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**Notes on the Effects of Cooperative Security Measures on National Defense
Spending and Global Security**

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Notes on the Effects of Cooperative Security Measures on National Defense Spending and Global Security

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Abstract

Using public goods models of military alliances, this paper presents a normative analysis of the effects of cooperative security institutions, such as the Organization for Security and Co-operation in Europe and the ASEAN Regional Forum, on defense spending of countries and global security. The analysis reveals that the effects of these measures on national defense spending are not deterministic. Depending on the network of military alliances, the membership of cooperative security organizations, and national budgets of countries, cooperative security measures are either effective or ineffective.

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1 INTRODUCTION

Although the world of sovereign states is a self-help system in which individual states are ultimately forced to rely on their own powers, states have attempted to alleviate this situation by embarking on collective efforts between them. Among other efforts, collective defense, which is conventionally called alliance, is a form of collaboration that has played a central role to the present day. Although alliances remained loose bonds of countries until the early 20th century, states' efforts to formalize collective defense were strengthened during the Cold War. In fact, multilateral collective defense organizations, such as NATO and the Warsaw Treaty Organization, as well as bilateral alliances, such as those between the United States and Asian countries, were institutionalized to an unprecedented level during this period. Despite the disappearance of some collective defense arrangements after the end of the Cold War, most of them have adjusted their function to the new environment, and they continue to assume a vital role in contemporary world politics.¹

Meanwhile, states launched another type of collective effort, called cooperative security, in the late 20th century. In order to promote dialogue between the West and the East, which had faced off by organizing their own collective defense groups, the Conference on Security and Cooperation in Europe (CSCE) was created in the 1970s. Like collective defense arrangements, cooperative security institutions also survived the end of the Cold War. The CSCE developed into the Organization for Security and Co-operation in Europe (OSCE) in the 1990s, and it continues to play a role in stabilizing the precarious relationship between the Western and the former socialist countries. Cooperative security has expanded geographically as well. In Asia, cooperative security mechanisms were embodied in the ASEAN Regional Forum (ARF)

¹ Following the changes in the international security environment after the end of the Cold War, NATO's role has been expanded to include a wide range of so-called non-Article 5 operations, such as peacekeeping and humanitarian intervention (NATO 2011). Some researchers have focused on this new development and illuminated significant changes in NATO's functions in the post-Cold War period (see Adler 2008; Hoffman 2009). Even so, the conventional role of a military alliance remains its primary objective. For Russia, NATO's eastward expansion in the post-Cold War period is an indication that NATO's purpose has been essentially unchanged. Meanwhile, it is also said that Russia and China have attempted to strengthen the Shanghai Cooperation Organisation (SCO) as a collective defense organization able to compete with the growing presence of the Western countries in Central and East Asia (e.g., Ambrosio 2008; Hanova 2009; see also Aris 2011: 6–7). Thus, the rivalry pitting the Western countries against Russia and China continues to evolve through the old and new collective defense arrangements.

in the early 1990s. The ARF's function has been increasingly strengthened since its establishment, and it is currently seen as the first Asian security forum that helps foster mutual confidence between China and Russia on the one hand, and liberal democratic countries such as Japan, South Korea, and the United States on the other.²

As of 2000, version 3.03 of the Correlates of War (COW) formal alliance dataset identifies 32 military alliances, and 122 participants in these alliances, around the world (Gibler 2009; Gibler and Sarkees 2004). Meanwhile, the current OSCE consists of 56 countries, and the member states are drawn from all across North America and Europe, while the ARF has 26 participants, mostly located in the Asia-Pacific region and the European Union. Given this fact, the contemporary international security system is appropriately described as a network of countries that is sustained by the combination of collaborative as well as individual defense activities of countries.

A notable fact regarding this system is that in contrast to private and collective defense, cooperative security has scarcely been addressed by scholars. The one exception is constructivists in international relations studies. Since key elements of cooperative security practices are designed to build mutual confidence between enemies, constructivists, who emphasize intersubjective understandings, have been more interested in these practices than others have been. In particular, ASEAN scholars have played a dominant role in the study of cooperative security. These scholars find that the so-called ASEAN way could be extended to the broader East Asian area and argue that this diplomatic and security approach would become an effective means of stabilizing the entire region. After witnessing the intensified rivalry between major countries in the region, such as China and Japan, they are more cautious about the ARF's prospects in recent years (e.g., Morada 2010). However, their overall expectations remain unchanged, and they regard the ARF as constituting a significant cooperative security institution in East Asia (e.g., Katsumata 2009; Acharya 2009: Chap. 6).

