

Inquiry & Insight

**POLITICS
AND INNOVATION**
VOLUME 13



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LETTER FROM THE EDITORS

On behalf of the Political Science Graduate Students Association and Journal Committee at the University of Waterloo, we are pleased to introduce the thirteenth volume of *Inquiry & Insight*.

This volume's theme is politics and innovation. It explores how innovations interact with existing political structures, create new challenges, and offer potential solutions to global issues. It also examines the politics of innovation itself. Breakthroughs in science and technology do not occur in a vacuum. They occur in a world shaped by political, historical and social forces.

Exploring the politics of innovation itself, Elia Rasky discusses the link between local and national innovation systems, while Luiz Leomil compares China and Canada's approaches to fueling innovation through immigration policy.

Innovation can bring opportunities to empower marginalized groups. Viktoriya Vinik discusses the possibility of cryptocurrency serving as a national currency for Palestine, while Lauren Dubay discusses Indigenous inclusion in renewable energy projects.

Of course, innovation also brings new challenges. Lucia Nalbandian raises the issue of algorithmic discrimination in immigration processes. On the international level, Kallen Morrison explores the use of cryptocurrencies in evading economic sanctions, Morgan Slessor assesses the possibility of circumventing arms control arrangements through 3D printing, and Richard Beattie asks whether the dual-use nature of artificial intelligence will increase the likelihood of conflict between states.

We also sought to capture truly innovative solutions to new political issues. In this vein, Nicole Covey discusses pre-emptive action to prevent unregulated fisheries in the arctic as climate change turns ice into rich fisheries, and Jacob Benjamin proposes an innovative expansion of NATO into the Middle East.

This publication would not be possible without our faculty advisor-reviewer Dr. Anna Drake, our faculty reviewers Dr. Alexander Lanoszka and Alana Cattapan, and our undergraduate volunteers. We would like to thank everyone who submitted their work to *Inquiry & Insight* this year.

Sincerely,

The Inquiry & Insight Senior Editors

Viktoriya Vinik, Richard Beattie, Sukhneet Kahlon and Jacob Benjamin





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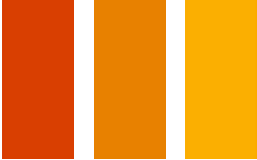


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Examining the Links Between Local and National Systems of Innovation: A Preliminary Analysis

Elia Rasky

Elia Rasky is a third-year doctoral student in the Department of Politics at York University. His main research interest is in the political economy of innovation, with a special focus on national systems of innovation and state innovation policies. He is currently preparing to write his dissertation, which will examine different Canadian organizations engaged in artificial intelligence research, and the state-supported linkages between these organizations.

Abstract

Like most advanced industrialized countries, Canada is investing heavily in artificial intelligence (AI) research. The locus of AI research in Canada is Toronto, Montreal, and Edmonton, all of which have large public and private research organizations dedicated to creating smart, self-learning technologies. In March 2017, the Canadian federal government announced the 'Pan-Canadian Strategy on AI', which sought to create a national AI research network by bringing together research organizations in Toronto, Montreal, and Edmonton. What this strategy seeks to do, essentially, is harness the power of three different local innovation systems to form a national innovation system. This paper will argue that the Pan-Canadian Strategy on AI presents a great opportunity for innovation scholars to investigate how local and national systems of innovation are connected, and how the state can foster these connections. Further, the paper will propose methods for researching the impact of the Pan-Canadian Strategy on AI, and the connections between different innovation systems at different geographical scales.

1 Introduction

In the 1950s, computer scientists and engineers working in various institutions around the world started developing "artificial intelligence" (AI) technologies capable of operating autonomously or "thinking for themselves". Instead of performing preprogrammed actions and functions dictated by strict algorithms, these technologies could decide what actions to take and what functions to carry out by themselves, all the while responding dynamically to environmental stimuli. For example, a machine equipped with AI may sense objects placed in front of it, determine the size, weight, and colour of these objects, and manipulate these objects in different ways depending on their physical characteristics. In the 1990s and 2000s, researchers in both the public and private sectors continued advancements in AI, leading to the emergence of "deep learning" technologies that mimic the neural networks in the human brain. Today, these technologies are employed in a number of different industries, including manufacturing, healthcare, finance, law, transportation, and communication. The ubiquity of AI technologies is one of the defining features of our current industrial epoch or techno-economic paradigm.

National governments around the world have recognized the economic importance of AI technologies, which are radically changing how goods, services, capital, and information are being produced and exchanged. Many governments have launched programs to accelerate the development of AI and to encourage industries to adopt AI technologies at a faster rate. One example is the Canadian federal government, which initiated an ambitious plan in 2017 to "make Canada a global leader in AI". This plan, called the 'Pan-Canadian Strategy on Artificial Intelligence', involves creating a national AI innovation network that will advance knowledge about AI, create new AI technologies, and examine the societal repercussions and ethical implications of AI development.

To create this national network, the federal government is establishing connections between researchers and organizations in three Canadian cities: Toronto, Montreal, and Edmonton. Each city already contained a local AI innovation network made up of public research institutions, corporate research laboratories, and startup ventures. From a conceptual standpoint, the federal government is bringing together three local innovation networks to form one large national innovation network.

The Pan-Canadian Strategy on Artificial Intelligence presents an opportunity for scholars to better understand the relationship between local and national innovation systems. As the Canadian federal government brings together researchers and organizations from Toronto, Montreal, and Edmonton, scholars can learn how innovation processes at the local and national levels interact and complement each other. This paper will attempt to shed light on local-national innovation links by providing a preliminary analysis of the Pan-Canadian Strategy on Artificial Intelligence. To do so, this paper is divided into three sections. The first section provides a survey of the literature on systems of innovation, demonstrating a need for more scholarship addressing how local and national innovation systems are related. The second section tells the history of the Pan-Canadian Strategy on Artificial Intelligence, describing its inception, implementation, and design. The third section identifies the different actors involved in the Strategy, and draws links between these actors using network theory.

2 National and Local Systems of Innovation

Writings about national systems of innovation first appeared in the late 1980s and early 1990s, a time when the global economy was undergoing dramatic changes. The most notable change was the economic ascendance of China, Japan, South Korea, and India, which threatened the leading economic position of the United States and led to an overall intensification of global economic competition. Scholars wondered how a large part of Asia had become competitive so suddenly, how the United States could maintain its leading position, and how countries in the global South could also become formidable actors in the global economy.¹ The answer to these questions, according to many scholars², had to do with *innovation*. In order to be competitive (or maintain competitiveness), these scholars argued, countries must become very adept at designing, producing, and distributing new products and production processes. In order to be innovative, however, countries must develop national systems of innovation—that is, nation-wide networks of universities, firms, financial institutions, and public research institutions that carry out innovations in a systematic and coordinated way. It is not coincidental that the most competitive countries in the world, including Japan and the United States, have the most robust and well-functioning national systems of innovation.

One of the first scholars to use the term ‘national system of innovation’ was Christopher Freeman, a British economist who taught at the University of Sussex. In his writings, Freeman described in detail Japan’s national system of innovation.³ He explained how Japanese industrial firms work together to plan and execute innovations, often with the financial and logistical support

1. Miyoshi Shinohara, “Japan as a World Economic Power,” *The Annals of the American Academy of Political and Social Science* 513, no. 1 (1991): 12–24; Umesh Gulati, “The Foundations of Rapid Economic Growth: The Case of the Four Tigers,” *The American Journal of Economics and Sociology* 51, no. 2 (1992): 161–172; Bernhard Heitger, “Comparative Economic Growth: Catching Up in East Asia,” *ASEAN Economic Bulletin* 10, no. 1 (1993): 68–82; Richard Nelson and Nathan Rosenberg, “Technical Innovation and National Systems,” in *National Innovation Systems: A Comparative Analysis*, ed. Richard Nelson (Oxford University Press, 1993); Vincent Cable and Peter Ferdinand, “China as an Economic Giant: Threat or Opportunity?,” *International Affairs* 70, no. 2 (1994): 243–261; Eduardo Borensztein and Jonathan Ostry, “Accounting for China’s Growth Performance,” *The American Economic Review* 82, no. 2 (1996): 224–228.

2. Stephen Cohen and John Zysman, “Manufacturing Innovation and American Industrial Competitiveness,” *Science* 239, no. 4844 (1988): 1110–1115; Giovanni Dosi Giovanni Amendola and Erasmo Papagni, “The Dynamics of International Competitiveness,” *Weltwirtschaftliches Archiv* 129 (1993): 451–471; Christopher Freeman, “The ‘National System of Innovation’ in Historical Perspective,” *Cambridge Journal of Economics* 19 (1995): 5–24; Mike Hobday, “Innovation in East Asia: Diversity and Development,” *Technovation* 15, no. 2 (1995): 55–62.

3. Freeman, “The ‘National System of Innovation’ in Historical Perspective,” 4.

of the Ministry of International Trade and Industry. Switching from a descriptive to a prescriptive mode, Freeman argued that Japan's national system of innovation is superior to all other systems and should be widely emulated. In 1993, one of Freeman's colleagues named Richard Nelson assembled an anthology of essays on national systems of innovation, with each essay focusing on a particular country.⁴ This anthology covered a total of fifteen countries, including the United States⁵, Germany⁶, France⁷, and South Korea⁸. What the anthology clearly showed was that national systems of innovation are heterogeneous—each national system has its own dynamics of interaction and its own institutional configurations.

In the mid-1990s, political scientists started to believe that nation-states were losing their economic and geopolitical salience.⁹ In their view, cities and regions were becoming more important than nation-states as sites of economic and political activity.¹⁰ This belief in a post-Westphalian world order was embraced by innovation scholars, who shifted their focus from national systems of innovation to local and regional systems of innovation. One of the scholars who pioneered the study of regional systems of innovation was AnnaLee Saxenian. In her book *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*, Saxenian compared and contrasted the regional innovation systems of California and Massachusetts.¹¹ Her thesis was that California's regional innovation system is stronger and more adaptable than that of Massachusetts because there are fewer barriers between firms in the former system than in the latter. Two years after the publication of Saxenian's book, an anthology on regional systems of innovation was put together by Philip Cooke, Martin Heidenreich, and Hans Braczyk.¹² This anthology examined the innovation systems of Ontario¹³, Baden-Wurttemberg¹⁴, Catalonia¹⁵, and other regions with a large concentration of innovative firms. This was followed by the publication of various studies on local innovation systems, one of which looked at the innovation systems of Toronto, Ottawa, Vancouver, and Calgary.¹⁶

As scholars became interested in regional and local systems of innovation, questions arose about the relationship between different systems at different geographical scales. Timothy Bunnell and Neil Coe, two professors of economic geography, suggested that local, regional, and national systems of innovation are intertwined. They also argued that scholars should combine these systems in their analyses, rather than study them in isolation: "There is a need for a qualitative shift away from work which focuses on particular scales as the locus for understanding innovation, towards that which gives more credence to relationships operating between and across differ-

4. Nelson and Rosenberg, "Technical Innovation and National Systems."

5. David Mowery and Nathan Rosenberg, "The U.S. National Innovation System," in *National Innovation Systems: A Comparative Analysis*, ed. Richard Nelson (Oxford University Press, 1993), 29.

6. Otto Keck, "The National System for Technical Innovation in Germany," in *National Innovation Systems: A Comparative Analysis*, ed. Richard Nelson (Oxford University Press, 1993), 115.

7. Francois Chesnais, "The French National System of Innovation," in *National Innovation Systems: A Comparative Analysis*, ed. Richard Nelson (Oxford University Press, 1993), 192.

8. Linsu Kim, "National System of Industrial Innovation: Dynamics of Capability Building in Korea," in *National Innovation Systems: A Comparative Analysis*, ed. Richard Nelson (Oxford University Press, 1993), 357.

9. Peter Drucker, "The Global Economy and the Nation-State," *Foreign Affairs* 76, no. 5 (1997): 159.

10. Kenichi Ohmae, *The End of the Nation State: The Rise of Regional Economies* (The Free Press, 1995), 2.

11. AnnaLee Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Harvard University Press, 1996), 4.

12. Martin Heidenreich Phillip Cooke and Hans-Joachim Braczyk, *Regional Innovation Systems: The Role of Governance in a Globalized World* (Routledge, 1998).

13. Meric Gertler and David Wolfe, "The Regional Innovation System in Ontario," in *Regional Innovation Systems: The Role of Governance in a Globalized World*, ed. Martin Heidenreich Phillip Cooke and Hans-Joachim Braczyk (Routledge, 1998), 107.

14. Martin Heidenreich and Gerhard Krauss, "The Baden-Wurttemberg Production and Innovation Regime: Past Successes and New Challenges," in *Regional Innovation Systems: The Role of Governance in a Globalized World*, ed. Martin Heidenreich Phillip Cooke and Hans-Joachim Braczyk (Routledge, 1998), 235.

15. Jordi Bacaria and Susana-Borras Alomar, "The Catalan Innovation System: Governing Rapid Changes," in *Regional Innovation Systems: The Role of Governance in a Globalized World*, ed. Martin Heidenreich Phillip Cooke and Hans-Joachim Braczyk (Routledge, 1998), 76.

16. Anita Sands Matthew Lucas and David Wolfe, "Regional Clusters in a Global Industry: ICT Clusters in Canada," *European Planning Studies* 17, no. 2 (2009): 189.

ent scales.”¹⁷ Unfortunately, the relationship between local, regional, and national systems of innovation has only been studied by a few scholars, most notably Phillip Cooke¹⁸ and Martina Fromhold-Eisebith¹⁹. Both scholars situated local and regional systems of innovation within the context of the nation-state, showing how these systems are supported (or hindered) by national industrial policies. They both, however, provided little insight into multi-scalar innovation dynamics, as their analyses did not show how innovative actors at the local, regional, and national levels *interact*. More recently, Johannes Meuer, Christian Rupietta, and Uschi Backes-Gellner used data from the Innovation Survey of the Swiss Economic Institute to determine “how innovation systems integrate within and across different analytical levels, regions, and sectors.”²⁰ These scholars identified the different innovation systems in Switzerland, and categorized them according to their industrial specialization, level of public funding, and knowledge flow dynamics. They then showed how these innovation systems overlap and compete for resources. The innovation systems under examination, however, were *sectoral* and *regional* systems; local and national systems of innovation were excluded from the analysis. In 2017, Franz Todtling and Alexander Auer wrote a paper arguing that “innovation is nowadays a highly interdependent process where firms rely on distributed knowledge sources at various spatial scales.”²¹ Although this paper did not explore the relationship between local and national innovation systems, it presented a theory that is key to understanding this relationship—namely, that firms draw knowledge from local, regional, and national partners throughout the innovation process. This theory, as we will see, is at the centre of this paper’s empirical analysis.

3 The Pan-Canadian Strategy on Artificial Intelligence

Research into AI in Canada started in the late 1970s and early 1980s, when computer scientists at the University of Toronto, the University of British Columbia, and McGill University began working on computer software that could recognize patterns in visual images, text, and speech.²² A major development in AI research occurred in 1983, when the dean of the School of Graduate Studies at the University of Toronto founded a nonprofit organization called the Canadian Institute for Advanced Research (CIFAR).²³ This organization provided a forum where computer scientists from different universities could meet to exchange information about AI, solve technical problems, and collaborate on a range of AI-related projects. The organization also provided opportunities for Canadian computer scientists interested in AI to meet and interact with their counterparts in other countries. In 2004, CIFAR launched a research program called Learning in Machines and Brains, which helped Canadian computer scientists develop new AI technologies that mimicked the neocortex in the mammalian brain. Like the neocortex, these technologies filtered sensory information through a series of processing layers in order to gain an accurate representation of that information.²⁴ Today these technologies are used to translate text from one language to another, guide self-driving cars, and perform numerous other useful functions.

In 2016, CIFAR conducted consultations with computer scientists, engineers, academics, and

17. Timothy Bunnell and Neil Coe, “Spaces and Scales of Innovation,” *Progress in Human Geography* 25, no. 4 (2001): 570.

18. Phillip Cooke, “Regional Innovation Systems, Clusters, and the Knowledge Economy,” *Industrial and Corporate Change* 10, no. 4 (2001): 952.

19. Martina Fromhold-Eisebith, “Bridging Scales in Innovation Policies: How to Link Regional, National and International Innovation Systems,” *European Planning Studies* 15, no. 2 (2007): 221.

20. Christina Rupietta Johannes Meuer and Uschi Backes-Gellner, “Layers of Co-Existing Innovation Systems,” *Research Policy* 44 (2015): 888.

21. Franz Todtling and Alexander Auer, “Knowledge Bases, Innovation and Multi-Scalar Relationships—Which Kind of Territorial Boundedness of Industrial Clusters?,” 2017, 2.

22. Gordon McCalla and Nick Cercone, “Artificial Intelligence: A National Synopsis,” *Information Systems and Operational Research* 22, no. 4 (1984): 300.

23. Robert Craig Brown, *Artificial Intelligence: A National Synopsis* (University of Toronto Press, 2007), 3.

24. Derek Rose Itamar Arel and Thomas Karnowski, “Deep Machine Learning—A New Frontier in Artificial Intelligence Research,” *Digital Object Identifier* 10 (2010): 14.

entrepreneurs across Canada working in the field of AI. These consultations aimed to assess the current state of AI research and innovation in Canada and to make policy recommendations to the Canadian federal government based on this assessment. What CIFAR discovered through its consultations was that AI research and innovation are highly concentrated in three cities—namely, Toronto, Montreal, and Edmonton. Each city hosts a large number of public research institutions, corporate research laboratories, and startup ventures involved in the creation, along with application, and dissemination of AI technology. Having made this observation, CIFAR recommended that the federal government connect these three local AI innovation networks. This policy recommendation became the basis of the Pan-Canadian Strategy on Artificial Intelligence, a program launched by the federal government in 2017 to promote AI development on a national scale.

To carry out the Pan-Canadian Strategy on Artificial Intelligence, the federal government has enlisted the help of three AI research institutes: the Toronto Vector Institute (TVI), the Montreal Institute for Learning Algorithms (MILA), and the Alberta Machine Intelligence Institute (AMII). These three institutes are dedicated to discovering new applications for AI, training graduate students to conduct AI research, and teaching organizations how to adopt and use AI technologies. In addition to performing research and providing educational services, these institutes also foster collaboration between universities, public research institutions, large corporations, and small startup ventures interested in AI. For example, TVI hosts workshops where AI researchers from public and private organizations come together to “discuss technical machine learning challenges, test their ideas, and seek out resources on a wide variety of machine learning problems.”²⁵ Similarly, MILA provides AI organizations with communal office space that is conducive to collaboration.²⁶ Through their educational activities and collaboration initiatives, TVI, MILA, and AMII have become central figures in the local AI innovation systems of Toronto, Montreal, and Edmonton. Many organizations that use or develop AI in Toronto have ties to TVI, while many such organizations in Montreal and Edmonton have ties with MILA and AMII, respectively. Arguably, these three institutes represent the nucleus of each local AI innovation system, and this is why the federal government is working with them to carry out the Pan-Canadian Strategy on Artificial Intelligence.

There are three stages to the Pan-Canadian Strategy on Artificial Intelligence. The first stage is giving TVI, MILA, and AMII an investment of \$125 million to support their research, educational programming, and collaboration initiatives.²⁷ This investment is being made by CIFAR on behalf of the Canadian federal government. The second stage is arranging an annual meeting between the members of TVI, MILA, and AMII. By bringing members of these three institutes together once a year, the government hopes to create a bridge between the local AI innovation systems of Toronto, Montreal, and Edmonton. Each institute is expected to consolidate the knowledge and expertise of its respective local innovation system, and then share these resources with the other institutes at the annual meetings. The third stage is creating an Advisory Council on Artificial Intelligence that will help the government shape future public policies around AI. It is intended that the Chief Scientific Directors of TVI, MILA, and AMII will sit on the Advisory Council.

It should be noted at this point that the Pan-Canadian Strategy on Artificial Intelligence is not the first federal program designed to foster a national innovation or research network. In 1989, the federal government launched the National Centres of Excellence program, which established virtual links between academic and industrial researchers across Canada.²⁸ Ten years later, the federal government created Genome Canada, an organization which funds, oversees, and coordinates genetics research centres in Ontario, the Maritimes, the Prairies, and other regions.²⁹ Both initiatives

25. Vector Institute, *Annual Report 2019* (2019), 38.

26. Montreal Artificial Intelligence Institute, *Annual Report From April 1, 2018 to March 31, 2019* (2019), 34.

27. Impact News Service, “Canada First To Adopt Strategy For Artificial Intelligence”:1.

28. Janet Atkinson-Grosjean, “Canadian Science at the Public-Private Divide: The NCE Experiment,” *Journal of Canadian Studies* 37, no. 3 (2002): 71.

29. David Castle Bruce Doern and Peter Phillips, *Canadian Science, Technology and Innovation Policy: The Innovation*

sought to meld pockets of innovation and research throughout Canada to form a unified national innovation/research system. This paper focuses on the Pan-Canadian Strategy on AI, instead of the other programs mentioned, for two reasons. First, no scholarly writing has been done about the Strategy so far, given that it was launched fairly recently. Second, the actors involved in the Strategy are easily identifiable, and the interactions between them can be easily observed and mapped out. By studying this program, scholars can learn how technical knowledge and other resources flow between innovative actors operating at the local and national levels. This information can enrich our theoretical understanding of systems of innovation and create new possibilities for policy intervention. It can also help fill a gap in the literature on systems of innovation, which, up to now, has not adequately addressed local-national innovation linkages.

4 Studying Local-National Innovation Linkages: A Preliminary Analysis

To understand how local and national systems of innovation are related, one cannot merely look at how national policies shape the local networks. Rather, one must look at how firms, universities, public research institutions, and other organizations interact at both the local and national levels. This raises an important question: what methods can we use to study the local-level and national-level interactions between organizations?

Jerome Stuck, Tom Broekel, and Javier Diez suggest that these interactions can be studied using a network theory framework: “Typical arguments about interactions and knowledge exchange relations made in the [systems of innovation] literature can be rendered more precisely by applying a network-theoretical perspective.”³⁰ In network theory, a network is a cluster of nodes that are linked together. Some nodes in the network have more linkages than others. Nodes that have a large number of linkages are called ‘central nodes’, while those that have a small number of linkages are called ‘peripheral nodes’. ‘Gatekeeper nodes’ have links to nodes in more than one network, giving them the ability to connect these different networks. Scholars who use this framework often create diagrams to visually display the links between the various nodes and networks.

Let us apply the network theory framework to Canada’s national and local AI innovation systems. As previously mentioned, Canada has three large AI research institutes funded by the federal government: the Toronto Vector Institute (TVI), the Montreal Institute for Learning Algorithms (MILA), and the Alberta Machine Intelligence Institute (AMII). These three institutes have links to local organizations in Toronto, Montreal, and Edmonton. links to each other, as their members meet once a year to share knowledge and resources, and also engage in remote communication.

Economy and Society Nexus (McGill-Queen’s University Press, 2016), 303.

30. Tom Broekel Jerome Stuck and Javier Revilla-Diez, “Network Structures in Regional Innovation Systems,” *European Planning Studies* 24, no. 3 (2016): 424.

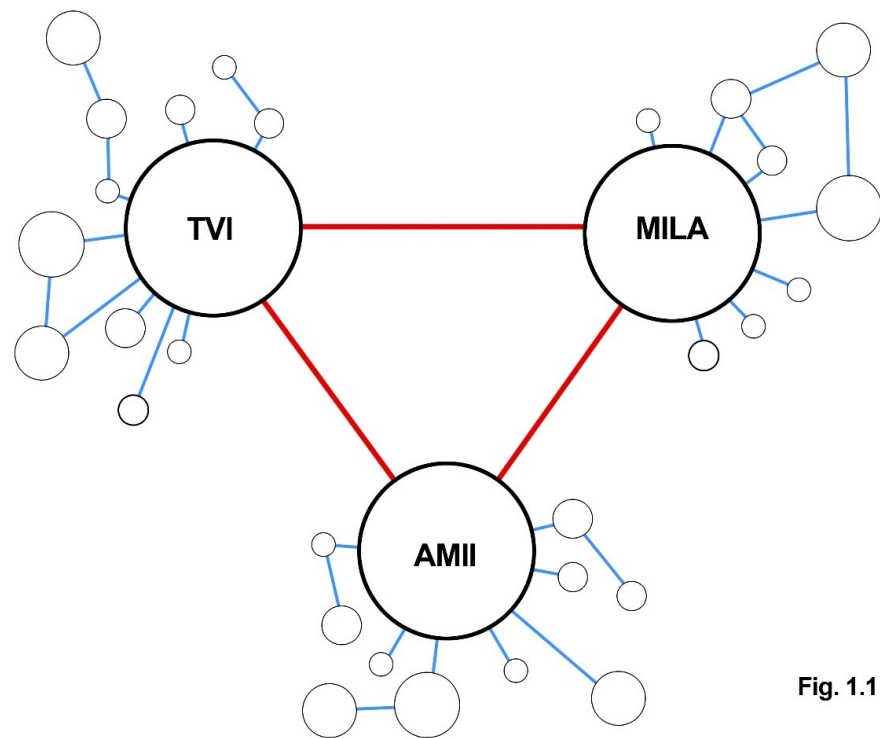


Fig. 1.1

Figure 1.1 shows the links between TVI, MILA, and AMII, and between these three institutes and their local partners. The red lines in the figure represent national links, while the blue lines represent local links. The small circles clustered around TVI represent a diverse collection of organizations in Toronto working on AI, such as Ryerson University, Sunnybrook Hospital, Accenture, Shopify, Manulife, MindBridge Analytics, and TD Bank Group. Similarly, the small circles clustered around MILA and AMII represent organizations in Montreal and Edmonton working on AI, such as DeepMind (Google), QuantumBlack, Imagia, Element AI, Samsung, Mitsubishi Electric, and the Royal Bank of Canada. Using terminology from network theory, we can say that TVI, MILA, and AMII are ‘central nodes’ because they have direct or indirect links to all of the other nodes in each local network. We can also say that these institutes are ‘gatekeeper nodes’ because they connect the three local networks.

So far, we have examined the links between the different organizations that make up Canada’s local and national AI innovation systems. We have seen how local AI organizations in Toronto, Montreal, and Edmonton are linked to TVI, MILA, and AMII, and how these three institutes are linked to each other. We still know very little, however, about how these different organizations *interact*—specifically, how they communicate, collaborate on innovative projects, and share resources such as personnel, technical knowledge, and equipment. As a starting point to understand these interactions, we must recognize that TVI, MILA, and AMII are situated far apart geographically, which makes it difficult for their members to interact in person. Most of the interaction between the members of these institutes is done through electronic communication (telephone, email, teleconferencing). The only time when the members of TVI, MILA, and AMII engage in face-to-face interaction is during the annual conference organized by the federal government. While these institutes are situated far apart from each other, they are situated very close to their local partners, which allows for face-to-face interaction. Every day, the members of TVI, MILA, and AMII speak to the members of local organizations in person, whether at workshops, information sessions, or collaboration sessions.

Social science research suggests that face-to-face and electronic communication allow for different kinds of knowledge exchange. Face-to-face communication allows individuals to exchange ‘tacit knowledge’, while remote or electronic communication allows individuals to exchange ‘codified knowledge’.³¹ Tacit knowledge is a form of knowledge that only exists in the mind of a person; it cannot be written down, recorded, or reduced to some symbolic form.³² Codified knowledge, on the other hand, is a form of knowledge that is embedded in texts, documents, and images. Arguably, if tacit knowledge can only be transmitted through face-to-face communication, then TVI, MILA, and AMII clearly exchange tacit knowledge with their local partners but are largely limited to exchanging codified knowledge with each other. One way to investigate the flow of tacit and codified knowledge would be to conduct in-depth interviews with the members of TVI, MILA, and AMII. A good example of such a study is Rejean, Amara, and Doloreux³³, where the authors interviewed the executive officers of knowledge-intensive business services (KIBS) firms in Quebec. They asked these executive officers to identify which actors or organizations their firms draw technical knowledge from, including clients, competitors, suppliers of software and equipment, universities, and consultancy firms. They also asked them whether the knowledge they derive from these actors is mostly codified, tacit, or a mix of the two. Finally, they ranked the answers they received and calculated an average ‘codification score’ for all of the firms. A similar method might be applied to the three AI research institutes, TVI, MILA, and AMII.

5 Conclusion

The Pan-Canadian Strategy on Artificial Intelligence presents an opportunity for researchers to study the relationship between local and national systems of innovation. This relationship is poorly understood by innovation scholars, who tend to study these two systems in isolation. By applying a network theory framework to Canada’s local and national AI innovation systems, this paper has drawn links between the different organizations that make up these systems. The analysis presented in this paper is not comprehensive, however; in order to fully understand the relationship between Canada’s local and national AI innovation systems, researchers must conduct interviews, analyze documents, and perhaps administer surveys. Once the relationship between Canada’s local and national AI innovation systems is understood, it may be possible to improve or strengthen this relationship through various public policy interventions. It may also be possible to create a model of local and national innovation interactivity that is applicable to multiple geographic settings.

31. Peter Maskell and Anders Malmberg, “Localized Learning and Industrial Competitiveness,” *Cambridge Journal of Economics* 23 (1999): 171; Pierre Desrochers, “Geographical Proximity and the Transmission of Tacit Knowledge,” *The Review of Austrian Economics* 14, no. 1 (2001): 25–46.

32. Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy* (Routledge, 1958), 70.

33. Nabil Amara Landry Rejean and David Doloreux, “Knowledge-Exchange Strategies Between KIBS Firms and Their Clients,” *The Service Industries Journal* 32, no. 2 (2012): 298.

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Attracting Minds: How Canada and China Make Pragmatic Use of Migration Policies to Foster Innovation

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Abstract

One of the main features of the Westphalian state system is the degree of control nations have vis-a-vis their borders. Throughout the centuries, national governments were consolidated as the ‘gatekeepers’ of their territories, having the prerogative to determinate who and in which circumstances foreigners shall have access to their sovereign spaces.

In recent decades, migration has emerged as a relevant subject in states’ agendas. Despite the enactment of stricter entry policies in countries around the world, some states have aligned their prerogatives towards migration control with wider objectives, looking to attract high-skilled individuals to fill labor shortages or contribute with the development of strategic sectors and innovations.

While Canada is known for welcoming migrants and highlighting the positive impacts newcomers have to its economy, China, known as a country of emigration, has also recently introduced policies for ‘talented migrants’. Therefore, it is pertinent to understand how these two different countries, with very distinct societies and economies, make usage of their migration policies to boost innovation.

This paper will conduct a comparative study on Canada’s and China’s policies aimed at attracting high-skilled workers, drawing attention to their similarities and discrepancies in order to better understand their respective objectives and consequences. The study will argue that, while Canada’s policies congregate its inherent need for a larger population and its desire to foster innovation, China’s model is much more selective and not aimed at promoting a population increase.

1 Introduction

One of the main features of the Westphalian state system is the degree of control nations have vis-à-vis their borders and territory. Throughout the centuries, national governments were consolidated as the ‘gatekeepers’ of their territories, having the prerogative to determinate who and in which circumstances non-nationals shall have access to their sovereign spaces.¹

During recent decades, migration has emerged as a more relevant subject in states’ agendas. In the post-Cold War era, migration started to be interpreted as a phenomenon capable of generating real crises, which opened the way for the establishment of a new international regime for global cross-border movements. This would be a comprehensive regime covering all types of human mobility, including more ‘reactive’ types of migration (such as refugee movements), and intended to generate a more predictable and beneficial process for all actors involved. Despite the perpetuation of restrictive policies, a ‘regulated openness’ towards migrants whose skills and ‘talents’ are deemed to be needed or beneficial to States also emerged.² Thus, alongside the appearance of stricter

1. Harald Bauder, “Westphalia, Migration, and Feudal Privilege,” *Migration Letters*, July 2018, 333.

2. Martin Geiger and Antoine Pécoud, “The Politics of International Migration Management,” in *The Politics of International Migration Management. Migration, Minorities and Citizenship*, ed. Martin Geiger and Antoine Pécoud (London: Palgrave Macmillan, 2010), 3.

control strategies in many countries around the world, nowadays, governments increasingly align their prerogatives towards migration with wider objectives, looking to attract foreign workers to fill labour shortages or even contribute to the development of more specialized industries and innovative technologies.³

Canada has long given great importance to the arrival of newcomers. In recent decades, the country became well-known for highlighting the positive impacts immigrants have on its economy and establishing ‘migration management’ policies aimed at attracting ‘high-skill talent’. During recent years, despite having the world’s largest population, China also enacted policies and regulations directed to attracting high-skilled migrants. Having one of the world’s largest diaspora communities, China sees the return migration of skilled overseas Chinese and the attraction of ‘talented’ foreigners as a key for a new stage of its development process.⁴

While these two states converge on the establishment of migration strategies oriented at attracting ‘high-skill talent’, the spectrum of their policies as well as their intended outcomes vary to a considerable degree. Therefore, as other states join the ‘race for global talent’, it is pertinent to understand how these two different countries, with very distinct societies and economies, attempt to make use of their migration policies to boost innovation.

This paper will conduct a review of some of Canada’s and China’s most prominent policies aimed at attracting high-skilled workers and ‘talented’ migrants, drawing attention to their similarities and discrepancies in order to better understand their respective objectives and consequences. Following this introduction, this paper will consist of four sections: the first will debate the process in which, through innovations, states attempt to insert themselves in a distinguished manner in the global economy; then, the section will explore how this process is fomenting the enactment of migration policies aimed at attracting high-skilled migrants. Afterwards, the second and the third sections will review these migratory strategies directed to ‘high-skilled talent’ in Canada and China respectively. The fourth section will offer a conclusion.

This paper will argue that both countries are indeed employing their prerogatives towards border control to attract high-skilled migrants. This paper will postulate that, throughout the years, Canada has established wider programs that are simultaneously complementary to its demographic needs and to its endeavour to develop more innovations; China, on the other hand, has enacted programs that are much more selective and limited in the scope of permits granted.

2 The Need for Innovation and the Search for Global Talent

In *Creativity and Dependency in Industrial Civilization*, late Brazilian economist Celso Furtado discusses the multiple meanings and implications of innovation.⁵ The book portrays technological progress as one of the main spheres of human innovation and one of the determinants of the capitalist dynamic.⁶ Innovations are capable of generating technical progress and expanding productivity, which, consequently, promote economic growth and capital accumulation on the basis of the possession of distinguished advantages in the global economy.⁷

Despite recognizing that industrial societies tend to constrain and limit human creativity by making it an instrument directed to the foment of technical progress, Furtado also points out that creativity and innovations break the macroeconomics/microeconomics logics in the sense that they give agents the power of transformation. Therefore, one of the focus of Furtado’s book

3. United Nations, “The Migration of the High-Skilled as a new Policy Concern,” UN DESA, October 2019, 3, https://www.un.org/en/development/desa/population/events/pdf/4/P01_ICMPD.pdf.

