that there was a sharp difference in behavior between parties in Prisoner's Dilemmas and parties in Chicken (and asymmetric games). Parties in Chicken and asymmetric games do not prefer the outcomes that come with mutual firmness, and thus the party that can show it will continue to stand firm will usually prevail. In Prisoner's Dilemma situations, each party prefers war (or the non-cooperative outcome) to accepting the other's demand. This outcome is intuitively believable, for as Snyder and Diesing (1977) suggest:

> When this is realized [that both parties prefer war to concession in Prisoner's Dilemma], the parties know they must reduce their goals to something the other can accept, or the outcome is likely to be war. There occurs an internal reassessment of goals, plus probing the opponent, to determine what is essential and what can be sacrificed, and what the opponent is willing to give up. The communication of reduced goals to the opponent is the turning point, after which the parties make reciprocal concessions leading to compromise. In the Chicken cases ..., one or both parties prefer to yield than risk war. Therefore when one party establishes superiority of resolve it can force the other to give way completely, and usually does so.

Thus situations that are seen by the actors as Prisoner's Dilemmas are more likely to endure because there is less risk that they will bring about the worst outcome. While a situation seen as Chicken will bring about great pressure to either (1) convince the other party that the non-cooperative mode will continue or (2) work to bring about the cooperative outcome. As an example, the Cuban Missile Crisis can be seen as a game of Chicken, with Kennedy's non-cooperative move being continued preparations for an invasion while Khrushchev's non-cooperative move was continued installation and preparation of the missiles (Bundy 1988). If both persisted in their actions, war was likely, and as a result there were efforts to find a way out of the confrontation (Blight 1990).

Interstate nuclear dyads produce these games of Chicken. The presence of nuclear weapons serve to incorporate the element of deterrence and thereby aid in preventing conflict escalation. Thus, the conflict process between nuclear states is different from non-nuclear dyads as the participants in a nuclear dyad may be deterred not only from nuclear war, but also from escalation in general. Thomas Schelling (1966: 35) notes that common conceptions of deterrence "seem to depend on the clean-cut notion that war results – or is expected to result – only from deliberate yes-no decisions. But if war tends to result from a process, a dynamic process in which both sides get more and more deeply involved, more and more expectant, more and more concerned not to be a slow second in case war starts, it is not a 'credible first strike' that one threatens, but just plain war." In other words, states need not threaten an immediate full-scale nuclear attack on the other side in order to deter it. Instead, they can threaten to take actions that could lead to an undesired conflagration by a series of steps that cannot be entirely be foreseen. Empirical evidence bears out this argument: Alexander George and Richard Smoke (1974) found that one important cause of deterrence failure was the challenger's belief that he could control risks. In games of Chicken, this is not the case. Therefore, the logic of nuclear dyads indicates that they should be less prone to conflict than other interstate couplings.

5. CONFLICT ESCALATION AND NUCLEAR WEAPONS

While it is clear that the deterrent value of nuclear weapons on crises in general is impressive among all the nuclear powers (warfare has not occurred between two nuclear powers since the creation of such weapons of mass destruction), it is less evident what specific impact nuclear weapons may have had on conflict escalation. Might the impact of nuclear weapons be felt also in terms of their coercive capabilities? In other words, is it reasonable to conceptualize nuclear arms not only as deterrent weapons, but as defensive weapons as well? The answer might be yes if one differentiates use from utilization. While the actual use of nuclear weapons would be strictly for punitive effect, the utilization of the threat of use of nuclear weapons could be used as a defensive measure to repel or stop an enemy from taking further action.

Nuclear weaponry's strong punitive nature provides an easy understanding as to why nuclear devices are often classified under the deterrent heading. Deterrence's goal, after all, is to dissuade an enemy from initiating an action by threatening a highly credible punitive response (Morgan 1977). In other words, deterrence in most instances threatens punishment. However, US nuclear doctrine in the 1970s and 1980s expanded the definition of deterrence by arguing that US nuclear doctrine should be expanded to include deterrence by denial as well as deterrence by punishment.[2] The aim of deterrence by denial is to hold at risk strategic assets (counterforce targets), especially those assets "whose destruction would deny [the enemy] military success" (Payne 1998a).

