WEEK 5 ARTICLE PRESENTATION

Andrew Zentgaf

SECURITY GUARANTEES AND ALLIED NUCLEAR PROLIFERATION

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BACKGROUND

- Article is predicated on a divide between policy makers and empirical research
  - Policy-makers view security guarantees as crucial to preventing nuclear proliferation and research has shown mixed conclusions
- Authors see both policy-centered literature and empirical studies as limited
- Security guarantees have two goals: dissuading adversary states and reassuring allies
- Authors employ a Large-N empirical study and case study analysis

ARGUMENT

- Security guarantees make recipients less likely to engage in all levels of proliferation

ADDITIONAL BACKGROUND INFORMATION

- Recent scholarship is divided and used a variety of techniques

- Theoretically, states desire the deterrence capabilities but don't pursue weapons themselves because they are expensive, difficult or will harm them in the global political arena

Table 1. Quantitative Studies of Proliferation and Security Guarantees.

				Findings		
Study	Estimator(s)	DV	IV	Explore	Pursue	Acquire
Singh and Way (2004) (SW)	Hazard and logit	SW	SW	NR/—	NR	NR/—
Jo and Gartzke (2007) (JG)	Probit	JG	JG	n/a	NR	—
Kroenig (2009b/2010)[a]	Hazard	GK[b]	SW	n/a	n/a	—/NR
Fuhrmann (2009)	Probit and RElogit	SW	SW	n/a	NR	NR

Note: NR = no relationship; — = statistically significant negative relationship; n/a = not applicable.
[a]Kroenig (2010) data are unavailable, so it is not possible to explore why Kroenig's (2009b, 2010) studies, which appear similar in all important respects, reached differing conclusions on the relationship between security guarantees and acquisition of nuclear weapons.
[b]GK = Gartzke and Kroenig (2009), which included a new coding for nuclear weapons acquisition, but did not code exploration or pursuit.

HYPOTHESIS

- "Countries receiving formal security guarantees from nuclear-armed allies are less likely to explore nuclear weapons options, launch programs to obtain weapons, and acquire nuclear weapons."

EMPIRICAL SET-UP

- Adapted versions of existing data sets to extend back to 1939 and to 1992

- Behavior coded in four ways:
  - No discernable nuclear proliferation behavior, exploring weapons options, launching programs to pursue weapons and acquiring at least rudimentary deliverable weapons

- Operationalizing security guarantees
  - Formal defense pacts with the United States and Soviet Union (COW data set)

CONTROL VARIABLES

- Economic resources
- Technological resources
- Conventional security threats
- Nuclear security threats
- NPT: ratification and proportion of states that have ratified
- Major power
- Regime type: democracy/autocracy
- Integration with international economy

MODELING

- Hazard model: time until proliferation
- Division between "core" and "fully specified" models

Table 2. Core Multivariate Hazard Modeling Results.

Independent variable	Explore	Pursue	Acquire
Security guarantee	−1.534 (0.480)****	−2.030 (0.714)***	−1.880 (0.872)**
Economic capacity	20.300 (6.263)****	8.833 (1.399)****	8.397 (2.018)****
Nuclear capacity	0.5850 (0.102)****	0.548 (0.120)****	1.274 (0.764)*
Conventional threat	0.700 (0.188)****	1.148 (0.387)***	0.545 (0.590)
Nuclear threat	1.340 (0.487)***	−0.757 (1.325)	1.378 (0.933)
Constant	−6.447 (0.821)****	−8.132 (1.071)****	−13.741 (4.045)****
Log likelihood	−60.877	−39.957	−16.710
Number of countries[a]	160	164	164
Total observations	4,840	5,326	5,557

Note: Coefficients are estimates for parametric survival models with a Weibull distribution. Robust standard errors, adjusted for clustering by country, are in parentheses. Statistically significant parameter estimators are denoted by *($p = .10$), **($p = .05$), ***($p = .01$), and ****($p = .001$).
[a]The *n* changes because four countries that later pursued and acquired, the United States, France, Israel, and India, lack data prior to their exploration, and are therefore dropped from the risk pool for exploration.

Table 3. Fully Specified Multivariate Hazard Modeling Results.

