Importing the Bomb: Sensitive Nuclear Assistance and Nuclear Proliferation

Written by Matthew Kroenig
Presentation by Martin Hutto

Why do Nuclear Weapons Spread?

- Author finds strong support for a supply-side approach to nuclear proliferation

- States that are better able to produce nuclear weapons, due to either international assistance or domestic capacity, are more likely to do so

- Sensitive nuclear transfers are an important determinant of nuclear proliferation

Kroenig's Argument

-States that receive sensitive nuclear assistance can better overcome the common obstacles that states encounter as they attempt to develop a nuclear-weapons arsenal

-States that are better able to produce nuclear weapons, due to either international assistance of domestic capacity, are more likely to do so.

-Taken together, these findings provide strong support for the supply-side approach to understanding the causes of nuclear proliferation

Explaining Nuclear Proliferation

- Technological and strategic advantages to importing nuclear materials and technology from more advanced nuclear states

- Demand-side Approach vs Supply-side Approach

  - Demand: a state's willingness to proliferate

  - Supply: a state's opportunity to proliferate

    - Opportunity can lead to willingness

Causes of International Nuclear Assistance

- Kroenig argues that the spread of nuclear weapons is more threatening to relatively powerful states than it is to relatively weaker states

1. The more powerful a state is relative to a potential nuclear recipient, the less likely it is to provide sensitive nuclear assistance
2. States are more likely to provide nuclear assistance to states with which they share a common enemy
3. States that are less vulnerable to superpower pressure are more likely to provide sensitive nuclear assistance

Importing the Bomb

- A state's ability to produce nuclear weapons often hinges on the availability of external assistance from a more advanced nuclear state

- There is a massive amount of trial-and-error that goes into the development of a nuclear program

- Building a program from scratch is also ludicrously expensive

- With a guaranteed design in hand, scientists and technicians can leapfrog technical design stages and focus their effort on replicating a model that has proven effective elsewhere.

Table 1
Cases of Sensitive Nuclear Assistance

Recipient	Year of First Assistance	Supplier(s)	Type of Assistance
China	1958	Soviet Union	Plutonium reprocessing, uranium enrichment
Israel	1959	France	Plutonium reprocessing, nuclear-weapon desig
Japan	1971	France	Plutonium reprocessing
Pakistan	1974	France, China	Plutonium reprocessing, uranium enrichment, nuclear-weapon design
Taiwan	1975	France	Plutonium reprocessing
Iraq	1976	Italy	Plutonium reprocessing
Brazil	1979	Germany	Plutonium reprocessing, uranium enrichment
Egypt	1980	France	Plutonium reprocessing
Iran	1984–1995	China, Pakistan	Plutonium reprocessing, uranium enrichment[a]
Algeria	1986	China	Plutonium reprocessing
Libya	1997	Pakistan	Plutonium reprocessing, uranium enrichment, nuclear-weapon design
North Korea	1997	Pakistan	Plutonium reprocessing, uranium enrichment[a]

a. It is widely suspected that Pakistan provided a nuclear-weapon design to Iran and North Kore although, as of yet, there is no firm evidence to prove it.

Table 2
Hazard Models of Nuclear Proliferation

	Model			
Independent Variable	1	2	3	4
Sensitive nuclear assistance	3.323**** (0.951)	2.093**** (0.641)	2.024*** (0.786)	1.478** (0.694)
GDP		0.649*** (0.240)	0.625*** (0.227)	0.609 (0.378)
GDP squared		–5.13e–5**** (1.54e–5)	–5.69e–5*** (2.03e–5)	–4.60e–5 (3.02e–5)
Industrial capacity (0.756)		3.430**** (0.387)	3.606**** (0.497)	3.276****
Rivalry		2.382* (1.367)	2.371* (1.252)	1.517 (1.651)
Alliance		–1.800* (1.061)	–1.705* (0.945)	–.8253 (0.835)
Regime type		0.114** (0.050)	0.112** (0.055)	0.112** (0.050)
Openness		–0.022 (0.018)		–0.027 (0.026)
Liberalization		0.028 (0.026)		0.059** (0.028)
Log likelihood	–32.669	–18.784	–19.260	–15.413
Number of countries	156	156	156	18
Total observations	5,901	5,901	5,901	398

Note: Statistically significant parameter estimators are denoted by *(p = .10); **(p = .05); ***(p = .01); ****(p = .001). Coefficients are estimates for Cox proportional hazard models; robust standard errors, adjusted for clustering by country, are in parentheses. GDP = gross domestic product.

Table 3
Substantive Effects of the Explanatory Variables on the Likelihood of Nuclear Proliferation

	Percentage Change in the Hazard Ratios	
Variable	Uncensored	
Censored		
Sensitive nuclear assistance	+711	+338
Industrial capacity	+2,986	+2,546
Regime type	+12	+12

Note: Hazard ratios on whether a state acquires a nuclear weapon are based on the hazard models reported in Table 2, models 2 and 4.

Table 4
Balance Statistics

Variable		Mean Treated	Mean Control	t-test p value	K-S test p value	Var. ratio (Tr/Co)	Mean eQQ Diff.
GDP	Before matching	7,057.700	5,452.500	0.000	0.000	1.077	0.114
	After matching	6,943.900	6,608.600	0.574	0.144	1.063	0.046
GDP squared	Before matching	86,540,299.000	63,991,650.000	0.031	0.000	0.976	0.105
	After matching	84,853,891.000	78,135,099.000	0.625	0.144	1.154	0.045
Industrial capacity	Before matching	0.746	0.229	0.000		1.079	0.259
	After matching	0.751	0.726	0.571		0.940	0.012
Rivalry	Before matching	0.761	0.269	0.000		0.929	0.246
	After matching	0.766	0.741	0.564		0.934	0.012
Alliance	Before matching	0.462	0.466	0.915		1.004	0.002
	After matching	0.453	0.532	0.111		0.995	0.040
Regime type	Before matching	–0.523	–0.274	0.647	0.124	0.968	0.035
	After matching	–0.692	–0.557	0.860	0.114	0.936	0.049
Openness	Before matching	39.030	52.432	0.000	0.000	0.370	0.096
	After matching	38.304	38.621	0.902	0.273	1.239	0.028
Liberalization	Before matching	–0.195	2.587	0.008	0.195	0.697	0.033
	After matching	–0.185	0.044	0.869	0.330	1.037	0.029

Note: GDP = gross domestic product.

Table 5
Hazard Model of Nuclear Proliferation, Postmatching

Matched observations	280
Number of countries	48
Coefficient	2.552
Standard error	1.029
p value	.013

Conclusion

- The article sought to explain why states acquire nuclear weapons

- The receipt of sensitive nuclear assistance helps potential nuclear proliferators overcome the common obstacles that states encounter as they attempt to develop a nuclear arsenal.

- By importing the bomb, states can leapfrog technical design stages, benefit from tacit knowledge in more advanced scientific communities, economize on the cost of nuclear weapons development, and avoid international scrutiny