Defense, on the other hand, is focused upon protection once an action has begun. A state's defensive capability is its ability to limit the costs an adversary can impose on it (Snyder 1961; Powell 1990). Defense seeks to stop or reverse an action, goals nuclear weapons have not typically been associated with.

But while nuclear weapons are best described as deterrent weapons (Waltz 1990), when conflict does arise between two states nuclear weapons might have some defensive value in terms of their coercive potential (Feldman 1995). To be clear, the actual "use" of nuclear weapons would not be considered a defensive move, but rather a state's efforts to "utilize" nuclear weapons as a bargaining method during a conflict could be considered a defensive gesture. This latter employment could be defined as an example of coercive diplomacy, which is limited to defensive actions (George 1991).

Alexander George (1991: 5) clearly restricts coercive diplomacy to defensive use as he describes it as "efforts (made) to persuade an opponent to stop and/or undo an action he is already embarked upon."

While the threat of the use of nuclear weapons for coercive diplomacy has rarely occurred in overt instances (George 1994) describes the Potsdam Declaration as one such instance), it seems reasonable to assert that nuclear weapons might have influenced state behavior in more subtle ways. The ominous threat such weapons provide might elicit more pacific reactions, or at least a more cautionary approach, between adversaries during a conflict as each seeks to prevent an escalation toward Armageddon.

Thus, it is important to examine what impact the presence, or lack thereof, of nuclear

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[2] The classic description of the distinction between deterrence by denial and deterrence by punishment is presented by Glen Snyder (1961). See also Slocombe (1981), (Gray 1984) Sloss and Milot (1984), and Payne (1996).

weapons might have in conflict situations in order to identify if the characteristics of such weapons not only may have served to prevent interstate warfare, but also to have dulled conflict in general among pairs of states. This study is notable in that the impact nuclear weapons have had on conflict escalation between interstate dyads (if they have had any) has not yet been explored quantitatively at all, and qualitatively outside of the US-Soviet dyad. This probably is the case for two major reasons: first, the relative dearth of nuclear weapons states since the first use of the weapons in 1945; and second, their non-use following the end of World War II. During the years of the Cold War (1945-1992) only nine states were identified as having nuclear weaponry (Spector 1990): the United States (1945); the USSR (1949); the UK (1953); France (1960); China (1964); Israel (1970); India (1974); the Republic of South Africa (1980); and Pakistan (1986). Such a limited number of states has not provided scholars much data with which to work.

This study argues that the relative scarcity of data on dyadic relations between nuclear weapons states can be overcome by simply altering the dependent variable from the mere presence of interstate warfare between states to a scaled interstate dispute score which serves to measure and compare the level of conflict between states involved in dyadic confrontations. Thus, the impact of nuclear weapons can be directly measured to understand if such weapons truly have had a pacifying effect on interstate conflict.

It is hypothesized that the symmetrical presence of nuclear weapons in dyads will lessen conflict escalation. The methodology and the means by which this chapter will scientifically address this inquiry now follow.

6. METHODOLOGY

The most solidly proven contribution of scholars' of international politics to the social science world at-large has been the notion first asserted by Immanuel Kant (1970) that democracies do not fight one another. This so-called "democratic peace" phenomenon has time and again survived the strict rigors of quantitative analysis to ascend in the realm of international politics as the discipline's most identifiable law.

The democratic peace proposition, however, augurs caution when presenting its findings regarding democracies, by noting that while democracies refrain from warfare in dyadic relations with one another, when faced with a state of a differing type (i.e. autocracy, anocracy, etc.) democracies are just as likely as other types of states to engage in conflictual behavior. Thus, democratic states are pacific only in their dealings with like states. In fact, four of the five most conflictual states during the 170 years between 1912-1982 were democracies (Chan 1984). Only Russia/USSR was a non-democracy among France, India, Israel, and the United Kingdom.

Might the same be the case with respect to nuclear weapons' states? In order to ascertain if there is a significant difference in conflict escalation among differing types of states three categories of dyads have been created: symmetrical nuclear dyads (two nuclear states), asymmetrical nuclear dyads (only one nuclear state), and symmetrical non-nuclear dyads (two non-nuclear states).

The conflict observations will be taken from the Militarized Interstate Dispute (MID) data set (Gochman and Maoz 1984; Jones, Bremer and Singer 1997). Those disagreements between states considered to be interstate disputes must contain at least one of the following three events: "(1) an explicit threat to resort to military force; (2) a mobilization, deployment,

or other display of military force; or (3) an actual resort to military force" (Senese 1997, 4). For these events to be included, they "must be explicit, overt, non-accidental, and government sanctioned" (Gochman and Maoz 1984: 586).