² The concept of common security is also used to describe the function of the CSCE. This notion was developed during the Cold War and presupposes unambiguous hostility between military blocs. On the other hand, the concept of cooperative security began to prevail in the post-Cold War period, following the publication of Carter et al. (1993). Cooperative security usually presupposes more potential rivalry than common security does. In addition, cooperative security often indicates more flexible and less institutionalized collaboration, as observed in Asia. Despite these differences, however, the two concepts describe substantively the same type of security collaboration, in that the core function fulfilled by both mechanisms is to promote peace between adversaries, either explicit or potential, by developing mutual confidence that encompasses these adversaries (see also Emmers 2004: 6–8). Since this paper investigates the role of this core function, in the rest of this paper I will use only the term “cooperative security.”

Despite the constructivists' evaluation, however, the nascent and nonviolent nature of cooperative security arrangements leads a number of international security scholars to consider that these measures are merely "well-meaning" and ineffective. For example, Jones and Smith (2007), who are skeptical about constructivist approaches, argue that constructivists overestimate the ASEAN way's potency and assert that the extension of the ASEAN way into wider areas is unpromising. Similarly, although some researchers, such as Galbreath (2007), rate the effectiveness of the OSCE highly, many scholars emphasize the enmity between the Western and the former Soviet countries in the first decade of the 21st century and are usually skeptical about the prospects of the OSCE in Eurasia (e.g., Gheciu 2008; Boonstra 2011).

I also agree with the view that cooperative security arrangements are still in a primitive stage and that the ability of these arrangements to promote peace remains limited. Taking these limitations as a given, this paper attempts to estimate the policy effects of cooperative security measures when these measures are strengthened or weakened by countries, using a model of national resource allocation between different types of defense policy. In other words, this paper provides a normative, rather than positive, analysis of defense policy choice in the sense used by mathematical economics. If the analysis reveals that the increased practices of cooperative security curtail the overall defense expenditure in the world, then this paper implies that cooperative security should be encouraged. On the other hand, if these practices function inversely, then these measures should be discouraged. Thus, instead of presenting an assessment of the current cooperative security institutions, this paper aims at providing policy suggestions for the future implementation of cooperative security policy.

In this paper, I develop a model in which states seek to enhance their security by allocating their resources to three types of defense activities: private defense, collective defense (alliance), and cooperative security. The next section reviews the literature relating to this model. The third section derives general propositions by presenting a two-group model in which states participating in one of two adversarial collective defense groups attempt to embark on cooperative security activities across the groups. The fourth section concludes.

2 RELATED LITERATURE

As described above, countries in the contemporary international security system allocate their resources not only to private but also to collaborative defense efforts. This type of collective action between countries has been seen as the provision of international

public goods by states. International collective action in the area of defense policy was first addressed by Olson and Zeckhauser (1966). Although Olson and Zeckhauser's (1966) seminal model focused on resource allocation problems between defense and non-defense goods, Sandler (1977) and Murdoch and Sandler (1982) expand the OZ model to differentiate private and public aspects of defense goods. The model in this paper is further extended to divide the public part of defense goods into collective defense and cooperative security.³

The literature on the variants of the OZ model before the mid-1990s has been extensively reviewed by Sandler and Hartley (1995: Chap. 2). In addition to Sandler (1977) and Murdoch and Sandler (1982) mentioned above, these studies include the comparison of various types of technologies employed for aggregating the defense contributions provided by the allies (e.g., Conybeare et al. 1994; see also McGuire 1990: 19); allies' comparative advantages for supplying public goods (e.g., Boyer 1989); resource allocation processes other than the Nash equilibrium (e.g., McGuire and Groth 1985); and the effects of domestic decision-making structure (e.g., Murdoch et al. 1991; Jones 1992). More recently, Stone et al. (2008) combined the Olsonian public goods approach with the repeated prisoner's dilemma and investigated how hegemon-led interstate cooperation could provide international institutions.

Among other developments, this study is most closely related to Bruce (1990) and Ihori (2001) in that, unlike other OZ model variants that focus on the relations within allies, their models, along with the model in this paper, allow for the relations between adversarial alliances, although, unlike my model, Bruce (1990) and Ihori (2001) focus on arms races between adversaries and do not address cooperative security. To the best of my knowledge, Yamamoto (2010) is the only model that advances Olsonian public goods analysis by incorporating the role of cooperative security. However, his model focuses on the effects of the changes of the membership size in alliances. As a result, unlike this paper, he also fails to analyze the policy effects of states' implementation of cooperative security measures on national defense strategy and disarmament in the world.