4. Dudley Poston and Juyin Wong, “The Chinese diaspora: The current distribution of the overseas Chinese population,” *Chinese Journal of Sociology*, 2016, 351.

5. The book was originally published in Portuguese under the title *Criatividade e Dependência na Civilização Industrial* (Furtado 1978).

6. Celso Furtado, *Criatividade e Dependência na Civilização Industrial* (Rio de Janeiro: Paz & Terra, 1978).

7. Furtado, *Criatividade e Dependência na Civilização Industrial*, 52-53.

is how creativity and innovation enabled the existence of developed countries amid the world periphery, and how they might be the path to overcome underdevelopment. In that, “technical creativity” would be one of the main features of the “capitalist countries that exert leadership in the industrialized civilization.”⁸

Since adopting a series of free-market reforms in the late 1970s, China has been amongst the world’s fastest-growing economies, averaging a real annual gross domestic product (GDP) growth of 9.5% through 2018.⁹ Such growth has helped raise an estimated 800 million people out of poverty and made the country the world’s second-largest economy.¹⁰ However, China’s GDP growth has been steadily slowing, from a peak of 14.2% in 2007 to 5.8% in 2019.¹¹

Accordingly, in 2014, Chinese President Xi Jinping embraced the “new normal of China’s economy”, which has two main characteristics: the first is the slowdown from high-speed growth to high-middle-speed growth; the second is about fostering quality and intensive growth, instead of a scale extensive growth.¹² This approach would be capable of generating more sustainable growth and would rely less on fixed investment and exporting, giving priority to private consumption, services, and innovation to foster economic growth. Therefore, innovation became one of the government’s top priorities for the years to come.¹³

The long-existing notion that a nation’s competitiveness in the global economy is related to the capacity of its industry to innovate and upgrade is thus alive and well in the works of contemporary authors and economists. In 1990, Michael Porter pointed to the existence of three development stages through a nation’s trade evolution, comprising: (1) the factor-driven stage, where the competitive advantages are low-cost labour, unprocessed natural resources, and the value-added is minimum; (2) the investment-driven stage, where firms begin to produce more sophisticated goods and services with bigger value; (3) the innovation-driven stage, where national firms compete on the global level by producing innovative products and services whose technical expertise is dominated by them or very limited around the world.¹⁴

Daniel Treffer proposed a similar framework, where two types of economies are identified: low cost-based economies and innovation-based economies.¹⁵ While low cost-based economies would obtain advantages through the low cost of its resources and labour, they would have to import and/or copy foreign technologies and would assume a position of ‘trend followers’. On the other hand, innovation-based economies would be able to achieve unique market positions by focusing on new products, processes, and technologies. Moreover, these latter types of economies would be ‘trendsetters’.¹⁶

As identified by many economists, national governments play a preeminent role in creating an environment capable of sustaining such developments and leading its firms towards the creation of innovative technologies, which would place the nation in a more competitive place vis-à-vis other States in the global economy. As pointed by Furtado, greater expenses in research and development throughout the 20th century allowed the United States to modify the structures of its economy and

8. Furtado, *Criatividade e Dependência na Civilização Industrial*, 53.

9. CIC, “China’s Economic Rise: History, Trends, Challenges, and Implications for the United States,” Federation of American Scientists, June 2019, 2, <https://fas.org/sgp/crs/row/RL33534.pdf>.

10. CIC, “China’s Economic Rise: History, Trends, Challenges, and Implications for the United States,” 2.

11. IMF, “Real GDP growth: Annual percent change,” IMF, October 2019, https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/OEMDC/ADVEC/WEOWORLD.

12. Haochen Guo Jin Han and Mengnan Zhang, “China’s “New Normal” and Its Quality of Development,” ed. Jaromir Gottvald (Ostrava: IntechOpen, 2017), 176.

13. Jing Zhang and Jian Chen, “Introduction to China’s new normal economy,” *Journal of Chinese Economic and Business Studies*, April 2017, 1-3.

14. Michael Porter, “The Competitive Advantage of Nations,” March 1990, <https://hbr.org/1990/03/the-competitive-advantage-of-nations>.

15. Daniel Treffer, “Canadian Policy Responses to Offshore Outsourcing,” in *Offshore Outsourcing: Capitalizing on Lessons Learned*, ed. Daniel Treffer (Toronto: Rotman School of Management, 2010), 9.

16. Treffer, “Canadian Policy Responses to Offshore Outsourcing.”

start exerting technological leadership internationally.¹⁷

Nevertheless, according to the International Labor Organization (ILO), while emerging economies have been investing heavily in education and research, “their domestic schooling and training systems have failed, for a wide variety of reasons, to keep pace with the talent demands of employers.”¹⁸ Notwithstanding, this ‘gap’ in high-skilled and ‘talented’ labour is not an exclusivity of emerging economies. The organization also points out that countries from the Global North, such as Canada, “have long been attracting overseas talent in order to bridge skill gaps in their economies.”¹⁹

In addition to being scarce and in high demand, ‘high-skilled talent’ would also be highly mobile across international borders.²⁰ In that, these individuals would have a higher tendency of migrating (5.5%) than medium- and low-skilled professionals.²¹ Therefore, the overall competition to attract and retain high-skilled and ‘talented’ workforce has increased and, over the past decades, admission conditions for the ‘highly qualified’ have been eased. However, a countries’ attractiveness for these migrants tends to vary due to, inter alia, admission conditions, quality of opportunities, quality of life, future prospects and integration opportunities.²² According to the Organization for Economic Development and Cooperation:

Countries increasingly compete to attract and retain talented workers notably by adopting more favourable migration policies for the best and the brightest. This competition has led to a convergence of policy frameworks but significant differences in policies and practices remain.²³

Taking into consideration the degree of importance innovation has to countries’ economies and development and the scarcity of high-skilled workforce experienced by many states, the two following sections of this paper will explore policies directed at admitting and retaining ‘high-skilled talent’ in Canada and China. In academic literature, there is no agreed-upon definition of who is a high-skilled migrant. Therefore, for the purposes of this paper, a high-skilled migrant/worker will be considered to be a person with tertiary (university-level) education. Naturally, the study will take into account the inherent structural discrepancies of these countries while attempting to draw attention to the motives, impacts, and possible ‘attractiveness’ of their policies to migrants and ‘talented’ individuals.

3 Canada: Promoting ‘Talent Attraction’ via Wider Immigration Policies

With a population of circa 37.7 million inhabitants, Canada is widely known as an immigration destination and has had a bigger net migration rate than the average in other developed countries throughout the last 70 years.²⁴ Since 1990, over six million migrants settled in the country and, currently, 20% of its population is composed of immigrants born outside of the country’s territory.²⁵ In 2017, Canada distributed over 286,000 permanent residents permits and, in 2020, expects to

17. Furtado, *Criatividade e Dependência na Civilização Industrial*, 61.

18. ILO, “Attracting skilled international migrants to China: A review and comparison of policies and practices,” ILO, 2017, 8, https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/---ilo-beijing/documents/publication/wcms_565474.pdf.

19. ILO, “Attracting skilled international migrants to China: A review and comparison of policies and practices.”

20. ILO, “Attracting skilled international migrants to China: A review and comparison of policies and practices,” 8.

21. ILO, “Attracting skilled international migrants to China: A review and comparison of policies and practices,” 8.

22. OECD, “How do OECD countries compare in their attractiveness for talented migrants?” May 2019, 1-8, <https://www.oecd.org/els/mig/migration-policy-debates-19.pdf>.

23. OECD, “How do OECD countries compare in their attractiveness for talented migrants?,” 1.

24. Statistics Canada, “Population estimates, quarterly,” 2020, <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000901>.

25. IRCC, “2018 Annual Report to Parliament on Immigration,” Publications and Manuals, February 2018, 5, <https://www.canada.ca/en/immigration-refugees-citizenship/corporate/publications-manuals/annual-report-parliament-immigration-2018/report.html>.

issue more than 340,000 of these documents.²⁶

Due to an ageing population and low fertility rates, Canada has portrayed immigration as a strong pillar of its development plan and, in more recent years, its government has fostered a positive narrative on migration vis-à-vis its population.²⁷ Canada, thus, portrays itself as “a world leader in managed migration” where “waves of immigrants and their descendants have contributed their talents and hard work to [the country’s] success.”²⁸

Canada’s first immigration policy dates back to 1869, four years after Confederation when a statute imposing restrictions on the arrival of certain groups of migrants was enacted.²⁹ According to Atkey, many foreigners who arrived in Canada during the state’s “first wave” of immigration (from 1895 to 1914) were recruited to provide unskilled labour, while the second “wave” in the post-war era might have attempted to attract more skilled migrants, capable of contributing to the urban industrial expansion of the country.³⁰ In 1967, the country established a ‘points system’ to favour the admission of more skilled migrants, which remains a feature of its permanent residency program today.³¹ In 1973, a program to attract high-skilled temporary workers was created under the rubric of the Non-Immigrant Employment Authorization Program (NIEAP).³² This program focused on attracting individuals such as academics, business executives, and engineers.³³ With the 1976 Immigration Act, the minister responsible for immigration became responsible for formulating annual targets for levels of immigration and setting priorities for the processing of the different types of visa requests received each year.³⁴

Currently, most foreign ‘talented’ and high-skilled workers are admitted in Canada via the ‘Temporary Foreign Worker Program’ (TFWP), which provides foreign nationals with temporary work visas, and the ‘Federal Skilled Worker Program’ (FSWP), which gives migrants permanent residency visas.³⁵ Under these programs, employers are required to submit a Labor Market Impact Assessment (LMIA) to the government. This document aims to ensure that, inter alia, no Canadian citizen or permanent resident is available to assume the required position.³⁶ Moreover, it verifies if the employer made previous efforts to hire a Canadian citizen or permanent resident and measures the overall impacts that employing a foreign worker might have in the Canadian labour market.³⁷ The main initiatives created by the Canadian government directed at attracting ‘high-skilled talent’ are summarized in Table 1 below.

26. IRCC, “2018 Annual Report to Parliament on Immigration,” 2.

27. IRCC, “2018 Annual Report to Parliament on Immigration,” 5.

28. IRCC, “2018 Annual Report to Parliament on Immigration,” 5.

29. Ronald Atkey, “Canadian Immigration Law and Policy: A Study in Politics, Demographics and Economics,” *Canada-United States Law Journal*, January 1990, 1–20.

30. Atkey, “Canadian Immigration Law and Policy: A Study in Politics, Demographics and Economics,” 59.

31. Atkey, “Canadian Immigration Law and Policy: A Study in Politics, Demographics and Economics,” 60.

32. OECD, *Recruiting Immigrant Workers* (Paris, 2019).

33. OECD, *Recruiting Immigrant Workers*.

34. Atkey, “Canadian Immigration Law and Policy: A Study in Politics, Demographics and Economics,” 60.

35. Employment and Social Development Canada, “Program requirements for the Global Talent Stream,” 2020, <https://www.canada.ca/en/employment-social-development/services/foreign-workers/global-talent/requirements.html>.

36. CIC, “What is a Labour Market Impact Assessment?,” CIC, 2020, <https://www.cic.gc.ca/english/helpcentre/answer.asp?qnum=163&top=17>.

37. CIC, “What is a Labour Market Impact Assessment?”

Table 1. Summary of Immigration Initiatives Specifically Directed to High-Skilled and ‘Talented’ Migrants in Canada

Initiative	Overarching Program	Visa or stay permit	Year	Need for a labour market assessment plan
Global Talent Stream	Temporary Foreign Worker Program (TFWP)	Temporary work visa	2017-2019	Yes
Academics Stream	Temporary Foreign Worker Program (TFWP)	Temporary work visa	2007-present	Yes
Federal Skilled Worker Program	Express Entry	Permanent residency permit	1996-2002	Yes
Information Technology Workers Immigration Program	Temporary Foreign Worker Program (TFWP)	Temporary work visa	1997-2010	No

Source: Information adapted from Employment and Social Development Canada, *Temporary Foreign Worker Program*, <https://www.canada.ca/en/employment-social-development/services/foreign-workers.html>.

The TFWP is seen as the continuation of the 1973 NIEAP Program, but with wider categories/streams of migration, that is not only directed to ‘high-skilled talent’.³⁸ In that, the TFWP currently has six overarching categories, including, inter alia, a stream for ‘global talents’ and one for academics. Under these categories, employers are obliged to offer predefined salary levels, in accordance (or above) the average for the required position.³⁹

The ‘global talent’ stream was first introduced as a pilot program between 2017-2019 and became a permanent category of the TFWP in 2019.⁴⁰ The stream, which has a focus on tech-related workers, has faster processing times (14 calendar days, instead of the average⁴¹ of five to seven weeks under the TFWP) and is divided into two categories: the first, entitled ‘Category A’, allows referred companies with a focus on innovation to hire “unique and specialized talent to help the firm scale-up and grow.”⁴² Indeed, to join this category, companies need to be referred by one of the government’s partners⁴³ and potential new employees need to be offered at least an \$80,000 annual base salary while having an advanced degree, knowledge, and experience in the field of the

38. In that, the Program also has streams for caregivers, ‘workers in Québec’, and agricultural workers, which do not focus on the attraction of ‘high-skilled talent’. See “Temporary Foreign Workers Program”, *House of Commons*, <https://www.ourcommons.ca/Content/Committee/421/HUMA/Reports/RP8374415/humarp04/humarp04-e.pdf>, 1-6.

39. Employment and Social Development Canada, “Program requirements for the Global Talent Stream.”

40. Employment and Social Development Canada, “Hire a top foreign talent through the Global Talent Stream,” 2020, <https://www.canada.ca/en/employment-social-development/services/foreign-workers/global-talent.html>.

41. Processing times may vary according to the country of origin of the prospective employee.

42. Employment and Social Development Canada, “Hire a top foreign talent through the Global Talent Stream.”

43. As of March 2020, the companies could be referred by more than 45 partners, including government agencies, spread out through different regions of the country.

employer.⁴⁴ Additionally, companies in this category should be seeking to fill a “very limited number of unique and specialized positions [...] on the basis that very few specialized individuals exist with the unique skill-set required for the positions being requested.”⁴⁵ Therefore, the government recommends that only one or two positions in innovative companies should be filled via this stream per year.⁴⁶

‘Category B’ of the ‘global talent’ stream does not require companies to be referred to. However, employers are limited to only choose between a list⁴⁷ of twelve occupations related to the information technology industry deemed to be “in-demand and for which there is insufficient domestic labour supply.”⁴⁸

Since 2007, under the TFWP, Canadian universities can also hire foreign academics, under the condition that these individuals have at least one postgraduate degree and are to earn the majority of their income from teaching or conducting research. Moreover, when hiring certain foreign academics, universities may be exempt from having to submit an LMIA. That is the case for post-doctoral fellows, research award recipients, “eminent individuals” (e.g.: “leaders in various fields”), guest lecturers, visiting professors, and citizens of the US, Mexico, and Chile.⁴⁹ In that, hires of these three countries may be exempt due to trade agreements with Canada, viz. the NAFTA and the Canada-Chile Free Trade Agreement. Additionally, researchers affiliated to publicly funded institutions for up to 120 days are exempt from a work permit.⁵⁰ Complementary to this academic stream of the TFWP is the Canada Research Chairs Program (CRCP), created in the year 2000. Despite not being a migration initiative per se, the CRCP invests circa \$295 million per year in grants “to attract and retain a diverse cadre of world-class researchers” and “make Canada one of the world’s top countries in research and development.”⁵¹ Similar programs, such as the Canada Excellence Research Chairs (CERC) program (created in 2008) and the Canada 150 Research Chairs (created in 2017), have focused even more on attracting international scholars.⁵²

From 1997 to 2010, Canadian employers could hire foreign information technology (IT) workers without having to submit an LMIA, via the ‘Information Technology Workers Immigration Program’. However, this stream of the TFWP (which had a focus similar to the current ‘global talent’ stream) was ceased to ensure that the hiring of foreign workers would not result in an adverse impact on the Canadian labour market.⁵³

As other temporary residents, foreigners who are admitted to Canada via the TFWP can apply for permanent residency status after living in the country for 730 days within a five-year period before the application.⁵⁴ Permanent residency cards were introduced in Canada in 2001, via the Immigration and Refugee Protection Act (Canada 2001). Permanent residents can apply for citizenship after staying in the country for 1095 days within the last five years before the application.⁵⁵

44. Employment and Social Development Canada, “Program requirements for the Global Talent Stream.”

45. Employment and Social Development Canada, “Hire a top foreign talent through the Global Talent Stream.”

46. Employment and Social Development Canada, “Program requirements for the Global Talent Stream.”

47. Employment and Social Development Canada, “Global Talent Occupations List,” 2020, <https://www.canada.ca/en/employment-social-development/services/foreign-workers/global-talent/requirements.html>.

48. Employment and Social Development Canada, “Program requirements for the Global Talent Stream.”

49. Employment and Social Development Canada, “Hire a foreign academic,” 2020, <https://www.canada.ca/en/employment-social-development/services/foreign-workers/academic.html>.

50. Employment and Social Development Canada, “Hire a foreign academic.”

51. CRCP, “About Us,” 2019, https://www.chairs-chaires.gc.ca/about_us-a_notre_sujet/index-eng.aspx.

52. University of British Columbia, “Scientists join UBC as new Canada Excellence Research Chairs,” 2019, <https://news.ubc.ca/2019/04/17/scientists-join-ubc-as-new-canada-excellence-research-chairs/>; University of Ottawa, “Canada 150 Research Chairs,” 2020, <https://research.uottawa.ca/canada-150-research-chairs>.

53. Clark Wilson, “Facilitated Processing for Information Technology Specialists Ends on September 30, 2010,” June 2010, <https://www.cwilson.com/facilitated-processing-for-information-technology-specialists-ends-on-september-30-2010/>.

54. “Permanent resident status determination”, IRCC, <https://www.canada.ca/en/immigration-refugees-citizenship/services/canadian-citizenship/become-canadian-citizen/eligibility.html#time>

55. As of 2017, applicants to citizenship can also calculate their accumulated days in Canada with time spent in the country as temporary residents, before becoming permanent residents. However, each day accumulated during the temporary residency is counted as one half-day by the government. See “Apply for citizenship”, IRCC, <https://www.canada.ca/en/>

Under Canadian law, national citizens can maintain more than one citizenship, allowing naturalized citizens to maintain their previous nationalities when becoming Canadians.⁵⁶

Through the Federal Skilled Worker Program (FSWP), however, foreigners acquire the right to permanent residence directly upon arrival. Despite existing since the late 1990s, the FSWP as it exists today was established in 2001, via the Immigration and Refugee Protection Act.⁵⁷ The Program is now part of the Express Entry Program, a points-based system that ranks foreigners interested in acquiring permanent resident status in the country. In order to rank individuals, the system assesses their work experience, education, language skills, the presence of a job offer, and age.⁵⁸ In 2017, a total of 286,479 foreigners became permanent residents in Canada, and 57,834 of them obtained that status via the FSWP.⁵⁹

4 China: Attracting Overseas Chinese and Foreign ‘Talent’ Through More Selective Strategies

China has the world’s largest population (1.4 billion individuals in the year 2019) and the third-largest diaspora community, only behind India and Mexico.⁶⁰ In that, approximately 10.7 million individuals are considered overseas Chinese.⁶¹

Since 1978, the country has employed a strategy of allowing its high-skilled citizens to study abroad, with the expectation that they would return and help to support the nation’s modernization objectives.⁶² Indeed, as a country, China is the largest source of international students in the world, having sent more than 5.2 million students abroad over the last 40 years, especially to the US and Western Europe.⁶³ In 2017, 608,400 Chinese individuals left the country to pursue their studies abroad, and, while most of them were self-funded (88.97% in 2017), governmental scholarships provided by the Chinese government played an essential role.⁶⁴ Naturally, due to a fear of human capital flight (commonly referred to as ‘brain drain’), much attention has been paid to return the migration of students and skilled Chinese people. In a 1983 speech, Deng Xiaoping called for Chinese international students to return and assist the country. Similar discourses were given by Hu Jintao and Zeng Qinghong in 2003, where the “irreplaceable” and “outstanding historic role” of returnees was recognized.⁶⁵ According to the Chinese government, throughout the years, the return rate of international Chinese students has been steadily growing, especially due to policy stimulus and better economic conditions in the country since the mid-2000s.⁶⁶

Besides stimulating the return of its citizens abroad, China has also joined “the race for talent” and started to create strategies to attract foreign high-skilled and ‘talented’ migrants.⁶⁷ However,

immigration-refugees-citizenship/services/canadian-citizenship/become-canadian-citizen/eligibility.html#time

56. CIC, “What is dual citizenship?,” CIC, January 2020, <https://www.cic.gc.ca/english/helpcentre/answer.asp?qnum=356&top=5>.

57. Canada, “Immigration and Refugee Protection Act (S.C. 2001, c. 27),” Justice Laws Website, 2001, <https://laws-lois.justice.gc.ca/eng/acts/i-2.5/index.html>.

58. IRCC, “Eligibility to apply as a Federal Skilled Worker (Express Entry),” 2020, <https://www.canada.ca/en/immigration-refugees-citizenship/services/immigrate-canada/express-entry/eligibility/federal-skilled-workers.html>.

59. IRCC, “2018 Annual Report to Parliament on Immigration,” 13.

60. United Nations, “World Population Prospects 2019,” UN DESA, 2019, 12, https://population.un.org/wpp/Publications/Files/WPP2019_Highlights.pdf.

61. United Nations, “World Population Prospects 2019.”

62. Huiyao Wang and Yue Bao, *Reverse Migration in Contemporary China: Returnees, Entrepreneurship and the Chinese Economy* (New York: Macmillan, 2015).

63. Ministry of Education of the P.R. of China, “Brief report on Chinese overseas students and international students in China 2017,” April 2018, http://en.moe.gov.cn/documents/reports/201901/t20190115_367019.html.

64. Ministry of Education of the P.R. of China, “Brief report on Chinese overseas students and international students in China 2017.”

65. Huiyao Wang and Lu Miao, “China’s Talent Attraction Policies in the Present Age,” in *China’s Domestic and International Migration Development*, ed. Huiyao Wang and Lu Miao (Singapore: Springer, 2019), 172.

66. Ministry of Education of the P.R. of China, “Brief report on Chinese overseas students and international students in China 2017.”

67. Wang and Miao, “China’s Talent Attraction Policies in the Present Age,” 169.

its most prominent strategies created to attract high-skilled migrants do so while also encouraging the return of overseas skilled Chinese individuals.

At the end of 2008, the Chinese government established its ‘Thousand Talents Program’, aiming at attracting “top talents” interested in “returning or coming to China” in a period of five to ten years.⁶⁸ The Program offered “significant financial support” to high-level overseas scientists and experts interested in relocating to China to conduct research or to work in state-owned enterprises, state-owned financial institutions, or high-tech development zones and industrial parks.⁶⁹ The Program had three different streams (summarized in Table 2 below) with very high qualification criteria, such as having won a Nobel Prize, as required in one of the streams. Research subsidies and grants are given to recruited individuals ranged from 500,000 CNY to 5 million CNY, the equivalent of 96,000 CAD to 961,000 CAD⁷⁰, and additional working and living support was provided.⁷¹ According to a US Senate report, by 2017, the Chinese program had recruited more than 7,000 professionals.⁷²

Table 2. Summary of the ‘Thousand Talents Program’ Categories

Category	Target	Qualifications / Conditions	Duration of stay
‘Innovative Talents’ streams	Scientists Program	Hold a Ph.D. degree; Be under 55 years old; Have full professorship in a prestigious foreign university or research institute; or a senior technology or management position in a renowned international enterprise or financial institution.	<i>Long term:</i> at least 3 years. <i>Short term:</i> at least 2 months within 3 consecutive years.
‘Entrepreneurs’ stream	Entrepreneurs	Hold an overseas university degree; Be under 55 years old; Possession of technology results which are internationally competitive.	Not specified.
‘Young Talents’ stream	Case-by-case basis	Be the winner of a major international award; Be under 40 years old; Hold a Ph.D. degree in natural sciences, engineering or technology.	At least 3 years.

Source: Information adapted from China Innovation Funding, *Thousand Talents Plan* (2018), <http://chinainnovationfunding.eu/thousand-talents-plan/>

In 2019, the ‘Thousand Talents Program’ was replaced by the ‘National High-end Foreign Experts Recruitment Plan’.⁷³ The new plan focuses on four different themes: (1) science and technology development; (2) industrial technology innovation; (3) social and ecological construction;

68. China Innovation Funding, “Thousand Talents Plan,” China Innovation Funding, 2018, <http://chinainnovationfunding.eu/thousand-talents-plan/>.

69. China Innovation Funding, “Thousand Talents Plan.”

70. Currency exchange rates between the Chinese Yuan (CNY) to the Canadian Dollar (CAD) were provided by the Bank of Canada, via its currency converter mechanism, on March 4, 2020.

71. China Innovation Funding, “Thousand Talents Plan.”

72. United States Senate, “Threats to the U.S. Research Enterprise: China’s Talent Recruitment Plans,” Permanent Subcommittee on Investigations, November 2019, 2, <https://www.hsgac.senate.gov/imo/media/doc/2019-11-18%5C%20PSI%5C%20Staff%5C%20Report%5C%20-%5C%20China%5C%27s%5C%20Talent%5C%20Recruitment%5C%20Plans.pdf>.

73. China Innovation Funding, “National High-end Foreign Experts Recruitment Plan (2019 annual call),” 2019, <http://chinainnovationfunding.eu/project/2019-high-end-foreign-experts-recruitment-plan/>.

and (4) the rejuvenation of agricultural and rural areas. In that, it also encompasses important objectives not explicitly delineated by the ‘Thousand Talents Program’ strategy, such as sustainable development and the use of new technologies in agriculture and rural areas.⁷⁴ Despite its name, the new plan is not restricted to ‘foreigners’ and also accepts applications from Chinese institutions.⁷⁵ In addition of accepting individual applications of foreign ‘experts’, the Plan also accepts ‘team’ applications of five individuals or more. Potential candidates should be, inter alia, assistant professors in prestigious universities, high-level workers in preeminent international corporations and institutions, or possess qualifications deemed to be urgently needed by the Chinese government.⁷⁶

In addition to the new ‘National High-end Foreign Experts Recruitment Plan’, two other initiatives were recently established.⁷⁷ The first, is a ‘talent exchange’ initiative from countries encompassed by the new Belt and Road Initiative. This exchange initiative welcomes applications from research groups (of five people or more) and companies and was established to foster innovative developments in a wide variety of themes, ranging from artificial intelligence to humanities.⁷⁸ The second, is the ‘Young Foreign Talent Plan’. It is directed to postdoctoral researchers who are younger than 40 years old and approved applications can be supported for up to two years.⁷⁹

Some key temporary residency regulations enable and support these programs enacted by the Chinese government. Since 2017, through its work visa (usually referred as ‘Z’ Visa), the national government created a points-based system that ranks applicants in three different categories: (1) Category A, for ‘high-level talent’; (2) Category B, for individuals with ‘professional talent’ in demand by the labour market; and (3) Category C, for unskilled workers.⁸⁰ The Z-Visa can be issued with a five-year validity duration, however, new applicants to this visa tend to receive a one-year permit and, then, multi-year visas.⁸¹ Moreover, since 2013, via the R-Visa, China has been issuing short-term permits (valid for up to 180 days) to ‘high skill talent’ or individuals with skills that are urgently in need. For both visas, a letter of invitation or recognition from a relevant Chinese entity is required.⁸² These visas and their main characteristics are summarized in Table 3 below:

74. China Innovation Funding, “National High-end Foreign Experts Recruitment Plan (2019 annual call).”

75. China Innovation Funding, “National High-end Foreign Experts Recruitment Plan (2019 annual call).”

76. CSET, “Notice on Applying for 2020 National Foreign Expert Projects,” CSET, February 2020, 1-5, https://cset.georgetown.edu/wp-content/uploads/t0100_belt_road_young_experts_EN-1.pdf.

77. CSET, “Notice on Applying for 2020 National Foreign Expert Projects.”

78. CSET, “Notice on Applying for 2020 National Foreign Expert Projects.”

79. CSET, “Notice on Applying for 2020 National Foreign Expert Projects.”

80. Service System for Foreigners Working in China, “Classification standard for international talents,” Service System for Foreigners Working in China, 2017, 1-35, http://fwp.safea.gov.cn/attached/file/20180731/20180731103648_983.pdf.

81. Service System for Foreigners Working in China, “Classification standard for international talents.”

82. Embassy of the PR of China in Canada, “Requirements for Chinese Visa Applications,” Embassy of China in Canada, 2018, <http://ca.china-embassy.org/eng/sggg/t1624729.htm>.

Table 3. Summary of Chinese Work Visas and Targeted Individuals

Visa	Target	Ease of application	Duration of stay
Z-Visa (Category A)	High qualified ‘top talent’	Highly encouraged	Up to 5 years
R-Visa	‘High-skill talent’ or individuals with skills that are urgently in need	Highly encouraged	Up to 180 days
Z-Visa (Category B)	Professional talent in line with labour market demand	Generally controlled	Up to 5 years
Z-Visa (Category C)	Unskilled workers	Strictly limited	Up to 5 years

Source: Information adapted from Service System for Foreigners Working in China, *Classification standard for international talents* (2017), http://fwp.safea.gov.cn/attached/file/20180731/20180731103648_983.pdf.

Permanent residency cards have been issued in China since 2004, through an order from the Ministry of Public Security and the Ministry of Foreign Affairs.⁸³ The regulation allows foreigners to become permanent residents under four conditions: (1) having made direct investments (varying from US\$500,000 to US\$2 million, depending on the destination) in the country for three consecutive years; (2) having made “great and outstanding” contribution and being specially in needed by China; (3) having worked in high-ranking posts in the industry or academia; (4) being an immediate family member to a Chinese citizen or permanent resident in China.⁸⁴ To be eligible, applicants must have legally resided in China for at least five years.⁸⁵ Nevertheless, the amount of permanent residency permits issued has been very limited. In fact, the number of permanent residency cards distributed since 2004 only surpassed the 10,000 mark in 2016.⁸⁶

China’s permanent residence permit, commonly known as [a] green card, has been labelled over the years as the most difficult green card to obtain around the world and a source of fascination due to the exclusiveness of this document released to less than 1 percent of the expat community living in China.⁸⁷

Chinese law does not allow its citizens to maintain more than one nationality. Consequently, expat Chinese citizens are discouraged to obtain another nationalities and foreigners in China would have to give up their citizenship in order to become Chinese.⁸⁸ The regulations for the naturalization of foreigners were established in 1980 and impose quite broad requirements.⁸⁹ In order to apply for Chinese citizenship, a foreigner should meet one of the following requirements: (1) have near relatives who are Chinese nationals; (2) be born in China to parents who are stateless or of uncertain

83. Ministry of Commerce of the PR of China Department of Foreign Investment Administration, “Measures for the Administration of Examination and Approval of Foreigners’ Permanent Residence in China,” December 2003, http://www.fdi.gov.cn/1800000121_39_1423_0_7.html.

84. Ministry of Commerce of the PR of China Department of Foreign Investment Administration, “Measures for the Administration of Examination and Approval of Foreigners’ Permanent Residence in China.”

85. Ministry of Commerce of the PR of China Department of Foreign Investment Administration, “Measures for the Administration of Examination and Approval of Foreigners’ Permanent Residence in China.”

86. China Daily, “Chinese ‘green card’: Who got it and how to get it,” 2018, <http://www.chinadaily.com.cn/a/201806/20/WS5b29e3e7a3103349141dd4cf.html>.

87. Matteo Giovanni, “China’s proposal of a revised permanent residence law for foreigners is causing debate,” April 2020, <https://news.cgtn.com/news/2020-03-04/China-s-proposal-of-a-revised-permanent-residence-law-for-foreigners-OAHZls2pzi/index.html>.

88. Wang and Miao, “China’s Talent Attraction Policies in the Present Age,” 174.

89. Consulate-General of the PR China in New York, “Nationality Law of the People’s Republic of China,” 2003, <https://www.fmprc.gov.cn/ce/cgny/eng/lsqz/laws/t42221.htm>.

nationality; (3) have settled in China; or (4) have “other legitimate reasons”.⁹⁰ Nonetheless, despite being “theoretically possible”, state practice and selectiveness has made this possibility “extremely difficult”.⁹¹

Recently, recognizing how the possibility of obtaining permanent residency status may attract a bigger number of high-skilled and ‘talented’ migrants, the Chinese government published a draft proposal for new regulations for permanent residents.⁹² The draft proposal, published on February 2020, has a clear intent of attracting ‘high-skilled talent’, stating that priority shall be given foreigners who made “outstanding” achievements abroad or to China’s economic and social development in science and technology, education, culture, health, sports, inter alia.⁹³ Moreover, when recommended by the appropriate institutions or “well-known” companies in the technological field, high-level academics, management personnel, or individuals whose skills are in urgent need by the country should also have priority in the process.⁹⁴ However, the new proposed regulation has been receiving some negative feedback from the Chinese civil society, especially due to its 19th article, which states that foreigners who apply for “other legitimate reasons” shall also apply for the permanent stay status.⁹⁵ For many Chinese, who express their views through the internet, this latter criterion would be too broad and perhaps capable of endangering the status quo of society.⁹⁶

5 Conclusions

The development of innovative technologies, solutions, and services is key for countries looking to improve their standing in the international economy and obtain gains in productivity. While, primarily, countries invest in local research and development initiatives and the education of their own citizens to achieve that end, they may also use their prerogatives towards migratory control to attract foreign ‘talent’. Thus, in both countries studied, the enactment of migration strategies directed at attracting high-skilled migrants is pragmatic and complementary, created to supplement their national strategies to develop innovations and their domestic labour markets’ needs. In that, countries may impose the need for labour market assessment studies to evaluate if foreigners are indeed required to fill a specific position, as done by Canada, or impose highly selective criteria (such as the possession of internationally prestigious awards), as required by China.

When compared to Canada, China maintains a higher degree of control in the discernment of which ‘talented’ migrants may contribute to the country’s innovation endeavours. In that, the state promotes much more selective programs, aimed at a smaller cadre of migrants. This is mostly related to the size of China’s population and the centralized nature of its government. Nonetheless, despite enacting wider and more overt programs, where private companies tend to take the lead role in selecting ‘high-skilled talent’, the Canadian government also has the final authority to discern if hiring a foreigner is indeed aligned with the country’s needs.

Countries may also offer to integrate high-skilled foreigners who initially immigrated on a temporary basis as permanent residents or even citizens, as noted in the Canadian case. Creating channels of permanent stay tends to increase migrants’ prospects of local integration and is

90. Consulate-General of the PR China in New York, “Nationality Law of the People’s Republic of China.”

91. CIA, “The World Factbook: China,” CIA, 2020, <https://www.cia.gov/library/publications/resources/the-world-factbook/geos/ch.html>.

92. Ministry of Justice of PR of China, “Regulations of the People’s Republic of China on the Management of Permanent Residence of Foreigners,” 2020, http://www.moj.gov.cn/news/content/2020-02/27/zlk_3242559.html.

