



## The Political Economy of NORAD

Binyam Solomon

To cite this article: Binyam Solomon (2024) The Political Economy of NORAD, Defence and Peace Economics, 35:5, 521-526, DOI: [10.1080/10242694.2024.2349888](https://doi.org/10.1080/10242694.2024.2349888)

To link to this article: <https://doi.org/10.1080/10242694.2024.2349888>



Published online: 02 May 2024.



Submit your article to this journal [↗](#)



Article views: 187



View related articles [↗](#)



View Crossmark data [↗](#)



# The Political Economy of NORAD

Binyam Solomon 

Norman Paterson School of International Affairs, Carleton University, Ottawa, Canada

## ABSTRACT

This introductory article provides an overview of the North American Aerospace Defense Command (NORAD) as well as the contents of this special issue. NORAD is one of the oldest bi-national defence agreements in the world but the economics assessment of it remains scant. This special issue is one attempt to address this oversight. The articles in this special issue focus on the economic aspects of NORAD and its modernization. They delve into economic theories of alliances, burden sharing, potential private benefits of modernization, public choice theory and the impact on local communities and industries.

By focusing on the political economy of NORAD, this introductory article underscores the importance of NORAD in the face of evolving threats and calls for greater attention from defense economists to address the complex economic and strategic dynamics involved.

## ARTICLE HISTORY

Received 9 March 2024  
Accepted 7 April 2024

## KEYWORDS

The economics of alliance; joint product model; public choice; NORAD; burden sharing

## JEL CLASSIFICATION

D74; H42; H56

## Introduction

On May 12, 2023, NORAD, the North American Aerospace Defense Command, celebrated its 65<sup>th</sup> anniversary.<sup>1</sup> NORAD is a joint military organization of the United States (US) and Canada responsible for warning and control of North American aerospace. Established during the frostier period of the Cold War, NORAD's primary mission was countering the perceived threat of Soviet long-range bombers. Since then, it has evolved to include the detection, validation, and warning of attack against North America whether by aircraft, missiles, or space vehicles. Since 2006, NORAD's mission includes a maritime warning and awareness activity.

While the tight linkages of the bi-national command confer potential resource allocation efficiencies and benefits, the North American geography has also provided relative protection. These advantages are now threatened on several fronts. First, climate change is making the traditionally inaccessible north (arctic) the new frontier for resource extractions, increased navigation, and arctic arms race. Second, development of and technological advances in hypersonic weapons, as well as counter-space weapons are necessitating the modernization of the NORAD warning systems. Third, nuclear-capable rogue nations are increasingly threatening the North American theatre. Finally, the general global insecurity spurred by China's superpower ambitions and Russia's revanchism is re-focusing the conversation on the bi-national relation's effectiveness and optimality.

This special issue on the political economy of NORAD is not only motivated by these new challenges facing the bi-national alliance but also by the paucity of economic studies. This lack of interest by economists is partially explained by data limitation and difficulties in partitioning each country's military capabilities to NORAD specific activities. However, the articles in the special issue illustrate how existing models and tools in defence economics such as the economics of alliances,

defence procurement, and policies can be adapted and extended to explain and provide policy prescriptions.

The rest of this introductory article contains three sections. Section 2 provides a brief background on NORAD and bi-lateral<sup>2</sup> defence agreements between the US and Canada. Section 3 introduces the articles, and the last section provides directions for future research and further extensions.

## Background

According to the official NORAD website 'NORAD uses a network of satellites, ground-based radar, airborne radar, and fighters to detect, intercept and, if necessary, engage any air-breathing threat to North America'.<sup>3</sup> The ground-based radar systems are known as the North Warning System (NWS). The NWS consists of 54 long- and short-range radars covering an area that is 4,800 km long and 320 km wide (Sherman 2021). Most of the NWS systems reside in the Canadian territory (about 87%; Solomon and Fetterly 2023). The area is covered by three major zones, Alaska, Canada and continental US.