Thus, the formation of collective defense arrangements as problems of policy choice between non-defense activities and different types of defense activities has been

³ The provision of international public goods is also a primary subject addressed by the theory of hegemonic stability. Although this theory asserts that a hegemon plays a critical role in the provision of the goods (Kindleberger 1973; Gilpin 1981), Snidal (1985) argues against these scholars and asserts that the maintenance of international public goods by a hegemon is only a special case and illustrates the cases in which these goods can persist even in the absence of that power.

investigated by the studies inspired by collective action theory (Olson 1971/1965).⁴ Meanwhile, as described in the previous section, the study of cooperative security has been led by constructivist perspectives. In this paper, I incorporate the mechanism of cooperative security into collective action models of defense policy that have been advanced by the OZ and its variants. In doing so, this paper aims at bridging studies of collective defense and cooperative security, which have thus far been approached independently.

3 A TWO-GROUP MODEL

I now consider the world in which countries participating in either alliance A or B attempt to undertake cooperative security activities between the two groups of states. Assume that country i is a member of A.⁵ i allocates resources, I^i , between a non-defense private good, c^i , and a defense good, q^i , where $I > 0$ and $c, q \geq 0$. Moreover, q^i is divided into a pure private defense good, $p^i = \sigma^i q^i$, a collective defense public good, $g^i = \omega^i q^i$, and a cooperative security public good, $y^i = \delta^i q^i$, where σ , ω , and δ are parameters that satisfy $\sigma, \omega, \delta \in [0, 1]$ and $\sigma + \omega + \delta = 1$.⁶ i receives positive and negative defense spillins from its allies and adversaries. There are two types of spillins: the ones provided by collective defense arrangements, G^i , and the ones provided by cooperative security measures, Y^i . Thus i 's utility function, U^i , depends on c^i , q^i , G^i , and Y^i . U^i is assumed to be twice-continuously differentiable.

⁴ Besides collective action theory (or public goods theory), balance of power theory has played an important role in the study of military alliance (e.g., Waltz 1979: Chap. 6; Walt 1987; Ikenberry 2002; Paul 2004). More broadly, the study of interstate cooperation in general has been advanced by a variety of approaches: game theory and the prisoner's dilemma (e.g., Axelrod 1984; Oye 1986); international regime theory (e.g., Krasner 1983; Young 1989); neoliberal institutionalism (e.g., Keohane 1984); and, more recently, global governance, albeit with an emphasis on non-state actors (e.g., Hewson and Sinclair 1999; Weiss 2011).

⁵ Although I assume that country i is A's member, the same argument is applicable to countries in Alliance B because, as described below, the two alliances in the model are symmetrical.

⁶ Although the distinction between private and public defense goods is sometimes unclear, the deployment of conventional forces usually provides greater country-specific private benefits, whereas weapons such as nuclear missiles play a more public role among allies (Sandler and Hartley 1995: 31). Meanwhile, cooperative security activities, such as joint military exercises, disaster relief, peacekeeping operations, counter-terrorism cooperation, strategic dialogue, military liaison arrangements, and arms control negotiations between adversarial collective defense organizations (see also Dunn 2009: 178), yield public benefits that encompass potential enemies.

Since collective defense arrangements are designed to defend their members from external aggression (Cohen and Mihalka 2001: 6) by obliging the member states to abide by the principles of reciprocity and mutual defense (Emmers 2004: 4), the allies' defense efforts have positive externalities on other member states, while the same efforts cause negative externalities on non-members (potential enemies). Hence, country i 's spillins provided by the collective defense arrangements of the allies and adversaries are written as $G^i = \sum_{j \in A, j \neq i} g^j - \sum_{k \in B} g^k$.⁷ Meanwhile, cooperative security measures seek

security by supporting 'the notion that security should be promoted "with others" as opposed to "against others"' (Emmers 2004: 3). Hence, spillins produced by cooperative security activities benefit not only the allies but also the adversaries. The spillins that country i can receive from cooperative security efforts are written as

$$Y^i = \sum_{j \in A, j \neq i} y^j + \sum_{k \in B} y^k .$$

Also consider that i 's utility normally increases with an increase in c^i and q^i (i.e., $\partial U^i / \partial c^i > 0$ and $\partial U^i / \partial q^i > 0$), whereas the replacement of a defense good, q^i , by a non-defense good, c^i , decreases i 's utility (i.e., $\partial U^i / \partial c^i < 0$) if the adversarial alliance is seriously threatening i and exposes i to a large amount of negative spillins (i.e., $G^i + Y^i < 0$ and $q^i < |G^i + Y^i|$).