93. Ministry of Justice of PR of China, “Regulations of the People’s Republic of China on the Management of Permanent Residence of Foreigners.”

94. Ministry of Justice of PR of China, “Regulations of the People’s Republic of China on the Management of Permanent Residence of Foreigners.”

95. Ministry of Justice of PR of China, “Regulations of the People’s Republic of China on the Management of Permanent Residence of Foreigners.”

96. Giovanni, “China’s proposal of a revised permanent residence law for foreigners is causing debate.”

perceived as a positive factor for attracting ‘high-skill talent’. In some cases, ‘talented’ individuals may be offered permanent resident status directly upon arrival, without the requirement of having previously resided in the country on a temporary basis, as seen in Canada’s Federal Skilled Worker Program (FSWP). Despite maintaining a very restrictive permanent residency policy and only having surpassed the mark of 10,000 permanent residents after twelve years of the enactment of its permanent stay regulation, China published a new draft regulation proposal for permanent residents at the beginning of 2020. The proposed regulation gives explicit priority to high-skilled individuals. Nonetheless, it is not clear if the government has the intent of broadening the number of ‘talented’ migrants that come to China. Through the assessment of its demographic needs and historical trends, it can be predicted that Canada will continue to incentivize the arrival of more high-skilled foreigners. Meanwhile, how Chinese society will perceive a possible widening of these policies and that country’s ability to attract larger contingents of ‘high-skill talent’ will be better known in the years to come.

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The Digital Palestinian Pound, E-Shekel, and the Three Print Currencies: Palestine's Search for a National Currency in Cryptocurrencies

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Abstract

Palestine has not had a national currency since 1951. Since the 1993 Oslo Accord, the Occupied Palestinian Territories have been predominantly using the New Israeli Shekel (NIS) and all transactions with Israeli firms had to be settled with correspondent banking. In 2016, however, Israeli banks severed correspondent ties with Palestine due to allegations of money laundering and terror financing. The termination of these correspondent banking services has had significant economic and security consequences. Palestinian and Israeli authorities are yet to find a long-term solution. With the growing popularity of cryptocurrency in the region, the Palestinian Monetary Authority (PMA) have recently proposed adopting a cryptocurrency as their national currency. This currency reform could provide fiscal autonomy, a stable means of payment from Israeli firms, and the space for economic growth for the occupied nation. Using existing national cryptocurrencies as case studies, this paper outlines the three ways in which the PMA can approach it.

1 Introduction

In 2016, Israeli banks severed correspondent ties with their counterparts in Palestine due to accusations of money laundering and financing militant Islamic groups.¹ Prior to this, local Palestinian bank branches would offer key correspondent bank services such as wire transfers, conducting business transactions, accepting deposits, and gathering documents on behalf of Israeli financial institutions.² The termination of these correspondent banking services has had significant short-term economic and security effects. Palestinian and Israeli authorities are yet to find a long-term solution.

Many Palestinians in Gaza and the West Bank now face challenges receiving loans and payments for work conducted both remotely and in Israel. Blockchain currencies have become the leading solution to the lack of a secure and predictable means of payment for Palestinian workers. This paper argues that Palestine should adopt a national cryptocurrency as it would provide the occupied state with fiscal autonomy, a stable means of payment from Israeli firms, and the space for economic growth independent of its ever-changing relationship with Israel.

The Palestinian Monetary Authorities (PMA) has proposed adopting a cryptocurrency as a national currency³ and this paper outlines the three ways in which the PMA can approach it. The first approach the PMA could take is to allow a minority of Palestinian citizens and militant Islamic

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2. Will Kenton, "Correspondent Bank," ed. Khadija Khartit, *Investopedia*, April 25, 2020, <https://www.investopedia.com/terms/c/correspondent-bank.asp>.

3. Entsar Abu Jahal, "Palestinian Authority Looks to Cryptocurrency to Scrap Shekel," *Al-Monitor*, July 22, 2019, <https://www.al-monitor.com/pulse/originals/2019/07/palestine-israel-currency-economy-crypto-digital-reliance.html>.

organizations to continue using cryptocurrencies unregulated while keeping the New Israeli Shekel (NIS) as their primary national currency. The second approach is adopting a decentralized national cryptocurrency, similar to the approach taken by the Marshall Islands and the Oglala Lakota of the Pine Ridge Indian Reservation. The third approach is adopting an e-shekel, a centralized national cryptocurrency that is valued against the NIS, similar to the Senegalese eCFA.

2 Limitations of the Study

Before 2016, the majority of cryptocurrency users in Palestine were members of Hamas, who utilized it for military fundraising and money laundering. It was these fundraising campaigns that served as ‘advertising’ for cryptocurrencies to Palestinian citizens.⁴ Given that the use of cryptocurrencies by civilians in Palestine is a recent occurrence, there has not been a significant amount of academic research conducted on this phenomenon. For this reason, this paper employs other instances of states adopting cryptocurrencies as national currencies as case studies for how a Palestinian national cryptocurrency would work. As most of these national currencies were adopted in the past five years, this paper must largely draw from newspaper articles for information on how these new currencies worked. Due to the untraceable and anonymous nature of cryptocurrencies, there is also no concrete data on exactly how many cryptocurrency users there are in a given country. However, given the increasing number of states adopting cryptocurrencies as their national currency and the increasing measures Israel has taken against the use of cryptocurrencies in Palestine, there is an evident international shift towards cryptocurrencies. The full political implications of this shift are yet to be understood.

3 Palestine’s History with a National Currency

In 1994, the Israeli government and the Palestinian Liberation Organization (PLO) signed the Paris Protocol, which allowed Palestine to create a central bank.⁵ The Protocol, however, prohibited Palestine from issuing a national currency,⁶ leaving them dependent on the Israeli economy. This Protocol was originally supposed to last only five years;⁷ however, it has not been updated since. A key point of negotiation was a measure that allowed Palestinians to continue to work in Israel.

The Protocol regulates taxes, labour, agriculture, and industry. Israel acts as Palestine’s trade conduit and dictates all taxes on goods imported through Israel.⁸ This system has created an advantage for Israel which abuses the clearance system for political reasons, withholding revenue payments that severely impacted the Palestinian economy.⁹ In 1995, Israeli Prime Minister Yitzhak Rabin and PLO Chairman Yasser Arafat signed the Oslo Accord II.¹⁰ It envisioned the establishment of Palestinian interim self-government but failed to negotiate a comprehensive peace agreement and an independent Palestinian state after the interim period.

Since the termination of the British Mandate for Palestine, the country has used multiple currencies at different frequencies depending on the region. Currently, there are three currencies in circulation: the U.S. dollar (USD), the Jordanian dinar (JOD), and the new Israeli shekel (NIS). The USD and the JOD are usually used for high-value purchases such as houses, land, or cars, while most day-to-day transactions use the NIS.¹¹

4. Nathaniel Popper, “Terrorists Turn to Bitcoin for Funding, and They’re Learning Fast,” *The New York Times*, August 18, 2019, <https://www.nytimes.com/2019/08/18/technology/terrorists-bitcoin.html>.

5. Avraham Shohat and Abu Ala, *Gaza-Jericho Agreement Annex IV-Economic Protocol* (Paris, April 1994).

6. Shohat and Ala, *Gaza-Jericho Agreement Annex IV-Economic Protocol*.

7. Shohat and Ala, *Gaza-Jericho Agreement Annex IV-Economic Protocol*.

8. Shohat and Ala, *Gaza-Jericho Agreement Annex IV-Economic Protocol*.

9. Fadle M Naqib, “Economic Aspects of the Palestinian-Israeli conflict: The Collapse of the Oslo Accord,” *Journal of International Development* 15, no. 4 (2003): 499–512.

10. Yitzhak Rabin and Yasser Arafat, *Israeli-Palestinian Interim Agreement on the West Bank and the Gaza Strip (Oslo Accord II)* (Washington, DC, 1995).

11. Sahar Taghdisi-Rad, *The Political Economy of Aid in Palestine: Relief from Conflict or Development Delayed?* (London:

Non-cash payments between Israelis and Palestinians take place mainly through cheques and wire transfers.¹² Article IV of the 1994 Paris Protocol specifies that NIS payments between Palestinian and Israeli banks are to be settled via clearinghouses.¹³ Specifically, the clearing of money orders and transactions between banks operating in the Occupied Palestinian Territories and banks operating in Israel will be done between the Israeli and Palestinian clearinghouses on the same working day basis.¹⁴ Israeli-Palestinian payments are thus treated as ‘cross-border’ and settled via correspondent banking. Israeli banks, such as Bank Hapoalim and Discount Bank, provided the Bank of Palestine with correspondent services related to the clearing of cross-border transactions and the management of NIS liquidity for decades.¹⁵ Thus, the termination of these correspondent banking services undermines the payment system, increases cash-based transactions, weakens trade, erodes the tax base, and increases instability in the region.

4 Severed Ties with Israeli Banks

In Gaza

After Hamas took control of Gaza in 2007 through legislative elections, the Israeli Cabinet declared Gaza a hostile entity. In 2009, Israeli banks interrupted all correspondent services provided to banks in Gaza, claiming that it was impossible to verify that the transactions were not benefitting Hamas.¹⁶

In the West Bank

The West Bank, on the other hand, continued to be governed by the Palestinian Authorities. Israeli correspondent banks continued to process transactions in the territory while the Bank of Israel assumed the role of servicing NIS cash shipments from Palestinian banks, though with a monthly limit.¹⁷ However, in 2016 the Israeli correspondent banks started to interrupt correspondent relations with counterparts in the West Bank as well.¹⁸

The Palestinian Anti-Cash Law

In 2018, Israel passed a law forbidding businesses and employers from paying cash for wages and other financial transactions over a value of NIS 11,000 (approximately CAD 4,300).¹⁹ At the same time, around 140,000 to 185,000 Palestinians who work in Israel often hold the kind of low paid service jobs that pay in cash, and they (along with some Israeli-Palestinians) spend shekels in Palestinian areas.²⁰ Thus, true control lies in Israel’s central bank (Bank of Israel), which sets and enforces caps on the value of shekels that Palestinian banks can transfer. As Palestinian economist Bishara Dabah points out, Israel’s new anti-cash law will have the greatest effect on Palestinians

Routledge, 2010).

12. Priscilla Toffano and Kathy Yuan, “E-Shekels Across Borders: A Distributed Ledger System to Settle Payments Between Israel And the West Bank,” (London), 2019, 6.

13. Shohat and Ala, *Gaza-Jericho Agreement Annex IV-Economic Protocol*.

14. International Monetary Fund, *West Bank and Gaza’s IMF Report to The Ad-Hoc Liaison Committee* (Washington, DC: International Monetary Fund, 2016), 40.

15. Toffano and Yuan, “E-Shekels Across Borders: A Distributed Ledger System to Settle Payments Between Israel And the West Bank,” 7.

16. International Monetary Fund, *West Bank and Gaza’s IMF Report to The Ad-Hoc Liaison Committee*, 40.

17. Toffano and Yuan, “E-Shekels Across Borders: A Distributed Ledger System to Settle Payments Between Israel And the West Bank,” 8.

18. International Monetary Fund, *West Bank and Gaza’s IMF Report to The Ad-Hoc Liaison Committee*.

19. “Currency Converter NIS to CAD - Live Rates,” XE, March 15, 2020; Ruth Levush, “Israel: New Law Restricts Use of Cash,” *Global Legal Monitor*, March 27, 2018, <https://www.loc.gov/law/foreign-news/article/israel-new-law-restricts-use-of-cash/>.

20. Yaacov Benmeleh and Fadwa Hodali, “Amid Prospect of War, Israel Deepens Palestinian Banking Ties,” *Bloomberg*, October 23, 2018, <https://www.bloomberg.com/news/articles/2018-10-24/amid-prospect-of-war-israel-deepens-palestinian-banking-ties>.

and Palestinian banks: the cash they cannot convert or transfer may now not be spent either.²¹ Dabah noted that the use of dollars as an alternative was not available as “banks in the West Bank are already out of dollars.”²² This places Palestinians in jeopardy because they can neither ever receive a payment over NIS 11,000 nor are the banks able to accept additional cash deposits.

5 Benefits of Cryptocurrency

Unlike a print currency, a national decentralized cryptocurrency would require no clearance from the Israeli government. Considering the Palestinian Monetary Authority (PMA) were not allowed to print their own money, an electronic national currency can act as a loophole to the 1994 Paris Protocol. The Governor of the Palestine Monetary Authority said, “If we print currency, to get it into the country you would always need clearance from the Israelis and that could be an obstacle; So that is why we don’t want to go into it.”²³ Transactions cannot be vetoed by an intermediary, such as Israel, because anyone can conduct a peer-to-peer cryptocurrency transaction and once the transaction is paid for, the process is complete.

The simpler benefits of switching to cryptocurrency for a national currency would be low to no fees of sending money abroad. Unlike wire transfer services, such as Western Union, cryptocurrencies do not place fees on cross-border transactions or sending remittances abroad. The processing time of a cryptocurrency transaction is also virtually instantaneous compared to sending a wire transfer through a local bank branch or a money transfer service.

Approaches to Cryptocurrency as Palestine’s National Currency

6 Solution #1: Current State of Cryptocurrencies in Palestine

Cryptocurrencies, such as Bitcoin and Ethereum, are already being used by Palestinians today.²⁴ The bulk of Palestinian Bitcoin users are accepting Bitcoin payments for remittances from family abroad and cashing it out through local peer-to-peer groups or freelance work. Since PayPal and other online services exclude the Occupied Palestinian territories, this is one of the only ways for freelancers to easily receive international payments.²⁵ This approach would mean the PMA allows some Palestinian citizens and militant Islamic organizations to continue using cryptocurrencies unregulated while continuing to use the NIS as their dominant national currency, alongside the USD and the JOD.

Local Dealers

A cryptocurrency can only do so much in a place where power outages can be a daily occurrence and even traditional banks sometimes struggle to transact with much of the outside world. Palestinians cannot digitally exchange NIS, USD or the JOD at their local bank because Palestinian banks do not recognize cryptocurrencies; therefore, Palestinian citizens must rely on dealers as liquidity gateways – this makes it less accessible to the average citizen.²⁶ One Palestinian freelance developer and Gaza-based Bitcoin user stated:

There are some offices that now do \$5 million to \$6 million a month, I’ve seen a local trader send 100 BTC in one [transaction] ... There are also a lot of small clients. They

21. Dima Abumaria, “The West Bank Is Drowning in Shekels,” *The Media Line*, June 3, 2019, <https://themedialine.org/by-region/the-west-bank-is-drowning-in-shekels/>.

22. Abumaria, “The West Bank Is Drowning in Shekels.”

23. Marc Jones, “Palestinian Officials Hope to Launch e-Currency in 5 Years,” *Thomson Reuters Foundation News*, May 12, 2017, <http://news.trust.org/item/20170512142441-r6xsq/>.

24. Leigh Cuen, “In Palestine, Civilians Are Using Bitcoin More Than Hamas,” *CoinDesk*, August 23, 2019, <https://www.coindesk.com/palestinian-civilians-are-using-bitcoin-more-than-terrorists>.

25. Cuen, “In Palestine, Civilians Are Using Bitcoin More Than Hamas.”

26. Cuen, “In Palestine, Civilians Are Using Bitcoin More Than Hamas.”

send \$200 or \$1,000.²⁷

The function of these local cryptocurrency dealers is to act as a black-market substitute for corresponding banking services and provide liquidity to cryptocurrencies in exchanging the cryptocurrency for the NIS or to the JOD. One Palestinian cryptocurrency dealer can serve roughly 50 clients a month, purchasing or liquidating an average of \$500 each.²⁸

Users

From the limited data that has been gathered on Palestinian cryptocurrency usage, it shows there are at least 10,000 occasional Bitcoin users in Gaza alone and most regular Gazan users take more than 70 percent of their monthly salary in Bitcoin.²⁹ Hence, the demand for cryptocurrencies is there, but the demographic that uses them is still limited. This may be due to the security risks involved, widespread reliance on cash, and limits on access to the technology. According to the figures, most Palestinian cryptocurrency users are freelancers and those who receive remittances from family abroad. However, cryptocurrencies are anonymous and untraceable in nature which means these figures may only begin to scratch the surface.

Hamas and Bitcoin

In 2006, Hamas rose to power and Israel responded by halting all cash transfers to Gaza in hopes of deterring money laundering and Hamas military operations. In 2018, Hamas began a fundraising campaign to gather Bitcoin donations from abroad for its military wing, the Qassam Brigades, which have continued to this day.³⁰ The Qassam Brigades also engages in Bitcoin mining which alone brought in an additional \$195,000 worth of cryptocurrency this year.³¹

The PMA forbids institutional Bitcoin transactions.³² For this reason, Bitcoin dealers are now required to record the wallet address, amount, and full name and ID number of every client for each liquidation for police records.³³ To get around this, the Qassam Brigades website started featuring a Bitcoin tutorial and a wallet address generator to create a fresh account for each donation.³⁴ This technique is commonly seen with ransomware³⁵, which makes it more challenging for outside observers to monitor donations and trace where they are sent.³⁶

Unintended Positive Consequence

Although unintentional, the Qassam Brigades' fundraiser was exactly what brought the attention of regular Palestinian civilians to Bitcoin:

One Palestinian school-teacher stated: "Everybody was talking about 'what is Bitcoin' then," the teacher said about news in February when blockchain analytics firms identified a Coinbase account participating in a campaign that garnered \$4,000 ... Another Palestinian based in the United Arab Emirates is developing an Ethereum-based charity

27. Cuen, "In Palestine, Civilians Are Using Bitcoin More Than Hamas."

28. Leigh Cuen, "Palestinians Are Using Bitcoin to Transact Across Borders Amid Conflict," *CoinDesk*, September 21, 2018, <https://www.coindesk.com/crypto-gaza-west-bank-bitcoin-palestine>.

29. Cuen, "In Palestine, Civilians Are Using Bitcoin More Than Hamas."

30. Popper, "Terrorists Turn to Bitcoin for Funding, and They're Learning Fast."

31. Cuen, "In Palestine, Civilians Are Using Bitcoin More Than Hamas."

32. Cuen, "In Palestine, Civilians Are Using Bitcoin More Than Hamas."

33. Heidi Wilder, "Cracking the Code: Tracing the Bitcoins from a Hamas Terrorist Fundraising Campaign," *Elliptic*, April 26, 2019, <https://www.elliptic.co/our-thinking/tracing-bitcoin-terrorism>.

34. Wilder, "Cracking the Code: Tracing the Bitcoins from a Hamas Terrorist Fundraising Campaign."

35. Ransomware refers to a type of malware that threatens to publish the victim's data or perpetually block access to it unless a ransom is paid. The attacker creates two versions of the malware: one will target the IP address, and another will use a random address generator. See Javier Lopez, Roberto Setola, and Stephen D. Wolthusen, *Critical Infrastructure Protection: Advances in Critical Infrastructure Protection: Information Infrastructure Models, Analysis, and Defense* (Berlin New York: Springer, 2012), 221.

36. Wilder, "Cracking the Code: Tracing the Bitcoins from a Hamas Terrorist Fundraising Campaign."

platform with the intention to distribute crypto donations to schools in both Gaza and the West Bank.³⁷

These crypto charities aim to reduce the number of Palestinian children unable to afford a good education.

The Duality of Palestinian Cryptocurrency Use

Part cyberpunk black market, part terror-driven police state, Palestine has generated a truly unique Bitcoin ecosystem. On the one hand, the number of freelancers and business owners using Bitcoin is slowly growing due to the high demand for mobile financial services. According to the PMA, 77 percent of adults in the Palestinian territories are unbanked even though 2.6 million Palestinians have smartphones.³⁸ On the other hand, while the Qassam Brigades operations are confidential and not publicly related to the civilian Bitcoin ecosystem, Bitcoin dealers are now required to record the wallet address, amount and full name and ID number of every client for each liquidation for police records.³⁹ As Hamas continues to increase its use of Bitcoin, the Israeli state will continue to increase its security measures and surveillance of Palestinian capital flow.

7 Solution #2: The Digital Palestinian Pound

In 2017, Azzam Shawwa, the Governor of Palestine Monetary Authority (PMA), announced the intention to develop a cryptocurrency within the next five years: “That is something we would like to see; It will be called the Palestinian pound.”⁴⁰ As the PMA mulls over the idea of the Palestinian pound, it remains unclear how it would impact the Paris Protocol, but it is clear that it could provide Palestine with an option to forge its independence both in identity and on an economic level. To achieve that, the Palestinian pound must be a national decentralized cryptocurrency that would allow for fiscal autonomy from the Israeli authorities. The Palestinian pound can draw from two existing cases of national cryptocurrencies that originated from decolonial efforts: the Marshall Islands’ Sovereign (SOV) and the Oglala Lakota of the Pine Ridge Indian Reservation’s MazaCoin.

7.1 Case Study 1: The Marshall Islands

Since becoming an independent democratic nation in 1979, the Republic of the Marshall Islands has used the U.S. dollar as its main currency. However, in 2018, the Sovereign Currency Act allowed Marshall Islands banks to issue a digital decentralized currency as a legal tender.⁴¹ Since then, their national currency has been the Sovereign (SOV).⁴² There were three major requirements made by the Republic of the Marshall Islands in regard to adopting a cryptocurrency as a national currency: enforcing no financial infrastructural changes, fixed money supply growth, and a system that verifies users.

The Infrastructure Problem

Blockchain technology allows Palestine and the Marshall Islands to overcome similar issues surrounding a lack of infrastructure. Blockchain transactions do not require the state to have the resources to print and process money. The Marshall Islands faced difficulties installing and acquiring

37. Cuen, “In Palestine, Civilians Are Using Bitcoin More Than Hamas.”

38. Palestinian Money Authority, *Annual Report 2017* (Ramallah, Palestine, September 2017), <http://www.pma.ps/Portals/1/Users/002/02/2/Publications/English/Annual%20Reports/PMA%20Annual%20Reports/AR2017.pdf>.

39. Cuen, “In Palestine, Civilians Are Using Bitcoin More Than Hamas.”

40. Cuen, “In Palestine, Civilians Are Using Bitcoin More Than Hamas.”

41. Jepilpilin Ke Ejukaan, *Declaration and Issuance of the Sovereign Currency Act* (Republic of the Marshall Islands: Nitijela, February 26, 2018), https://rmiparliament.org/cms/images/LEGISLATION/PRINCIPAL/2018/2018-0053/DeclarationandIssuanceoftheSovereignCurrencyAct2018_1.pdf.

42. Ejukaan, *Declaration and Issuance of the Sovereign Currency Act*.

ATMs,⁴³ while Palestine encounters many power outages and does not have the capital needed to install numerous ATMs. The SOV demonstrates that a decentralized national cryptocurrency can make payments and remittances accessible to the average citizen even if the state is faced with many infrastructural challenges.

Purchasing Power Volatility Problem

A common concern with cryptocurrencies is purchasing-power volatility which makes them a poor store of value. However, the SOV has dealt with that issue by having the SOV supply grow at a sustainable 4% each year, following the “Milton Friedman’s K% Rule.”⁴⁴ Friedman’s K% Rule attributes inflation to an excess money supply generated by central banks, so by that logic he prescribes a monetary policy that enforces the central bank to increase the money supply by a constant percentage rate annually – regardless of the state of the economy.⁴⁵ However, as this is a decentralized cryptocurrency, the Bank of the Marshall Islands would not act as the central authority that would regulate and enforce Friedman’s K% rule. Rather, much like Bitcoin, SOV is created by the nodes of a peer-to-peer network.⁴⁶ The SOV algorithm defines, in advance, how the currency will be created and at what rate;⁴⁷ therefore, also coding in the constant 4% supply annual growth.

Security Risk Problem

As mentioned in the case of Bitcoin fundraising for Hamas’ Qassam Brigades, a cryptocurrency is so decentralized and untraceable that it becomes a great tool for money laundering and funding Hamas military operations. As Hamas continues to increase its use of Bitcoin, the Israeli Defense Force will continue to intensify its security measures and surveillance, which makes it harder for the average civilians to use cryptocurrencies. The SOV addressed this risk by having every individual using SOV identified by an approved verifier of their choice in part with their “Know Your Customer (KYC) procedure.”⁴⁸ The KYC procedure is still a work in progress, and it is only clear that users would be required to identify themselves on a blockchain network,⁴⁹ which is most likely done through an existing regulated banking system. Hence, the digital Palestinian pound would require the right balance of (a) secure methods to identify users that would safeguard it from becoming a tool for crimes and (b) privacy mechanisms without putting a lot of state resources into security measures. Although Palestine does not have a national currency, the state still has local bank branches and a central bank that would allow for the digital Palestinian pound to adopt the KYC procedure for themselves.

7.2 Case Study 2: MazaCoin

MazaCoin is a Bitcoin variant created to give the Oglala Lakota of the Pine Ridge Indian Reservation fiscal autonomy from the ‘settler government’ that is the United States.⁵⁰ In the past, the local Arizona government has taken action against the Oglala Lakota for running casinos on their

43. David Paul, “Why the Marshall Islands Is Issuing Its Own Cryptocurrency,” *CoinDesk*, September 4, 2019, <https://www.coindesk.com/why-the-marshall-islands-is-issuing-its-own-cryptocurrency>.

44. Ejukaan, *Declaration and Issuance of the Sovereign Currency Act*; Paul, “Why the Marshall Islands Is Issuing Its Own Cryptocurrency,” 5-7.

45. Milton Friedman and Anna Jacobson Schwartz, *A Monetary History of The United States, 1867-1960* (Princeton, NJ: Princeton University Press, 2008).

46. Rainer Böhme and Nicolas Christin, “Bitcoin: Economics, Technology, and Governance,” *Journal of Economic Perspectives* 29, no. 2 (2015): 213–38.

47. Böhme and Christin, “Bitcoin: Economics, Technology, and Governance.”

48. Ejukaan, *Declaration and Issuance of the Sovereign Currency Act*, 4.

49. Ejukaan, *Declaration and Issuance of the Sovereign Currency Act*, 6.

50. Cindy Tekobbe and John Carter McKnight, “Indigenous Cryptocurrency: Affective Capitalism and Rhetorics Of Sovereignty,” *First Monday* 21, no. 10 (2016).

land by freezing their accounts.⁵¹ The Oglala Lakota gain fiscal autonomy not only from eliminating the state's ability to freeze accounts and tamper with their lawful tax revenues but more so the history of "... state authorities [coercing] tribal compliance by threatening tribal assets."⁵² From the understanding of capital as power, a national cryptocurrency allows for subtle forms of rebellion by colonized groups and, in turn, creates spaces for national identities to form in the absence of an oppressing state force.

Weakness

A major foreseeable weakness for the Palestinian pound is the Palestinian economy's reliance on cash. Palestinian communities mostly revolve around local trust networks and physical assets such as cash because high unemployment and poverty rates create urgent daily needs. Moreover, while a decentralized cryptocurrency may be useful for cross-border and international transactions, it would be hard for the average citizen to use daily.

Currently, Israeli firms have strong incentives to work with Palestinians as they hold the same currency. Eighty percent of trade exchanges with Israel are in shekels as Israel does not usually accept transactions in any other currency,⁵³ therefore abandoning the NIS may cut some of those trade ties. Moreover, Palestinians rely on access to Israeli commercial ports to have direct commercial trade with neighbouring countries.⁵⁴ While fiscal autonomy sounds ideal, breaking ties with the shekel may lead to some major negative consequences for the Palestinian economy.

8 Solutions #3: The E-Shekel

This approach calls for the PMA to adopt a centralized national cryptocurrency that is valued against the NIS. As Palestinians turn to alternative currencies, the Palestinian economy has lost out on trade with Israel while Israel can no longer tax any economic activity that occurs with the use of alternative currencies by Palestinians. To mitigate these issues, Toffano and Yuan suggest "to set up a private permissioned distributed ledger jointly owned and supervised by the Bank of Israel and the Palestine Monetary Authority, where Israeli and Palestinian banks can exchange a digital representation of the shekel, the 'e-shekel'."⁵⁵ Senegal took a similar approach when the country introduced eCFA in 2016, a national centralized cryptocurrency association with eCurrency Mint Limited and Banque Regionale de Marches.⁵⁶ A centralized cryptocurrency can work to increase financial security measures, reduce the volatility of a cryptocurrency, and improve Israeli-Palestinian trade relations.

Security Risk Problem

Both militant Islamic organizations and Palestinian citizens have benefited from the invisible nature of unregulated cryptocurrencies in that it has shielded their fiscal activity from the State of Israel and their oppressive monetary policies. However, if the Israeli government is willing to give Palestinian citizens the same access to banking services as Israeli citizens to gain the ability to trace the fiscal activities of militant Islamic groups, a centralized national cryptocurrency would be the best way to go about it. With the e-shekel, the Bank of Israel can regulate and monitor financial

51. Tekobbe and McKnight, "Indigenous Cryptocurrency: Affective Capitalism and Rhetorics Of Sovereignty."

52. Tekobbe and McKnight, "Indigenous Cryptocurrency: Affective Capitalism and Rhetorics Of Sovereignty."

53. Abu Jahal, "Palestinian Authority Looks to Cryptocurrency to Scrap Shekel."

54. Sara Roy, "De-Development Revisited: Palestinian Economy and Society Since Oslo," *Journal of Palestine Studies* 28, no. 3 (1999): 65.

55. Toffano and Yuan, "E-Shekels Across Borders: A Distributed Ledger System to Settle Payments Between Israel And the West Bank," 5.

56. Baker McKenzie, "Blockchain and Cryptocurrency in Africa," Baker McKenzie, 2018, 16, https://www.bakermckenzie.com/-/media/files/insight/publications/2019/02/report_blockchainandcryptocurrencyreg_feb2019.pdf; Hanamika Singh, "'Show Me the Money': A Discussion of The Cryptocurrency Market and Its Potential Regulation in South Africa," *PhD diss* (University of KwaZulu-Nata), 2019,

activity more so than they can with cash, which is used for most transactions in Palestine today.

In spirit with the security measure already put in place by the PMA, Palestinian Authorities can avoid the previously mentioned issues caused by wallet generators by implementing a system in which each person has an 'identity wallet'. An identity wallet can be accessed by mobile phone and is associated with a cryptographic public key that functions as the person's ID number, and a private key that functions as their password and digital signature.⁵⁷ Similar to the case of Senegal, the CFA will act as:

... a high-security digital instrument that can be held in all mobile money and e-money wallets. It will secure universal liquidity, enable interoperability, and provide transparency to the entire digital ecosystem in WAEMU.⁵⁸

Therefore, having your national currency tied to your government-issued documentation and other personal information will act as a powerful security measure if implemented carefully. However, giving the State of Israel more surveillance power over fiscal activity in the Occupied Palestinian Territories may facilitate further oppression. The e-shekel must be implemented in collaboration with the PMA to ensure the right balance between information sharing and privacy protection for all citizens.

Purchasing Power Volatility Problem

The e-shekel overcomes the issue of volatility of the exchange rate for virtual-to-fiat by pegging the cryptocurrency to a stable fiat currency like the NIS. Every e-shekel would be backed 1:1 by shekel deposits either in Israel or in Palestine.⁵⁹ As the supply of money circulating in the banking system has not been altered and is backed by an existing stable currency, this system would prevent the cryptocurrency from hyperinflating.

Purchasing Power Volatility Problem

Unlike a decentralized national cryptocurrency, the e-shekel could work to increase trade between Israel and Palestine as it would streamline and secure the process of cross-border transactions. The e-shekel could further incentivize Israeli firms to trade with Palestinians as they would have a common currency.

9 Conclusion

Palestine has not had a national currency since 1951, so the state has used three other currencies instead: the USD, the JOD, and the NIS. The NIS is the currency Palestinians use on a day-to-day basis, however when Israeli cut ties with correspondent Palestinian banks it caused capital flow issues for many Palestinians. Cryptocurrencies have become the placeholder for NIS as the Israeli state can not regulate them, they do not have cross-border transaction fees, and have a quick processing time.

For these reasons, the Palestinian Monetary Authorities (PMA) has proposed adopting a national cryptocurrency. The best approach for Palestine would depend on how it wants to continue its relationship with Israel and whether or not they are ready to shift to a cashless economy. Given Netanyahu's scandals and Israel's multiple tied elections, Palestine's banking problems will not be addressed anytime soon. Until the Israeli and Palestinian states decide on long-term solutions, the demand for cryptocurrencies will likely continue to grow and act as a temporary placeholder for

57. Toffano and Yuan, "E-Shekels Across Borders: A Distributed Ledger System to Settle Payments Between Israel And the West Bank," 32.

58. Baker McKenzie, "Blockchain and Cryptocurrency in Africa," 16.

59. Toffano and Yuan, "E-Shekels Across Borders: A Distributed Ledger System to Settle Payments Between Israel And the West Bank," 17.

Palestine's national currency. Therefore, there must be more research conducted on cryptocurrencies in these unique environments.

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Beyond Consultation: Mitigating Barriers to Indigenous Inclusion and Agency in Renewable Energy Projects

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Abstract

Due to the growing concern for the detrimental impacts of carbon emissions, Canada has begun to focus on developing renewable energy (RE) projects to reduce emissions and minimize the use of finite resources in energy projects through naturally replenishing resources such as sunlight, wind, water, internal heat or plant matter. Similar to the negative impacts that carbon-producing energy projects often have on Indigenous communities, RE projects have the potential to infringe upon the rights of Indigenous communities and impose adverse environmental and social impacts on them. As more research and initiatives emerge on the impact of climate change and how development can be more sustainable, Canada has begun to focus on harnessing the energy of its renewable resources. Consequently, Canada employs several initiatives to encourage Indigenous inclusion in RE development. Provincial policies in this area also have the potential to mitigate the systemic barriers to Indigenous participation in RE. Through the analysis of Indigenous inclusion in RE projects in the Atlantic provinces and British Columbia, it is evident that policies that support Indigenous ownership and agency of renewable energy projects are more likely to result in career and educational opportunities for Indigenous peoples. Moreover, policies that recognize and respect Indigenous land rights offer a potential avenue for Indigenous self-determination.

1 Introduction

Due to the growing concern for the detrimental impacts of carbon emissions, Canada has begun to focus on developing renewable energy (RE) projects to reduce emissions and minimize the use of finite resources in energy projects.¹ Reliance on the oil and gas industry for energy production can be destructive not only to the environment but to the surrounding Indigenous communities.² The energy production industry perpetuates the systemic marginalization that Indigenous Peoples experience in Canada.³ While RE projects provide the potential for reducing Canada's carbon footprint, there is also the risk that these projects, without proper Indigenous inclusion and consultation, will adversely impact Indigenous communities, thus, bolstering pervasive systemic inequalities. An analysis of the relevant literature on Indigenous inclusion and provincial policies in the Atlantic provinces and British Columbia indicate that policies that focus on eliminating the barriers to own and manage renewable energy projects are most beneficial to the economic and social well-being of the community. Furthermore, rather than policies that simply encourage consultation and inclusion, policies that support and increase Indigenous ownership of renewable energy projects are more likely to result in jobs and educational opportunities for

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1. Environment and Climate Change Canada, "Pan-Canadian Framework on Clean Growth and Climate Change: Canada's plan to address climate change and grow the economy," (Gatineau, Quebec), 2016, 3.
 2. Jen Preston, "Neoliberal settler colonialism, Canada and the tar sands," *Race & Class* 55, no. 2 (2013): 43.
 3. Joel Krupa, Lindsay Galbraith, and Sarah Burch, "Participatory and multi-level governance: applications to Aboriginal renewable energy projects," *Local Environment* 20, no. 1 (2015): 82.