The Alaskan NORAD Region (ANR) main missions include aerospace warning and control and is supported by Air National Guard units as well as US and Canadian Air Force elements. The Canadian NORAD Region (CANR) is responsible for defending Canadians. Tactical fighter units of the Royal Canadian Air Force (RCAF) provide support. Finally, the Continental US NORAD Region (CONR) provides aerospace surveillance and control for the continental US (CONUS). The region is supported by the F-15 Eagle, F-16 Fighting Falcon, and F-22 Raptor.<sup>4</sup>

As pointed out earlier, the NORAD elements span a large portion of each nation's air and related military capabilities. In addition, the extension of the NORAD mission to include maritime warning implies not only the inclusion of naval assets but also assistance to policing and law enforcement, traditionally reserved for non-military agencies and organizations. As such, apportioning the exact NORAD expenditures and force elements is not possible.

For example, the three regions identified above have distinct headquarter and bi-national service elements. The ANR, responsible for the Alaskan Air Defense Identification Zone includes elements from US 11<sup>th</sup> Air Force, Air National Guard's 176<sup>th</sup> Wing and the 962<sup>nd</sup> Airborne Air Control Squadron and the Royal Canadian Air Force. There are 220 US and Canadian staff at the Headquarters in Joint Base Elmendorf-Richardson (Alaska). Similarly, the Canadian NORAD Region consists of a divisional headquarters in Winnipeg with over 500 personnel from the US and Canada as well as 21 Aerospace Control and Warning Squadron in North Bay and fighter bases in Eastern and Western Canada. Transport Canada and NAV Canada provide Civil Air Patrol. The Continental US NORAD region is headquartered in Tyndall Air Force Base, Florida with over 800 personnel from the US and Canada. Contributing organizations include, the Royal Canadian Air Force, the US Air Force, the Air National Guard, US Coast Guard and Civil Air Patrol.

The burden sharing article in this special issue by Solomon and Fetterly (2023) address this lack of NORAD- specific spending data by utilizing the overall defence expenditures of each nations data as well as by conceptualizing the NORAD 'production function' as the synthesis of land and sensors (radars, warning systems). Similarly, Berkok Secieru, and Peyrow Lee (2023) extends the Joint Product Model by assessing the degree of publicness of these NORAD inputs (land and technology).

Another unique aspect of the bi-national alliance is the close integration of military units and institution of both nations. This close bi-national approach to the defence of the North American theatre inculcates military professionalism that may influence decisions surrounding defence policies and postures. Crosby (1997) demonstrates this through a case study on Canada's policy reversal on accepting US Nuclear armaments. Interestingly, NORAD is only one of the several defence agreements that link the US and Canadian military services and businesses.

Table 1 lists a few Canada-US defence agreements excluding NORAD. The military relationship between the two nations started in 1940 with the Permanent Joint Board on Defense (PJBD) and closer military staff linkages in 1946 with Canadian and US joint military staffs developing and

**Table 1.** Canada-United States defence agreements.

Defence	Year Established	Key Purpose
Permanent Joint Board on Defense (PJBD)	1940	High level advice and discussion on defence policy issues related to continental defence and security
Military Cooperation Committee	1946	Bi-annual strategic link between Canadian and US joint military staffs.
The Defence Production Sharing Agreement (DPSA)	1959	Facilitate efficiency in procurement, through joint development and production of defence goods, and access to defence supply chains.
Defense Development Sharing Agreement (DDSA)	1963 <sup>11</sup>	Leveraging each country's expertise, resources, and research infrastructure to advance defence capabilities
Canada-US Civil Assistance Plan	2008	Military support to each other's armed forces during natural disasters
Tri-Command Framework (NORAD, USNORTHCOM and CJOCC)	2009	The operation and cooperation of the US-Canada commands responsible for homeland and continental security

coordinating continental military defence planning. Even aid to civil power is coordinated between the two-nations. As outlined in the Canada-US Civil Assistance Plan, Members of the armed forces from one nation can support the other when assisting civilian authorities during natural disasters.