Independent variable	Explore	Pursue	Acquire
Security guarantee	−1.759 (0.604)***	−1.765 (0.770)**	−2.119 (1.116)*
Economic capacity	31.533 (19.191)*	−7.341 (20.081)	11.261 (3.774)***
Nuclear capacity	0.575 (0.166)****	0.391 (0.204)*	1.506 (1.432)
Conventional threat	0.307 (0.337)	0.978 (0.392)**	2.743 (0.863)****
Nuclear threat	1.928 (1.078)*	−1.108 (1.617)	−0.214 (2.742)
Sens nuclear assistance	6.002 (0.980)****	0.400 (1.443)	−0.217 (1.012)
Civil nuclear assistance	0.139 (0.590)	1.059 (0.855)	−3.342 (3.531)
NPT ratification	−1.892 (0.872)**	−1.869 (1.020)*	−31.650 (2.142)****
NPT system effect	−1.55e-06 (0.009)	0.017 (0.013)	−0.0003 (0.018)
Major power	−1.253 (0.819)	3.044 (1.414)**	5.733 (2.737)**
Regional power	1.233 (0.602)**	0.205 (1.100)	3.427 (0.929)****
Democracy	−0.018 (0.077)	0.019 (0.078)	0.254 (0.251)
Openness	−0.003 (0.008)	−0.011 (0.015)	0.037 (0.025)
Liberalization	0.011 (0.015)	0.003 (0.050)	0.015 (0.030)
Constant	−4.878 (1.724)***	−6.627 (1.470)****	−33.930 (9.267)****
Log likelihood	−35.891	−26.029	1.073
Number of countries[a]	124	129	132
Total observations	3,782	4,249	4,474

Note: NPT = Nuclear Non-Proliferation Treaty. Coefficients are estimates for parametric survival models with a Weibull distribution. Robust standard errors, adjusted for clustering by country, are in parentheses. Statistically significant parameter estimators are denoted by *($p = .10$), **($p = .05$), ***($p = .01$), and ****($p = .001$).

[a]The *n* changes because some countries lack data before they engaged in a given threshold of behavior, and therefore drop out of the risk pool for earlier stages of proliferation.

FULLY SPECIFIED

CASE STUDY: SOUTH KOREA

- South Korea is the only country to pursue a nuclear weapons program with a US nuclear security clearance – Mutual Defense Treaty

- Nixon (Guam) Doctrine changes the view of South Koreans

- South Korea pursues nuclear weapons, even if it means getting materials on the black market

- Reagan reaffirms the commitment

- Abandoning the program gave them a credible US commitment to security

KEY TAKEAWAYS

- Both the empirical analysis and case studies confirm that policy makers in Washington are correct: security guarantees can reduce the risk of nuclear proliferation

- Rejects recent scholarship on the subject saying the reverse

- South Korea case shows that states weigh the cost of abandonment by allies and the benefits of a nuclear program

- Policy makers should consider security guarantees as a key component

CRITICISMS

- The study is widespread, but there are many interwoven variables in proliferation outcomes
- Case study bolsters empirical evidence, but is just one example to work with
- Due to the innovative work, it runs counter to much of the existing and current scholarship and is thus short on corroborating scholarly work
- Some differences between the core and fully specified version
- Could have benefited from additional hypotheses

NUCLEAR STRATEGY, NONPROLIFERATION, AND THE CAUSES OF FOREIGN NUCLEAR DEPLOYMENTS

Matthew Fuhrmann and Todd Sechser

RESEARCH QUESTION

- Why do countries deploy nuclear weapons abroad?
  - So what? Why is this an important question?

- Sub-questions:
  - Why do states deploy to some countries but not to others?
    - Why to only some of their allies?
  - Why do some states – but not others – agree to host another state's nuclear weapons?
  - Are foreign nuclear deployments driven by the same factors that drive nuclear proliferation?

INTRODUCTION AND BACKGROUND INFORMATION

- Twenty states have hosted foreign nuclear weapons on their territory and five do at the time of the article's publication (2013)

- Deployments have large consequences for international security but little research has been done on them

- The most significant crisis was triggered and resolved by deployed weapons

METHOD

- Authors develop three theoretical frameworks
  - Extended deterrence model
  - Nonproliferation
  - Power projection
- Tests theories with historical analysis and doesn't seek to falsify or exclude any of the theories
- Utilizes a data set of foreign nuclear deployments from 1945 to 2000 for the statistical analysis

THEORIES, EXPLAINED

- Extended deterrence
  - States deploy nuclear weapons to protect allies from third-party aggression
- Nonproliferation
  - Intended to persuade the host state it can achieve security without producing
- Power projection
  - States deploy to countries that offer an advantage geographically

HYPOTHESES

- D1: Foreign nuclear deployments are ore likely to occur between states that share defense allies

- D2: Foreign nuclear deployments are more likely to occur between states that share a common rival

- N1: Foreign nuclear deployments are more likely to occur when a potential host state is engaged in nuclear exploration

- P1: Foreign nuclear deployments are more likely to occur between states located far from one another