Indigenous peoples as well as a potential avenue for Indigenous self-determination. It is evident that as renewable energy projects become more prominent in Canada, the expansion of the RE industry provides an opportunity for policymakers to make strides towards mitigating the pervasive economic and social inequality for Indigenous peoples in Canada.

2 Background

2.1 Renewable Energy and Climate Change

In 2011, the Intergovernmental Panel on Climate Change (IPCC) outlined in its *Special Report on Renewable Energy Sources and Climate Change Mitigation*, that greenhouse gas emissions from energy production contribute significantly to the growing threat of climate change.⁴ Moreover, this IPCC Report indicates that RE production emits significantly less carbon and can be used as a tool to mitigate climate change.⁵ The term “renewable energy” refers to energy derived from naturally replenishing resources such as sunlight, wind, water, internal heat or plant matter that can be used for electricity, heat and transportation.⁶ More recently, the IPCC reports that in order to mitigate the harmful effects of climate change due to rapid global warming, the global net human-caused carbon emissions needs to be reduced by 45% from 2010 levels by 2030 and it would need to be further reduced to ‘net zero’ by 2050.⁷ Therefore, in order to reduce the rate of global warming in time to mitigate its detrimental effects, the IPCC asserts that the shift towards renewable energy must occur more rapidly.⁸ Similarly, the *United Nations’ Sustainable Development Goals* push for the development and transition toward renewable energy that is efficient, universal and affordable by 2030.⁹

However, it is important to note that while there is a clear shift towards renewable energy production and that there is the potential to reduce carbon emissions with this shift, RE projects present their own set of environmental risks and adverse impacts. For instance, as the RE sector continues to grow, demand for hard-rock and mineral mining increases to produce RE projects such as aluminum for wind turbines.¹⁰ As a result, the construction of RE projects presents its own set of environmental challenges and cannot be considered a solution to climate change on its own. In turn, policies regarding the development of RE projects must consider the ramifications of the expansion of this industry on surrounding communities.

2.2 Renewable Energy and Climate Policy in Canada

As more research and initiatives emerge on the impact of climate change and how development can be more sustainable, Canada has also begun to focus on harnessing the energy of its renewable resources. The 2016 *Pan Canadian Framework on Clean Growth and Climate Change* states that the Canadian government is prioritizing the investment and development of renewable energy.¹¹ In 2019, Clean Energy Growth Canada reports that the renewable energy sector comprises \$22.1

4. Intergovernmental Panel on Climate Change, “Renewable Energy Sources and Climate Change Mitigation,” 2011, 164.

5. Intergovernmental Panel on Climate Change, “Renewable Energy Sources and Climate Change Mitigation,” 174.

6. Sarah Bale and Judith Lipp, “Growing Indigenous Power: A Review of Indigenous Involvement & Resources to Further Renewable Energy Development Across Canada,” *TREC Renewable Energy Co-op*, 2018, 3.

7. Intergovernmental Panel on Climate Change, “Global Warming of 1.5° C: An IPCC Special Report on the Impacts of Global Warming of 1.5° C Above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty,” 2018, 95.

8. Intergovernmental Panel on Climate Change, “Global Warming of 1.5° C: An IPCC Special Report on the Impacts of Global Warming of 1.5° C Above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty,” 98.

9. UN (United Nations), “Global Sustainable development Report, 2015 Edition,” 2015, 23.

10. The University of Technology, Sydney, “New research exposes extent of mineral demand for renewable energy Technologies,” April 2019,

11. Environment and Climate Change Canada, “Pan-Canadian Framework on Clean Growth and Climate Change: Canada’s plan to address climate change and grow the economy,” 3.

billion of Canada's GDP in 2017 with an annual growth rate of 4.5% from 2010 to 2017.¹² Moreover, in Clean Energy Growth Canada's 2019 study, it is reported that the average annual investment in this industry was \$8.7 billion from 2010 to 2017.¹³ As renewable energy continues to be a priority for the Canadian government as a means to mitigate carbon emissions, there is a need for the construction and development of RE projects in remote locations that currently rely on diesel for energy, thus directly impacting the remote and often Indigenous surrounding communities.¹⁴

2.3 Systemic Inequalities for Indigenous Peoples in Canada

Due to the Canadian government's detrimental history of colonialism and exploitation, Indigenous peoples have repeatedly been the victim of harmful systemic injustices. Throughout its history, not only has the Canadian government exploited land and resources, but it has also established institutions that work to culturally assimilate, eradicate and marginalize Indigenous communities through the Residential School system and the *Indian Act*.¹⁵ The contemporary colonization of Indigenous peoples in Canada is often described as an ongoing process that occurs within Canadian systems and institutions.¹⁶ Studies have shown that the institutions in place have resulted in prominent disparities between life expectancy rates, educational advancement, and healthcare between the Indigenous population and the settler population of Canada.¹⁷ Moreover, this exploitation has been evident in the energy sector with the oil and gas industry often disregarding the rights of Indigenous Peoples and imposing its environmentally exploitative agenda onto Indigenous lands.¹⁸

To address this issue, Canada has shown an interest in establishing standards to protect the rights of Indigenous peoples and there has been a discussion of reconciliation through measures such as the Truth and Reconciliation Commission's *Calls to Action*.¹⁹ Climate change reports from the IPCC and the UN Sustainable Development Goals emphasize the importance of protecting the rights of Indigenous Peoples in developing climate change mitigation policy.²⁰ Although the federal government has the constitutional "duty to consult" Indigenous Peoples on policy that impacts their lands and communities, Canada's energy industry continues to disregard the needs and ramifications of energy developments on Indigenous Peoples.²¹ With the development and expansion of the RE sector in Canada, there is the danger of repeating history and perpetuating systemic inequalities. Although the expansion of the renewable energy sector offers an opportunity for change in structural processes, if it is not implemented in a manner that is inclusive and protects the autonomy of Indigenous communities, it could become just as oppressive as the oil and gas industry has proven to be in numerous cases.²²

2.4 Impact of RE Projects on Indigenous Communities

Similar to the negative impacts that carbon-producing energy projects often have on Indige-

12. Navius Research, *Quantifying Canada's Clean Energy Economy: An assessment of clean energy investment, value added and jobs* (2019), v.

13. Navius Research, *Quantifying Canada's Clean Energy Economy: An assessment of clean energy investment, value added and jobs*, v.

14. Jen Nathwani, "Clean energy can advance Indigenous reconciliation," *The Conversation*, October 25, 2017, <https://theconversation.com/clean-energy-can-advance-indigenous-reconciliation-83343>.

15. Krupa, Galbraith, and Burch, "Participatory and multi-level governance: applications to Aboriginal renewable energy projects," 82.

16. Preston, "Neoliberal settler colonialism, Canada and the tar sands," 43.

17. Krupa, Galbraith, and Burch, "Participatory and multi-level governance: applications to Aboriginal renewable energy projects," 83.

18. Preston, "Neoliberal settler colonialism, Canada and the tar sands," 43.

19. Truth and Reconciliation Commission of Canada, "Truth and Reconciliation Commission of Canada: Calls to Action," 2015,

20. A SHARED FUTURE Research Team, "Decolonizing Clean Energy Policy In Canada?," *The Yellowhead Institute*, 2019,

21. Dwight Newman, Michelle Biddulph, and Lorelle Binnion, "Arctic energy development and best practices on consultation with indigenous peoples," *BU Int'l LJ* 32 (2014): 471.

22. A SHARED FUTURE Research Team, "Decolonizing Clean Energy Policy In Canada?"

nous communities, RE projects have the potential to have adverse impacts. RE projects are often developed in remote areas where communities are off the power grid and rely on diesel for energy. Two-thirds of these communities are Indigenous.²³ As a result, Indigenous communities are particularly vulnerable to the potential ramifications of RE developments such as the increasing demand for land and water use, altered landscapes or noise pollution.²⁴ Despite recent movements towards protecting the rights of Indigenous Peoples, the practices of RE project development often do not align with these initiatives. Indigenous participation is legally enforced through land claims agreements in the North and the constitutional “duty to consult” or the obligation for the Canadian government to fulfill when acting in a manner that could affect the rights of Indigenous peoples.²⁵ While policies have been implemented to prevent energy producers from infringing on Indigenous rights, they are often ineffective and “tokenistic” or a means to appear inclusive.²⁶ The most common tactic in energy projects is for the dominant actors to practice “top-down forms of governance” that marginalize affected Indigenous peoples.²⁷ Moreover, large corporations and governments often fail to consult Indigenous peoples for contributions to policy development and program implementation.²⁸ Rather, consultation is often in the late stages and just to fulfill procedural regulations and validate policies and programs already underway.²⁹ In addition, Samson notes that while Indigenous peoples often benefit from employment opportunities in the construction of RE projects, once the land has been appropriated, the Indigenous populations are rarely considered.³⁰ Therefore, Indigenous inclusion policies in RE development should extend beyond consultation and work towards mitigating barriers to Indigenous RE ownership and protect the autonomy of Indigenous peoples.

2.5 Political Challenges

A prominent barrier to the implementation of Indigenous inclusion and consultation policies in RE projects is the variance in political ideologies between administrations. In many cases, governments prioritize economic prosperity or political strategy over Indigenous reconciliation or even sustainable development. For instance, in 2018, Premier Ford of Ontario cancelled 758 renewable energy projects to fulfill a campaign promise to reduce the cost of hydroelectricity for consumers which impacted the communities and First Nations that benefited from the jobs.³¹ Similarly, in 2007, the Harper government opted not to sign the United Nations *Declaration on the Rights of Indigenous Peoples* as it could hinder the development of pipelines due to its stipulation that development can only occur with free, prior and informed consent from Indigenous communities.³² Neoliberal ideologies that value the free-market and the elimination of government intervention in economic processes are prominent in Canadian politics and impacts social and environmental policy.³³ This can especially become a concern during politically right-leaning administrations as

23. Nathwani, “Clean energy can advance Indigenous reconciliation.”

24. Krupa, Galbraith, and Burch, “Participatory and multi-level governance: applications to Aboriginal renewable energy projects,” 84.

25. Newman, Biddulph, and Binnion, “Arctic energy development and best practices on consultation with indigenous peoples,” 471.

26. A SHARED FUTURE Research Team, “Decolonizing Clean Energy Policy In Canada?”

27. Krupa, Galbraith, and Burch, “Participatory and multi-level governance: applications to Aboriginal renewable energy projects,” 84.

28. Krupa, Galbraith, and Burch, “Participatory and multi-level governance: applications to Aboriginal renewable energy projects,” 84.

29. A SHARED FUTURE Research Team, “Decolonizing Clean Energy Policy In Canada?”

30. Colin Samson, “The Idea of Progress, Industrialization, and the Replacement of Indigenous Peoples: The Muskrat Falls Megadam Boondoggle,” *Social Justice* 44, no. 4 (150 2017): 8.

31. The Canadian Press, “Ontario government cancels 758 renewable energy contracts, says it will save millions,” *CBC News*, July 13, 2018, <https://www.cbc.ca/news/canada/toronto/758-renewable-energy-cancelled-1.4746293>.

32. Maham Abedi, “Why a UN declaration on Indigenous rights has struggled to become Canadian law,” *Global News*, November 2, 2019, <https://globalnews.ca/news/6101723/undrip-indigenous-relations-canada/>; The Canadian Press, “Ontario government cancels 758 renewable energy contracts, says it will save millions.”

33. James Patrick Nugent, “Changing the climate: Eco Liberalism, green new dealism, and the struggle over green jobs in

public support for Indigenous rights movements is driven primarily from the political left.³⁴ Overall, implementing reconciliatory policies that mitigate barriers to Indigenous ownership and inclusion in RE projects can be costly and governments driven by neoliberal ideologies are unlikely to invest in such measures.³⁵

2.6 Diversity of First Nations

Developing policies for reducing barriers to Indigenous ownership and agency in the development of renewable energy projects is further complicated by the diversity of values and priorities of different Indigenous communities. While projects in oil and gas energy present environmental and Indigenous rights infringement risks, there are several examples of First Nations who want ownership and involvement in pipelines and other projects. For example, organizations such as the Iron Coalition work to ensure that all Indigenous communities have the opportunity to own parts of the Trans-Mountain pipeline to establish autonomy over such exploitative but profitable developments.³⁶ Similarly, while there are Indigenous communities on both sides of pipeline debates, this can be the case for RE projects as well. Given the aforementioned potential negative environmental impacts of renewable energy projects, it is likely that some Indigenous communities will be opposed to this type of development on their land or to different processes and procedures involved in the process. In addition, some might support RE projects but are reluctant to disrupt their lifestyles and homeland to pursue it.³⁷ This diversity of Indigenous peoples is important to consider when developing policies on renewable energy projects that do not infringe on Indigenous rights. Rather than a one-size-fits-all approach to consultation and inclusion processes, policies that diminish barriers to ownership of RE projects allow for Indigenous autonomy over development on Indigenous land and respect Indigenous rights are likely to be more beneficial.³⁸

2.7 Canada's Current Policies for Indigenous-Owned Green Energy Projects

The Canadian federal government employs several policies to promote Indigenous inclusion in the development of RE projects. For instance, from 2011 to 2016, the federal government implemented its ecoENERGY program that allows Indigenous communities to apply for funding to develop RE projects.³⁹ In 2017, the Canadian government established the Northern Responsible Energy Approach for Community Heat and Electricity Program (Northern REACHE) which also allows Indigenous communities in Northern territories to apply for funding for renewable energy projects. This fund offered \$10.7 million over two years and then in 2018, \$53.5 million over ten years.⁴⁰ In addition, the Canadian government offers the 20/20 Catalysts Program that accepts 20 participants a year to match Indigenous peoples with non-Indigenous mentors to learn about clean technology.⁴¹

2.8 Barriers to Indigenous Ownership of Green Energy Projects

While there is an effort to facilitate Indigenous inclusion, it is evident that the Canadian gov-

Canada," *Labor Studies Journal* 36, no. 1 (2011): 60.

34. Gregory Lowan-Trudeau, "Indigenous environmental education: the case of renewable energy projects," *Educational Studies* 53, no. 6 (2017): 602.

35. Nugent, "Changing the climate: Eco Liberalism, green new dealism, and the struggle over green jobs in Canada," 60.

36. Dan Healing, "Indigenous group from Alberta adds rival bid for Trans Mountain pipeline," *Global News*, June 5, 2019.

37. Lowan-Trudeau, "Indigenous environmental education: the case of renewable energy projects," 604.

38. Bale and Lipp, "Growing Indigenous Power: A Review of Indigenous Involvement & Resources to Further Renewable Energy Development Across Canada," 92.

39. Government of Canada, "Clean technology, innovation and jobs," 2016, <https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework/clean-technology-innovation-jobs.html>.

40. Government of Canada, "Northern REACHE Program," 2019, <https://www.aadnc-aandc.gc.ca/eng/1481305379258/1481305405115>.

41. Government of Canada, "Clean technology, innovation and jobs."

ernment's policies are insufficient in mitigating the systemic barriers for Indigenous ownership of RE projects. For instance, while there is some funding available to support these projects from the federal government, one of the primary barriers to Indigenous inclusion from ownership of their local RE projects is the systemic barriers that prevent Indigenous peoples from attaining capital and loans to purchase major projects.⁴² Due to systemic inequalities, remote Indigenous communities often have difficulty securing financing as there is often the struggle to fulfill basic needs so they are unable to prioritize a high-cost revenue-generating project.⁴³ Similarly, due to a lack of access, Indigenous communities struggle to have the knowledge and experience or the "capacity" to facilitate large-scale RE projects.⁴⁴ For instance, remote Indigenous communities have little access to educational programming on the technical development and management of large infrastructure projects.⁴⁵ Even in the preliminary stages, due to lack of access to this education, Indigenous communities have difficulty with submitting the complex application necessary to develop the project as well as with negotiations with large corporations that want to partner on the project. Overall, the systemic issues that Indigenous communities face create barriers to ownership and equitable participation in RE projects as many are faced with ongoing issues with clean drinking water, housing, safety and mental health.⁴⁶ These issues stem from systemic inequalities that ultimately, prevent Indigenous peoples from owning the RE projects on their land or in their community.

3 Provincial Policy on Indigenous Participation in Renewable Energy Projects

In the TREC's report entitled *Growing Indigenous Power: A Review of Indigenous Involvement and Resources to Further Renewable Energy Development Across Canada*, Lipp and Bale demonstrate in their evaluation of 57 RE programs across Canada that there is a great deal of variation in provincial policies on Indigenous participation in RE development. While the federal government has policies in place to address this issue, the policies of provincial governments play a significant role in encouraging Indigenous inclusion in RE development. This is particularly evident in the case of the Atlantic Provinces as these provinces do not employ funding initiatives for Indigenous communities developing RE projects.⁴⁷ Nova Scotia has established two current capacity-building programs to promote knowledge-sharing and education as well as a recently discontinued Community Feed-in Tariff (ComFIT) Program, a RE community financing program, which has enabled Mi'kmaw participation in seven RE development projects.⁴⁸ However, Newfoundland and Labrador, Prince Edward Island and New Brunswick lack any policies to mitigate the financial and capacity barriers to Indigenous ownership and inclusion in RE projects.⁴⁹ Therefore, RE projects and development in Atlantic provinces must rely on potential funding from the federal government in order to gain partnerships in RE projects. In 2017, there were 152 medium or large renewable energy projects with Indigenous involvement and out of the eight in Atlantic Canada, only two, located in Nova Scotia, have a First Nation listed as a partner.⁵⁰ This indicates that while RE projects are legally required

42. Joel Krupa, "Identifying barriers to aboriginal renewable energy deployment in Canada," *Energy Policy* 42 (2012): 712.

43. Krupa, "Identifying barriers to aboriginal renewable energy deployment in Canada," 712.

44. Bale and Lipp, "Growing Indigenous Power: A Review of Indigenous Involvement & Resources to Further Renewable Energy Development Across Canada," v.

45. Bale and Lipp, "Growing Indigenous Power: A Review of Indigenous Involvement & Resources to Further Renewable Energy Development Across Canada," v.

46. Bale and Lipp, "Growing Indigenous Power: A Review of Indigenous Involvement & Resources to Further Renewable Energy Development Across Canada," 39-42.

47. Bale and Lipp, "Growing Indigenous Power: A Review of Indigenous Involvement & Resources to Further Renewable Energy Development Across Canada," 23.

48. Government of Nova Scotia, "Report on the Review of the Community Feed-In-Tariff Program," 2014, v, https://energy.novascotia.ca/sites/default/files/A_comfit_review_report_march_2014.pdf.

49. Bale and Lipp, "Growing Indigenous Power: A Review of Indigenous Involvement & Resources to Further Renewable Energy Development Across Canada," 23.

50. Margo McDiarmind, "Indigenous communities embracing clean energy, creating thousands of jobs," *CBC News*, October 11, 2017, <https://www.cbc.ca/news/politics/first-nations-renewable-energy-projects-1.4348595>.

to consult Indigenous communities, policies that mitigate the barriers to Indigenous ownership not only through capacity-building, but also through financial support as it is crucial to increasing Indigenous ownership of RE projects.

British Columbia's provincial government offers a more effective approach to ensuring Indigenous inclusion and ownership in RE projects. For instance the BC government addresses Indigenous barriers to financing RE projects with the Clean Energy Act and First Nations Clean Energy Business Fund (FNCEBF) as well as the Northern Development Initiative Trust and the British Columbia Indigenous Clean Energy Initiative (BCICEI).⁵¹ As of January 2017, over 100 communities have received almost \$8.7 million in funding through this initiative.⁵² Moreover, by 2019, 43 projects have been established as a result of BCICEI.⁵³ In addition, BC employs the BC First Nations Clean Energy Toolkit and the First Nations Clean Energy Working Group to help provide educational opportunities and guidance in the development of RE projects.⁵⁴ Both Quebec and Ontario employ similar policies as BC to build the finances and capacity of Indigenous communities. It is evident that these initiatives in British Columbia, Ontario and Quebec are an effective means of increasing Indigenous ownership as 86% of all Indigenous RE projects are being built in these regions.⁵⁵ This suggests that policies that work to decrease barriers to capacity and financing to Indigenous ownership of RE projects ultimately lead to more Indigenous ownership of RE projects and potentially more job opportunities. Overall, it is evident that jurisdictions that work to remove both capacity and financial barriers to Indigenous inclusion and agency in RE development are successful in producing more Indigenous-led RE projects.

4 Policy Recommendations

It is evident that policies that mitigate the financial and capacity barriers, perpetuated by systemic inequality, are most effective at ensuring Indigenous inclusion in renewable energy projects. For example, as demonstrated in British Columbia, policies that provide both educational opportunities and financing are able to ensure Indigenous inclusion and influence. Although corporations and other institutions are legally required to consult local Indigenous communities, they benefit more from ownership as a means of creating jobs, reducing social inequality and maintaining self-determination.⁵⁶ Moreover, in a study conducted by Krupa, Galbraith and Burch, in order for RE to be beneficial to Indigenous communities, they must have authority in decision-making from the start of the design process and that sustainable renewable energy development incentivizes Indigenous ownership.⁵⁷

Specific policies that are beneficial to mitigating barriers to Indigenous ownership of RE projects include programs that work to increase the accessibility of education and apprenticeships on the technology, business and operations of RE development. These programs help Indigenous communities increase their capacity to engage in RE development opportunities and attain the knowledge necessary for sustainable operations and to have applications approved. More importantly, policies that fund Indigenous-led and owned RE projects are crucial to eliminating financial

51. Bale and Lipp, "Growing Indigenous Power: A Review of Indigenous Involvement & Resources to Further Renewable Energy Development Across Canada," 19.

52. Bale and Lipp, "Growing Indigenous Power: A Review of Indigenous Involvement & Resources to Further Renewable Energy Development Across Canada," 18.

53. Judith Sayers, "A Response To 'Decolonizing Clean Energy?': The Case Of The BC Indigenous Clean Energy Initiative," *Yellowhead Institute*, November 2019, <https://yellowheadinstitute.org/2019/11/05/a-response-to-decolonizing-clean-energy-the-case-of-the-bc-indigenous-clean-energy-initiative/>.

54. Bale and Lipp, "Growing Indigenous Power: A Review of Indigenous Involvement & Resources to Further Renewable Energy Development Across Canada," 18.

55. McDiarmind, "Indigenous communities embracing clean energy, creating thousands of jobs."

56. Bale and Lipp, "Growing Indigenous Power: A Review of Indigenous Involvement & Resources to Further Renewable Energy Development Across Canada," 8-10.

57. Krupa, Galbraith, and Burch, "Participatory and multi-level governance: applications to Aboriginal renewable energy projects," 81.

barriers to ownership in a market dominated by large corporations.⁵⁸ Although these programs often require a great deal of time and money to implement, the potential economic growth and energy sovereignty has the potential to offer potential long-term benefits for Indigenous communities that will be less costly to governments in the long run.⁵⁹

Indigenous ownership of RE projects is beneficial to the economic and social well-being of the community as well as a means to move towards Indigenous self-determination. These economic benefits stem from the revenues that Indigenous peoples can generate from the sale of the energy as well as in the numerous jobs that these projects offer their community.⁶⁰ In addition, ownership creates the capacity for Indigenous peoples to have the experience to utilize the skills they attain in these projects for other community initiatives.⁶¹ As a result, these benefits have the potential to reduce the disproportionate poverty that exists within Indigenous communities across Canada as a result of systemic inequalities.⁶² Indigenous ownership of RE projects increases the autonomy or self-determination that Indigenous peoples have over their land and community as ownership ensures that there is Indigenous input and decision-making at each step of the process.⁶³ Overall, Indigenous ownership of RE projects provides an opportunity to determine what developments occur, when and how, while also ensuring that the benefits are channeled into the community. Implementing policies that require not only Indigenous consultation for projects but agency, ownership and autonomy in energy developments on First Nations' lands are crucial during Canada's shift towards renewable energy as it provides an opportunity for autonomous economic development.

5 RE Policy and Protecting Indigenous Rights

As Canada fulfills its obligations to prioritize the development of renewable energy, it is crucial that it moves beyond policies that ensure Indigenous consultations and towards policies that recognize Indigenous land rights. While the evidence suggests that policies in RE project development that eliminate the capacity and financial barriers that Indigenous communities face in attaining ownership of energy projects on their land, it is important that these policies are developed with acknowledgment of Indigenous rights under the Truth and Reconciliation Commission (TRC) of Canada as well as the tenets of the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) including the right to free, prior and informed consent.⁶⁴ Canada's current legal standards regarding the "duty to consult" Indigenous stakeholders are vague and often fail to respect Indigenous land rights and the right to free, prior or informed consent.⁶⁵ Moreover, according to research conducted by the Yellowhead Institute that builds off of the TREC's report by Lipp and Bale by reviewing the 57 projects outlined in the report to determine how many include mention of Indigenous peoples, their rights or Indigenous consultation, only 37 mentioned Indigenous peoples and only 10 discussed Indigenous consultation processes.⁶⁶ Therefore, it is clear that more recognition of Indigenous peoples and their inherent right to their lands is needed moving forward as it requires an approach that prioritizes Indigenous decision-making. Without rights recognition throughout the policy-

58. Krupa, "Identifying barriers to aboriginal renewable energy deployment in Canada," 713.

59. Lowan-Trudeau, "Indigenous environmental education: the case of renewable energy projects," 608.

60. Bale and Lipp, "Growing Indigenous Power: A Review of Indigenous Involvement & Resources to Further Renewable Energy Development Across Canada," 8.

61. Krupa, Galbraith, and Burch, "Participatory and multi-level governance: applications to Aboriginal renewable energy projects," 95.

62. Bale and Lipp, "Growing Indigenous Power: A Review of Indigenous Involvement & Resources to Further Renewable Energy Development Across Canada," 9.

63. Krupa, Galbraith, and Burch, "Participatory and multi-level governance: applications to Aboriginal renewable energy projects," 81.

64. UN (United Nations), "United Nations Declaration on the Rights of Indigenous Peoples," 2007, 23.

65. Derek Inman, Stefaan Smis, and Dorothee Cambou, "We will remain idle No more: The shortcomings of Canada's duty to consult Indigenous peoples," *Goettingen J. Int'l L.* 5 (2013): 253.

66. A SHARED FUTURE Research Team, "Decolonizing Clean Energy Policy In Canada?"

making process, Canada's RE development is destined to fall into the same exploitative and rights infringement patterns towards Indigenous peoples and their land that it has throughout its history.

6 Conclusion

The expansion of the renewable energy sector in Canada provides an opportunity to improve the economic and social well-being of Indigenous communities while also increasing their autonomy over their land. Indigenous peoples are the victims of systemic marginalization due to colonial institutions that continue to permeate Canadian society.⁶⁷ In the past, energy developments have been a large contributor to the problem as there was often little consultation and significant environmental risks that were imposed on Indigenous communities by colonial governments and energy production companies.⁶⁸ However, it is evident that policies that not only ensure Indigenous participation but eliminate barriers to ownership and ensure Indigenous agency in RE projects result in more ownership of projects as well as provide several economic and social benefits. More importantly, as Canada moves towards and further develops renewable energy, the federal and provincial governments should use this opportunity to encourage Indigenous-led and owned projects while respecting the autonomy of First Nations and their land rights throughout this process. Going forward, more research is required that is led by or in collaboration with Indigenous peoples to determine how to design and implement policies that both mitigate barriers to Indigenous ownership, while increasing agency and inclusion in RE projects and protecting Indigenous rights under UNDRIP.

67. Preston, "Neoliberal settler colonialism, Canada and the tar sands," 44.

68. Krupa, Galbraith, and Burch, "Participatory and multi-level governance: applications to Aboriginal renewable energy projects," 82.

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The Intelligent Border: Implications of Using Artificial Intelligence in Canadian Immigration Processes on Discrimination and Racism in Canada

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Abstract

In 2017, the Canadian government launched the Pan-Canadian Artificial Intelligence Strategy, announcing a C\$125 million investment in artificial intelligence (AI) research and talent, making Canada the first country to release a national AI strategy. The following year, the Canadian government began experimenting with the use of algorithms and AI in decision-making related to Canada's immigration and refugee system. The Canadian government must take caution in implementing AI in its immigration processes as algorithms and statistical analyses are not objective and can perpetuate and continue racism and discrimination. Because certain categories of AI can mimic or entirely replace human decision-making, it is important to first acknowledge and address systemic racism and discrimination in the immigration system prior to implementing mathematical algorithms and statistical analyses in its operation.

1 Introduction

In 2017, the Canadian federal government adopted a multi-year plan to grow annual immigration levels to 340,000 by 2020.¹ That same year, the government launched the Pan-Canadian Artificial Intelligence Strategy, announcing a C\$125 million investment in artificial intelligence research and talent, making Canada the first country to release a national artificial intelligence strategy.² In 2018, the University of Toronto's International Human Rights Program and the Citizen Lab at the Munk School of Global Affairs and Public Policy released a report indicating that the Government of Canada has been experimenting with the use of algorithms and artificial intelligence in decision-making related to Canada's immigration and refugee system.³ In this paper, I argue that the Canadian government must be wary in implementing artificial intelligence in its immigration processes as mathematical algorithms and statistical analyses are not objective and can perpetuate and continue "the legacy of discriminations past and the reality of discriminations present."⁴

This paper explores the implications of using artificial intelligence in Canadian immigration processes on discrimination and racism in Canada. In Part I, I examine artificial intelligence and

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1. Minister of Immigration, Refugees and Citizenship Canada, *Notice – Supplementary Information 2018-2020 Immigration Levels Plan* (Ottawa, 2018), <https://www.canada.ca/en/immigration-refugees-citizenship/news/notices/supplementary-immigration-levels-2018.html>.

2. Canadian Institute for Advanced Research, "CIFAR Pan-Canadian Artificial Intelligence Strategy," Canadian Institute for Advanced Research, <https://www.cifar.ca/ai/pan-canadian-artificial-intelligence-strategy>.

3. Petra Molnar and Lex Gill, "Bots at the Gate: A Human Rights Analysis of Automated Decision-Making in Canada's Immigration and Refugee System," September 2018, <https://ihrp.law.utoronto.ca/sites/default/files/media/IHRP-Automated-Systems-Report-Web.pdf>.

4. Anupam Chander, "The Racist Algorithm?," *The Michigan Law Review* 115 (6 2017): 1025, <http://repository.law.umich.edu/mlr/vol115/iss6/13>.

machine learning processes to define and explain the scope of the technology that can be implemented in immigration processes. In particular, I consider the use of machine learning systems that can mimic or entirely replace human decision-making. Specifically, I look closely at the sub-categories of artificial intelligence: machine learning, predictive analytics and deep learning. In Part II, I examine Canadian immigration and socio-ethnic trends. Namely, I consider where most of Canada's immigrants come from and the migratory paths they take. I address the nexus between discrimination and immigrant identities, with the understanding that identity is fluid, subjective and intersectional. In Part III, I consider how artificial intelligence has been and can be used to discriminate against targeted groups, adopting Margaret Hu's concept of "Algorithmic Jim Crow," to exemplify how mathematical algorithms and statistical analyses are not objective, and instead have the potential to perpetuate and continue "the legacy of discriminations past and the reality of discriminations present."⁵

2 Part I: Artificial Intelligence and Machine Learning Processes

To understand how artificial intelligence and machine learning can and are being implemented in immigration processes, it is imperative to first understand what exactly artificial intelligence and machine learning entail. Artificial intelligence is a concept that has existed in the field of computer science since the 1950s.⁶ The concept refers to "machine-based operations that mimic human intelligence."⁷ Accordingly, machine learning is a subfield of artificial intelligence that involves areas of mathematics, statistics and computer science used to acquire knowledge, and therefore, make predictions effectively.⁸

Notably, for artificial intelligence, and particularly machine learning, to be effective, the computer must be assigned a task to do or problem to solve – this is how machines "learn." An algorithm, or a mathematical model, trains the machine to do a certain thing a certain way. As such, a four-step process is generally accepted in the use of machine learning and algorithmic problem solving: 1) Assign the computer a task; 2) Provide an algorithm or method to complete a task or solve a problem; 3) Provide performance measures for the computer to evaluate performance; finally, 4) The computer, through experience, becomes better at solving the problem. This fourth and final step is a method of reinforcement achieved through the repetition of an algorithm.

Several different algorithms allow machines to learn in various ways. Machine learning can be divided into four categories: supervised learning, unsupervised learning, semi-supervised learning and reinforcement machine learning.⁹ Most straightforward tasks fit the category of supervised machine learning, where an individual first submits a "training dataset," which includes an input variable and an output variable. These variables are then used alongside an algorithm to map the path from the input to the output. This method allows the machine to learn from the training dataset so that when there is new input data, the machine can predict the output variable.¹⁰ This function can be demonstrated by the following equation:

$$Y = f(X) \tag{1}$$

5. Chander, "The Racist Algorithm?," 1025.

6. Nicholas Schmidt and Bryce Stephens, "An Introduction to Artificial Intelligence and Solutions to the Problems of Algorithmic Discrimination," November 8, 2019, 133, <https://arxiv.org/abs/1911.05755>.

7. Schmidt and Stephens, "An Introduction to Artificial Intelligence and Solutions to the Problems of Algorithmic Discrimination," 133.

8. Schmidt and Stephens, "An Introduction to Artificial Intelligence and Solutions to the Problems of Algorithmic Discrimination," 133.

9. Audrey Lorberfield, "Machine Learning Algorithms in Layman's Terms, Part 1," *Towards Data Science*, March 1, 2019, <https://towardsdatascience.com/machine-learning-algorithms-in-laymans-terms-part-1-d0368d769a7b>.

10. Jason Brownlee, "Supervised and Unsupervised Machine Learning Algorithms," March 16, 2016, <https://machinelearningmastery.com/supervised-and-unsupervised-machine-learning-algorithms/>.

where (x) represents the input variable, (y) the output variable and "f" the mapping function. A subgroup of supervised learning is classification, which assigns observations into categories.¹¹ Within supervised machine learning, there are two subcategories: classification and regression. For this paper, I only define and explain the classification method.