The MID data set includes interstate dispute data through 1992 (Jones, Bremer and Singer 1997). The year 1950 has been chosen as the beginning point for data analysis in this paper because this was the first full year in which more than one state in the international system had nuclear weapons. Both the United States and the Soviet Union had the atomic bomb in 1950, firmly rooting the two superpowers as Cold War adversaries. Within this time period of 1950-1992, 1,042 conflict dyads are available for study.

7. DEPENDENT VARIABLE: CONFLICT ESCALATION

Escalation processes have been analyzed previously in concert with deterrence (Bueno de Mesquita and Riker 1982; Zagare 1992), arms races (Richardson 1960) and the bargaining process (Schelling 1960, 1966; Kahn 1965; Young 1968; Smoke 1977). Schelling (1960, 1966) suggests that one of the effects of escalation is to persuade an opponent to back down by playing on the fear that continued and/or future escalation will lead to disastrous results. Thus, escalation is often conceptualized as a game of competitive risk taking, with actors attempting to demonstrate their superior ability to tolerate risk (Schelling 1960, 1966; Kahn 1965, Maoz 1985, 1990; Geller 1990).

Disputes between states are rarely, if ever, static occurrences (Ray 1974). Such confrontations often evolve from one stage of conflict to another involving an augmentation in hostilities as the initial spark of the confrontation creates a larger conflagration. Thus, this paper employs two measures for its dependent variables. First it uses the highest level of conflict reached between pairs of states as a dependent variable. This score (see Table 1), referred to as the level of hostility, is a scaled reference point allowing the quantitative differentiation between levels of conflict. MID dispute level types range from 1 (a nonmilitary act) to 22 (interstate warfare).

Table 1. MID Dispute Level Codes

1 = Nonmilitary act	4 = Threat to occupy territory
2 = Threat to use force	5 = Threat to declare war
3 = Threat to blockade	6 = Threat to use nukes
7 = Show of troops	11 = Nuclear Alert
8 = Show of ships	12 = Mobilization
9 = Show of planes	13 = Fortify border
10 = Alert	14 = Border Violation
15 = Blockade	18 = Clash
16 = Occupation of territory	19 = Raid
17 = Seizure	
20 = Declaration of war	
21 = Use of CB weapons	
22 = Interstate warfare	

The level of hostility in a dispute is an important marker for distinguishing it from other disputes. For example, it seems reasonable to assert that a threat to blockade an area is less hostile than an actual naval blockade, just as a mere threat to use force is less hostile than an actual raid into another state's sovereign territory. Thus, the higher a dispute escalates, the more dire its consequences can be.

As a second marker, dispute severity also was used as a dependent variable for conflict escalation. The severity of interstate disputes was measured by the number of battle fatalities registered by both states. An increase in the number of fatalities is considered to display conflict escalation because "an increase in severity is usually associated with an increase in the intensity of actions taken by combatants, in terms of militarized uses of force" (Senese 1997: 7). In other words, higher battle fatalities are considered to be characteristic of a more serious conflict. The MID data set employs seven levels of fatalities in its coding procedures: 0, 1 to 25, 26 to 100, 101 to 250, 251 to 500, 501 to 999, and >999 battle deaths.[3]

8. INDEPENDENT VARIABLES

Eight independent variables are examined in this chapter. The first two of these directly relate to the focus of the paper: presence of nuclear weapons. It is hypothesized that those dyads in which both of the paired states have nuclear weapons will produce less conflictual outcomes than those dyads in which only one nuclear power is present, or in which none is present. This is because in symmetrical nuclear dyads there is greater destructive potential than in the other two types of dyads. Further, asymmetrical nuclear dyads are hypothesized to be less conflictual than non-nuclear dyads again because of the deterrent value of such weapons.

Two dummy variables have been created to measure the effect of nuclear weapons on conflict escalations. First, a symmetrical dyad variable has been created. In this variable dyads in which two nuclear states are present are coded as "1" and all other cases as "0." Second, an asymmetrical dyad variable has been created. For this dummy variable those dyads in which only one nuclear state is present are coded as "1" with all others coded as "0." A dummy variable need not be created for the independent category of non-nuclear dyads because its value is determined by the first $k - 1$ dummies entered into the regression equation. In other words, the independent category (also known as the reference category) is equal to the Y intercept.