There are also linkages between the defence industrial base in Canada and the US through two agreements known as the Defence Production Sharing Arrangement (DPSA) and the Defence Development Sharing Arrangement (DDSA). These arrangements allow for the coordination of defence production between the two countries as well as leveraging facilities and R&D expertise.<sup>5</sup> This access constitutes the main source of defence export revenue for the Canadian Defence Industrial Base (CDIB).<sup>6</sup>

These defence bi-lateral agreements are further strengthened by an economic relationship with daily trade surpassing \$1B (CDN). The trade relationship now includes Mexico with the signing of the North American Free Trade Agreement (NAFTA) in 1994 and amended in 2020 as an Agreement between the US, Mexico, and Canada (USMCA). The US is Canada's largest trading partner, accounting for 63.4% of total trade (customs basis) in 2022.<sup>7</sup> In addition, the US direct investment in Canada accounts for 47% of all direct investment in Canada. The US is also Canada's direct investment destination accounting for 48% of investment abroad.

What are the implications of these agreements and arrangements between the two countries to the production of continental defence (a public good)? Do these agreements reinforce each other, or do they work at cross purposes, diluting any potential gains in the production of the public good? Does linking defence and the economy through a production agreement increase the private benefits for each country leading to an optimal provision of the public good as predicted by the joint product model? These are just a few of the questions that economists may have regarding this long standing and intricate bi-lateral relationship. Some of these questions are addressed in this special issue which the next section summarizes.

## On Special Issue's Articles

The special issue begins with an article by Berkok Secrieru, and Peyrow Lee (2023)<sup>8</sup> and focuses on the economic theory of alliances. The article explores the concepts of public goods and joint-products models in the context of defence, drawing on historical models and extending them to accommodate two types of defence inputs – technology and land. The authors illustrate this insight by characterizing the NORAD mission as the joint production of alliance-wide public defence output through military technology (sensors and radars) and land. The article further discusses the modernization of NORAD in response to evolving threats, emphasizing the need to consider the scale and scope of investment, multi-domain sensors, and potential benefits for both Canada and the US. The analysis also touches on the private outputs generated by NORAD, including infrastructure maintenance, technological input, and sovereignty assertion in northern waters. Additionally, the public output of a modernized NORAD may extend beyond its two member countries to benefit other

members of the Arctic Council. The article concludes by presenting a model that distinguishes between defence inputs (technology and land) and explores allies' responses to changes in each other's contributions, offering a nuanced analysis of incentives and behavior in military alliances.

The second article by Solomon and Fetterly (2023)<sup>9</sup> is an empirical investigation of the burden sharing in NORAD. The asymmetric alliance is evident when applying traditional burden-benefit concordance measures common in the military alliance literature. Specifically, when applying the relative burden (relative share of defence expenditures) and benefit (average of population, GDP, and exposed borders) measures, the US shouldering about 97.6% of the North American defence burden but receiving only 64% of the benefits. Meanwhile, Canada contributes about 2% of the burden but enjoys 36% of the benefits.

However, depicting NORAD's mission as the utilization of inputs such as land and warning systems and the disaggregation of military expenditures into personnel, equipment, and R&D reveals Canada's relative cost advantages in land, equipment, and personnel. For example, the authors point out that during the deployment and operation of the Distant Early Warning (DEW) system from 1957–1993 and using the two inputs as a measure of burden (land and systems), Canada shouldered 36% of the burden and similar amount in benefits. Similarly, the US experienced balanced burden-benefit concordance during the DEW period. However, the upgrade of the system starting in the late 1980s to the North Warning System (NWS) shifted the burden to Canada.

The article also addresses institutional constraints in the delivery of military capabilities and the associated implications to burden sharing. Notably, the article notes that the burden-sharing assessment doesn't determine the ideal level of defence spending for Canada to align with its burden-benefit concordance. It discusses challenges in implementing the current defence policy, due to recruitment issues, lapsing procurement funds, and unaccounted costs such as accrual liabilities. It also suggests options such as re-evaluating force structures, expediting equipment funding, and investing in R&D to enhance military productivity.

One of the main contributions of the economics of alliances is the intuition that defence produces joint outputs with varying degrees of publicness. The next two articles in the special issue take advantage of this intuition by highlighting potential private benefits that may accrue to Canada with the anticipated modernization of NORAD's North Warning System. Specifically, the third article by Stone (2024) implies that NORAD modernization project includes technologies that may have dual military and civilian use, benefiting not only industries with comparative advantages, but also local communities.