In contrast, unsupervised machine learning involves finding patterns, or mapping functions, where there is no output variable (Y) available. In this instance, the goal of the unsupervised learning process is to learn more about the available data; there is no right answer, and there is no "teaching," per se. Thus, it remains entirely up to the algorithm to discover and present interesting structures in the data.¹² Two subgroups of unsupervised learning include clustering and association. Clustering involves grouping observations or data based on similarities that distinguish the group from another. Association is discovering rules that describe large parts of data. Clustering groups customers based on their purchasing behaviour and association would outline rules that describe that behaviour; for example, customers who purchase eggs also purchase bacon.

Situated between supervised and unsupervised machine learning is semi-supervised machine learning. Semi-supervised machine learning involves a large amount of input (X) data and some output (Y) data and therefore, both supervised and unsupervised machine learning are used.¹³

Another notable mathematical technique in the domain of machine learning is predictive analytics. Predictive analytics is an area in statistical science that extracts existing information and processes it to predict trends and outcome patterns.¹⁴ Predictive analytics, unlike machine learning, is heavily informed by statistics. Predictive analytics, today, is being in the immigration space across various jurisdictions across the world, including international agencies involved in managing migration, like the UN (United Nations).¹⁵ For example, developers have recommended using predictive analytics to predict Africa's migration crises.¹⁶

Finally, deep learning is a branch of machine learning which involves the use of algorithms inspired by the structure and function of the human brain.¹⁷ Deep learning, therefore, uses artificial neural networks to take on both supervised and unsupervised learning methods. Deep learning uses multiple layers to progressively develop a better understanding of raw input data (X). Deep learning is used in processes such as facial and iris recognition. More specifically, in these instances of image recognition, "deep learning algorithms recognize edges at a certain level, nose at another level and face at yet another level."¹⁸ This ability to develop an understanding from a low level, to a more complex level, improves a machine's performance over time and its ability to decide at any given moment in time.

By removing decision-making processes that rely heavily on humans, and therefore, inherently involve human error, machine learning has the potential to minimize bias – both implicit and explicit. Machines are fairer in the data they produce and the decisions they make. This notwithstanding the potential for the initial input data having been influenced by bias or the mapping function being swayed by a human error. While it has been argued that over time, machines learn to

11. Towards Data Science, "Machine Learning 101 | Supervised, Unsupervised, Reinforcement & Beyond," Towards Data Science, <https://towardsdatascience.com/machine-learning-101-supervised-unsupervised-reinforcement-beyond-f18e722069bc>.

12. Brownlee, "Supervised and Unsupervised Machine Learning Algorithms."

13. Brownlee, "Supervised and Unsupervised Machine Learning Algorithms."

14. EDUCBA, "Predictive Analytics vs Data Science – Learn The 8 Useful Comparison," EDUCBA, <https://www.educba.com/predictive-analytics-vs-data-science/>.

15. Molnar and Gill, "Bots at the Gate: A Human Rights Analysis of Automated Decision-Making in Canada's Immigration and Refugee System," 62.

16. Babusi Nyoni, "How artificial intelligence can be used to predict Africa's next migration crisis," (UNHCR), February 10, 2017, <https://www.unhcr.org/innovation/how-artificial-intelligence-can-be-used-to-predict-africas-next-migration-crisis/>.

17. Jason Brownlee, "What is Deep Learning?," August 16, 2019, <https://machinelearningmastery.com/what-is-deep-learning/>.

18. Jun Wu, "AI, Machine Learning, Deep Learning Explained Simply," Towards Data Science, July 1, 2019, <https://towardsdatascience.com/ai-machine-learning-deep-learning-explained-simply-7b553da5b960>.

evaluate and re-evaluate their predictions and outcomes to achieve objectivity, this potential has not been significantly explored.¹⁹ As such, it is important to consider how artificial intelligence, and machine learning specifically, can inform decisions that shape lives, particularly in an area such as immigration, which involves complex decision-making with high stakes.

3 Part II: Canadian Immigration and Socio-Ethnic Trends

In Canada, the government offers 80 different programs for immigration.²⁰ Each program effectively responds to particular groups of individuals and what they are seeking to gain from immigrating to Canada. For example, the economic immigration streams offer opportunities for individuals looking to come to Canada to fill high-skill occupations, like Information Systems Analysts and Consultants, Software Engineers, or low-skilled occupations like administrative assistants.²¹ Similarly, the Refugee Streams offer opportunities for individuals to flee warfare or persecution and access better lives in Canada.²² For this particular reason, paths to Canada are unique.

In 2017, 159,262 permanent residents were admitted into Canada under the economic immigration streams; 82,470 permanent residents were admitted into Canada under family reunification streams; 41,475 permanent residents were admitted into Canada as protected persons and refugees; and, finally, 3,272 permanent residents were admitted into Canada under humanitarian and other categories.²³ Cumulatively, in 2017, Canada admitted 286,479 permanent residents.²⁴ Table 1 indicates that of these 286,479 permanent residents, at minimum, 53% were visible minorities. Visible minorities, defined by the Employment Equity Act includes “persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in colour.” More specifically, of the top ten source countries, 152,686 individuals emigrating from eight countries, or 88%, were visible minorities.

In the same vein, one in six immigrants to Canada reports experiencing discrimination, where discrimination appeared to be more closely linked to visible minority status than to immigrant status.²⁵ Importantly, immigrant victims of discrimination reported feeling discriminated against for their ethnicity or culture (54%), race or skin colour (47%) and language (31%).²⁶

These feelings, and therefore the need to address discrimination, are compounded by the increase in anticipated immigrants for the upcoming two years. In 2017, the Government of Canada launched a multi-year immigration plan to contribute to Canada’s immigration levels.²⁷ Two years later, these figures were updated, and the plan was extended to 2021.²⁸ The revitalized plan was “designed to contribute to an immigration system that strengthens the Canadian middle class through economic growth, supports diversity and helps build vibrant, dynamic and inclusive communities while maintaining border integrity to preserve the safety and security of Canadians.”²⁹

19. Schmidt and Stephens, “An Introduction to Artificial Intelligence and Solutions to the Problems of Algorithmic Discrimination,” 137.

20. Canada Visa, “What are your options for Canadian Immigration?,” Canada Visa, <https://www.canadavisa.com/canadian-immigration-visas.html%5C#gs.ivvyj0>.

21. Minister of Immigration, Refugees and Citizenship Canada, *Express Entry year-end report 2018* (Canada, Ottawa, 2018), <https://www.canada.ca/content/dam/ircc/documents/pdf/english/pub/express-entry-year-end-report-2018.pdf>.

22. Minister of Immigration, Refugees and Citizenship Canada, *Refugees and asylum* (Ottawa, 2019), <https://www.canada.ca/en/immigration-refugees-citizenship/services/refugees.html>.

23. Minister of Immigration, Refugees and Citizenship Canada, *2018 Annual Report to Parliament on Immigration* (Canada, Ottawa, 2018), <https://www.canada.ca/content/dam/ircc/migration/ircc/english/pdf/pub/annual-report-2018.pdf>.

24. Canada, *2018 Annual Report to Parliament on Immigration*, 39.

25. Dyna Ibrahim, “Violent victimization, discrimination and perceptions of safety: An immigrant perspective, Canada, 2014,” *Statistics Canada*, April 12, 2018, <https://www150.statcan.gc.ca/n1/pub/85-002-x/2018001/article/54911-eng.htm>.

26. Ibrahim, “Violent victimization, discrimination and perceptions of safety: An immigrant perspective, Canada, 2014.”

27. Minister of Immigration, Refugees and Citizenship Canada, *Express Entry year-end report 2017* (Ottawa, 2017), <https://www.canada.ca/en/immigration-refugees-citizenship/corporate/publications-manuals/express-entry-year-end-report-2017.html>.

28. Minister of Immigration, Refugees and Citizenship Canada, *Notice – Supplementary Information 2019-2021 Immigration Levels Plan* (Ottawa, 2019), <https://www.canada.ca/en/immigration-refugees-citizenship/news/notices/supplementary-immigration-levels-2019.html>.

29. Canada, *Notice – Supplementary Information 2019-2021 Immigration Levels Plan*.

As outlined in Table 2, these figures have risen substantially from the initial target numbers. With the anticipated rise of immigration applications under various streams, the Government of Canada has sought ways³⁰ to manage and sort through applications in all of the immigration streams to classify and screen potential immigrants to Canada.³¹

4 Part III: Artificial Intelligence and the Potential to Discriminate Against Targeted Groups

4.1 Classification and Screening

In assessing immigration documents, applications can be classified based on several different aspects. Classifying individuals based on identity is a particular characteristic of the Canadian immigration system. To understand the cultural diversity of Canada, it is imperative to understand and classify who makes up the populace. However, the classification of identity is also a step in developing an exclusionary system.³² To classify – or separate – individuals into distinct groups, a set of criteria must first be established that forms the foundation on which exclusion can occur. Margaret Hu posits that during the Jim Crow era, these classifications were based on the "one-drop" laws, which outlined the distinction between who was "coloured" and who was not;³³ in South Africa, under Apartheid, segregation relied on identification cards that classified individuals into racial groups;³⁴ in Rwanda, during the Belgian colonial period, the distinction between the favoured Tutsis and the disenfranchised Hutu populations was indicated on identity cards;³⁵ and in Germany, under Nazi rule, the Nuremberg Laws determined Jews from non-Jews.³⁶

Once classification criteria are established, classifications can be made. Classification, in turn, allows for screening to include or exclude desirable or undesirable groups. With the rise in immigrant applications, the Government of Canada has sought ways to manage and sort through applications by implementing machine learning processes. However, if classification and screening systems have inherited biased structures or mapping functions, the whole process, and therefore system (in this case immigration system), inherits the biases of the individual teaching the machine.

4.2 The Express Entry System

The Government of Canada is already implementing advanced technologies in migration processes. For example, Immigration, Refugees and Citizenship Canada (IRCC) deploys new technology to digitize the delivery of the Express Entry System. This involves a comprehensive ranking system that sorts through applications in the Federal Skilled Worker Program, Federal Skilled Trades Program, Canadian Experience Class and a portion of the Provincial Nominee Program.³⁷ In the Express Entry System, applicants create a candidate profile using self-reported information, which is then assessed based on the aforementioned comprehensive ranking system. Applicants who meet the criteria for one of the aforementioned economic immigration streams are then pre-screened into the Express Entry candidate pool, where candidates are ranked per the CRS.³⁸ As applications are

30. Public Works and Government Services Canada Canada, *Artificial Intelligence Solution* B8607-180311/A (Ottawa, 2018), <https://buyandsell.gc.ca/procurement-data/tender-notice/PW-EE-017-33462>.

31. Diana Robinson and Karina Vold, "Responsibly deploying AI in the immigration process," *Policy Options – IRPP*, August 27, 2018, <https://policyoptions.irpp.org/magazines/august-2018/responsibly-deploying-ai-in-the-immigration-process/>.

32. Kitty Calavita, "The Paradoxes of Race, Class, Identity, and 'Passing': Enforcing the Chinese Exclusion Acts, 1882-1910," *Law & Social Inquiry* Vol. 25, No. 1 (2000): 200.

33. Margaret Hu, "Algorithmic Jim Crow," *Fordham Law Review* 86 (2 2017): 655, <https://ir.lawnet.fordham.edu/flr/vol86/iss2/13>.

34. Hu, "Algorithmic Jim Crow," 655.

35. Hu, "Algorithmic Jim Crow," 655.

36. Hu, "Algorithmic Jim Crow," 655.

37. Jean-Christophe Dumont, Jonathan Chaloff, and Maria Vincenza Desiderio, "The Expression of Interest Model: What Lessons for Migration Management in the EU and elsewhere?," *OECD*, March 18, 2019, 5, <http://www.oecd.org/els/mig/migration-policy-debates-18.pdf>.

38. Canadian Immigration Law Firm, "Comprehensive Ranking System (CRS)," Canadian Immigration Law Firm, <https://www.cicli.com/crs/>.

received, candidates with the best indicators for success in Canada's labour market receive an invitation to apply for permanent residence.

As mentioned above, the Express Entry System categorizes applicants into the various economic immigration streams and determines whether they are appropriate candidates for each. Of course, given that this System involves self-reporting, the input variable – the applicant's profile – can be flawed or biased and therefore, can positively or negatively impact applicant's eligibility under one or more of the EES umbrella programs.³⁹ However, the information reported in the candidate's profile is only verified at the electronic application for permanent residence stage.⁴⁰ What would be of more concern is whether the Express Entry System employed a comprehensive ranking system that preferred a particular race, ethnicity or religion over another. However, this is not the case. Rather, the Express Entry System does not target groups that are identified as vulnerable. Instead, the Express Entry System is predominantly being used by individuals already residing in Canada to gain permanent residence. This has consistently been the case in 2015⁴¹, 2016⁴², 2017⁴³ and 2018⁴⁴.

4.3 Decisions About Vulnerable Groups

The issue presents itself when machine learning is used to make decisions about vulnerable groups specifically. In April 2018, the Government of Canada distributed a request for information⁴⁵ to identify areas where artificial intelligence, namely machine learning, could be used in the immigration process.⁴⁶ More specifically, the Government wanted to employ machine learning to decisions in two immigration streams: requests for consideration on humanitarian and compassionate grounds and applications for Pre-Removal Risk Assessment.⁴⁷ Concerning requests for consideration on humanitarian and compassionate grounds, decisions are made based predominantly on the "applicants' connections with Canada and the best interests of children involved."⁴⁸ As for Pre-Removal Risk assessment, immigration officers consider whether returning an applicant to their home country poses serious dangers.⁴⁹ Both of these projects, while pilots, highlight the importance of considering the implications of implementing machine learning to make decisions about vulnerable groups.

Take, for example, the United States. In 2017, President Trump signed Executive Order 13,769,⁵⁰ "Protecting the Nation from Foreign Terrorist Entry into the United States."⁵¹ This Executive Order "immediately suspended for 90 days the entry of all permanent residents, immigrants, visitors, and refugees from seven countries—Iran, Iraq, Libya, Somalia, Sudan, Syria, and Yemen—all of which are Muslim-majority. It also paused all refugee resettlement for 120 days and indefinitely

[//www.canadim.com/immigrate/express-entry/comprehensive-ranking-system/](http://www.canadim.com/immigrate/express-entry/comprehensive-ranking-system/).

39. Brankica Jakovlevski, "Introducing Canada's Expression of Interest Model – The Early Shortfalls of Express Entry," 2015, 34.

40. Jakovlevski, "Introducing Canada's Expression of Interest Model – The Early Shortfalls of Express Entry," 34.

41. Minister of Immigration, Refugees and Citizenship Canada, *Express Entry year-end report 2015* (Ottawa, 2015), <https://www.canada.ca/en/immigration-refugees-citizenship/corporate/publications-manuals/express-entry-year-end-report-2015.html>.

42. Minister of Immigration, Refugees and Citizenship Canada, *Express Entry year-end report 2016* (Ottawa, 2016), <https://www.canada.ca/en/immigration-refugees-citizenship/corporate/publications-manuals/express-entry-year-end-report-2016.html>.

43. Canada, *Express Entry year-end report 2017*.

44. Canada, *Express Entry year-end report 2018*.

45. Canada, *Artificial Intelligence Solution*.

46. Robinson and Vold, "Responsibly deploying AI in the immigration process."

47. Robinson and Vold, "Responsibly deploying AI in the immigration process."

48. Robinson and Vold, "Responsibly deploying AI in the immigration process."

49. Robinson and Vold, "Responsibly deploying AI in the immigration process."

50. Hu, "Algorithmic Jim Crow," 645.

51. Ryan Lizza, "Why Sally Yates Stood Up to Trump," *The New Yorker*, May 29, 2017, <http://www.newyorker.com/magazine/2017/05/29/why-sally-yates-stood-up-to-trump>.

halted [the] admission of Syrian refugees."⁵² The Order was contested by then-acting Attorney General, Sally Yates, who compared it to the Jim Crow laws that prevented African-Americans from voting.⁵³ Yates argued that the Order, while presenting itself as being neutral, could lead to negative implications based on protected classifications. This impact is largely due to the algorithms that conduct screening and vetting to determine and gauge risk, algorithms that consider identity and associational assessments. A comparable system is used in the No-Fly database, which screens for potential terroristic and criminal risk by, among other things, conducting screens and sweeps of databases, including but not limited to biometric databases.⁵⁴ Biometrics is "[t]he science of automatic identification or identity verification of individuals using physiological or behavioral characteristics."⁵⁵

4.4 Biometric Data

Biometric data currently collected by the United States Department of Homeland Security includes scanned fingerprints, irises, digital photos for facial recognition technology⁵⁶ and DNA⁵⁷. This, all justified in the post-9/11 world, by the rationale of 'protecting citizens and the state. Hu argues that, in this regard, there is no stark difference between Jim Crow and what she terms "Algorithmic Jim Crow."⁵⁸ Hu posits that both systems of segregation are facially neutral. The separation of the races, or Jim Crow in its foundational stages, was justified as being necessary to minimize and avoid race-based conflict. This was entrenched in the Court's ruling in *Plessy v. Ferguson* 1896.⁵⁹ Similarly, Algorithmic Jim Crow, in its foundational stages, isolates individuals strictly based on data suspicions, justified under security rationales like preventing terrorism.

Hu suggests that under Jim Crow laws classification was done by bus drivers, who segregated passengers based on the colour of their skin, a "screening protocol that required human judgment and human action."⁶⁰ Under Algorithmic Jim Crow, Hu argues that a combination of automated screening and human screening, like security screeners, will rely on predictive analytic systems (a subcategory, like machine learning, of artificial intelligence) of the No-Fly List. Another example is biometric screening that conducts digital assessments of skin colour and estimated age extracted from a digital photo to predict criminal or terroristic behavior.⁶¹ This example does not stray too far from the tactics Canada is seeking to or already has employed to make determinations about potential immigrants.

These concerns also exist for the aforementioned request for information to identify areas where artificial intelligence, namely machine learning, could be used in requests for consideration on humanitarian and compassionate grounds and applications for Pre-Removal Risk Assessment.⁶² Canada, while arguably exceptionally multicultural, does have pockets of discrimination and hatred embedded in it. This is precisely why strategies like "Building a Foundation for Change: Canada's Anti-Racism Strategy 2019–2022" are developed, to ensure that all "Canadians benefit

52. Muzaffar Chishti, Sarah Pierce, and Laura Plata, "In Upholding Travel Ban, Supreme Court Endorses Presidential Authority While Leaving Door Open for Future Challenges," *Migration Policy Institute*, June 29, 2018, <https://www.migrationpolicy.org/article/upholding-travel-ban-supreme-court-endorses-presidential-authority-while-leaving-door-open>.

53. Hu, "Algorithmic Jim Crow," 646.

54. Hu, "Algorithmic Jim Crow," 647.

55. Homeland Security United States, *Privacy Impact Assessment for the Automated Biometric Identification System* (Washington D.C., 2012), https://www.dhs.gov/sites/default/files/publications/privacy/PIAs/privacy_pia_usvisit_ident_appendixj_jan2013.pdf.

56. United States Homeland Security, *Privacy Impact Assessment for the Iris and Face Technology Demonstration and Evaluation (IFTDE)* (Washington D.C., 2010), https://www.dhs.gov/sites/default/files/publications/privacy_pia_st_iftde.pdf.

57. Homeland Security, *Privacy Impact Assessment for the Iris and Face Technology Demonstration and Evaluation (IFTDE)*.

58. Hu, "Algorithmic Jim Crow," 660.

59. "Plessy v. Ferguson," *History*, October 29, 2009, <https://www.history.com/topics/black-history/plessy-v-ferguson>.

60. Hu, "Algorithmic Jim Crow," 661.

61. Shanti Gomatam and Michael D. Larsen, "Record Linkage and Counterterrorism," *Chance* 17 (1 2012): 25, <https://doi.org/10.1080/09332480.2004.10554883>.

62. Robinson and Vold, "Responsibly deploying AI in the immigration process."

from equitable access to and participation in the economic, cultural, social and political spheres. It builds a foundation for long-term action by supporting three guiding principles.”⁶³ Therefore, “in a society where discrimination affects opportunities in innumerable ways, we must worry about the migration of discrimination to [decision-making] by an algorithm.”⁶⁴

While the Canadian Government has been exceptionally silent on how it seeks to implement machine learning and artificial intelligence in its governing processes,⁶⁵ the IRCC has been experimenting with predictive analytics to replace immigration officials who otherwise evaluate immigrant and visitor applications. These systems are specifically used “to identify the merits of an immigration application, spot potential red flags for fraud and weigh all these factors to recommend whether an applicant should be accepted or refused.”⁶⁶ This system was developed in response to an immigration system overwhelmed by backlogs and delays. A senior IRCC data analyst indicated that the IRCC is using a form of an automated system to distinguish applications into “simple” cases that can be processed by machines and “complex” cases that require review.”⁶⁷

Additionally, biometric data analysis is an area of deep learning which has been posited as useful in accelerating the rate at which immigration applications are processed. Several scholars are of the view that “an international biometric identification system would help to address [issues relating to the flow of people across borders like] the refugee crisis in Europe and simultaneously serve national security interests.”⁶⁸ A prominent proposition for the development of an international biometric identification system is a biometric ePassport.⁶⁹

The Government of Canada must be careful so as not to implement biometric data analysis that can be influenced by systems that have inherited the discriminative tendencies of the humans that design them. Notably, individuals designing automated systems or selecting the input, output and mapping functions that train machines can consciously, subconsciously or unconsciously input their individual biases. As such, this can compound discrimination and influence the outcomes of these decision-making machines, reflecting the designer’s prejudices or pre-existing societal biases.⁷⁰

5 Conclusion

As Cathy O’Neil outlines, “mathematical algorithms can be formulated and tweaked based on powerful interests.”⁷¹ Canada has continuously expressed an interest in accepting more immigration through the wide range of immigration programs. However, it is important to recognize that group and vested interests can impact who gets across the border.

This paper has explored the implications of using artificial intelligence in Canadian immigration processes on discrimination and racism in Canada. More specifically, I examined artificial intelligence and machine learning processes to define and explain the scope of the technology that

63. Minister of Canadian Heritage & Multiculturalism Canada, *Building a Foundation for Change: Canada’s Anti-Racism Strategy 2019–2022* (Canada, Ottawa, 2019), <https://www.canada.ca/en/canadian-heritage/campaigns/anti-racism-engagement/anti-racism-strategy.html%5C#a2>.

64. Chander, “The Racist Algorithm?,” 1028.

65. Molnar and Gill, “Bots at the Gate: A Human Rights Analysis of Automated Decision-Making in Canada’s Immigration and Refugee System,” 14.

66. Nicholas Keung, “Canadian immigration applications could soon be assessed by computers,” *Toronto Star*, January 5, 2017, <https://www.thestar.com/news/immigration/2017/01/05/immigration-applications-could-soon-be-assessed-by-computers.html>.

67. Molnar and Gill, “Bots at the Gate: A Human Rights Analysis of Automated Decision-Making in Canada’s Immigration and Refugee System,” 14.

68. Michael Ignatieff, “The Refugees & the New War,” *The New York Review*, December 17, 2015, <https://www.nybooks.com/articles/2015/12/17/refugees-and-new-war/>.

69. Hu, “Algorithmic Jim Crow,” 679.

70. David García-Soriano, “Fair-by-design algorithms: matching problems and beyond,” *ISI Foundation*, February 7, 2018, 1-2, <https://arxiv.org/pdf/1802.02562.pdf>.

71. Mona Chalabi, “Weapons of Math Destruction: Cathy O’Neil adds up the damage of algorithms,” *The Guardian*, October 27, 2016, <https://www.theguardian.com/books/2016/oct/27/cathy-oneil-weapons-of-math-destruction-algorithms-big-data>.

can be implemented in immigration processes. I considered the use of machine learning systems that can mimic or entirely replace human decision-making. I closely examined the subcategories of artificial intelligence: machine learning, predictive analytics and deep learning. In Part II, I examined Canadian immigration and socio-ethnic trends. Namely, I considered where most of Canada's immigrants come from and the migratory path they take. In doing so, I addressed the nexus between discrimination and immigrant identities, with the understanding that identity is fluid, subjective and intersectional. In Part III, I considered how artificial intelligence has been and can be used to discriminate against targeted groups, adopting Margaret Hu's concept of "Algorithmic Jim Crow" to exemplify how mathematical algorithms and statistical analyses are not, objective, and instead have the potential to perpetuate and continue "the legacy of discriminations past and the reality of discriminations present."⁷²

Moving forward, as Canadians, we must design our algorithms for a world permeated by discrimination past and present. Much of the discrimination that prevails today is founded on statistical discrimination – where those seeking to distinguish between individuals will rely on racial proxies.⁷³ Therefore, it is important to understand the potential for discrimination inherent in how artificial intelligence is developed. Migration can be seen as the act of gatekeeping: however, to ensure that Canada's multicultural identity – which is so often admired and celebrated – remains intact, we must ensure that the processes that govern who makes up our multicultural identity are not discriminatory or biased.

72. Chander, "The Racist Algorithm?," 1025.

73. Chander, "The Racist Algorithm?," 1025.

Table 1. Permanent Residents Admitted in 2017, by Top 10 Source Countries⁷⁴

Rank	Country	Number	Percentage
1	India	51,651	18
2	Philippines	40,857	14
3	China, People's Republic of	30,279	11
4	Syria	9,100	4
5	United States of America	7,656	3
6	Pakistan	7,656	3
7	France	6,600	2
8	Nigeria	5,459	2
9	United Kingdom and Overseas Territories	5,293	2
10	Iraq	4,740	2
Total	173,679	173,679	61

Table 2. Immigrant Targets by Year

Year Targets Published	Targets per Year		
Year			
2017	2018	2019	2020
	310,000	330,000	340,000
2019	2019	2020	2021
	330,800	341,000	350,000

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Iran & Bitcoin: Examining Iran's Use of Bitcoin and US Economic Sanctions

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Abstract

Economic sanctions on Iran have taken a toll on its economy. With the costs of living and inflation increasing Iranians have looked into alternative methods to securing their savings: Bitcoin. Bitcoins allow for the Iranian government and its citizens to bypass the United States economic sanction regime and has provided much needed breathing room for the economy. Currently the United States does not possess a legal framework to deal with Bitcoins and their use in bypassing economic sanctions. There are numerous problems with Bitcoins that prevent the currency from solving all of Iran's economic woes. The most notable is the unpredictability of the currency making it a risky investment. Despite all its problems Bitcoin does provide a challenge to the United States' economic sanction regime and would be unwise to ignore its use in Iran.

1 Introduction

The relationship between the United States and Iran has been deteriorating since the end of the Iranian Revolution. A constant in the relationship between Iran and the United States are US economic sanctions directed at Iran. In recent years US imposed economic sanctions have increased in scope and potency as a result of Iran's nuclear program. While scholars debate the effectiveness of the economic sanctions deterring Iran from their activities, one of the more productive results of the US sanctions on Iran was the Joint Comprehensive Plan of Action (JCPOA), or more commonly known as the Iranian Nuclear Deal. In short, the JCPOA was an agreement between Iran and the United States (which also included France, the United Kingdom, China, Germany, and Russia) which promised sanction relief in return for greater restriction of Iran's nuclear deal. Initially the results of the JCPOA were promising. Iran complied with the framework of the agreement and in return the sanctions were eased. Despite the success, President Donald Trump withdrew from the agreement on May 8th, 2018. Since the United States has dropped out of the Joint Comprehensive Plan of Action, it has levied heavy sanctions against Iran. This is an attempt to apply "maximum pressure"¹ to the regime in Iran. Due to this harsh economic situation Iran has turned to an unlikely method in an attempt to alleviate the pressure: Bitcoin.

2 The Impact of US Sanctions

As alluded to prior, Iran's economy has been under sanctions since the 1979 Revolution and the subsequent hostage crisis. While these economic sanctions have had an "adverse"² effect on the Iranian economy the real economic pressure came from an "international campaign to impose extensive sanctions in response to Iran's nuclear programme."³ Economic sanctions imposed on Iran over its nuclear programme include restrictions on international banking, insurance for oil tankers,

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1. Emily B. Landau, "Iran's Nuclear Violations: JCPOA and Beyond," *Institute for National Security Studies*, no. 1232 (November 2019): 1.

2. Sara Bazoobandia et al., "Sanctions Against Iran: Winners And Losers," *European Union Institute for Security Studies*, 2015, 57.

3. Bazoobandia et al., "Sanctions Against Iran: Winners And Losers," 58.

and a “forced exit from the SWIFT (Society for Worldwide Interbank Financial Telecommunication) worldwide messaging system used for international money transfers.”⁴ All these measures “had a direct impact in curbing Iranian oil exports globally.”⁵

Considering that “Iran has the world’s second-largest natural gas reserves and the fourth-largest oil reserves,”⁶ and that “oil exports contribute about 80 percent of the nation’s public revenue”⁷ these economic sanctions have had a potent effect on Iran’s economy. Due to economic sanctions, Iran’s oil production has plummeted and went from “second-largest producer within the Organisation of the Petroleum Exporting Countries (OPEC) and fell to fourth position.”⁸ These economic sanctions in combination with government “mismanagement”⁹ have left Iran’s economy in a precarious position. The economic sanctions have “adversely affected the middle class.”¹⁰ The cost of everyday necessities like food, rent, medicine, fuel rising by as much as “100 percent”¹¹ due to the worsening economy of Iran. To make matters worse for Iranians, the Rial (Iran’s currency) has gone through high levels of inflation¹² as well as high levels of unemployment. Overall unemployment is over 12 percent, but “youth unemployment [is] a staggering 30 percent.”¹³ The mounting economic pressure is believed to be a key factor in bringing “Rouhani to power”¹⁴ and by extension the signing of the JCPOA.

Despite the success of the JCPOA for both sides the United States would withdraw from the deal. President Trump, who has made no secret of his dislike for the JCPOA, withdrew from the agreement on May 8th, 2018. The decision is part of a hard-lined approach aimed at Iran. The United States intends to apply maximum pressure economic sanctions on Iran over issues including the presence of proxy forces in Iraq and Syria, a destabilizing foreign policy, and in general the “US mistrust of Iran engaging in any kind of nuclear technology.”¹⁵ Donald Trump unleashed two phases of economic sanction, one in August of 2018 and the second round in November of the same year. The first round of sanctions “included a ban on the sale of dollars on international markets to Iran and Iranian companies, as well as the purchase and sale of Iranian rials outside of Iran and the sale of gold and precious metals to Iran.”¹⁶ As noted before, Iran’s ability to sell oil on the international market is crucial for the health of the Iranian economy. The November round of sanctions targeted Iran’s “oil exports and banks.”¹⁷ Member states that were still part of the JCPOA, most notably the European Union, are developing tactics that are trying to skirt around US sanctions. The EU has resorted to using central banks to send funds to Iran in hopes that the “Trump administration would never sanction a European central bank.”¹⁸ However, these caveats were contingent on Iran continuing to follow the guidelines of the JCPOA, which Iran officially withdrew from on January 2020.¹⁹

4. Bazoobandia et al., “Sanctions Against Iran: Winners And Losers,” 58.

5. Bazoobandia et al., “Sanctions Against Iran: Winners And Losers,” 58.

6. Medea Benjamin, *The Iranian Economy After Decades of Sanctions* (OR Books), 129.

7. Benjamin, *The Iranian Economy After Decades of Sanctions*, 129.

8. Bazoobandia et al., “Sanctions Against Iran: Winners And Losers,” 58.

9. Bazoobandia et al., “Sanctions Against Iran: Winners And Losers,” 58.

10. Sara Bazoobandia et al., “Sanctions Against Iran - A Preliminary Economic Assessment,” *European Union Institute for Security Studies*, 2015, 53.

11. Benjamin, *The Iranian Economy After Decades of Sanctions*, 133.

12. Benjamin, *The Iranian Economy After Decades of Sanctions*, 125.

13. Benjamin, *The Iranian Economy After Decades of Sanctions*, 125.

14. Benjamin, *The Iranian Economy After Decades of Sanctions*, 53.

15. Adam Tarock, “Iran’s Nuclear Programme and the West,” *Third World Quarterly* 27, no. 4 (2006): 653.

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17. Dagues and Skavin, “How Iran Will Cope with US Sanctions,” 1.

18. Dagues and Skavin, “How Iran Will Cope with US Sanctions,” 3.

19. “Iran Takes Fifth and Last Step to End Commitment to JCPOA,” *Tehran Times*, January 5, 2020, <https://www.tehrantimes.com/news/443820/iran-takes-fifth-and-last-step-to-end-commitment-to-JCPOA>.

3 The Pivot to Bitcoin

Since Iran was unable to rely on the European Union and the United Kingdom, to deliver any meaningful methods of mitigating US economic sanctions, the Iranian government has taken an unorthodox approach to their economic woes. In August of 2019 the Iranian Government, “officially recognized cryptocurrency mining as an industry”²⁰ therefore making the practice legal within Iran. In addition, the Central Bank of Iran drafted “a policy framework for cryptocurrencies to be used for foreign trade.”²¹ Due to the decentralized nature of cryptocurrencies “sanctioned nations might transact in BTC [Bitcoin] to circumvent international regulations.”²² With the use of Bitcoin, “the Iranian government could theoretically sell its oil to unscrupulous buyers and accept payment in BTC to avoid the eyes and punishment of the United States and its allies.”²³ The Iranian government’s pivot towards Bitcoin is an odd move, yet clever because of the decentralized nature of Bitcoin. There are three reasons in particular why cryptocurrencies, such as Bitcoin, are so attractive to the Iranian regime. These three reasons are: “1) Bitcoin is not presently illegal under existing legal frameworks in nearly every country; 2) Bitcoin offers significant economic advantages over traditional currencies and payment methods; and 3) governments do not currently possess the ability to target the Bitcoin network directly.”²⁴

Arguably the most appealing factor of Bitcoin is how they are able to skirt around The United States’ economic sanction regime. The means of acquiring and transferring Bitcoins are “run on private blockchains that provide no traceability to outside countries.”²⁵ These private blockchains cannot be easily traced because they currently “are completely outside the purview of current U.S.-led global financial architecture.”²⁶ This allows the Iranian regime to bypass the need for SWIFT when conducting international trades. Iran has understood the strategic importance of cryptocurrencies as they are a way “to challenge and subvert the U.S.-dominated financial architecture.”²⁷ Finding ways to effectively deal with these sanction evasion tactics “will take global coordination and cooperation with cryptocurrency service providers; both global and Iranian regulations will determine the degree of access to these avenues.”²⁸ In the meantime, “as long as holes in regulation exist, they are sure to be exploited by the Iranian regime and people.”²⁹

4 The General Public

One of the interesting developments of crypto currencies in Iran is how popular it has become among Iranian citizens. One of the reasons for this popularity is “because of generous government subsidies, electricity — the energy for the computers needed to process cryptocurrency transactions — costs little in Iran. It goes for about six-tenths of a cent per kilowatt-hour, compared with an average of 12 cents in the United States and 35 cents in Germany.”³⁰ Because of these low energy costs mining Bitcoins is rather lucrative for Iranians. In a survey conducted in 2019 “with 1,650 Iranians using bitcoin showed that 25 percent of respondents made \$500 to \$3,000 per month working with cryptocurrency.”³¹ Another reason, and arguably one with broader implications, is

20. Maziar Motamedi, “Iran’s Government Recognises Cryptocurrency Mining with Caveat,” *Al Jazeera*, August 5, 2019, <https://www.aljazeera.com/ajimpact/iran-government-recognises-cryptocurrency-mining-caveat-190804193912792.html>.