- P2: Foreign nuclear deployments are more likely to occur when a potential host is located in close proximity to the deplorer's adversary

- P3: Foreign nuclear deployments are less likely to occur when a potential deployer possesses ICBMs

DATA SET: FOREIGN NUCLEAR DEPLOYMENTS

- Authors create a data set based on declassified documents and historical accounts

- Temporal domain: 1945-2000

- Spatial domain: all known cases in which a state intentionally stationed nuclear forces on the sovereign territory of another country
  - Excluding: Soviet deployments in the aftermath of the Cold War; US "nonnuclear" bombs abroad; sea-based weapons; sovereign bases

FOREIGN DEPLOYMENT DATA

Table 1. The Foreign Deployment of Nuclear Weapons, 1945–2000.

Nuclear weapons state	Host country	Years
Britain	Cyprus	1961–1975
Britain	Malaysia	1963–1965
Britain	Singapore	1965–1970
Britain	(West) Germany	1972–1998
Soviet Union	Cuba	1962
Soviet Union	Czechoslovakia	1969–1990
Soviet Union	East Germany	1958–1991
Soviet Union	Hungary	1974–1989
Soviet Union	Mongolia	1967–1992
Soviet Union	Poland	1967–1990
United States	Belgium	1963–2000
United States	Britain	1954–2000
United States	Canada	1964–1984
United States	Denmark	1958–1965
United States	Greece	1960–2000
United States	Italy	1956–2000
United States	Morocco	1954–1963
United States	The Netherlands	1960–2000
United States	Philippines	1957–1977
United States	South Korea	1958–1991
United States	Spain	1958–1976
United States	Taiwan	1958–1974
United States	Turkey	1959–2000
United States	(West) Germany	1955–2000

Note: Data are right censored.

DATA SET: OPERATIONALIZATION OF VARIABLES

- Dichotomous dependent variable called "**Foreign nuclear deployment**"
- Defensive alliance is dichotomous (Alliance Treaty Obligations and Provisions data set)
- **Shared rival** is coded 1 if deployer and host state have a shared rival and 0 otherwise
- **Nuclear exploration**: 1 if host is exploring and 0 if not
- **Distance from State A** and **Distance from State A's rival** measures great circle distance in thousands of miles
- **ICBM** is dichotomous and coded 1 if a power possesses ICBMs and 0 if not

DATA SET: CONTROL VARIABLES

- **Arsenal size**: logged number of nuclear weapons
- **Civil war:** dichotomous to control for an unstable country
- **Post-Cold War:** dichotomous; 1 before 1991 and 0 otherwise
- **NPT:** dichotomous, 1 if one is a member and 0 if not
- **Temporal:** number of years that pass without a deployment, squared and cubed; **Deployment years,** measures the number of consecutive years a country has hosted nuclear weapons

Table 2. Logit Analysis of Foreign Nuclear Deployments.

	(1) Full sample	(2) Full sample	(3) Allies only	(4) Allies only
Defense pact	4.016** (0.579)	4.024** (0.659)		
Shared rival	1.583** (0.470)	1.681** (0.407)	1.628** (0.496)	1.679** (0.424)
Nuclear exploration	−1.869* (0.736)		−1.827** (0.654)	
Probability of proliferation (State B)		−0.828 (0.801)		0.590 (0.870)
Distance from State A	−0.100 (0.118)	−0.044 (0.115)	−0.122 (0.116)	−0.047 (0.108)
Distance from state A's rival	−0.506** (0.155)	−0.346** (0.103)	−0.821** (0.295)	−0.515* (0.202)
ICBM	−2.512** (0.621)	−3.204** (0.628)	−2.402** (0.914)	−2.788** (0.834)
Civil war	−1.992** (0.749)	−2.034* (0.798)	−1.538* (0.603)	−1.756* (0.729)
Arsenal size	0.847** (0.117)	0.942** (0.099)	0.857** (0.143)	0.927** (0.127)
Post–Cold War	−1.991** (0.770)	−1.647* (0.719)	−1.946** (0.688)	−1.787** (0.605)
NPT	−1.166* (0.549)	−0.237 (0.442)	−1.111* (0.553)	0.212 (0.459)
Deployment years	0.112** (0.036)	0.066^{+} (0.035)	0.082** (0.028)	0.022 (0.027)
Time	−1.476** (0.235)	−2.813** (0.399)	−1.473** (0.234)	−2.696** (0.393)
$Time^2$	0.080** (0.027)	0.251** (0.052)	0.078** (0.025)	0.234** (0.051)
$Time^3$	$−0.001^{+}$ (0.001)	−0.006** (0.002)	−0.001* (0.001)	−0.006** (0.002)
Constant	−6.928** (0.670)	−6.948** (0.691)	−2.612** (0.670)	−2.923** (0.541)
N	41,252	34,244	4,195	3,898
Pseudo R^2	.891	.917	.857	.896

Note: ICBM = intercontinental ballistic missile; NPT = Nuclear Nonproliferation Treaty. Robust standard errors in parentheses.
$^{+}p < .10$, $*p < .05$, $**p < .01$.