Local communities also bring some public choice considerations in the form of lobbying for local business participation, development of infrastructure and other economic benefits. Stone (2024) reminds us that the NWS contract, won by a local Inuit company, included a substantial Inuit Benefits criterion. Modernizing the North Warning System (NWS) requires engaging local indigenous communities, addressing regulatory processes, and integrating advanced capabilities like 'look-down' systems. Linking modernization to country-specific economic and social goals imply the possibility that Canada will be willing to shoulder the burden. Given the competing private incentives of local communities and industrial development strategies of governments, Stone (2024) attempts to quantify likely economic impacts of various NWS upgrade scenarios. Since the analysis is done at a sub-provincial or state level, the article relies on the Input-Output framework including multipliers to quantify GDP and employment impacts.

The article assesses five NWS modernization scenarios ranging from straightforward radar replacements to broader upgrades and estimates GDP impacts ranging from (\$1) \$489 M (CDN) to \$4B. The latter assumes a comprehensive modernization effort with larger Canadian contribution. Interestingly, this latter option will result in an economic activity almost equal to current Nunavut's GDP! Stone (2024) cautions that modernization effort may also include advanced technology and space-based systems which will benefit some industries but not the local communities.

The final article (Berkok and Secrieru 2023<sup>10</sup>) in the special issue looks at the industry side with emphasis on private country-specific (excludable and partially rival) strategy of developing

key Canadian industrial capabilities. The potential benefits for Canada include technology transfers and domestically produced inputs, particularly from sectors with comparative advantage. Whether the benefits will be realized depends on how the modernization contracts are managed. If a consortium in the spirit of the Joint Joint Strike Fighter (JSF) is utilized in which case a prime will select sub-contractors based on capabilities and superior products. This outcome essentially treats the modernization project as a club good where both nations' industries are given access to bid on the project. The authors caution that the Canadian government may instead opt for an inefficient offset program known as Industrial and Technological Benefits (ITB) Policy to protect domestic industries. The authors hope that the evolving security environment, the bi-national nature of the project and the overall urgency may limit Canada from imposing the flawed offset program.

## Conclusions and Future Considerations

Hopefully, the special issue will motivate defence economists to focus their attention on NORAD and bi-lateral alliances in general. As mentioned earlier, the North American sphere enjoyed relative peace thanks to its relative isolation. Now, both nations must re-evaluate the defence of the homeland owing to emerging threats from advanced weapon systems such as hypersonic missiles and increased competition for resources in the arctic. This is an area where traditional defence economics with its focus on the supply side may contribute novel ideas and useful policy prescriptions. The re-focus on the homeland will also sharpen the debate about burden sharing and the optimality of defence outputs. Some aspects of the issue have been addressed in the special issue, but there are other aspects that need a defence economist's perspective.

For example, the article by Berkok and Secieru (2023) implies but does not fully articulate the publicness of the technologies entertained for NORAD modernization. Some of the changes to the North Warning System may render their application partially rival or fully rival. As an extreme case, consider Fergusson and Carlson (2022, 21) and the discussion about Ballistic Missile Defence.

With a limited number of interceptors ... Intercept decisions will be determined, in part, by the size of the attack, the probability of successful intercepts in a 'shoot-look-shoot' strategy, and the ability of the US to identify the target of the attack during the mid-course phase. In other words, this an environment of uncertainty which precludes a formal commitment to Canada.

There are also public choice perspectives that can explain the strong military professionalism engendered by the bi-national (NORAD) and bi-lateral defence agreements. Specifically, institutional aspects of the armed forces are another under-researched area in economics. Keupp (2021) is the most recent that examines the efficiency and effectiveness of military institutions using public choice and Austrian perspectives.

More specific to NORAD, the tight linkages between the armed forces of both nations can facilitate a more efficient defence plan and closer alignment on policies and procedures. Alternatively, the multiple agreements and arrangements that link defence and economic goals may increase inefficiencies due to duplication of efforts. Regardless, this is an area of research that public choice theory and defence economists can contribute meaningfully.

Another interesting research topic for defence economists is whether economic integration promotes or retards fairer defence burden sharing. With two-thirds of the Canadian population residing within 100 kilometres of the Canada-US border (southern part) can one nation effectively preclude the protection of the other?