21. Dagres and Skavin, “How Iran Will Cope with US Sanctions,” 4.

22. Jonathan B. Turpin, “Bitcoin: The economic case for a global, virtual currency operating in an unexplored legal framework,” *Ind. J. Global Legal Studies* 21 (2014): 360.

23. Turpin, “Bitcoin: The economic case for a global, virtual currency operating in an unexplored legal framework,” 360.

24. Turpin, “Bitcoin: The economic case for a global, virtual currency operating in an unexplored legal framework,” 367.

25. Tanvi Ratna, “Iran Has a Bitcoin Strategy to Beat Trump,” *Foreign Policy*, January 24, 2020, <https://foreignpolicy.com/2020/01/24/iran-bitcoin-strategy-cryptocurrency-blockchain-sanctions/>.

26. Ratna, “Iran Has a Bitcoin Strategy to Beat Trump.”

27. Ratna, “Iran Has a Bitcoin Strategy to Beat Trump.”

28. Ratna, “Iran Has a Bitcoin Strategy to Beat Trump.”

29. Ratna, “Iran Has a Bitcoin Strategy to Beat Trump.”

30. Thomas Erdbrink, “How Bitcoin Could Help Iran Undermine U.S. Sanctions,” *The New York Times*, January 29, 2019, <https://www.nytimes.com/2019/01/29/world/middleeast/bitcoin-iran-sanctions.html>.

31. Ratna, “Iran Has a Bitcoin Strategy to Beat Trump.”

that “people have described Bitcoin as the only way to get money out of Iran.”³² In Iran, “citizens who would like to protect their wealth against hyperinflation by converting it into another currency previously relied on the U.S Dollar, but that has become increasingly difficult due to international banking sanctions.”³³ In response, Iranians are using their Bitcoins on DeFi (decentralized financial systems) to “borrow from global markets at rates much lower than those inside Iran.”³⁴ Doing so will allow the average Iranian to diversify their savings into more stable currencies. The Iranian populace are not the only ones taking advantage of these DeFis, since, due to the “decentralized nature of these platforms”³⁵ the Iranian government has been using DeFis to “convert cryptocurrencies to fiat through channels that cannot be effectively controlled by outside regulators.”³⁶

5 Problems with Bitcoin

Bitcoins are helpful for Iran and its citizens in order to alleviate certain aspects of economic sanctions. It is most notably useful for currency exchanges and access to international markets, but that is not to say Bitcoin is not without its flaws. There are three main concerns with Bitcoin: exchange rate volatility, the legal status of the currency, and a general lack of trust. The first, and arguably the most notable, is the “exchange rate volatility.”³⁷ When Bitcoin can “experience a 40 percent swing in as little as one day”³⁸ it is hard for merchants and businesses to set prices and makes Bitcoin a riskier currency to accept rather than more traditional currencies. In addition, Bitcoin’s volatility makes it difficult to hold reserves of the currency as the value changes too often. Another factor is the legal status of Bitcoin, because its quasi-legal status is attractive to some users of Bitcoin it can be a headache for business owners.

Another issue with the quasi-legal status of Bitcoin is the prevalence of theft and fraud surrounding the cryptocurrency. In one cyber attack in 2011 “hackers had stolen more than sixty thousand BTC from [the Bitcoinica] exchange in two separate attacks.”³⁹ Tong, the owner of the exchange, promised a partial return of the stolen property, but the promise never materialized. Some believed the robbery to be an inside job. A lawsuit was filed in San Francisco over the incident, but “what funds might be recoverable, remain uncertain.”⁴⁰ While fraud and theft of traditional currencies is fairly common there is also an existing legal framework and years of legal precedent that protect the people who have been wronged. Bitcoin users, at least for now, do not have this luxury.

Lastly, there is a lack of trust around Bitcoin. The appeal of the currency is the decentralized nature of the currency, but that is a double-edged sword. Since it is not backed by “any government or redeemable for any commodity, it may be difficult to convince individuals to trust a significant portion of their wealth to the virtual cryptocurrency” due to volatility and inherent risk. These factors make investing into bitcoin less like investing in stable currencies and commodities like gold, but closer to collectibles like trading cards. At least when things go bust you can use the trading cards as flint for warmth; Bitcoins only take space on a harddrive.

So, the question remains: how effective are cryptocurrencies in alleviating pressure from economic sanctions? The technology is still young and cryptocurrencies are still a new field of study. Currently, major businesses remain under surveillance from the United States, but Iran can still exploit Bitcoin to deal with small and medium size businesses while flying under the American

32. Ratna, “Iran Has a Bitcoin Strategy to Beat Trump.”

33. Turpin, “Bitcoin: The economic case for a global, virtual currency operating in an unexplored legal framework,” 367.

34. Ratna, “Iran Has a Bitcoin Strategy to Beat Trump.”

35. Ratna, “Iran Has a Bitcoin Strategy to Beat Trump.”

36. Ratna, “Iran Has a Bitcoin Strategy to Beat Trump.”

37. Turpin, “Bitcoin: The economic case for a global, virtual currency operating in an unexplored legal framework,” 343.

38. Turpin, “Bitcoin: The economic case for a global, virtual currency operating in an unexplored legal framework,” 343.

39. Turpin, “Bitcoin: The economic case for a global, virtual currency operating in an unexplored legal framework,” 346.

40. Turpin, “Bitcoin: The economic case for a global, virtual currency operating in an unexplored legal framework,” 346.

radar.⁴¹ Despite being widely used “the value of Iranian cryptocurrency schemes is estimated to be in the millions, not billions, of dollars.”⁴² Hardly a large amount of money on the state level. Even if Iran did have more capital in the form of cryptocurrencies, “cryptocurrencies are not widely enough accepted by companies around the world for sanctioned actors to use to them to engage in significant commercial trade, such as selling oil or other commodities on global markets, or to make large-scale purchases of key economic inputs.”⁴³ Another problem with Bitcoin and other cryptocurrencies is that they are “treacherously unpredictable.”⁴⁴ The value Bitcoin has experienced wide swings, in both directions, over short periods of time. This makes Bitcoin an unreliable currency. There is also the fact that “due to illicit activities with websites like the [Silk Road] and other nefarious websites the United States will work towards limiting the anonymous nature of cryptocurrencies.”⁴⁵ In addition, the use of cryptocurrencies by Iran and Venezuela — the latter being another country beleaguered by US economic sanctions, has motivated the United States to pursue “heavy regulation of the sector.”⁴⁶ With the continued use from adversarial regimes it is likely that the US will develop a way to tackle the use of cryptocurrencies as a method of sanction evasion. When taking all these factors into consideration, cryptocurrencies, mostly Bitcoin, are useful in alleviating the pains of economic sanctions on a small scale, and gives the Iranian regime and its citizens much needed breathing room, but it is unlikely that cryptocurrencies, will be the solution to Iran’s current economic troubles.

6 Conclusion

The use of Bitcoin in Iran to circumvent economic sanctions from the United States is an interesting development in the study of economic sanctions. While there is evidence to support that Iranian citizens are benefitting from the use of Bitcoins to access the international financial systems, which provides the regime with much needed breathing room, it is hard to argue that Bitcoin is the answer to Iran’s economic woes. For starters, Iran’s cryptocurrency operations are still on a small scale. The amount of capital needed to run a country is just not there with Bitcoin. The lack of capital, coupled with the unpredictable nature of Bitcoin and cryptocurrencies in general makes Bitcoin a problematic financing option. In addition, the global economy is not positioned to accept Bitcoin and other cryptocurrencies at a scale that is sustainable for an economy the size of Iran’s. Plus, the United States, due to Iran and other countries using cryptocurrencies to evade sanctions, is pushing hard to regulate the industry to prevent further evasion. In saying that, cryptocurrency technology highlights the limitations of the US economic sanctions regime. Governments and citizens can bypass economic sanctions with only a computer and do so easily and anonymously, albeit with caveats. As cryptocurrency technology advances it is likely that the current economic sanctions regime will be pushed further and further, possibly to its breaking point. While the case study of Iran and their use of Bitcoins has only produced moderate successes it would be unwise to dismiss the technology and the potential it can have in disrupting the existing economic sanctions regime.

41. Erdbrink, “How Bitcoin Could Help Iran Undermine U.S. Sanctions.”

42. Barry E. Carter and Ryan M. Farha, “Overview and Operation of the Evolving U.S. Financial Sanctions, Including the Example of Iran,” *Proceedings of the ASIL Annual Meeting* 107 (2013): 15.

43. Carter and Farha, “Overview and Operation of the Evolving U.S. Financial Sanctions, Including the Example of Iran,” 15.

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A Moment of Truth: Additive Manufacturing's Threat to Nuclear Proliferation, Real or Imagined

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Abstract

Over time there has been a tremendous struggle to contain the spread of nuclear weapons but this push has met with resistance by nuclear weapon states which continue to modernize and update their nuclear stockpile. This paper will examine the effects of Additive Manufacturing (AM) technology, more commonly known as 3D printing, on nuclear weapons. AM technology has the capability to transform conventional manufacturing processes by simplifying the number of components for a product, improving efficiency and minimizing material waste. There have been concerns that AM could pose as a pathway for nuclear proliferation, enabling horizontal proliferation, the transfer of nuclear technology from state to state, and the domestic development of nuclear weapons. AM could significantly impact a state's capacity to vertically proliferate, including their ability to modernize and update their nuclear arsenal, by simplifying part production and reducing costs. In sum I argue that AM technology will have more impact on vertical proliferation than horizontal proliferation and to that end, nuclear weapon states may benefit from AM technology in expanding and modernizing their nuclear arsenal, creating a wider gap between the nuclear haves (nuclear weapon states) and have-nots (non nuclear weapon states).

1 Introduction

The Additive Manufacturing (AM) process, commonly known as 3D printing, is a manufacturing technology which produces complex parts, simplifying the number of components for a product, improving efficiency, and minimizing material waste. AM has the capability to significantly transform traditional manufacturing processes and alter production practices in many industries from consumer goods to components for nuclear weapons.¹ AM has already had a significant impact for aerospace and defense firms, enabling them to produce more sophisticated designs for “jet engines, missiles, and satellites, often at a fraction of the cost and time of traditional production processes.”² The ceiling for the impact of this technology is even loftier, potentially reshaping the very nature of supply chains by greatly consolidating them.³ It is not difficult to imagine a global market where winding supply chains at various locations have been reduced to a central facility where all manufacturing, distribution, and shipping take place. AM is a disruptive technology combined with its wide application on local global industries, it could also affect nuclear weapons proliferation.⁴ To this end, AM could aid states in developing and advancing nuclear weapon technology

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1. Trevor Johnston, Troy D. Smith, and L. Luke Irwin, “Additive Manufacturing in 2040: Powerful Enabler, Disruptive Threat,” *Rand Corporation*, 2018, 4, <https://www.rand.org/pubs/perspectives/PE283.html>.

2. Tristan A Volpe, “Dual-use Distinguishability: How 3D-printing Shapes the Security Dilemma for Nuclear Programs,” *Journal of Strategic Studies* 42 (6 2019): 815, <https://www.tandfonline.com/doi/pdf/10.1080/01402390.2019.1627210?needAccess=true>.

3. Volpe, “Dual-use Distinguishability: How 3D-printing Shapes the Security Dilemma for Nuclear Programs,” 815.

4. Matthew Kroenig and Tristan Volpe, “3-D Printing the Bomb? The Nuclear Nonproliferation Challenge,” *The Washington Quarterly* 38, no. 3 (2016): 17, <https://carnegieendowment.org/2015/11/04/3-d-printing-bomb-nuclear-nonproliferation-challenge-pub-61920>.

by lowering technical barriers, increasing automation, reducing waste, and easing production bottlenecks.⁵ The additive manufacturing process could enable states to manufacture components of a nuclear weapon surreptitiously and to transfer the computer aided design (CAD) build file digitally undetected therefore bypassing multilateral export controls.⁶

Brockmann and Kelley describe AM capabilities have been “chronically overestimated and underestimated in the literature.”⁷ The overestimation and underestimation of AM technology and capabilities could lead to an inaccurate assessment of AM on non-proliferation. There has been a glut of non-proliferation research up to this point focusing on AM’s effect on horizontal proliferation which refers to non-nuclear weapon states procuring nuclear weapons either by state to state technology transfer or by domestic production.⁸ Thus far, the study of vertical proliferation has taken a backseat to horizontal proliferation and the emphasis has become even more distorted within policy spaces where non-proliferation has undergone a semantic reduction to exclude any aspect of vertical proliferation.⁹ Since much of the emphasis on vertical proliferation is limited to its relation to horizontal proliferation, the result is a disproportionate threat perception of states with small nuclear programs. Instead, more studies should be directed to AM’s effect on vertical proliferation—the modernization of nuclear weapons by nuclear weapon states (NWS) to develop new arsenals, improve technology, upgrade security, and to maintain current stockpile.¹⁰

In this paper I will examine the effect of AM on a state’s nuclear weapon programs and how vertical proliferation is impacted more than horizontal proliferation. To that end, the nuclear weapon states would benefit from AM technology in expanding and modernizing their nuclear arsenal, creating a wider gap between the haves (nuclear weapon states) and the have nots (non-nuclear weapon states).

2 Capabilities of Additive Manufacturing

The additive manufacturing (AM) process begins with using a CAD build file to produce a model, created through successive layers of material which are bonded or fused under computer control into three dimensional objects of any shape. Models were made initially from materials such as synthetic resin or plastic then later advanced to polymers, metals, alloys and tissues, simplifying and consolidating designs allowing them to be produced “at the same cost as more simple items.”¹¹ The technology first gained widespread notoriety in the early 2010s when a functional, single-shot gun was printed; however, its capacity to create more complex designs greatly improved to a point that in May 2015, General Electric (GE) printed a miniature jet engine rated for 33,000 rpm.¹² This revealed the high potential of the technology as well as the capacity to manufacture parts in nuclear weapons, as GE’s engine operated at levels “required for uranium-enriching centrifuge.”¹³ With the continued progress of AM technology, in October 2018 GE mass printed a metal fuel nozzle for its

5. Kolja Brockmann and Robert Kelley, “The Challenge of Emerging Technologies to Non-Proliferation Efforts - Controlling Additive Manufacturing and Intangible Transfer of Technology,” *Stockholm International Peace Research Institute*, April 2018, 1, https://www.sipri.org/sites/default/files/2018-04/sipri1804_3d_printing_brockmann.pdf.

6. Kroenig and Volpe, “3-D Printing the Bomb? The Nuclear Nonproliferation Challenge,” 8.

7. Brockmann and Kelley, “The Challenge of Emerging Technologies to Non-Proliferation Efforts - Controlling Additive Manufacturing and Intangible Transfer of Technology,” 5.

8. Katarzyna Kubiak, “Vertical Proliferation in Light of the Disarmament Commitment,” in *Non-Nuclear Peace: Beyond the Nuclear Ban Treaty*, ed. Tom Sauer, Jorg Kustermans, and Barbara Segaert (Cham, Switzerland: Palgrave Macmillan, 2020), 60.

9. Kubiak, “Vertical Proliferation in Light of the Disarmament Commitment,” 60-61.

10. Kubiak, “Vertical Proliferation in Light of the Disarmament Commitment,” 54.

11. Grant Christopher, “3D Printing: A Challenge to Nuclear Export Controls,” *Strategic Trade Research* 1, no. 1 (2017): 18, https://strategictraderesearch.org/wp-content/uploads/2017/09/2_3D_Printing_A_Challenge_to_Nuclear_Export_Controls.pdf.

12. “Mini 3D Printed Jet Engine Can Reach 33,000 RPM,” *Metal Powder Report* 70, no. 4 (July 2015): 197, <https://www.sciencedirect.com/journal/metal-powder-report/vol/70/issue/4>.

13. Christopher, “3D Printing: A Challenge to Nuclear Export Controls,” 19.

engine at a rate of 600 nozzles a week.¹⁴ The nozzle was previously made from 20 pieces, however, AM allowed the design to be consolidated into a single printed piece easing production.¹⁵ Despite these notable successes, the current AM technology is not especially well-suited for large scale manufacturing as minor defects in the finished products are not yet correctable in post-processing techniques, meaning that conventional manufacturing will still account for the lion's share of industrial activity in the future.

Still, despite its shortcomings, it is not difficult to conceive AM as an easier path for manufacturing weapons for “a country or non-state actor that wants to produce small arms, major conventional weapon systems, or even nuclear weapons.”¹⁶ There is a general acknowledgement that AM could circumvent the existing control regimes because the control regimes did not specifically include or address AM.¹⁷ Policies and regulations have been developed and implemented to control the transfer of sensitive research and technology but the dual-use nature of AM makes it challenging to identify and enforce existing control regimes. For instance, the Wassenaar Arrangement (WA), which was established during the post-Cold War period, consists of 42 states primarily from NATO and former Eastern Bloc states, amongst others. WA seeks to place restrictions on both conventional weapons and sensitive dual use technology which could impact on the development of weapons. Early 3D-printers are subject to export control under Category 2 - Materials Processing of the Wassenaar Arrangement; however newer 3D printers utilize a different AM process and generally are not subject to export controls.¹⁸ Some states such as the US have already seized the opportunity to exploit the new technology towards proliferation ends with the US Department of Energy/National Nuclear Security Administration (DOE/NNSA) utilizing AM for the maintenance and modernization of their nuclear weapons stockpile.¹⁹ Part of their Advanced Manufacturing Development Program specifically uses AM to reduce production and design cycles, to increase quality of the manufactured components not available with current manufacturing technologies, to focus on innovative and revolutionary processes, and to provide rapid prototype production.²⁰

3 Impact of Additive Manufacturing on Nuclear Weapons

AM's potential influence on manufacturing is vast and as its technology improves, the impact would extend to weapons, including nuclear weapons. Some of the first academics to establish the connection between AM and nuclear weapons were Kroenig and Volpe, who in 2015 had the prescience to envisage the potential impact of AM as “[a] revolution in manufacturing.”²¹ They consider that AM will reduce the level of technical expertise required to construct nuclear weapons likening it to solving a simple jigsaw puzzle.²² Kroenig and Volpe describe the potential misuse of AM that could allow more pathways for states to procure nuclear weapons and make it more difficult for the “international community to detect and stop them.”²³ The notion that AM could impact nuclear weapons may not be well supported as Brockmann and Kelley observe that the comments are made without adequately considering the technological limits in the capability of AM.²⁴ AM

14. “New Manufacturing Milestone: 30,000 Additive Fuel Nozzles,” *GE*, October 4, 2018, <https://www.ge.com/additive/stories/new-manufacturing-milestone-30000-additive-fuel-nozzles>.

15. *GE*, “New Manufacturing Milestone: 30,000 Additive Fuel Nozzles.”

16. Kroenig and Volpe, “3-D Printing the Bomb? The Nuclear Nonproliferation Challenge,” 10.

17. Brockmann and Kelley, “The Challenge of Emerging Technologies to Non-Proliferation Efforts - Controlling Additive Manufacturing and Intangible Transfer of Technology,” 24.

18. Brockmann and Kelley, “The Challenge of Emerging Technologies to Non-Proliferation Efforts - Controlling Additive Manufacturing and Intangible Transfer of Technology,” 5-6.

19. U.S. Department of Energy's National Nuclear Security Administration (DOE/NNSA), “Fiscal Year 2020 Stockpile Stewardship and Management Plan”:1-2, https://www.energy.gov/sites/prod/files/2019/08/f65/FY2020_SSMP.pdf.

20. U.S. Department of Energy's National Nuclear Security Administration (DOE/NNSA), “Fiscal Year 2020 Stockpile Stewardship and Management Plan,” 2-18.

21. Kroenig and Volpe, “3-D Printing the Bomb? The Nuclear Nonproliferation Challenge,” 7.

22. Kroenig and Volpe, “3-D Printing the Bomb? The Nuclear Nonproliferation Challenge,” 7.

23. Kroenig and Volpe, “3-D Printing the Bomb? The Nuclear Nonproliferation Challenge,” 7.

24. Brockmann and Kelley, “The Challenge of Emerging Technologies to Non-Proliferation Efforts - Controlling Additive

technology has not advanced to the level to have this impact yet and given the nascent threat, Kroenig and Volpe advocate for a comprehensive “bottom-up effort” and “top-down attention” from governments and international organizations to amend existing control systems.²⁵ Brockmann and Kelley attributed this misconception to some scholars suggesting that AM could be used for manufacturing nuclear weapons without adequately considering the technological limits in the capability of AM.²⁶ Christopher acknowledges that “[a]t present, 3D printing constitutes an unmanaged potential proliferation pathway”²⁷ and contemplates why further efforts have not been made to incorporate AM into existing export control regimes.²⁸ Brockmann and Kelley describe some of the nuclear weapon components that could be manufactured using AM but the notion that nuclear weapons could be printed in “a single pass” would not be feasible now or in the future as it is beyond the present and future capacity of AM.²⁹ Kelley describes the notion that AM could be misused and exploited in the proliferation of nuclear weapons as a “pure fantasy”.³⁰

Brockman and Kelley integrated mechatronics literature to examine current AM technology and its impact on various types of weapon programs including nuclear weapons. They review the various ways software and technology is transferred, the current control structure, and recommend for more effective oversight on AM technology. They also discuss export controls on AM machines which are geared towards older model 3D printers, but not on modern AM machines which process metal and use a variety of different techniques.³¹ Even though only a slight potential for this use, there should be closer scrutiny on this rapidly improving technology.³²

Several issues lay with the notion that AM exacerbates the threat of horizontal proliferation. First and foremost, AM does not affect either of the key bottlenecks during the development of a nuclear weapon – the acquisition and processing of fissile materials – AM industry from inception. States that wish to develop nuclear weapons using AM would be completely reliant on licensing technology from other states. This would leave the status and affects the later stage in the process: the delivery systems. Arguably the most time-intensive stage of the nuclear fuel cycle is the processing of fissile materials to weapons-grade levels in gas centrifuges which are tightly controlled. Centrifuges are restricted by, among other agreements, Articles I and II of the NPT which prevent the transfer of sensitive technologies that could be used to develop nuclear weapons. A popular contention put forth is that AM can be used to produce gas centrifuges therefore facilitating a breakout, however, as Brockmann and Kelley point out, centrifuges manufactured by AM are inferior in quality than the ones by traditional manufacturing technique.³³

Vertical proliferation is a contentious issue for the non-nuclear weapon states. Under Article VI of the NPT, member states undertake measures to cease their nuclear arms race and to commit to complete nuclear disarmament.³⁴ The NPT is structured so the NWS retain their nuclear arsenals with a commitment to nuclear disarmament while the non-nuclear weapon states are relegated to “second-class” status.³⁵ Many of the non-nuclear weapon states consider the ongoing development

Manufacturing and Intangible Transfer of Technology,” 15.

25. Kroenig and Volpe, “3-D Printing the Bomb? The Nuclear Nonproliferation Challenge,” 8.

26. Brockmann and Kelley, “The Challenge of Emerging Technologies to Non-Proliferation Efforts - Controlling Additive Manufacturing and Intangible Transfer of Technology,” 15.

27. Christopher, “3D Printing: A Challenge to Nuclear Export Controls,” 25.

28. Christopher, “3D Printing: A Challenge to Nuclear Export Controls,” 18.

29. Brockmann and Kelley, “The Challenge of Emerging Technologies to Non-Proliferation Efforts - Controlling Additive Manufacturing and Intangible Transfer of Technology,” 15.

30. Robert Kelley, “Is Three-dimensional (3D) Printing a Nuclear Proliferation Tool?,” *EU Non-Proliferation Consortium-EU Non-proliferation Paper*, no. 54 (February 2017): 1, https://www.sipri.org/sites/default/files/EUNPC_no_54.pdf.

31. Kroenig and Volpe, “3-D Printing the Bomb? The Nuclear Nonproliferation Challenge,” vii.

32. Kroenig and Volpe, “3-D Printing the Bomb? The Nuclear Nonproliferation Challenge,” 15.

33. Brockmann and Kelley, “The Challenge of Emerging Technologies to Non-Proliferation Efforts - Controlling Additive Manufacturing and Intangible Transfer of Technology,” 21.

34. Office for Disarmament Affairs United Nations, “Treaty on the Non-Proliferation of Nuclear Weapons (NPT),” <https://www.un.org/disarmament/wmd/nuclear/npt/text>.

35. Scott D Sagan, “The Causes of Nuclear Weapons Proliferation,” *Annual Review of Political Science* 14, no. 1 (June 15,

of new types of nuclear weapons and weapon moderation (vertical proliferation) by NWS as undermining their commitment and violating their legal obligations on nuclear disarmament under the NPT.³⁶ In terms of the effect of AM on nuclear programs, it is a question of want versus need at the state level. States without nuclear programs which aspire to nuclear proliferation lack the means to develop AM independently. The states that possess robust AM sectors include the US, Germany, Japan, South Korea, and China lack the reason to proliferate as they have either already developed nuclear weapons or are part of strategic alliances such as NATO and have relatively few security concerns. There are few other states with an established AM industry or the capital investment necessary to start the continuation of their nuclear programs in a tenuous position.

I contend that while AM has minimum effect on horizontal proliferation, it plays a much larger role on vertical proliferation. Even with the advance of AM, the hardware and engineering proficiency are not at the level required for the production of missiles or nuclear weapons.³⁷ Currently, there are advanced applications of AM in aerospace technology “reflecting the significant utility that AM technology offers in the production of aerospace products and components, including missiles”³⁸ and these applications will likely improve in the future. This problem is further exacerbated by the distribution of the technology and expertise which are predominantly in NWS which suggests that they would benefit the most. Modernizing nuclear arsenals is a necessary upkeep which NWS must engage in to ensure the reliance of their arsenal as over time weapons become inert as their nuclear warheads decay. Arms control is a constant struggle between states and international organizations to balance security issues and AM’s rapidly changing technology could endanger the equilibrium we find ourselves in. A policy solution which could be pursued by states is to first ensure that AM technology is comprehensively covered by existing export control agreements such as the Wassenaar Arrangement. Another step could be for states to explicitly declare when there are private-public partnerships including usage of AM which would set precedence for distinguishing between civilian and military use. Further negotiations could take place between state government experts and stakeholders regarding a more comprehensive international control agreement.

4 Conclusion

The threat of advancing AM technology to horizontal proliferation has been overestimated but the impact of AM on vertical proliferation is well-founded and closer monitoring is needed in the future. More attention is needed to review and update control regimes to keep pace with the rapidly changing AM technology. Academics and states should place more focus on nuclear weapon states and the status of their domestic AM industries vis-a-vis their nuclear programs. The current export control regimes are insufficient to monitor the advancement of AM technology and the impact on nuclear weapons. Perhaps the international community should develop a control system for the export of this technology. Efforts to bring all the relevant states to the table will prove equally as difficult given the divergent interest of key stakeholders but it would need to be the first step in any risk assessment and mitigation efforts.

2011): 238, <https://www.annualreviews.org/doi/pdf/10.1146/annurev-polisci-052209-131042>.

36. Kubiak, “Vertical Proliferation in Light of the Disarmament Commitment,” 60.

37. Brockmann and Kelley, “The Challenge of Emerging Technologies to Non-Proliferation Efforts - Controlling Additive Manufacturing and Intangible Transfer of Technology,” 8.

38. Brockmann and Kelley, “The Challenge of Emerging Technologies to Non-Proliferation Efforts - Controlling Additive Manufacturing and Intangible Transfer of Technology,” 12.

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Artificial Intelligence, Information and Uncertainty

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Abstract

Artificial intelligence (AI) may be contributing to a Fourth Industrial Revolution. How might such rapid technological change affect relations between states? This paper uses a rationalist framework to explore the role that technological advancement plays in generating uncertainty between states, and the consequences of that uncertainty.

1 Introduction

Klaus Schwab, founder of the World Economic Forum, argues that the advent of artificial intelligence (AI) is contributing to a “fourth industrial revolution”.¹ Indeed, we may be on the precipice of a “Cambrian explosion” of AI and robotics.² How will this potentially “explosive” transformation affect relations between states? To answer this question, this paper first describes the dual-use nature of AI, highlighting its potential military applications. Next, it provides a brief overview of the bargaining model of war which argues that states may fight rather than bargain if they are uncertain about the likely outcome of a conflict. Such uncertainty may arise due to insufficient, asymmetric or otherwise incorrect information about the relative war-fighting capabilities of each state.³ This paper then suggests that the dual-use nature of AI may increase information flows between states through technological diffusion, corporate espionage and other mechanisms. Unfortunately, greater information flows may not necessarily decrease the likelihood of conflict. Further, rapid technological development may inherently lead states to miscalculate their own relative bargaining power. Ultimately, this paper argues that the rapid development of AI will increase uncertainty between states, shrink the bargaining space, and make conflict more likely.

2 Military Application of AI

Although AI development is driven by the private sector largely for commercial purposes, the “underlying technologies between commercial AI and military/security AI products are identical or nearly so.”⁴ Consequently, AI can be considered a dual-use or omni-use technology (as opposed to stealth technology, for example, which only has military applications).⁵ Military applications of

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1. Klaus Schwab, *The Fourth Industrial Revolution* (New York: Crown Business, 2017); James Johnson, “Artificial Intelligence and Future Warfare: Implications for International Security,” *Defense and Security Analysis* 35, no. 2 (2019): 147–169. The First Industrial Revolution occurred in 18th century Britain with the advent of steam power. The Second Industrial Revolution occurred in the late 19th and early 20th and was shaped by mass production, steel, petroleum and electricity. The Third Industrial Revolution occurred in the 20th century with the proliferation of electronics and global communications technology.

2. Gill Pratt, “Is a Cambrian Explosion Coming for Robotics,” *Journal of Economic Perspectives* 29, no. 3 (2019): 51–60. The Cambrian Explosion occurred during the Cambrian Period of the Paleozoic Era. It is characterized by the sudden appearance of a wide array of complex fossils in the geological record, representing a significant step in the evolution of life on Earth.

3. James Fearon, “Rationalist Explanations for War,” *International Organization* 49, no. 3 (1995): 383.

4. Gregory C Allen, “Understanding China’s AI strategy: Clues to Chinese Strategic Thinking on Artificial Intelligence and National Security,” 2019, 9.

5. Jeffrey Ding, “Deciphering China’s AI Dream,” *Future of Humanity Institute* 3 (2018): 4; Michael C Horowitz, “Artificial Intelligence, International Competition, and the Balance of Power,” *Texas National Security Review* 1, no. 3 (2018): 36–57.

AI include directing physical objects (e.g. robotics), processing and interpreting information (e.g. image analysis), and command and control (e.g. battle management).⁶ Some of the most effective uses of AI may be in strategic decision making or intelligence processing.⁷ Kenneth Payne goes so far as to suggest that more advanced AI could serve as an “oracle for decision making.”⁸

3 Information and Bargaining

According to the bargaining model of war, states are rational, and war is always ex-post inefficient.⁹ This raises the question, why do wars occur at all? States should prefer to bargain instead. There are three reasons: disagreements about the likely outcome of a war (information uncertainty), the difficulty of making credible commitments in an inherently anarchic international system (credibility problems), and objectives that cannot be split in a bargain (issue indivisibility).¹⁰ This paper will focus on the issue of information uncertainty.

According to rationalists, an increase in information flows between states reduces the likelihood of conflict.¹¹ This is because sharing information about capabilities allows states’ beliefs about relative bargaining power to converge, enabling them to bargain for mutually agreeable outcomes without resorting to war.

However, in certain circumstances, states may knowingly withhold or misrepresent information (for example, in order to maintain a strategic advantage).¹² When states do not have access to crucial information, they may disagree about their relative capabilities. This leads to divergent estimates of bargaining power thus shrinking the bargaining space and increasing the likelihood of conflict.¹³

Among other factors, technology is an important input into the relative capabilities of states.¹⁴ In the case of an omni-use technology like AI, the impact on military, economic, and even political power is likely to be even more pronounced. As a result, information about AI development is an important factor that states need to consider when estimating relative capabilities.

This raises some important issues. States may be unable to control the flow of strategically important information because that information is in the hands of non-state actors. That means states may not be able to accurately communicate information to other states, nor be able to withhold information that could provide a strategic advantage if kept secret.

The inability of states to accurately gauge potential future capabilities could also worsen credible commitment problems by skewing estimates about if (or when) a state’s relative power will surpass that of a potential adversary. Using the logic of rationalist explanations for war, the simple fact that non-state actors lead AI development (and therefore have greater access to information about AI development than state actors) should be considered potentially destabilizing.

The remainder of this paper will show that the non-state development of AI will likely increase information flows about AI development. However, despite these increased information flows, disagreements between states will be more likely due to rapid technological development.

4 Non-State Development of AI Could Increase Information Flows

The fact that non-state actors are leading AI development (and that AI is inherently a dual-use technology) may lead to faster dissemination of information about technological capabilities than

6. Horowitz, “Artificial Intelligence, International Competition, and the Balance of Power,” 40.

7. Johnson, “Artificial Intelligence and Future Warfare: Implications for International Security,” 150.

8. Kenneth Payne, “Artificial Intelligence: A Revolution in Strategic Affairs?,” *Survival* 60, no. 5 (2018): 10.

9. Fearon, “Rationalist Explanations for War,” 383.

10. Fearon, “Rationalist Explanations for War”; Dan Reiter, “Exploring the Bargaining Model of War,” *Perspectives on Politics* 1, no. 1 (2003): 27-43.

11. Phillip Arena and Scott Wolford, “Arms, Intelligence, and War,” *International Studies Quarterly* 56, no. 2 (2012): 352; Fearon, “Rationalist Explanations for War.”

12. David Lindsey, “Military Strategy, Private Information, and War,” *International Studies Quarterly* 59, no. 4 (2015): 630.

13. William Reed, “Information, Power, and War,” *The American Political Science Review* 97, no. 4 (2003): 634.

14. Horowitz, “Artificial Intelligence, International Competition, and the Balance of Power,” 42.

state-led development of military-specific technology.¹⁵ This rapid dissemination of information is facilitated by international technology sales, international talent recruitment, the patenting process (which requires disclosing technical details), corporate espionage, and investment and mergers in AI-related fields. Each of these mechanisms is either the direct result of, or accelerated by, the leading role the private sector plays in AI (compared to the more tightly restricted development and procurement process for defence-specific technologies).

5 More Information, More Peace?

Through the above mechanisms, private-sector development of AI will likely increase information flows relative to state-led innovations. Revealing information is generally linked to a greater likelihood of peace in rationalist explanations for war, however, what is important is not necessarily the volume of information that is being shared, but the nature of that information. Indeed, under some circumstances, more information can lead to more conflict.

