Domestic Politics and Nuclear Proliferation

Chul Min Kim and Man-Sung Yim[*]
Department of Nuclear and Quantum Engineering,
Korea Advanced Institute of Science and Technology (KAIST), Daejeon 305-701, Korea
[*]Corresponding Author: msyim@kaist.ac.kr

1. Introduction

Why do states try to build nuclear weapons? What kind of the status or event can motivate a nuclear weapons program? How does the opportunity cost of weapons change when some particular condition changes? From the 1960s, U.S. policymakers and international relations scholars thought the country developed nuclear weapons due to the external security threat. However, Sagan [44] suggested the three models for the causes of nuclear weapons development: the security model, the domestic politics model, and the norms model. Even though the external security threat is known as the most important factor of nuclear weapons program, the domestic politics situation can also affect the nuclear proliferation decision of a country. For example, when a leader wants nuclear weapons as an ultimate weapon, the domestic politics situation can determine the effectiveness of the weapons program of a country. This study analyzes the current knowledge of the relationship between domestic politics and nuclear proliferation and suggests the main challenges of the quantitative models trying to calculate nuclear proliferation risk of countries.

2. Current Knowledge of the Relationship between Domestic Politics and Nuclear Proliferation

Singh and Way [1] analyzed the nuclear proliferation risk in quantitative way to analyze the relative importance of each determinant to nuclear proliferation. They defined the progress of nuclear program divided into 3 levels (exploration, pursuit, acquisition). They used the nuclear proliferation history as dependent variables and proliferation determinants related to current capability, domestic politics, and external security threat as independent variables. However, they considered only 'the democracy score' as domestic politics indicator. In their analysis, the democratic country has higher probability of initiating nuclear programs, although it was not significant. Tables 1 and 2 summarize the current approach for analyzing nuclear proliferation determinants in quantitative way.

Table 1. Four Levels of Nuclear Proliferation

Level	Name	Description
0	No interest	No proliferation attempts
1	Exploration	Country considered nuclear weapons and conducted some exploratory work
2	Pursuit	Country started a nuclear weapons development program
3	Acquisition	First explosion/assembly of nuclear weapon

Table 2. Categories of Proliferation Determinants and Variables from Previous Studies

Category	Subcategory	Variable
Capability	Economic capacity	GDP, GDP per capita, GDP^2, log(GDP), population
	Industrial capacity	Industry indicators, electricity, Iron and steel production
	Nuclear capability	Existence of nuclear fuel cycle capacity and sensitive material
	Nuclear assistance	Sensitive nuclear assistance, civilian nuclear assistance, IAEA technological cooperation
Domestic Politics	Political System	Democracy score (Polity IV data)
	Domestic Unrest	5-year change of democracy score
	Leader's Characteristics	Coup d'etat experience, regime length, leader type
International Security	Rivalry	Frequency of disputes, conventional threat, nuclear threat
	Alliance	Security guarantee (defense pact), nuclear deployment, troop deployment
	Domestic Isolation	Economic openness
	Power of Nation	Major power country, regional power country
International Norm		IAEA(member, safeguard

	agreement), NPT (signed/ratified), other agreements	

After Singh and Way, various quantitative studies have been performed to analyze the effectiveness of domestic politics determinants to nuclear proliferation [2,3,4,5], using the framework of Singh and Way. Table 3 summarizes the variables indicating the domestic politics status from two of the most recent studies.

Table 3. Domestic Politics Indicators of Fuhrmann's and Bleek's datasets

Fuhrmann (2014)	Bleek(2014)
Rebel experience Irregular entry Civil war Democracy Borders Personalist regime	Democracy Liberalization

The domestic politics status related to nuclear proliferation decision can be categorized as Table 4. First of all, specific political structure can support a nuclear weapons program. If there are many veto players in the nation, the weapons project would be less effective. The influence of the domestic politics situation on a nuclear weapons program should be explored based on the decision-making process of a country. For example, regime type and transparency of a state can help understanding how country makes its policy decision. The leader's psychology can be an indicator for nuclear weapons program. He/She might really want to make nuclear weapons to maintain the regime, to gain nationalistic prestige, or use nuclear weapons as a negotiation option against other states.

Public support for nuclear weapons can be another indicator of the effectiveness of weapons program. In democratic country, absolute public support is needed to progress such kind of nuclear program.

Table 4. The Categorization of Domestic Politics

Category	Subcategory	Reason for Selection
Political Structure	Regime Type	Common measure of political structure
	Power of Leader	Influences the efficiency of nuclear program
	Veto Players	Influences the efficiency of nuclear program
	Transparency	Detectability of nuclear program
Intention of Decision-maker	View for Nuclear Weapon	Direct indicator of leader's intention
	Fear from Threat	Necessity of nuclear weapon
	Risk-taking Characteristics	Will for continuing the weapons program

	National Prestige	Indirect indicator of approval for the weapon
Public Opinion	Non-proliferation	Approval rating for nuclear program

4. Nuclear Risk Projection using Domestic Politics Variables

In previous studies, multinomial logistic regression (and Rare Events logit) and survival analysis (Weibull, Cox model) have been used to analyze the correlation of various determinants and three levels of nuclear proliferation. This study used all four methods listed above to analyze the significance of domestic politics variables, which were used in previous studies at least once. However, some of the variables listed in Table 4 cannot be used because of the lack of historical data. Table 5 shows significant variables with explore, pursue and acquire among the domestic politics variables in each of four analysis methods. In the table, "MLogit" indicates multinomial logistic regression analysis, "RELogit" indicates rare events logistic regression analysis, "Weibull" indicates Weibull event history analysis, and "Cox" indicates Cox event history analysis. For level of nuclear proliferation, "Ex" represents exploration, "Pu" represents pursuit, and "Ac" represents acquisition. "+" sign represents significant positive correlation, and "-" sign represents significant negative correlation with certain proliferation level ($p<.05$).