The data set provides 1,042 conflict dyads between the years of 1950-1992. 56 of these conflicts involve a symmetrical pairing of nuclear powers. 291 dyads are asymmetrical in nature. These dyads include one nuclear power and one non-nuclear state. The remaining 695 cases are dyads in which no state with nuclear weapons was present.

The third predictor variable to be used in this study is democracy. Numerous studies have been undertaken to explore the effect of democratic institutions on conflict resolution among states (Chan 1984; Maoz and Abdolali 1989; Bremer 1992, 1993a, 1993b; Dixon 1993; Russett 1990, 1993, 1995; Senese 1997). Strong agreement among scholars has arisen that democratic dyads produce more peaceful outcomes than other dyadic groupings. The coding of states as being democratic or not is based on scores taken from the Jaggers and Gurr's (1995) Polity III data set which has been employed in recent studies on the effects of

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[3] MID does not provide the actual fatality numbers for disputes.

democracy on conflict (Reiter and Stam 1998; Ward and Gleditsch 1998). Polity III rates individual states' level of democracy on an 11-point (0-10) scale (Jagger and Gurr 1995). This is a continuous interval measure ranging from a score of "0" least democratic to a score of "10" or most democratic.

Fourth, a variable has been created to measure the impact of dyadic maturity on conflict escalation. This variable will attempt to capture the impact of stability on interstate relations. The assumption here is that more mature polities will recognize the potential costs of escalation as well as the ability to call on past experience to reduce the likelihood of conflict severity. Scholars have noted a tendency for states in transition, specifically, states whose regimes are in flux, to be more likely to engage in military ventures than those whose governments remain stable (Mansfield and Snyder, 1995).[4] The logic of this argument states that those countries which are in a state of flux are more prone to military action because their leaders are seeking to rally their publics around a patriotic cause in order to save their faltering position. This rally around the flag effect (Miller 1995; Levy and Vakili 1992) is intended to provide the leader with the necessary internal support to stay in power.

Therefore, a variable of dyadic maturity (or stability) has been created by measuring polity persistence in years. This variable will be dichotomized, as has been common practice in previous studies (Bremer 1992; Senese 1997), as mature/not mature based on a twenty year threshold. Again the data will be drawn from the Polity III data-set which extends from 1800-1994. If both the regimes in a dyad have persisted for at least twenty years the dyad will be considered mature; otherwise the dyad will be considered not mature.

As a fifth independent variable, proximity will be studied. The impact of geographical proximity has been shown in previous studies to be significant on the escalation of hostilities between states not only because of the animosity close interactions can produce, but also because of the monetary expense of such efforts (Bremer 1992; Diehl 1985; Russett 1993; Vasquez 1993, 1995; Senese 1996). War fighting is a costly business after all, and therefore the monetary impact of moving troops and equipment often serves as a strong deterrent. Proximity serves to lessen these costs, thereby augmenting the chances for interstate bloodshed. As Senese (1997) argued, "States are less constrained for participation (in warfare) when the venue of combat is geographically proximate."

In order to determine the effects of proximity on conflict escalation the Correlates of War (COW) contiguity data set has been used. Five divisions of state-to-state contiguity are delineated by the COW data: contiguous by land, or separated by 12, 24, 150, or 400 miles or less of water (those over 400 miles are not considered contiguous). Geographically proximate rivals are classified as those that are contiguous by land or separated by 150 miles or less of water.[5] Proximate dyads are coded as "1" and all others as "0".

Sixth, the impact of alliances on interstate relations will be examined. The inclusion of data on alliances is needed and appropriate because of its possible relation to joint conflict. Alliance members generally have been shown to engage infrequently in conflict with one

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[4] While the findings of Mansfield and Snyder (1995) are generally supported, a study by Gleditsch and Ward (1997) does challenge them. However, this paper finds the work of Mansfield and Snyder (1995) to be more compelling.