Arena and Welford's model shows that while 'perfect' information leads to peaceful outcomes, more (but not perfect) information can increase the likelihood of conflict – particularly when a state believes its opponent is relatively weak.¹⁶ Consequently, "intelligence gathering is a double-edged sword".¹⁷

Commercial AI development will increase information flows, but contrary to traditional rationalist explanations for war, this should not be taken as an inherently peace-making phenomenon. One potential causal mechanism for this phenomenon is the persistence of private information.

6 Private Information Will Persist

Technology is an important input factor in a state's relative capabilities, but it is not entirely determinative. Instead, Michael Horowitz posits that "how people, organizations, and societies adopt and utilize technologies" is equally or more important.¹⁸ For example, both Austria and Prussia observed the use of needle guns in the American Civil War, but they took different lessons from the conflict.¹⁹ The Austrians believed that unit cohesion was the key to victory, whereas the Prussians viewed the adoption of the needle gun itself as the key to victory – and of course, Prussia was victorious in the Seven Weeks' War.²⁰ In the 20th century, Britain was the first to develop aircraft carriers, but it was the U.S. and Japan that first recognized their primacy in naval warfare.²¹ These examples illustrate that increased information about technology does not necessarily allow states to estimate capabilities accurately.

David Lindsey argues that states may retain information, even at the risk of war, in order to preserve a military advantage over potential rivals.²² Applied to AI, states have an incentive to hide or misrepresent how they intend to utilize AI if they believe that the military advantages of doing so may outweigh the diplomatic gains of revealing such information. Considering more technical information about AI will be available due to its private sector development, states may have a greater incentive to misrepresent or conceal how they intend to use that technology.

7 Technological Change Always Leads to Uncertainty

Smith and Stam argue that as technology evolves so too do strategies, theories and tactics

15. Horowitz, "Artificial Intelligence, International Competition, and the Balance of Power," 39.

16. Arena and Welford, "Arms, Intelligence, and War," 352.

17. Arena and Welford, "Arms, Intelligence, and War," 361.

18. Horowitz, "Artificial Intelligence, International Competition, and the Balance of Power," 38.

19. Alastair Smith and Allan Stam, "Bargaining and the Nature of War," *The Journal of Conflict Resolution* 48, no. 6 (2004): 786.

20. Smith and Stam, "Bargaining and the Nature of War," 786.

21. Horowitz, "Artificial Intelligence, International Competition, and the Balance of Power," 38.

22. Lindsey, "Military Strategy, Private Information, and War," 630.

of war and any estimates about relative strength will necessarily have to include “unknown or unobserved factors.”²³ The result is that perfectly rational actors can disagree about potential outcomes, and consequently reduce the bargaining space and increase the likelihood of war.²⁴ In this sense, fighting a battle is a means for states to resolve information uncertainty.²⁵ However, even revised estimates based on the latest information will necessarily become outdated over time.²⁶ To simplify Smith and Stam’s argument: technology is an important factor of a state’s capabilities, as time progresses technology evolves (and therefore so too do capabilities) and estimates about relative bargaining power diverge.²⁷

8 AI May Evolve Faster Than Other Technology

In Smith and Stam’s model, all technology evolves at the same pace. In this model, there is no reason to believe that AI will contribute to uncertainty any more than any other technology. However, there is reason to believe that AI will not be like other technological advances. Rather, it will rapidly increase the pace of technological change. Gill Pratt, a former Program Manager at DARPA (Defense Advanced Research Projects Agency) argues that we are approaching a “Cambrian explosion” of AI and robotics.²⁸ The technical drivers behind this explosion include exponential growth in computing performance, data storage, cloud computing, wireless digital communication, scale and performance of the internet.²⁹ Pratt argues that these core drivers, combined with deep learning and cloud robotics will create a “virtuous cycle of explosive growth.”³⁰ Given the explosion of growth predicted by Pratt, Smith and Stam’s model may underestimate the level of uncertainty that AI’s ‘explosive growth’ could generate. Their model may be better suited to explaining uncertainty in an age of incremental technological evolution rather than a sweeping “fourth industrial revolution”³¹. Indeed, AI’s potential impact may be greater than either the advent of gunpowder or nuclear weapons.³²

9 Conclusion

AI development is being driven by the private sector. This will result in greater information flows about technological capabilities – a key input into the relative power of states. Typically, increased information flows are associated with more peaceful outcomes between states. However, states will still have incentives to misrepresent or hide information from one another, particularly information pertaining to their adoption and implementation of AI. Perhaps most significantly, Smith and Stam show that all technological change inherently leads to divergent expectations about relative bargaining power. The fact that AI development is being led by the private sector will increase the pace of technological change and thus increase uncertainty more rapidly than other technology. Ultimately, despite increased information flows regarding technological capabilities, AI-driven technological change will increase uncertainty between states and thus, according to rationalist explanations for war, also increase the likelihood of conflict.

23. Smith and Stam, “Bargaining and the Nature of War,” 805.

24. Smith and Stam, “Bargaining and the Nature of War,” 805.

25. Smith and Stam, “Bargaining and the Nature of War,” 787.

26. Smith and Stam, “Bargaining and the Nature of War,” 805.

27. Smith and Stam, “Bargaining and the Nature of War,” 806-11.

28. Pratt, “Is a Cambrian Explosion Coming for Robotics,” 51.

29. Pratt, “Is a Cambrian Explosion Coming for Robotics,” 51.

30. Pratt, “Is a Cambrian Explosion Coming for Robotics,” 51.

31. Schwab, *The Fourth Industrial Revolution*.

32. Payne, “Artificial Intelligence: A Revolution in Strategic Affairs?,” 7-12.

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Preemptive Action and Why the International Agreement to Prevent Unregulated Fisheries in the Central Arctic Ocean was Created

Nicole Covey

Nicole just received her MA in Political Studies from the University of Manitoba as part of the class of 2020, with her MA thesis entitled “Select International Relations Theories and Their Treatment of the International Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean: Canada’s Position”. During the course of her MA, Nicole held the Duff Roblin Fellowship for 2018-2019 and 2019-2020, in addition to the 2018-2019 Murray and Muriel Smith Fellowship.

Abstract

This paper looks at the 2018 International Agreement to Prevent Unregulated Fisheries in the Central Arctic Ocean in an attempt to understand the conditions that allowed for this innovative Agreement to be created. The Agreement is the first large scale fishing moratorium that has been put into place before any commercial fisheries have been established in the region. The Arctic has become more accessible than ever before due to Climate Change and as the ice melts in the central Arctic ocean, a potentially rich fishery is expected to emerge in the high seas. In fear of straddling stocks being over-fished in the high seas and impacting domestic fisheries, the Arctic Coastal States created the 2015 Declaration Concerning the Prevention of Unregulated High Seas Fishing in the Central Arctic Ocean which later turned into the 2018 Agreement. This paper aims to uncover what causes contributed to the creation of this agreement and why the first preemptive large scale commercial fisheries operation occurred in the Arctic. Through the application of the Constructivist framework and the examination of primary documents this paper will explore the question of why the Arctic states took preemptive action, focusing on the perspective of Canada. Concluding that while this Agreement may have only come to fruition due to the unique circumstances surrounding the Central Arctic Ocean, the proactive nature of the Agreement could be applied to future international resource management agreements in order to increase the possibility of resource sustainability in the global commons.

1 Introduction

The International Agreement to Prevent Unregulated Fisheries in the Central Arctic Ocean (henceforth referred to as the Agreement) was signed on October 3, 2018.¹ The Agreement was signed in Ilulissat by the five Arctic coastal states: Canada, Russia, the United States, Norway, and Denmark, as well as Iceland, China, Japan, South Korea, and the European Union.² Making the Agreement’s list of signatories a group comprised of arctic coastal states (Canada, Denmark, Norway, Russia, and the United States), an arctic non-coastal state (Iceland), non-arctic states (China, Japan, and South Korea), and the European Union. The Agreement is the first large scale proactive fishing moratorium in the global commons.³ While there has not been any commercial fisheries established in the high seas of the central Arctic Ocean to this point, the Agreement will prevent the signatories from establishing commercial fisheries once it enters into force.⁴ This Agreement was declared revolutionary and historic, as according to the vice president of conservation policy

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1. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean,” October 3, 2018, <https://www.dfo-mpo.gc.ca/international/agreement-accord-eng.htm>.

2. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

3. Fisheries and Oceans Canada, *Canada Ratifies Landmark International Agreement to Prevent Unregulated Fishing in the Central Arctic Ocean*, Fisheries and Oceans Canada. Government of Canada, May 29, 2019, <https://www.canada.ca/en/fisheries-oceans/news/2019/05/canada-ratifies-landmark-international-agreement-to-prevent-unregulated-fishing-in-the-central-arctic-ocean.html>.

4. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

and programs, Scott Highleyman said “[t]his historic agreement will not only safeguard the Central Arctic Ocean from overfishing but also serves as a model for international cooperation in the face of unprecedented environmental change.”⁵ This paper will explain why preemptive policy is important in terms of management in the global commons, discuss why the first large scale agreement was created in the Arctic, and finally apply a constructivist logic to understand why the government of Canada decided to support and ratify the Agreement. Demonstrating that while this Agreement may have only come to fruition due to the unique circumstances and political climate surrounding the central Arctic Ocean, the proactive nature of the Agreement could be used in order to increase the possibility of resource sustainability in the global commons.

The Agreement was created from the understanding amongst all of the signatories that while the region is currently not suitable for commercial fisheries right now, there is a desire to prevent unregulated fisheries in the future.⁶ The Agreement attempts to accomplish the objective by taking a scientific based proactive approach to resource management in the Arctic high seas, a response that is rooted in the precautionary principle.⁷ There are two major sections of the Agreement, the first being a complete commercial fishing moratorium in the region, and second the Agreement includes the establishment of a “Joint Program of Scientific Research and Monitoring”, that will allow scientific data to be collected about the potential fish stocks in the region.⁸ The Agreement places a high degree of importance on the desire to meld both western scientific research and Indigenous Traditional Knowledge within the framework of the collective scientific research that will be conducted because of the Agreement.⁹ Once the Agreement goes into force it will be considered legally binding for a period of sixteen years, with optional five year renewal periods thereafter.¹⁰ The Agreement will only enter into force once all the signatories have domestically ratified the Agreement.¹¹

2 Constructing the Canadian Perspective

Constructivism is an IR theory that allows for the unique nature of Arctic cooperation and this Agreement to be understood. Since the end of the Cold War the Arctic has been deemed an area of Arctic exceptionalism, regardless of rising tensions around the world involving the Arctic states. When looking at the list of signatories— Canada, the U.S., Russia, Iceland, Denmark, Norway, the E.U., China, South Korea, and Japan— it is surprising that the group would have been able to sign a consensus based international agreement in 2018. The fact that the signatories are a group with diverse interests and geographic relations with the region makes the theory of Constructivism useful in the pursuit to understand the Agreement. Constructivism allows clarity to why the signatories were able to work together to craft and sign the Agreement, through the theory’s view on identity. Ted Hopf in his 1998 work “The Promise of Constructivism” says that:

[i]dentities perform three necessary functions in a society: they tell you and others who you are and they tell you who others are. In telling you who you are, identities strongly imply a particular set of interests or preferences with respect to choices of action in particular domains, and with respect to particular actors.¹²

Emanuel Adler demonstrates this point in his work “Seizing the Middle Ground: Constructivism in

5. Levon Sevunts, “Canada, EU and 8 Other Countries Set to Sign ‘Historic’ Agreement to Protect Central Arctic Ocean,” *CBC News*, October 2, 2019, <https://www.cbc.ca/news/politics/canada-treaty-protect-arctic-ocean-1.4847890>.

6. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

7. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

8. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

9. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

10. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

11. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

12. Ted Hopf, “The Promise of Constructivism in International Relations Theory,” *International Security* 23, no. 1 (1998): 175, <https://doi.org/10.1162/isec.23.1.171>.

World Politics” by saying if you

take a group of people, a nation or various nations and metaphorically toss them in the air. Where they go, how, when and why, is not entirely determined by physical forces and constraints; but neither does it depend solely on individual preferences and rational choices. It is also a matter of their shared knowledge, the collective meaning they attach to their situation, their authority and legitimacy, the rules, institutions and material resources they use to find their way, and their practices, or even, sometimes, their joint creativity.¹³

In other words, the actions a state takes or does not take will have a profound impact on how the actions of the state are viewed. “Constructivist theory requires the analyst to think of the identities of actors as dynamic and consider the sum total of the experiences of others with the particular actor in question before one can understand the actions of the actor.”¹⁴ Meaning and value can only be understood in relation to action and actors, through the context and history through which they are occurring.

Constructivism is not a theory that has an innate view on whether international cooperation will be successful or not, as the theory believes that the context will determine the outcome. Due to the dynamic nature of state identity under Constructivism whether the potential cooperation will be successful is directly related to the current dynamic identities of the actors involved at the point in time.¹⁵ In situations where the actors involved have demonstrated long-term stable identities, there is a greater chance that once international cooperation begins it will be able to be maintained, when compared to situations where the actors involved experience more changes regular changes in identity.¹⁶ Along the same lines, if states have had successfully cooperated in agreements in the past, they may be more inclined to cooperate in the present, but this does not mean that they will always cooperate.¹⁷ This is where the Arctic being known as a region of peaceful cooperation is helpful under a Constructivist framework, as there has been an international cooperation norm established in the region amongst the Arctic states.

The Canadian government’s advocacy of the Agreement and its antecedent Declaration is an attempt to solidify its desired identity of that as an Arctic Leader. The act of signing and being an advocate for international cooperative agreements demonstrates that Canada is taking steps to achieve its desired identity. The desire for this Arctic identity to be recognized by others can be seen in the press release that the Government of Canada released regarding Canada’s ratification of the Agreement says that “[t]his agreement demonstrates Canadian leadership with its partners for responsible stewardship of the central Arctic Ocean and is part of Canada’s broad efforts to contribute to international oceans governance and to combat illegal, unreported, and unregulated fishing (IUU).”¹⁸ For the “Arctic Leader” identity label to be recognized by others, the use of press releases and government statements are important to spread recognition in regards to the policy decisions made by the state.

The decision by the Canadian government to include a representative from the Canadian

13. Emanuel Adler, “Seizing the Middle Ground: Constructivism in World Politics,” *European Journal of International Relations* 3, no. 3 (1997): 320-21, <https://doi.org/10.1177/1354066197003003003>.

14. Nicole Covey, “Select International relations theories and their treatment of the International Agreement to prevent unregulated high seas fisheries in the central Arctic Ocean: Canada’s Position” (master’s thesis, University of Manitoba, 2020), 65, <http://hdl.handle.net/1993/34562>.

15. Covey, “Select International relations theories and their treatment of the International Agreement to prevent unregulated high seas fisheries in the central Arctic Ocean: Canada’s Position,” 66.

16. Covey, “Select International relations theories and their treatment of the International Agreement to prevent unregulated high seas fisheries in the central Arctic Ocean: Canada’s Position,” 66.

17. Covey, “Select International relations theories and their treatment of the International Agreement to prevent unregulated high seas fisheries in the central Arctic Ocean: Canada’s Position,” 66.

18. Fisheries and Oceans Canada, *Canada Ratifies Landmark International Agreement to Prevent Unregulated Fishing in the Central Arctic Ocean*.

Chapter of the Inuit Circumpolar Council as part of the Canadian declaration¹⁹ can be explained by Canada's desire to be seen as a champion of Indigenous interests in the international community. This desire can also be seen in the rhetoric that the Canadian state has released in relation to the Agreement. In the official press release from May 2019 that announced that the Canadian government ratified the Agreement which was entitled *Canada ratifies landmark international agreement to prevent unregulated fishing in the central Arctic Ocean* stated that: "[t]hroughout the negotiation process, Fisheries and Oceans Canada engaged with Inuit organizations, including the Inuit Circumpolar Council Canada [...]"²⁰ and "[t]he Agreement also provides for the participation and inclusion of Arctic Indigenous peoples and their communities, recognizing the critical value of their local knowledge in the conservation of the Arctic Ocean."²¹ The press release from October 2018 *Canada signs international agreement to prevent unregulated fishing in the high seas of the central Arctic Ocean* said: "The shrinking ice cover is affecting the traditional lifestyles of the Indigenous peoples of Canada's North, a fact emphasized by the Inuit Circumpolar Council during the negotiation of this Agreement. Indigenous peoples will continue to play an integral role in the implementation of this Agreement and their traditional knowledge will be an important source of information moving forward. Territorial governments, the fishing industry, and environmental groups will also be involved."²² The inclusion of the Inuit by the government of Canada in reference to the Agreement exemplified by the government's press releases, clearly demonstrate the desire for the state to be viewed as a promoter of Indigenous interests in the North.

If the Agreement goes into force, the next question that will be asked is, will the signatories abide by the terms of the Agreement? When the Agreement was signed it was considered a very low-cost Agreement, as fishing in the Arctic High Seas was and is still considered to be unfeasible. Once the Agreement goes into force it will last sixteen years with possible five-year renewal periods thereafter, and by then it is a possibility that the region will be more accessible and suitable to fisheries during the time of the Agreement. From a Constructivist perspective, with the current available knowledge and the Arctic still being a political arena of international cooperation, it would not make sense for Canada to cheat and violate the terms of the Agreement.

Canada has both domestic and international reasons to abide by the terms of the Agreement. In terms of the international audience, Canada wants the Arctic to remain a zone of peace that is successfully managed through international cooperation. The international identity that Canada wants to achieve/maintain is one of a rule-following, Arctic leader who cares about Indigenous and sustainability issues. It would be determinantal in terms of the moral high ground that the government of Canada likes to claim in relation to the Arctic and international cooperation, if the state were to cheat and/or back out of an International Agreement that they have loudly advocated for since its beginning stages. In terms of the domestic audience, the Canadian government would be extremely cognizant that the legacy of the Atlantic Cod Collapse has remained in the minds of Canada's fishing industry. While there were numerous causes that contributed to the Atlantic Cod Collapse, many attribute the collapse to the over-fishing of the straddling stocks. An additional factor that the government would have to take into consideration is the fact that the Canadian state worked closely with the Inuit on the creation of the Agreement. The Agreement values Indigenous

19. Gloria Galloway, "Ten Governments Reach Deal on Sustainable Arctic Fishing," *The Globe and Mail*, November 30, 2017, <https://www.theglobeandmail.com/news/politics/ten-governments-reach-deal-on-sustainable-arctic-fishing/article37160834/>.

20. Fisheries and Oceans Canada, *Canada Ratifies Landmark International Agreement to Prevent Unregulated Fishing in the Central Arctic Ocean*.

21. Fisheries and Oceans Canada, *Canada Ratifies Landmark International Agreement to Prevent Unregulated Fishing in the Central Arctic Ocean*.

22. Fisheries and Oceans Canada, *Canada Signs International Agreement to Prevent Unregulated Fishing in the High Seas of the Central Arctic Ocean*, FGovernment of Canada, October 3, 2018, <https://www.canada.ca/en/fisheries-oceans/news/2018/10/canada-signs-international-agreement-to-prevent-unregulated-fishing-in-the-high-seas-of-the-central-arctic-ocean.html>.

input and Indigenous Traditional Knowledge, and violating it would bring back to the spotlight the way that the Canadian government has treated the Inuit in the past, through residential schools and the forced High Arctic Inuit relocations of the 1950s. Creating a strong incentive for Canada to maintain the terms of the Agreement.

Constructivism views the possibility of international cooperation through the lens that cooperation is more likely to occur when cooperative behaviour has been established as the norm in the region.²³ Due to Arctic exceptionalism, the Arctic has established norms that it is a political arena that is governed by peaceful international cooperation. This does not mean that the states will always abide by the set terms, but it would make the costs of cheating, namely the international backlash, more significant than in other political arenas. Thus, from the Constructivist perspective it would not be in the interest of the Canadian state to cheat and violate the terms of the Agreement.

3 Preemptive Action in the Global Commons

It is generally accepted that a state has the ability to control its territory and resources within its own borders. The state can create regulations to control the utilization of a resource, and/or ban the extraction of a resource. The state also has the sovereign ability to enforce those aforementioned regulations, but outside a state's borders the question of control and management becomes more complex. Global commons are by definition entities that do not fall under the jurisdiction of any state and therefore every state has the same legal right to utilize the commons.²⁴ Thus, the ability of a single state to regulate the area/resource present in the global commons is seriously curtailed. The high seas, outer space, and Antarctica are all examples of various global commons. Due to the fact that these areas are not under the supervision of a particular state there is a serious concern that the commons will be exploited due to states having unrestricted access to them guided only by self-interest.²⁵ That in order for a state to prevent missing out, they will rush to gain full utilization of the area/resource in question, resulting in unsustainable practices. In terms of global commons management that would translate into unsustainable resource extraction and result in what is commonly referred to as the tragedy of the commons. The 'Tragedy of the Commons' refers to "the ecological collapse that will follow self-interested overuse of an open access commons."²⁶ In order to disincentive states acting solely in self-interest, innovative international agreements must be struck to guide international action. Historically, the agreements struck to manage the global commons have occurred after the area/resource is exhibiting signs of distress. The fact that the Agreement was created proactively could have an important impact on future global commons agreements, as it creates a precedent in which states have acted proactively to manage the commons before issues emerge.

While the definition of what area is classified as the high seas, and therefore what part of the ocean should be classified as part of the global commons has changed over time, the high seas are univocally acknowledged to be the oldest acknowledged form of a global commons.²⁷ In terms of resource management on the high seas, unless a fisheries agreement is put into place, states can exploit the available fish stocks present to the extent that it is in their own interest. The problem with traditional resource agreements in the global commons, is that the political will to create them only appears after problems have started to occur. John Vogler notes that creating international agreements that "[i]n the deep oceans there was little to discuss until marine resources became

23. Covey, "Select International relations theories and their treatment of the International Agreement to prevent unregulated high seas fisheries in the central Arctic Ocean: Canada's Position," 66.

24. Susan J Buck, *The Global Commons: an Introduction* (Washington, DC: Island Press, 1998), 6.

25. John Vogler, "Global Commons Revisited," *Global Policy* 3, no. 1 (February 2012): 64, <https://doi.org/10.1111/j.1758-5899.2011.00156.x>.

26. Vogler, "Global Commons Revisited," 64.

27. "Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean."

scarce, with the arrival of intensive whaling and fishing.”²⁸ As the global demand for fish increases it places a strain on the existing global fisheries. As

[t]he fraction of fish stocks that are within biologically sustainable levels has exhibited a decreasing trend, from 90.0 percent in 1974 to 66.9 percent in 2015. In contrast, the percentage of stocks fished at biologically unsustainable levels increased from 10 percent in 1974 to 33.1 percent in 2015 [... and i]n 2015, maximally sustainably fished stocks (formerly termed fully fished stocks) accounted for 59.9 percent and underfished stocks for 7.0 percent of the total assessed stocks. While the proportion of underfished stocks decreased continuously from 1974 to 2015, the maximally sustainably fished stocks decreased from 1974 to 1989, and then increased to 59.9 percent in 2015.

The fact that the world stocks are experiencing a higher degree of pressure would make a new and emerging fishery more likely to be exploited, which translates to the importance of proactive management for new and emerging fisheries.²⁹

A really interesting point regarding the Agreement is that due to the ice cover there is a serious lack of knowledge regarding what the potential central Arctic Ocean fishery would look like. Article 4.2 of the Agreement says “... determining whether fish stocks might exist in the Agreement Area now or in the future that could be harvested on a sustainable basis and the possible impacts of such fisheries on the ecosystems of the Agreement Area.”³⁰ This is a very important point because it clearly demonstrates the lack of knowledge surrounding the area in question and even the possible existence of a fishery located in the central Arctic Ocean. This lack of understanding and knowledge can also be seen earlier in the Agreement when it states, “ACKNOWLEDGING that, while the central Arctic Ocean ecosystems have been relatively unexposed to human activities, those ecosystems are changing due to climate change and other phenomena, and that the effects of these changes are not well understood.”³¹ Yet, even though a serious lack of knowledge exists regarding the existence of a potential central Arctic Ocean fishery, the signatories involved especially the Arctic coastal states who signed on to the 2015 Oslo Declaration, recognized the need to create the moratorium. In an attempt understand the status of the central Arctic Ocean before the area in question becomes feasible and economically viable for establishing a commercial fishery.

The status of fishery practices on both inside state borders and on the high seas is not only a matter for a state’s domestic affairs due to the existence of straddling stocks. Straddling stocks are a common concern for coastal states because fish are a mobile resource that do not respect the arbitrary human borders. As fish are not a fixed stationary resource, they can straddle the boundary between a country’s Exclusive Economic Zone (EEZ), the area of which the domestic state has first control over the zone’s resources,³² and the high seas. It is also important to note that the area outside the state’s EEZ is considered High Seas and therefore any state can utilize the resources, such as fish.³³ When commercial fisheries are established right outside the coastal

28. Vogler, “Global Commons Revisited,” 63.

29. “The State of World Fisheries and Aquaculture 2018. In Brief,” *The State of World Fisheries and Aquaculture 2018. In Brief*, 2018, <http://www.fao.org/3/CA0191EN/ca0191en.pdf>.

30. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

31. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

32. Article 56 Rights, jurisdiction and duties of the coastal State in the exclusive economic zone 1. In the exclusive economic zone, the coastal State has: (a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds. “United Nations Convention on the Law of the Sea,” *United Nations*, 2018, https://www.un.org/depts/los/convention_agreements/convention_overview_convention.htm

33. Article 116 Right to fish on the high seas: All States have the right for their nationals to engage in fishing on the high seas subject to: (a) their treaty obligations; (b) the rights and duties as well as the interests of coastal States provided for, inter alia, in article 63, paragraph 2, and articles 64 to 67; and (c) the provisions of this section. “United Nations Convention on the Law of the Sea,” *United Nations*, 2018, https://www.un.org/depts/los/convention_agreements/convention_overview_convention.htm.

state's EEZ, the commercial fishery can overfish the straddling stocks which cause serious issues for the coastal state's domestic fishery. In extreme cases the overfishing of straddling stocks can cause the coastal state's domestic fishery to collapse.

The Agreement is the first large scale proactive fishing agreement in the global commons. Preemptive action is not a revolutionary concept in political science, but, preemptive action in terms of international resource management is relatively novel. In fact, the Agreement is the first large scale precautionary fisheries agreement to cover the high seas.³⁴ Historically, the international community comes together to legislate after problems have started to occur, but in regards to the soon-to-emerge central Arctic Ocean fishery an Agreement was struck before any commercial fisheries could be established. The unique proactive nature of the Agreement did not emerge in a political vacuum and the idea of preemption as a way to advance environmental policy can be seen in the 1992 Rio Declaration.

The Agreement itself draws a direct connection between preemptive action and the precautionary principle when it states “DESIRING, consistent with the precautionary approach, to prevent the start of unregulated fishing in the high seas portion of the central Arctic Ocean while keeping under regular review the need for additional conservation and management measures”.³⁵ The precautionary principle has existed in international law for decades, while some scholars argue about when the notion behind the principle first appeared, it has now become an accepted part of many treaties and agreements.³⁶ While there is not a unified understanding of the principle, the most well-known³⁷ and the one this Agreement is based on comes from the 1992 Rio Declaration. The revolutionary proactive nature of the Agreement should be viewed alongside the Precautionary principle which was defined by Principle 15 from the 1992 Rio Declaration on Environment and Development.³⁸

Unrestricted high seas fishery practices can have a serious impact on domestic policies and stocks. One of the most famous fishery collapses was the Canadian Atlantic Northwest Cod Fishery Collapse in the early 1990s.³⁹ “The collapse of the Atlantic Canadian cod fishery in the 1990s is one of the most commonly cited examples in the world of overfishing and its economic, social and cultural implications.”⁴⁰ The Cod Collapse has had a profound impact on the Canadian fisheries industry as a whole. In 2005 a House of Commons Standing Committee Report stated the following reasons caused the Atlantic Cod collapse: catch levels that were too high, domestic underreporting, destructive fishing practices, technological and ecological changes, and foreign overfishing of straddling stocks.⁴¹ The possibility of a fragile emerging Arctic fishery that would be susceptible to collapse would be a major consideration for the Canadian government.

4 Why the Arctic?

The fact that the first large scale preemptive fishing moratorium was established in the central Arctic Ocean can in some ways be attributed to the unique geographic Arctic environment and the

34. Fisheries and Oceans Canada, *Canada Signs International Agreement to Prevent Unregulated Fishing in the High Seas of the Central Arctic Ocean*.

35. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

36. Runyu Wang, “The Precautionary Principle in Maritime Affairs,” *WMU Journal of Maritime Affairs* 10, no. 2 (2011): 143, <https://doi.org/10.1007/s13437-011-0009-7>.

37. Wang, “The Precautionary Principle in Maritime Affairs,” 144-45.

38. “In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.” *Rio Declaration on Environment and Development*, New York, 1992, <https://www.jus.uio.no/lm/environmental.development.rio.declaration.1992/portrait.a4.pdf>

39. Fisheries and Oceans Canada, *Global Consequences of Overfishing*, Government of Canada, February 3, 2009, <https://www.dfo-mpo.gc.ca/international/isu-global-eng.htm>.

40. Fisheries and Oceans Canada, *Global Consequences of Overfishing*.

41. Canada, Parliament, House of Commons, Standing Committee on Fisheries and Oceans, *The Northern Cod: A Failure of Canadian Fisheries Management*, 1 sess., 38 Parliament, Committee Report 4, 2005, 8, <https://www.ourcommons.ca/DocumentViewer/en/38-1/FOPO/report-4/>.

cooperative norms that govern the geopolitical region. The legacy of international cooperation in the Arctic combined with the region's high operating costs, when viewed in addition to the established international cooperative scientific efforts, made the high seas of the central Arctic Ocean the perfect storm for creating an innovative resource management agreement in the global commons.

The central Arctic Ocean is unique due to the harsh conditions that have made the region historically unappealing and unprofitable in regards to establishing commercial fisheries in the high seas. Therefore, by drafting and signing the Agreement the signatories faced no immediate financial disincentive. The signatories were effectively agreeing to continue with the status quo of not establishing commercial fisheries in the region. This is not to say that the Agreement does not have value because a large part of the Agreement's terms solidify the region's current status quo. In fact, the Agreement will become increasingly valuable because of the melting ice in the central Arctic Ocean. Due to global climate change, the Arctic has become more accessible than ever before, and as the Arctic Ocean goes through periods of a longer sustained ice melt the more appealing it will be for states to establish commercial fisheries in the high seas of the central Arctic Ocean.

The Arctic has already started to see an increase in the amount of commercial enterprises due to the region becoming more accessible because of global climate change. There has been an increase in maritime traffic through the Arctic Ocean and that increase is expected to continue.⁴² This increase in traffic is a sign that the region that was once considered unprofitable is now starting to be viewed as a new sphere ripe for commercial expansion. Signalling that once the Arctic becomes more accessible there is a desire to operate in the region. It is therefore, not a far stretch to assume if a rich fishery is found in the central Arctic Ocean, there will be a growing desire amongst many actors to establish commercial fisheries in the Arctic high seas.

The ability of the Agreement to contain such an eclectic group of signatories (Canada, the U.S., Denmark, Norway, Russia, China, the E.U., South Korea, Iceland, and Japan) speaks to the Arctic being considered an area of exception. Arctic exceptionalism is the term that has been given to the region due to the fact that the Arctic has been since the end of the Cold War, treated as somewhat of an isolated political theatre. In other words, the Arctic is a political arena that tends to be impervious by events and tensions occurring with the same actors in other political theatres. While some scholars are now speculating that the era of Arctic exceptionalism is ending, the fact remains that international Arctic governance has been set up to be one of peaceful cooperation. The region retains its peaceful history regardless if the region ends up receiving a higher degree of political spill over from other political arenas in the future. A major reason why states have found high rates of success with international cooperation in the Arctic is because of the isolated nature and high operating cost associated with the Arctic.⁴³ In addition, to the desire of the Arctic states to not bring in tensions from other political arenas, thereby allowing the Arctic to remain a zone of exception.⁴⁴

The terms of the Agreement are seen to be in line with those of the Arctic Council, the region's intergovernmental forum.⁴⁵ All of the state signatories of the Agreement are either Member States

42. Michael Byers and Nicole Covey, "Arctic SAR and the 'Security Dilemma'," *International Journal* 74, no. 4 (2019): 501, <https://doi.org/10.1177/0020702019890339>.

43. Michael Byers, "Cold, Dark, and Dangerous: International Cooperation in the Arctic and Space," *Polar Record* 55, no. 1 (2019): 36, <https://doi.org/10.1017/s0032247419000160>.

44. Danita Catherine Burke and Jon Rahbek-Clemmensen, "Debating the Arctic during the Ukraine Crisis – Comparing Arctic State Identities and Media Discourses in Canada and Norway," *The Polar Journal* 7, no. 2 (March 2017): 391, <https://doi.org/10.1080/2154896x.2017.1376449>.

45. "The Arctic Council: A Background," *Arctic Council*, September 13, 2018, <https://arctic-council.org/index.php/en/about-us>.

⁴⁶ or Observers ⁴⁷ of the Council. The Arctic Council runs on consensus amongst the Member States⁴⁸ which is echoed in the Agreement which states “Decisions of the Parties on questions of substance shall be taken by consensus.”⁴⁹ All those involved with the Arctic Council are required to cooperate and participate in Arctic scientific research.⁵⁰ The corner stone of the Agreement is that the fishing moratorium is put in place until sufficient scientific data is collected that would allow for the future establishment of a sustainable fishing regime.⁵¹ The Agreement even makes the signatories establish “a Joint Program of Scientific Research and Monitoring with the aim of improving their understanding of the ecosystems of the Agreement Area and, in particular, of determining whether fish stocks might exist in the Agreement Area now or in the future that could be harvested on a sustainable basis and the possible impacts of such fisheries on the ecosystems of the Agreement Area.”⁵² Thereby, the Agreement is following the established tradition of an international cooperative effort being established as to advance international Arctic scientific knowledge and research.

The status of the Arctic being a region characterized by international cooperation can be seen both in the work of the Arctic Council but also in signed Arctic Declarations and Agreements. An example is in 2008 when the five Arctic Coastal states (Canada, the U.S., Denmark, Norway, and Russia) signed the Ilulissat Declaration, which stated that “[t]he Arctic Ocean is a unique ecosystem, which the five coastal states have a stewardship role in protecting.”⁵³ The Declaration reinforced the idea that the Arctic states are willing to work together and follow international law.⁵⁴ The 2008 Ilulissat Declaration also spoke to the status of international cooperation in the Arctic, by saying that “[t]he five coastal states currently cooperate closely in the Arctic Ocean with each other and with other interested parties. This cooperation includes the collection of scientific data concerning the continental shelf, the protection of the marine environment and other scientific research.”⁵⁵ The principles that the Ilulissat Declaration reaffirmed such as international Arctic cooperation and joint scientific research are seen in the International Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.