Based on the above formulation of resource allocation, spillins, and utility, i 's utility function can be specified as a Cobb-Douglas form, $U^i(c^i, q^i, G^i, Y^i) = c^i(p^i + g^i + G^i + y^i + Y^i)$. Then, i will allocate resources in order to solve

$$\begin{aligned} \max_{c^i, q^i} c^i (\sigma^i q^i + \omega^i q^i + G^i + \delta^i q^i + Y^i) \\ \text{s.t. } I^i = c^i + q^i. \end{aligned} \quad (1)$$

Proposition 1: Country i spends q_*^i if $|G^i + Y^i| \leq I^i$. q_*^i is decreasing in cooperative security activities, δ , of any other nation, $h \in A, B (h \neq i)$:

$$q_*^i = \frac{I^i - G^i - Y^i}{2} = \frac{I^i - \sum_{j \in A, j \neq i} g^j + \sum_{k \in B} g^k - \sum_{j \in A, j \neq i} y^j - \sum_{k \in B} y^k}{2}, \quad (2)$$

⁷ I use the simplest and most standard summation technology in this model. For other technologies, see Conybeare et al. (1994) and McGuire (1990).

$$\frac{\partial q_*^i}{\partial \delta^h} = -\frac{\sum_{j \in A, j \neq i} \frac{\partial y^j}{\partial \delta^h} + \sum_{k \in B} \frac{\partial y^k}{\partial \delta^h}}{2} < 0, (\delta > 0). \quad (3)$$

Condition $|G^i + Y^i| \leq I^i$ has two implications. First, since this inequality indicates that a country's budget is greater than the absolute size of externalities provided by other nations, the big countries, rather than the small ones, are more likely to satisfy the condition. As a result, larger countries would be likely to be more willing to curtail their defense expenditures by the increase of cooperative security activities by other nations. Second, since G^i is the summation of both positive and negative spillins brought by the allies and adversaries, G^i approaches zero as the power of the two alliances is more balanced. Therefore, if no cooperative security measures are launched (i.e., $Y^i = 0$) and the power of the international system is balanced, small as well as large countries would be more likely to meet the condition and thereby choose q_*^i . Thus, the new initiatives in cooperative security might be more effective for promoting global disarmament in the balanced international systems than in the ones characterized by the asymmetry of power, such as a unipolar system. This analysis suggests that the invention of cooperative security measures through the creation of the CSCE was a wise policy in the 1970s, when power was more balanced and the Cold War rivalry was stabilized between the two blocs.

Proposition 2: Country i spends $q_*^i = 0$ if $G^i + Y^i > I^i$. q_*^i is unchanged with an increase in cooperative security activities of any other nation.

Considering that cooperative security activities remain nascent in the contemporary world (i.e., the value of Y^i is small), $G^i + Y^i > I^i$ indicates that i is strongly protected by its allies. Although whether this inequality applies to a country depends on the actual size of the country and the international security environment surrounding it, small countries, which usually have a small value of I^i , that rely on public defense benefits provided by other countries are more likely to meet the condition. Member states in NATO such as Iceland are examples. Moreover, countries in this group are insensitive to changes in the level of cooperative security activities provided by other nations, and continue to be free riders irrespective of the changes.

Proposition 3: Country i spends $q_*^i = I^i$ if $G^i + Y^i < -I^i$. q_*^i is unchanged with an increase in cooperative security activities of any other nation.

By contrast, $G^i + Y^i < -I^i$ indicates that i is seriously threatened by its adversaries (or potential enemies). As a result, i chooses to expand its defense budget. This situation can be illustrated by isolated states that align themselves with few countries. For example, countries such as North Korea usually consider themselves to be threatened by other countries and commit tremendous amounts of their budget to military forces (q) at the expense of domestic welfare (c). These countries are also indifferent to the cooperative security activities of other states and continue to spend on defense regardless of the advancement of cooperative security activities around the world.

4 CONCLUDING REMARKS

As the above propositions suggest, the response of countries (that is, the Nash reaction) depends on their size and the security relationship with other nations. These results indicate that the effects of cooperative security policy in the contemporary international system are determined by referring to specific security situations such as the network of military alliances, the membership of cooperative security organizations, and national budgets of countries. Addressing this empirical question should be the next step for research along this study's lines

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