[5] This delineation is used by Senese (1997, 11) who defends it by noting, "An earlier study (Bremer 1992) shows the major effect of proximity on conflict to be captured by a 'contiguous by land or sea' versus 'not contiguous' distinction." In both these studies (Bremer 1992; Senese 1997) 150 miles was shown to be the proper cut-off point in accounting for proximal significance.

another (Mihalka 1976; Bueno de Mesquita 1981; Weede 1989; Kim 1991; Bremer 1992). In order to ascertain whether dyad pairs are alliance members the Correlates of War alliance data is used (Small and Singer 1982). Weede (1989) and Bremer (1992) both find that the major effect of alliance on conflict can be captured in an allied/not allied dichotomy. Therefore, allied dyads are coded as "1" and all others as "0."

Seventh, a variable measuring trade relations for each of the dyadic pairs of states has been created. Realist thinkers have argued that the relative gains of one trading partner could ultimately threaten the survival, or at least the international standing, of the other (Gowa and Mansfield 1993; Grieco 1988). Liberals, on the other hand, have suggested that the absolute gains accumulated by both trading partners may create security externalities, which would both increase trade and decrease conflict (Snidal 1991).

There is no strong scholarly consensus, however, on the impact of trade on international conflict. Several studies of interstate conflict and trade have shown that conflict is negatively related to international trade (Gasiorowski and Polachek 1982; Polachek 1980; Pollins 1989). Yet Russett (1967) and Barbieri (1996) produce quite different findings. Russett (1967: 198) found that trade partners were "twice as likely to fight" than those which were not. Barbieri (1996) concludes that trade interdependence increases the probability that dyads will experience militarized disputes. These mixed findings suggest any hypothesis with respect to the impact of trade on conflict levels between interstate is imperiled. Thus, it is assumed that trade will have a significant impact on dyadic conflict, yet in what direction remains uncertain.

The majority of trade data are derived from the International Monetary Fund's Direction of Trade Statistics electronic tape.[6] Data were reconfigured from national accounts to dyadic trade flows using the importing countries' reported trade figures. When these figures were absent, the exporter's reports were used. The values that each state reports to import from each partner were added to derive the dyadic total. Each state's total imports and export figures were combined to arrive at each nation's total trade.

Unlike the case of trade, one key variable affecting the decision to escalate has reached a status of general consensus among researchers. A number of studies have shown that an actor's relative military capability is the most vital variable affecting the decision to escalate (Garnham 1976a, 1976b; Organski and Kugler 1980; Bueno de Mesquita 1981; Leng and Gochman 1982; Gochman and Maoz 1984; Bremer 1992; Geller 1993). Military capabilities are important to consider because they determine the level of potential costs which can be doled out by either side (Small and Singer 1982). Empirical evidence suggests that states of relatively equal military capability are more likely to go to war with each other than states with disparate capabilities (Bremer 1992).

So as a eighth marker, an independent variable measuring military capabilities has been created. This capability score was obtained from the Correlates of War (COW) data set (Small and Singer 1982). Military capabilities are measured by six indicators: military

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[6] Data are made available by Katherine Barbieri (1996b). Data were collected for all sovereign states within the interstate system, as defined by the Correlates of War (COW) Project, for the period 1870-1992. Barbieri (1996a, 31) notes concerning the data: "In many instances, the electronic version of the IMF data tape reports trade flows as zero or missing, but these trade values are reported in their annual publications. Missing data were investigated and supplemented with The International Monetary Fund's International Financial Statistics (1956-1998) and The Direction of Trade Statistics Yearbook (1956-1998)."

expenditures, military personnel, iron/steel production, energy consumption, total population, and urban population. These indicators are combined in the COW data set to create an index reflecting a state's percentage of the total capabilities in the world for each year. From this index, a variable is created to serve as a reflection of the ratio of military capabilities of the two actors per dispute. The stronger state is represented in the numerator and the weaker state in the denominator. The ratio will vary from 1.0 (the actors' capabilities are equal) to any positive number less than 1.

These eight independent variables were regressed against the dependent variable measures of level of hostility and severity of hostility in order to ascertain the impact of each on conflict escalation.

9. RESULTS

The two-tailed regression results show (Tables Two and Three) that nuclear dyads significantly reduce conflict escalation between states in terms of level of conflict but not in terms of fatalities. The Y intercept value of 13.961 is the mean response if all the independent variables equal zero. If such was the case the model predicts an outcome of nearly 14 on the twenty-two point MID scale.