Table 5. Analysis Results

Variable	MLogit	RELogit	Weibull	Cox
Rebel experience	Ex, + Pu, +	Ex, +	Ex, + Pu, +	
Irregular entry			Ac, +	Ac, +
Leader's year of power				Ac, +
Democracy score of a country				
Personalist regime	Pu, + Ac, +		Ex, + Pu, +	Pu, + Ac, +

Figures 1 through 3 show the projected proliferation risk of selected countries using the analysis results. Multinomial logistic regression and Weibull survival analysis were used as representative methods in these figures. The number of years of regime of current leader makes dominant effect on proliferation risk, even though it was not significant. The rebel experience of a leader also made an effect for increasing the estimated proliferation risk.
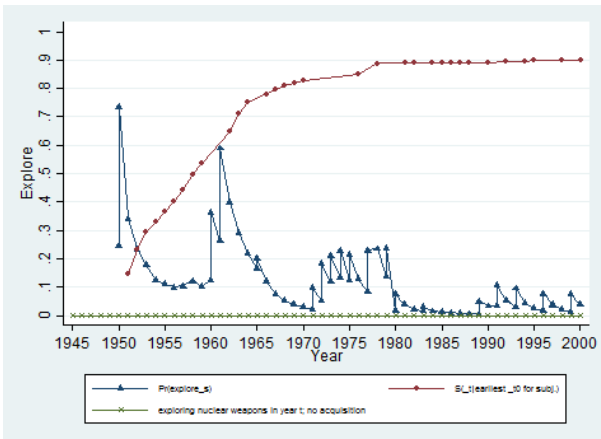
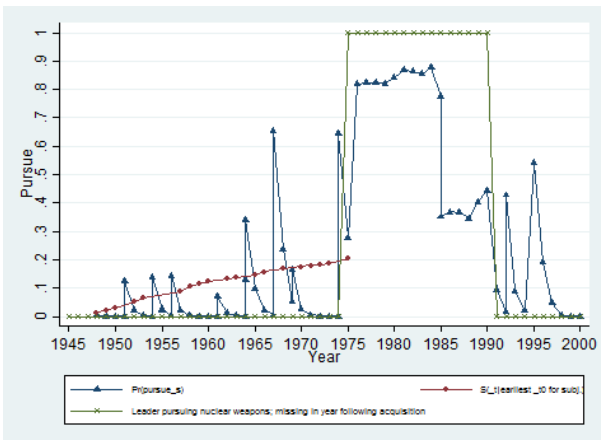Figure 1. Projected Proliferation Risk of Country A

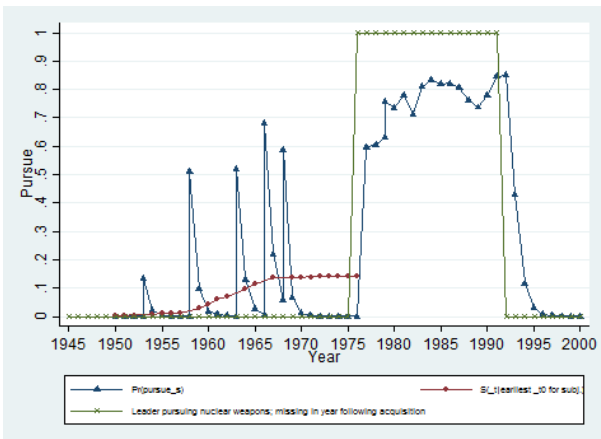Figure 2. Projected Proliferation Risk of Country B

Figure 3. Projected Proliferation Risk of Country C

5. Discussion and Conclusion

The domestic politics status is one of the most important indicators of nuclear program. However, some variables have never been used in quantitative analyses; for example, number of veto players and the public opinion on nuclear weapons; despite they are considered to be important in various qualitative studies. Future studies should focus on how should they be coded and how can they be linked with existing domestic politics variables.

REFERENCES

[1] Singh, S. and Way, C. R., 2010. The Correlates of Nuclear Proliferation: A Quantitative Test, Journal of Conflict Resolution. 48, 6, 859-885.

[2] Bleek, Philipp C., 2010. 'Why Do States Proliferate? Quantitative Analysis of the Ex-ploration, Pursuit, and Acquisition of Nuclear Weapons,' Chap. 8 in Forecasting Nu-clear Proliferation in the 21st Century: The Role of Theory, Volume 1. Stanford, Ca-lif.: Stanford University Press.

[3] Fuhrmann, Matthew and Michael C. Horowitz, 2015. 'When Leaders Matter: Rebel Experience and Nuclear Proliferation.' Journal of Politics 77 (1): 72-87.

[4] P. C. Bleek and E. B. Lorber, 2015. Security Guarantees and Allied Nuclear Proliferation, Journal of Conflict Resolution, 58 (3), 429–54.

[4] Li, Jun, Yim, M.-S., McNelis D. N., 2010. Model-based calculations of the probability of a country's nuclear proliferation decisions, Progress in Nuclear Energy, 52, 8, 789-808.