EMPIRICAL FINDINGS

Table 4. Logit Analysis of Foreign Nuclear Deployments.

	(5) Initiations only	(6) Expanded deployments	(7) Deployers only	(8) United States/Union of Soviet Socialist Republics only
Defense pact	3.112** (0.645)	3.732** 0.511)	3.888** (0.585)	4.246** (1.002)
Shared rival	1.042+ (0.578)	1.384** (0.479)	1.544** (0.463)	1.236* (0.601)
Nuclear exploration	−1.138 (1.283)	−0.997 (0.825)	−1.698* (0.761)	−1.239+ (0.701)
Distance from State A	−0.022 (0.123)	−0.144 (0.110)	−0.107 (0.117)	−0.214* (0.103)
Distance from State A's rival	−0.636** (0.193)	−0.555** (0.161)	−0.462** (0.159)	−0.760** (0.234)
ICBM	−2.533** (0.872)	−2.794** (0.630)	−2.414** (0.627)	−2.147* (0.895)
Civil war		−1.809** (0.662)	−1.929** (0.728)	−1.426* (0.728)
Arsenal size	0.654** (0.157)	0.895** (0.123)	0.770** (0.124)	1.170** (0.207)
Post–Cold War		−1.503** (0.541)	−1.937* (0.765)	−1.150 (1.248)
NPT	−1.537* (0.677)	−1.076* (0.486)	−1.162* (0.538)	−2.365** (0.634)
Deployment years		−0.001+ (0.001)	0.113** (0.036)	0.110* (0.045)
Time	−1.071** (0.342)	0.097** (0.030)	−1.480** (0.239)	−1.334** (0.190)
Time^2	0.095* (0.038)	−1.500** (0.249)	0.081** (0.028)	0.066** (0.019)
Time^3	−0.002* (0.001)	0.084** (0.030)	−0.001+ (0.001)	−0.001* (0.000)
Constant	−8.173** (0.951)	−6.770** (0.666)	−6.218** (0.787)	−9.258** (1.455)
N	40,365	41,252	20,059	11,709
Pseudo R^2	.392	.883	.876	.888

Note: ICBM = intercontinental ballistic missile; NPT = Nuclear Nonproliferation Treaty. Robust standard errors are given in parentheses.
+$p < .10$, *$p < .05$, **$p < .01$.

FINDINGS

- **Defense pact** is positive and statistically significant – Hypothesis D1
- **Shared rival** is positive and statistically significant at the 99th percent level – Hypothesis D2
- **Distance from State A** is statistically insignificant – Hypothesis P1
- **Distance from State A's rival** is negative and highly significant – Hypothesis P2
- **ICBM** is negative and statistically significant
- **Nuclear exploration** is negative and significant – Hypothesis N1

CONTROL VARIABLE FINDINGS

- **Civil war** is negatively associated with hosting nuclear weapons

- **NPT** is statistically significant and negative

- **Deployment years** is positive and significant; weapons are more likely to remain in places the longer they are stationed there

Table 3. Substantive Effects of Statistically Significant Covariates.

	Odds ratio	Percentage change in odds
Defense pact	55.47	5,447
Shared rival	4.87	387
Nuclear exploration	0.15	−85
Distance from State A's rival	0.60	−40
ICBM	0.08	−92
Civil war	0.14	−86
Arsenal size	2.33	133
Post–Cold War	0.14	−86
NPT	0.31	−69
Deployment years	1.12	12

Note: ICBM = intercontinental ballistic missile; NPT = Nuclear Nonproliferation Treaty.

KEY FINDINGS

- Deterrence is the key reason behind nuclear deployment
  - Protect protégés and allies from attack
- Nonproliferation does not seem to play a role in deployment
  - Hosts may reject it or not in the deployer's interest
- Explains why the United States might deploy to South Korea or Saudi Arabia
- Security relationships are – roughly speaking – a larger motivator behind **deployments than nonproliferation**

POTENTIAL CRITICISMS

- Innovative theoretical framework is interesting
  - Could have benefited from discussing the theoretical framework in the context of existing work
  - Some of it seems intuitive, and potentially tautological