Beginning with the two predictor variables of concern to this article, the nuclear symmetry variable reduced the level of conflict between states by 1.55 and was significant at the .04 level. This indicates that a pairing of symmetrical nuclear dyads leads to a 1.55 reduction in the level of conflict on the twenty-two point MID scale. In the case of asymmetrical nuclear dyads an increase in conflict likelihood was found, though it was not significant.

This divergence in findings between symmetrical and asymmetrical dyads suggests that nuclear deterrence is nullified in asymmetrical situations. This is most likely the case because symmetrical nuclear relationships promote extraordinary caution between countries, with both states preferring to err on the side of caution and de-escalate the conflict rapidly.

Table 2. The Effect of Nuclear Weapons on Conflict Level

Variable	Estimate	t-Score	Significance
INTERCEPT	13.961	16.422	.01
Asymmetrical	.605	1.502	.13
Nuke Symmetry	-1.555	2.026	.04
Democracy	-.502	.798	.43
Maturity	-1.932	3.137	.01
Proximity	.676	1.876	.06
Allied	-1.871	2.009	.05
Trade	.001	1.763	.08
Capabilities	2.765	2.392	.02

N = 840
$R^2 = .06$

Table 3. The Effect of Nuclear Weapons on Conflict Fatalities

Variable	Estimate	t-Score	Significance
INTERCEPT	.295	1.643	.10
Asymmetrical	.078	.937	.34
Nuke Symmetry	-.024	.156	.88
Democracy	-.077	.590	.56
Maturity	-.182	1.462	.14
Proximity	.449	5.999	.01
Allied	-.147	.775	.44
Trade	-.001	.762	.45
Capabilities	.192	.782	.43

N = 789
R^2 = .06

The heightened tension of mutual Armageddon experienced by nuclear pairs does not exist (at least for the nuclear state) in an asymmetrical dyad as the non-nuclear state can only threaten with conventional forces. This, in turn, may reduce the deterrent value of nuclear weapons altogether, as the non-nuclear side may feel that as long as it seeks only limited objectives, the nuclear state will not decide to employ its weapons of mass destruction for fear of international outrage.

The 1982 invasion and occupation of the Falkland Islands (referred to as the Malvinas Islands by the Argentineans) by Argentina provides a clear example of an asymmetrical nuclear dyad which escalated to the pinnacle of interstate warfare.[7] A limited aimed strategy promoted by Argentina's desire to recapture what it considered to be lost sovereign territory overrode any apprehensions the Argentinean junta in charge of the country might have had about a potential nuclear response to their military actions. The Argentinean leaders expected the British not to respond militarily to their action, and even if they did, they believed that they could only wage a limited war (Lebow 1985). It has been argued that the junta believed nuclear weapons would never be used in such a small regional theater because of the wrath which would befall Great Britain was it to do so (Lebow 1985).

An alternate explanation is that asymmetrical nuclear dyads permit bullying by the nuclear power. Nuclear capability allows the nuclear powers to react more strongly to conflict challenges by non-nuclear states. Thus when the United States decided to capture Manuel Noriega it invaded Panama to do so. Such a decision almost certainly would not have been made had Panama possessed nuclear weapons.

Most of the other independent variables were found to have a significant effect on conflict between states. The most powerful results were from the "Mature" variable (p = .01) which measured regime longevity. This variable indicates that the likelihood of conflict is decreased in dyads whose two states have had long and stable regimes. This was expected, as previous studies have shown that mature regimes tend to behave more prudently in conflict

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[7] Other research has noted the 1973 Arab Israeli war as an instance of asymmetrical escalation, though it clearly was not dyadic in nature. Despite Israel's "undeclared" status, it was generally understood that it had begun production of nuclear arms at its Dimona factory in the Negev desert in 1968. Thus, by 1973 it was assumed that Israel possessed twenty to twenty-five nuclear weapons (Paul 1994).

situations (Bremer 1992; Senese 1997).

Surprisingly, however, the presence of democratic institutions in dyads was not shown to produce significant effects (p = .425) on conflict escalation, though the sign is in the expected direction. While this finding is antithetical to Democratic peace research, it is important to recall that the dependent variable in this study is different. Democratic peace researchers are focused upon the presence of interstate war as a dependent variable, while this paper has expanded this to include any sort of conflict between states. This paper's findings are similar to those of Paul Senese (1997) who found that democratic dyads, while unlikely to escalate all the way to war, were just as likely as other types of dyads to escalate to threat and displays of force. Senese (1997, 1) finds: "Once a democratic pair has entered a militarized dispute, it is about as likely (possibly a little more so) to escalate that dispute through further stages of antagonism short of war, as is a non-jointly democratic dyad."