NORAD modernization can spur technological advances in space technologies, remote sensing, and autonomous vehicles (aerial and sea). How these advances are managed within the bi-national agreement is another avenue for research. A couple of the articles in this special issue consider potential regional and industrial benefits. Additional research in the design and application of policies that reward competition and comparative advantages may yield useful insights.

## Notes

1. Nine months earlier, in September 1957, the two nations agreed to create the bi-national command and centralize operational control of continental air defence against the threat of Soviet bombers. <https://www.norad.mil/Newsroom/Fact-Sheets/Article-View/Article/578772/norad-agreement/>.
2. NORAD is a bi-national structure implying that it is equally responsible to, and made up of personnel from, both Canada and the US. The other defence arrangements discussed in subsequent sections are bilateral or mutual defence agreements recognizing and allowing cooperation in continental and international security and defence issues.
3. <https://www.norad.mil/About-NORAD/NORAD-History/> Accessed February 5, 2024.
4. <https://www.norad.mil/About-NORAD/Continental-US-NORAD-Region/>.
5. <https://www.ccc.ca/wp-content/uploads/2022/03/DPSA-Brochure-English-Aug-2020.pdf>.
6. <https://www.ccc.ca/en/about/>.
7. <https://www150.statcan.gc.ca/n1/pub/71-607-x/71-607-x2019005-eng.htm>.
8. <https://doi.org/10.1080/10242694.2023.2209772>.
9. <https://doi.org/10.1080/10242694.2023.2232974>.
10. <https://doi.org/10.1080/10242694.2023.2228565>.
11. Based on information from ISED, <https://ised-isde.canada.ca/site/aerospace-defence/en/resources/defence-development-sharing-agreement-between-canada-and-united-states-america> Accessed February 4th 2024.

## Acknowledgment

This special issue would not have been possible without the help and guidance of Christos Kolias (editor) and Keith Hartley. Earlier versions of the articles in this special issue were presented at the 2022 Western Economics Association International meeting in Portland, Oregon and Defence and Security Economics Workshop (2022) in Ottawa, Canada. We would like to thank the participants and discussants at these meetings including Ellen Pint, Steve Green, Julien Malizard, Josselin Droff, Raymond Franck and Daniel Arce for their helpful comments and suggestions.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## ORCID

Binyam Solomon  <http://orcid.org/0000-0002-9779-7735>

## References

- Berkok, U., and O. Secrieru. 2023. "NORAD Modernization: Private Benefits to Canada." *Defence and Peace Economics* 1–24. <https://doi.org/10.1080/10242694.2023.2228565>.
- Berkok, U., O. Secrieru, and K. Peyrow Lee. 2023. "On Distinguishing Defence Inputs in an Alliance – the Case of NORAD." *Defence and Peace Economics* 1–15. <https://doi.org/10.1080/10242694.2023.2209772>.
- Crosby, A. D. 1997. "A Middle-Power Military in Alliance: Canada and NORAD." *Journal of Peace Research* 34 (1): 37–52. <https://doi.org/10.1177/0022343397034001004>.
- Fergusson, J., and B. Carlson. 2022. "The Implications of United States Ballistic Missile Defence Policy and Programmes for Canadian Defence Spending Defence Research and Development Canada, Contract Report, DRDC-RDDC-2022-C170." Ottawa [https://cradpdf.drddc.gc.ca/PDFS/unc397/p815263\\_A1b.pdf](https://cradpdf.drddc.gc.ca/PDFS/unc397/p815263_A1b.pdf).
- Keupp, M. M. 2021. *Defense Economics: An Institutional Perspective*. Cham: Springer.
- Sherman, J. 2021. "Forging a SHIELD for the Homeland" Air & Space Forces Magazine. [Accessed May 17, 2023]. <https://www.airforcemag.com/article/forging-a-shield-for-the-homeland/>.
- Solomon, B., and R. Fetterly. 2023. "Canada and the NORAD: Economics and Burden Sharing." *Defence and Peace Economics* 1–15. <https://doi.org/10.1080/10242694.2023.2232974>.
- Stone, C. J. 2024. "The Economic Benefits of North Warning System Modernization." *Defence and Peace Economics* 1–20. <https://doi.org/10.1080/10242694.2024.2328432>.