Geographic proximity was shown to have significant effects (p = .06) on dyadic escalation. This reconfirms the earlier research mentioned previously which asserted that states bordering one another are more likely to escalate conflicts than those that do not. Thus, neighbors in conflict are more likely to escalate than distal dyadic combinations.

This clearly has important significance for current conflictual regional dyads. Since proximity appears to promote conflict escalation, might nuclear weapons be effectual in offsetting discord between neighbors, especially when other pacifying influences such as alliance and regime maturity are not present? This question will be addressed in the next chapter by qualitatively examining the Indo-Pakistani dyad.

Alliance membership was shown to significantly (p = .05) reduce the likelihood of conflict escalation between dyads. Again, this was to be expected, as the institutional constraints placed on alliance members were believed to reduce the likelihood of conflict escalation between them.

Military capabilities were shown to have a significant (p = .02) impact on conflict escalation as well. As the military capabilities of two states approach relative equality, the likelihood of escalation increases. This finding confirms earlier research, suggesting that evenly matched rivals are more likely to escalate than dyads containing two militarily divergent states. This is most likely the case in conventional instances because neither side is deterred. Relative conventional military equality precludes either party from clearly appreciating ahead of time which side would prevail. Thus, the conflict escalates. The symmetrical effects of nuclear dyads produce pacifying results, though, because in such instances escalation of the conflict would lead to both sides losing. This is the reason why deterrence is successful in symmetrical nuclear dyads and not in symmetrical conventional dyads.

Trade was shown to have a very minimal impact in terms of its marginal significance (p = .08), as well as its magnitude of effect, on conflict escalation. As the level of trade between two states increased, so too did the likelihood of conflict escalation. These results are somewhat counter-intuitive, but, again, some earlier research has produced similar findings.

Employment of the second dependent variable (conflict fatalities) largely did not produce significant results. In fact, the only variable displaying a significant effect on fatality levels was geographic proximity (p = .01). This suggests that geographically proximal states tend to produce higher numbers of fatalities during dyadic conflicts with one another than other types of state couplings. This makes sense as proximity provides more and easier opportunities for contact with one's adversary.

Despite the fact that the remaining variables were not significant, their b values all were

in the same direction as was in the case when conflict level was the dependent variable, with the exception of trade. This movement from a positive to a negative b-value of the trade variable indicates that while trade may lead to marginally higher levels of conflict escalation between interstate dyads, the fatality levels between trading partners are reduced (though insignificantly). What this may indicate is that trading partners are inclined to escalate conflicts between one another, but rarely carry such escalation to a point of interstate war, where fatality levels would be higher. Recall also that previous research has produced mixed results with respect to trade and conflict. Irrespective, it seems reasonable, based on the b-vales and significance levels, to assert that trade has a very minimal effect on conflict escalation between interstate dyads.

10. SUMMARY

In total, these results suggest some positive effects for the presence of nuclear weapons in conflict dyads, but only when nuclear weapons appear on both sides. Nuclear symmetry must exist for any pacifying effects to occur. In such symmetrical nuclear dyads conflict levels are significantly reduced, though fatalities are not. Notably, however, asymmetrical dyads appear to be less stable. Indeed the regression results show that conflict and fatalities are increased in asymmetrical nuclear dyads, though these results are not significant.

So nuclear weapons can be a successful deterrent to conflict escalation when they occur in symmetrical interstate relationships. Thus, nuclear weapons appear to have played a significant role in placating relations between the great powers during the Cold War. Clearly, the presence of nuclear weapons on both sides of a dyad does not prevent conflict, but they do appear to limit it. Thus the spread of nuclear weapons throughout the international system may indeed produce some of the pacifying effects theorized. What is important is where these weapons spread. Introduction of nuclear weapons to only one side of an unstable regional rivalry (thereby creating a nuclear asymmetry) could produce disastrous results. Yet it appears that should both sides of a dyadic rivalry possess nuclear weapons, the level of conflict between the two will be reduced.

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