International Arctic cooperation has not been limited to the post-Cold War political environment. As there are examples of International Arctic cooperation that can be found even during the Cold War. The Agreement on the Conservation of Polar Bears (more commonly known as the Polar Bear Treaty) was signed in 1973 by five Arctic coastal states; Canada, Denmark, Norway, the USSR, and the United States.⁵⁶ The agreement was created because there was a general acknowledgment that polar bears needed a greater level of protection than what existed, and so the states with polar bears decided to create the Polar Bear treaty.⁵⁷ An example of bilateral Arctic cooperation

46. “Member States,” *Arctic Council*, September 10, 2015, <https://arctic-council.org/index.php/en/about-us/member-states> Canada, Denmark, Norway, Russia, Iceland, and the U.S. are all member states of the Arctic Council.

47. Japan, China, and South Korea are all currently observers and in regards to the E.U., “[a]t the Kiruna Ministerial Meeting in 2013, the Arctic Council “receive[d] the application of the EU for Observer status affirmatively”, but deferred a final decision. Until such time as Ministers of the Arctic States may reach a final decision, the EU may observe Council proceedings.”

“Observers,” *Arctic Council*, January 14, 2020, <https://arctic-council.org/index.php/en/about-us/arctic-council/observers>
48. “Ottawa Declaration,” September 19, 1996, https://oarchive.arctic-council.org/bitstream/handle/11374/85/EDOC-1752-v2-ACMCA00_Ottawa_1996_Founding_Declaration.PDF?sequence=5&isAllowed=y.

49. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

50. “Ottawa Declaration.”

51. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

52. “Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean.”

53. “The Ilulissat Declaration,” 2008, <https://arcticportal.org/images/stories/pdf/ilulissat-declaration.pdf>.

54. P. Whitney Lackenbauer, “Mirror Images?,” *International Journal* 65, no. 4 (2010): 887, <https://doi.org/10.1177/002070201006500417>.

55. “The Ilulissat Declaration.”

56. “Agreement on the Conservation of Polar Bears,” November 15, 1973, <https://polarbearagreement.org/index.php/resources?task=document.viewdoc&id=1>.

57. Government of Canada, “Polar Bear Conservation: Multilateral Agreement,” *Government of Canada*, April 1, 2019, <https://www.canada.ca/en/environment-climate-change/corporate/international-affairs/partnerships-organizations/polar-bear-conservation-multilateral.html>.

amongst NATO and Non-NATO Arctic states is the Joint Russian-Norwegian Fisheries Commission. The Commission was signed and entered into force in 1975 by Norway and the USSR and was later inherited by Russia after the collapse of the Soviet Union.⁵⁸ Since its creation, the Commission has been amended a few times but has remained in force.⁵⁹

The Arctic Council is the regional high-level forum that fosters cooperation amongst the Arctic states.⁶⁰ The Arctic Council was established in 1996 and since its inception the Arctic Council has fostered increased communication amongst its participants and has helped to facilitate multiple international Arctic agreements.⁶¹ The agreements were created to solve common issues facing the region. The first legally binding international agreement created through the Arctic Council was the 2011 Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, followed by the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic in 2013.⁶² Then, in 2017, the aforementioned Agreement on Enhancing International Arctic Scientific Cooperation was created.⁶³ The presence of legally binding agreements such as the ones facilitated through the Arctic Council are important in understanding that the international management of the Arctic runs through cooperative norms and international agreements.

As established in this section, scientific cooperation in the Arctic is not a unique phenomena to the Agreement in question. In fact, the Agreement tends to follow neatly in line with the established international scientific based cooperative norms that tend to flourish in the region. When the Arctic coastal states were faced with the problem of the central Arctic Ocean opening up to the possibility of commercial fisheries, the coastal states turned to how they had successfully solved regional Arctic issues in the past through international cooperation lead by the five Arctic coastal states. While the terms of the Agreement are not novel for the region, it is the proactive approach that was taken in this Agreement in regard to resource management in the global commons that makes this Agreement unique and fascinating.

5 The Road to Creation

Agreements that contain novel and innovative elements tend to have interesting stories regarding their creation. Containing the circumstances regarding how the agreement was formed, and why that particular agreement came into existence at that particular time and place. In this regard, the International Agreement to Prevent Unregulated Fisheries in the Central Arctic Ocean is no exception. The story of the Agreement that as of the beginning of May 2020, is still ongoing, considering the fact that the Agreement has yet to enter into force. The following events are not an exhaustive list of every event that would have had an impact on the Agreement's creation but does include specific elements that paved the way to the creation of the Agreement, particularly from the perspective of the Canadian state.

The event that started the process leading up to the creation of the Agreement, was the United States closing their north Alaskan Exclusive Economic Zone in regard to commercial fisheries in 2009.⁶⁴ The United States decided to close their EEZ “until such time as domestic fisheries managers have sufficient information about the ecosystem to allow fishing to proceed on a well-regulated

58. “History,” *Joint Fish: Joint Russian Norwegian Fisheries Commission*, <https://www.jointfish.com/index.php/eng/THE-FISHERIES-COMMISSION/HISTORY.html>.

59. “History.”

60. Andrea Charron, “Canada and the Arctic Council,” *International Journal: Canada’s Journal of Global Policy Analysis* 67, no. 3 (2012): 765, <https://doi.org/10.1177/002070201206700312>.

61. “International Cooperation,” *Arctic Council*, <https://arctic-council.org/en/explore/work/cooperation/>.

62. “International Cooperation.”

63. “International Cooperation.”

64. Office of the Spokesperson, *U.S. Signs Agreement To Prevent Unregulated Commercial Fishing on the High Seas of the Central Arctic Ocean*, U.S. Embassy & Consulates in Canada, October 1, 2018, <https://ca.usembassy.gov/u-s-signs-agreement-to-prevent-unregulated-commercial-fishing-on-the-high-seas-of-the-central-arctic-ocean/>.

basis.”⁶⁵ Due to concerns that commercial fisheries would be established right outside the American EEZ depleting the straddling stocks, the U.S. reached out to the other Arctic coastal states — Russia, Denmark, Norway, and Canada— to discuss a possible Arctic fishing moratorium.⁶⁶ As it would have been in the interest of all the Arctic coastal states to limit the possibility of commercial fisheries being established right outside of their respective EEZs.

The next event was that of the 2012 International Polar Year, and the publishing of an open letter. In honour of the first day of the Polar year, an open letter was published from over 2,000 scientists from around the globe.⁶⁷ In the letter, the scientists from sixty-seven countries publicly asked for the creation of a commercial fisheries moratorium in the Arctic.⁶⁸ Due to the fragility of the Arctic the scientists cautioned that “The scientists say even the act of exploratory fishing could cause problems for the ecosystem.”⁶⁹ The melting of sea ice and the increase in attention that the Arctic was receiving, there was a serious concern that the fragile ecosystem would be irreparably damaged if proactive measures were not put into place.

On July 16, 2015 the Arctic coastal states signed the Oslo Declaration, which is also known as the Declaration Concerning the Prevention of Unregulated High Seas Fishing in the Central Arctic Ocean.⁷⁰ The declaration included many key elements that would go on to form the basis of the Agreement. Creating the declaration also provided the opportunity for the Arctic coastal states to announce their priorities and desires for the potential upcoming Agreement before they officially brought in other members.

The next day, July 17, 2015, the Inuit Circumpolar Council (ICC) released a press release entitled *ICC Applauds Adoption of Central Arctic Ocean Fishing Moratorium*. The press release said that the “ICC supports such a precautionary approach and we encourage other nations to follow this lead and sign the agreement”. ICC has been represented in the discussions between the coastal states and provided an Inuit perspective in this process.”⁷¹ The Inuit Circumpolar Council also looked to the future and noted the limitations of the moratorium being a declaration by saying that “ [w]hile the Arctic countries cannot stop boats from China, Japan, South Korea and the European Union from entering the region, the hope is that this agreement can set an example. “Although this is a good start we need a binding international agreement.”⁷² This point was echoed by the U.S. in regards to the Oslo Declaration saying that they recognize other states could be interested in the region’s fisheries as the Arctic Ocean becomes more accessible.⁷³

Negotiations to turn the Oslo Declaration into a legally binding international agreement started in December 2015 and lasted until November 30, 2017.⁷⁴ The number of participants increased at this stage from the five Arctic coastal states to include China, Iceland, Japan, the European Union

65. Office of the Spokesperson, *U.S. Signs Agreement To Prevent Unregulated Commercial Fishing on the High Seas of the Central Arctic Ocean*.

66. Office of the Spokesperson, *U.S. Signs Agreement To Prevent Unregulated Commercial Fishing on the High Seas of the Central Arctic Ocean*.

67. “More than 2,000 Scientists Worldwide Urge Protection of Central Arctic Ocean Fisheries,” *The Pew Charitable Trusts*, April 22, 2012, <https://www.pewtrusts.org/en/about/news-room/press-releases-and-statements/2012/04/22/more-than-2000-scientists-worldwide-urge-protection-of-central-arctic-ocean-fisheries>.

68. Gloria Galloway, “Scientists Urge Canada to Postpone Commercial Fishing in the Arctic,” *The Globe and Mail*, May 8, 2018, <https://www.theglobeandmail.com/news/politics/scientists-urge-canada-to-postpone-commercial-fishing-in-the-arctic/article4101724/>.

69. Galloway, “Scientists Urge Canada to Postpone Commercial Fishing in the Arctic.”

70. Fisheries and Oceans Canada, *International Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean*, Government of Canada, May 15, 2019, https://www.dfo-mpo.gc.ca/international/arctic-arctique-eng.htm%5C#_Key_dates.

71. “ICC Applauds Adoption of Central Arctic Ocean Fishing Moratorium,” *Inuit Circumpolar Council Canada*, July 17, 2015, <https://www.inuitcircumpolar.com/press-releases/icc-applauds-adoption-of-central-arctic-ocean-fishing-moratorium/>.

72. “ICC Applauds Adoption of Central Arctic Ocean Fishing Moratorium.”

73. Office of the Spokesperson, *U.S. Signs Agreement To Prevent Unregulated Commercial Fishing on the High Seas of the Central Arctic Ocean*.

74. Fisheries and Oceans Canada, *International Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean*.

and South Korea. While the members had come to a consensus regarding what the Agreement would say in 2017, they did not officially sign the agreement until October 3, 2018.⁷⁵ In order for the Agreement to enter into force, it requires ratification from all the signatories (Canada, U.S., Denmark, Norway, Iceland, China, Japan, Russia, South Korea, and the E.U.) before it can go into force.⁷⁶ As of the beginning of May 2020, only Canada, the U.S., the E.U., Russia, South Korea, Japan and Norway have ratified the Agreement.⁷⁷ Until the last three signatories ratify the Agreement (China, Denmark, and Iceland) the only document governing the central Arctic Ocean is the Oslo Declaration, which only has the Arctic coastal states (Canada, Denmark, Norway, Russia, the U.S.) as signatories and is not legally binding.

6 Looking to The Future

While it is too early to fully speculate about the future of the Agreement as it has not yet entered into force, some conclusions can still be drawn. The proactive nature of the Agreement is an important step forward in the ongoing dialogue of international management of the global commons. Additionally, the fact that the international community, as demonstrated by the signing of the Agreement, is willing to consider innovative approaches to new issue areas that are starting to emerge. Due to technological advances and global climate change the ability to consider novel approaches is an important point, as the Agreement indicates a willingness to embrace innovation in the global commons.

If all the signatories ratify the Agreement and it enters into force, the Agreement has the possibility to set an impressive precedent for future resource management agreements. Unfortunately, the fact that not all of the signatories have ratified the Agreement at this time means that it is too early to fully speculate on the impact the Agreement may have on future agreements and on the international community. The element of the precautionary principle that is clearly indicated in the Agreement is not revolutionary. As the intent of the precautionary principle has been used in global commons agreements for decades,⁷⁸ and since the 1992 Rio Conference the term itself has been popularized and be entered in more agreements.⁷⁹ The inclusion of the precautionary principle in the Agreement allows it to be included in the continuing dialogue for advancing global environmental interests. It is not the inclusion of the precautionary principle that that sets the Agreement apart from other international agreements, but instead it is the large-scale proactive nature of the Agreement. The fact that signatories decided to come together to proactively legislate an issue before it became a major problem is an important legacy that the Agreement would have on the international community. This legacy of the signatories coming together to proactively protect the central Arctic Ocean is one that the Agreement will hold, regardless of if the Agreement ever enters into force.

As global climate change and technological advances are opening up areas that require new international legislation and discourse. The fact that states are willing to try to prevent the tragedy of the commons from occurring is a positive step forward. Too often throughout history the international community has responded retroactively, taking action only once problems started occurring. If the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean gets enters into force it will be a groundbreaking international agreement that starts the dialogue of proactive problem solving. The story of the Agreement is one of activism and international solidarity to prevent a disaster of the commons from occurring in an incredibly fragile ecosystem. Due to the unique

75. Fisheries and Oceans Canada, *International Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean*.

76. "Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean."

77. Alexander N Vylegzhanin, Oran R. Young, and Paul Arthur Berkman, "The Central Arctic Ocean Fisheries Agreement as an Element in the Evolving Arctic Ocean Governance Complex," *Marine Policy* 118 (2020): 8, doi:10.1016/j.marpol.2020.104001.

78. Wang, "The Precautionary Principle in Maritime Affairs," 143-44.

79. Wang, "The Precautionary Principle in Maritime Affairs," 144.

nature of the Arctic ecosystem and the fact that no commercial fisheries have been previously established in the region makes the Agreement a low-cost opportunity amongst the signatories. Even if the Agreement never enters into force it can and should be viewed as a positive step forward, demonstrating the changing international attitudes surrounding environmental policy, resource management, and sustainability.

In conclusion, the Agreement contains innovative aspects especially in relation to the proactive nature of the Agreement. Considering that the Agreement has yet to enter into force and the low cost associated with the Agreement raises concerns that it may never be ratified by all the signatories. The fact that the first large scale proactive fisheries agreement was crafted in the Arctic when compared to other high seas can largely be attributed to the low cost associated with creating such an agreement. The low cost associated with the Agreement can be attributed to there being no pre-existing fisheries in the region, and all the states who are signatories of the Agreement would have already been doing Arctic scientific research due to their associations with the Arctic Council. Although the Agreement has been publicly signed, it has not yet entered into force and so it is too soon to fully speculate on the impact that the Agreement may have in the future. The question of why Canada would agree to ratify an agreement that contains adversarial partners in issue areas outside the Arctic can be understood through the logic of Constructivism. As Constructivism was able to explain how the Agreement helped to bolster the narrative and desired identity that successive governments of Canada have tried to create and maintain. Thus, it made logical sense for the government of Canada to be a part of and ratify the Agreement, even though it took a novel proactive approach to resource management in the high seas and contained adversarial actors in other issue areas. The proactive nature of the Agreement demonstrates a marked change in mindset from the prototypical in which international action and management is reactive in nature. New problems such as the opening up of the Arctic Ocean have emerged in the global system, and the Agreement demonstrates that states are willing to consider cooperative innovative approaches to solving problems.

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Could Upgraded NATO Partnerships Contain the Spread of Nuclear Weapons in the Middle East?

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Abstract

This paper considers a recent proposal for upgraded NATO partnerships in the Middle East, with the goal of containing nuclear armament proliferation and establishing NATO's influence in the region. This paper argues that there is a need for NATO to adapt to the precarious and fast-changing security reality of the contemporary world by establishing an alliance that maintains deterrence and nuclear non-proliferation in a balancing act. In this light, inclusive NATO partnerships with select Middle East polities could be a form of innovative and dynamic policymaking.

1 Introduction

On January 8, 2020, addressing the Iranian strike on the Al-Asad base in Iraq, U.S President Donald Trump proposed expanding NATO to "NATO+ME"¹, the "ME" referring to the Middle East. While the addition of volatile regimes and political climates into the NATO alliance could come with unwanted complications, NATO has long been active in expanding its Middle Eastern presence. In 1994, NATO launched the Mediterranean Dialogue, a cooperative forum for increased bilateral and "confidence-building" relations with seven countries, including countries in the Middle East and North Africa.² The Istanbul Cooperation Initiative (ICI) in 2004 took the relationship further by transforming NATO into a *partnership* with Middle Eastern states, moving beyond mere dialogue.³

This paper holds the premise that, by working alongside Middle Eastern nations to contain nuclear programmes, NATO could engage in the project of de-proliferation in ways that might not otherwise be possible, addressing a burden that is shared by both NATO members and Middle Eastern countries.⁴ A 2006 U.S Congressional Report on Energy Security states, "NATO is moving into a period in which member states believe that the alliance must be a global player with global partners"⁵ – this paper will consider increasing NATO's presence in the Middle East specifically through the potential of advancing disarmament and denuclearizing in the region. While NATO is still a "nuclear alliance", it has restrained the expansion of nuclear weapons in a number of countries, notably Turkey. NATO has contributed to keeping the exclusive group of nuclear weapons holders – indeed, exclusive, and Brussels is growingly espousing these non-proliferation principles

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1. Caitlin Oprysko, "NATO plus ME: Trump Proposes NATO Expansion into Middle East," *POLITICO*, January 9, 2020, <https://www.politico.com/news/2020/01/09/trump-nato-expansion-proposal-096772>.

2. "NATO Elevates Mediterranean Dialogue to a Genuine Partnership, Launches Istanbul Cooperation Initiative," *North Atlantic Treaty Organization*, July 29, 2004, www.nato.int/docu/update/2004/06-june/e0629d.htm.

3. A limitation of this paper is that it cannot elucidate what 'partnerships' and 'initiatives' concretely entail. This definitional problem is not unique to this paper, but originates from NATO, as "both Arab elites and the wider public are largely confused by terms such as 'dialogue', 'initiative' and 'partnership' and what they are actually going to produce in practical or policy terms".

4. Rep. Sally Khalifa Isaac, *NATO and Middle East and North Africa (MENA) Security* (March 11, 2011), 8, https://www.files.ethz.ch/isn/128708/fp_16.pdf.

5. Paul Gallis, "NATO and Energy Security," *CRS Report for Congress*, December 21, 2006, 4.

more definitively in the early twenty first century.⁶

One important concern is that the attachment of Western democracies to the foreign affairs and security ambitions of authoritarian regimes through an alliance between NATO and countries in the Middle East will effectively increase the likelihood of conflict escalation and eruption. This concern is sometimes called “alliance chain-ganging”. However, this paper argues in keeping with Tierney (2011) that “the tight alliance, once formed, is more likely to favor restraint rather than chain-ganging” especially in the context of the offensive.⁷ It is important to note that NATO is not simply a “tight alliance”, but increasingly a multilateral forum for how to proceed on security issues.⁸

2 The Need to Solve NATO’s ‘Relevancy Problem’ Now

NATO’s ‘relevancy problem’ is without a doubt on the minds of key policymakers and other officials. A 2001 NATO-sponsored publication addressed its ‘relevancy problem’ like this: “the argument put forward is simple: If NATO was created in order to act as a deterrent to Soviet imperialism and to counter communism and the perceived nuclear threat, then what is its relevance today?”⁹ Others question whether the nature of the alliance itself should remain grounded on “collective defence” (which for all intents and purposes can be translated to deterrence) or on a new teleology since, “the strategic security environment has changed to such a degree as to require a new purpose for the Alliance”.¹⁰ While the Kremlin remains a legitimate security concern for the NATO alliance in the twenty-first century (as the 2008 invasion of Georgia and 2014 annexation of Crimea demonstrate), given contemporary security concerns, the Middle East ought to be at the forefront of NATO interests going forward. At any rate, NATO is far removed from the time when members were exclusive to the North Atlantic region, as states such as Turkey and North Macedonia hold full membership status. A NATO expansion to the Middle East would not be without precedent on these grounds.

The time is ripe for NATO to upgrade and define its partnerships and initiatives with the Middle East. Following American withdrawals from the region throughout the 2010s, and following the Arab Spring, the Middle East is undergoing a period of crucial transformation. As the US withdraws its personnel and other resources from the region, it leaves behind volatile power vacuums on which both local militant extremists and Iran can capitalize. NATO has the capacity and the motivation to organize local actors—both military and political—in order to facilitate future stability in the Middle East. To this end, a major source of NATO’s modern relevance stems from the joint-training operations that foster trust among partners and enhance the power capabilities of military forces. Joint-training missions ought to continue into the new decade in the Middle East with NATO as the facilitator—they help define what shared responsibilities are necessary for ongoing partnerships.¹¹

The quickly transforming energy landscape towards nuclear power may also be a mark of a critical juncture in the region. Thirteen states in the Middle East have “announced new or re-launched civilian nuclear programs”, making the region fertile ground for a nuclear arms race.¹² Saudi Arabia has publicly acknowledged that it is pursuing nuclear capabilities. To the frustration of the international community, the Trump administration has authorized and facilitated the

6. Rose Gottemoeller, “NATO’s Enduring Commitment to the Non-Proliferation Treaty,” *North Atlantic Treaty Organization*, May 5, 2017.

7. Dominic Tierney, “Does Chain-Ganging Cause the Outbreak of War?,” *International Studies Quarterly* 55 (2011): 294.

8. Timo Noetzel and Benjamin Schreer, “Does a Multi-Tier NATO Matter? The Atlantic Alliance and the Process of Strategic Change,” *International Affairs (Royal Institute of International Affairs 1944-)* 85, no. 2 (March 2009): 224.

9. George Minas, *NATO’s Relations with Russia: The Greek Proposal* (Athens: North Atlantic Treaty Organization, 2001), 6.

10. Patrick T Warren, *Alliance History and the Future NATO: What the Last 500 Years of Alliance Behavior Tells Us about NATO’s Path Forward* (Washington: Brookings Institute, 2010), 9.

11. *NATO Mission Iraq* (Brussels: North Atlantic Treaty Organization, 2020), https://www.nato.int/cps/en/natohq/topics_166936.htm.

12. Mustafa Kibaroglu, Avner Cohen, and Marie Rost Rublee, *The Nuclear Question in the Middle East*, vol. 4 (2012), 6.

Saudi nuclear energy program, allowing select American companies to sell nuclear technology to Riyadh.¹³ Although the Saudis have claimed that these pursuits are for civilian purposes, this does not negate the possibility of Riyadh developing nuclear weapons covertly if they have the resources to do so.¹⁴ Saudi Energy Minister Prince Abd al Aziz bin Salman Al Saud has stated that, “we want to make sure that even if we scale up [nuclear power], we scale up to the notion that we want to go to the full cycle, to producing the uranium, enriching the uranium, using the uranium”.¹⁵ The United Arab Emirates is on a similar trajectory, as it plans to have four nuclear power reactors as part of a new programme. The Barakah Nuclear Power Plant is operational as of 2020, while the Emirati’s other three reactors are in “advanced levels of construction”.¹⁶ What is notable about these civilian nuclear programmes is that they suggest a capability to develop nuclear armaments in the future.

Perhaps most pressing is the case of Iran, as the unilateral nullification of the Iranian Nuclear Deal (a Trump initiative) has severely compromised the international community’s ability to limit the country’s pursuit of nuclear capabilities and other forms of armaments. As of 2019, Iran has begun to “back away from full compliance” with the Deal which had previously curbed the development of Iranian nuclear capacity.¹⁷ In order to pre-empt a nuclear-capable Iran, new geopolitical and diplomatic strategies must be devised. This is important, as the more capability Iran has to obtain nuclear weapons, the more its rivals and adversaries are likely to follow suit in a Cold War style security dilemma and arms race. In March 2018, Crown Prince Mohammed Bin Salman explicitly stated that he will develop nuclear weapons if Iran were to do so first.¹⁸

In summary, current conditions, left unchanged, might lead to a nuclear Middle East. Despite the fact that the security reality of the modern world is long detached from NATO’s origins in the Cold War, NATO could adapt and function as a force for containment in an increasingly unpredictable region. At the same time, Russia has expanded its nuclear market in the Middle East through its state-owned corporation (Rosatom), making NATO alliances in the Middle East a potential containment mechanism for the Kremlin’s geopolitical ambitions that could have nuclear consequences.¹⁹

3 Israel as a NATO member?

Convincing Israeli policymakers to join would not be an easy task, and would require some initiative and compromise on the part of NATO. There is little reason to believe that Israel would willingly put restraints on its nuclear program if it renders that its military and political capabilities are severely compromised. Israel has historically enjoyed unilateralism and unrestrained maneuvering in the Middle East; a NATO alliance could act as an obstacle to this behaviour.²⁰

Despite these obstacles (and controversy), the possibility of Israel becoming a NATO member is an important and serious proposal. Because Israel is one of the few countries in possession of nuclear weapons, it is also one of the few countries where a campaign for non-proliferation could have tangible results. Furthermore, geography is an important concern in relation to the security of Israel’s nuclear weapons. For illustration, Israel’s Shimon Peres Negev Nuclear Research Center has had Hamas rockets land in its vicinity on numerous occasions in 2012 and 2014.²¹ Nuclear weapons

13. Timothy Gardner, “U.S. Approved Secret Nuclear Power Work for Saudi Arabia,” *Rueters*, April 27, 2019.

14. Geoff Brumfiel, “As Saudi Arabia Builds A Nuclear Reactor, Some Worry About Its Motives,” *NPR*, May 6, 2019.

15. *Physical Protection of Critical Infrastructure Against Terrorist Attacks* (United Nations Security Council Counter-Terrorism Committee Executive Directorate, March 2017).

16. Natasha Turak, “The UAE Gets Green Light to Operate the Arab World’s First Nuclear Power Plant,” *CNBC*, February 17, 2020, <https://www.cnbc.com/2020/02/17/uae-gets-green-light-to-operate-the-arab-worlds-first-nuclear-power-plant.html>.

17. Vali Nasr, “A New Nuclear Deal Won’t Secure the Middle East,” *Foreign Affairs*, February 7, 2020.

18. David E Sanger and William J Broad, “Saudi Crown Prince Says Will Develop Nuclear Bomb If Iran Does: CBS TV,” *Reuters*, May 15, 2018, <https://www.reuters.com/article/us-saudi-iran-nuclear/saudi-crown-prince-says-will-develop-nuclear-bomb-if-iran-does-cbs-tv-idUSKCN1GR1MN>.

19. Matthew Cottee and Hassan Elbahtimy, “Russia’s Nuclear Ambitions in the Middle East,” *Foreign Affairs*, May 20, 2016.

20. David J Ingel, “Prospects for Closer Israeli-NATO Cooperation,” 2015, 29.

21. “Israel Air Strikes on Gaza: Hamas Video Shows Rocket Strikes on Israeli Nuclear Facility,” *The Telegraph*, July 10, 2014.

are far more geographically (and politically) secure in Britain, France, and the U.S. than they are on Israeli soil. To address this concern, NATO could work to convince Tel Aviv of increased nuclear sharing in exchange for fewer nuclear warheads on Israeli soil.

The case of Turkey demonstrates the mutual benefits that both Israel and NATO would enjoy from Israeli membership, without watering down the coercive power of each parties' deterrence. NATO has distanced Turkey from nuclear ambitions for almost 70 years. To this end, "Turkey's involvement in nuclear sharing reduces the temptation for Ankara to develop its own nuclear weapons capability", and because of nuclear sharing, "not even the prospect of a nuclear-armed Iran is likely to push Ankara to develop its own nuclear weapons".²² Being part of NATO therefore serves as a restraint in and of itself as "the opposition posed by the United States, Canada, and Germany has long been effective in impeding Turkey's attempts to benefit from peaceful uses of nuclear energy".²³ Erdogan expressed dissatisfaction with Turkey's lack of nuclear weapons in September 2019.²⁴ This resentment, targeted at NATO allies for not 'allowing' Turkey to own nuclear weapons of its own, is evidence in itself of weapons sharing functioning as a non-proliferation mechanism.

In January 2014, cabinet minister Ze'ev Elkin stated that Israel could, "broaden the range of matters that NATO and Israel join forces on, including having an Israeli representative at NATO".²⁵ Even if the prospect of Tel Aviv joining NATO is optimistic, upgraded Israeli involvement in NATO might eventually result in increased pressure for Israel to comply to the principles of non-proliferation.

4 Pre-empting a Potentially Nuclear Saudi Arabia

Saudi Arabia presents another opportunity for expanding NATO influence in the Middle East since Riyadh is in ongoing talks to include itself into the Istanbul Cooperation Initiative along with fellow Gulf States.²⁶ Because Saudi Arabia is upgrading its partnership, NATO could likely pressure the regime from pursuing a nuclear program. While Saudi Arabia does not presently possess nuclear weapons, the amicable relationship between Saudi Arabia and Pakistan poses an important threat (whereby Pakistani nuclear warheads are potentially available for use by the Saudis if conflict escalates in the Arabian Gulf).²⁷ Pakistan's hypothetical contribution to Riyadh would be a quid pro quo since the Saudis financed the initial Pakistani atomic bomb programme, and have previously "promised 50,000 barrels per day of free oil to help the Pakistanis cope with the economic sanctions that might be triggered by a counter test".²⁸

If NATO offers a more cohesive and concrete alliance with Saudi Arabia, it could distance two capricious states from a potentially disastrous nuclear transaction. A policy of nuclear sharing is immensely more stable if it is between the U.S. and Saudi Arabia instead of between Pakistan and Saudi Arabia. For the Saudi government, NATO offers a more diplomatic means of upgrading their defensive capacity without going down the long and risky route of developing nuclear weapons of its own. Using NATO as a mechanism of restraint could be a pragmatic plan to pre-empt a Saudi nuclear program, or the use of Pakistani warheads.

The good news for the international community is that Saudi Arabia could not covertly develop a nuclear weapon overnight, and "they couldn't plausibly build a weapon without out-side help".

22. Sinan Ulgen, "Turkey and the Bomb," *The Carnegie Papers*, February 2012, 1.

23. Kibaroglu, Cohen, and Rublee, *The Nuclear Question in the Middle East*, 16.

24. Toksabay Ece, "Erdogan Says It's Unacceptable That Turkey Can't Have Nuclear Weapons," *Reuters*, September 4, 2019.

25. Raoul Wootliff, "In Upgrade to Ties, NATO Accepts Israel's Official Representative," *The Times of Israel*, March 4, 2016, <https://www.timesofisrael.com/in-upgrade-to-ties-nato-accepts-israels-official-representative/>.

26. Jack Moore, "NATO 'Ready to Welcome' Saudi Arabia and Oman," *The National*, July 13, 2014, <https://www.thenational.ae/world/mena/nato-ready-to-welcome-saudi-arabia-and-oman-1.749925>.

27. Yoel Guzansky, "Questioning Riyadh's Nuclear Rationale Saudi Arabia's Atomic Ambitions," *Middle East Quarterly* 20, no. 2 (2013): 64.

28. Bruce Riedel, "Saudi Arabia: Nervously Watching Pakistan," *Brookings*, January 28, 2008, <https://www.brookings.edu/opinions/saudi-arabia-nervously-watching-pakistan/>.

²⁹ Moreover, NATO could use its shared logistics to detect covert nuclear weapons facilities. To quote a research report titled “Steps toward a Middle East Zone Free of Nuclear Weapons and all other Weapons of Mass Destruction” (2013), “Remote detection of the shut-down of Israel’s nuclear reactor and reprocessing plant could be the first step toward regional monitoring by prospective parties to a Middle East WMD-free zone” – a homogeneous remote detection operation of Saudi Arabia’s nuclear activity is arguably far more pressing.³⁰ If NATO enhances Saudi Arabia’s role, it is far more possible to remotely detect Riyadh’s nuclear activity. A mark of success for NATO is that it involves the multilateral sharing of resources and logistics, which helps to police the world’s security order; as a result, Brussels could function to make any civilian pursuit of nuclear technologies more transparent to the international community.

5 Counter-Terrorism Requires NATO Presence in the Middle East

Notably, NATO has a strong commitment to combatting terrorist nuclear threats, both domestically within the NATO community and externally.³¹ However, NATO cannot keep terrorist organizations denuclearized from Brussels. An increased presence in the Middle East would enable the negation of a calamitous scenario where a terrorist organization acquires nuclear capacity. Moreover, as nuclear reactors in the Middle East become more common, the increasingly sophisticated bombings carried out by terrorist organizations reaches new and devastating stakes. A nuclear site could be the target or the collateral of a terrorist attack – as a parallel illustration, global attacks on oil and gas infrastructure have skyrocketed in the 2000s, with the majority of these attacks coming in the form of bombings.³²

The potential scenario where a terrorist organization acquires access to nuclear weapons is not farfetched.³³ A *NATO Review* publication states that, “the international intervention in Afghanistan has effectively denied al-Qaida its major home base and has forced it to disperse, thereby making any concerted planning of a nuclear attack far more difficult”.³⁴ The logic follows that a NATO presence in a country functions as a deterrent to the acquisition of nuclear weapons by terrorists, and a potential site of intervention if such acquisition occurs. NATO activity in the Middle East may also deter host-states from sponsoring proxy-terrorists for training and other forms of patronage. In the case of Iran, for example, an enhanced NATO presence in the region could deter the Khamenei regime from facilitating terrorists on its territory, even if deterrence is ineffective to the terrorists themselves.³⁵ Isolating Iran from its terrorist affiliates, such as Hezbollah, ought to be a top priority for NATO’s containment strategy.

6 Conclusion

Upgraded NATO initiatives and partnerships in the Middle East are likely to contribute positively to denuclearizing unstable regimes in at least three ways. First, more NATO partnerships could mean increased leverage for NATO and thus more capacity for managing nuclear stability – alliances can function as a form of restraint. Second, both Israel and Saudi Arabia are more likely to avoid future nuclear armament if part of NATO, due to the principle of nuclear sharing. Turkey’s non-nuclear

29. Matthew Bunn as quoted in David E Sanger and William J Broad, “Saudis Want a U.S. Nuclear Deal. Can They Be Trusted Not to Build a Bomb?,” *New York Times*, November 22, 2018

30. Frank N von Hippel et al., *Fissile Material Controls in the Middle East: Steps toward a Middle East Zone of Nuclear Weapons and All Other Weapons of Mass Destruction* (International Panel of Fissile Materials, 2013), 9.

31. “Brussels Summit Declaration,” *North Atlantic Treaty Organization*, July 11, 2018, https://www.nato.int/cps/en/natohq/official_texts_156624.htm.

32. *Physical Protection of Critical Infrastructure Against Terrorist Attacks*, 5.

33. Michael Ruhle, “Analysis - The nuclear dimensions of jihadist terrorism,” *NATO Review*, October 1, 2007, <https://www.nato.int/docu/review/articles/2007/10/01/analysis-the-nuclear-dimensions-of-jihadist-terrorism/index.html>.

34. Ruhle, “Analysis - The nuclear dimensions of jihadist terrorism.”

35. Oliver Meier and Paul Ingram, “The NATO Summit: Recasting the Debate Over U.S. Nuclear Weapons in Europe,” *Arms Control Today*, March 2012.

status serves as a precedent for this approach, as the possibility of drawing on member-states' resources has been sufficient to prevent proliferation. Membership in the NATO alliance serves the purpose of having access to nuclear weapons without unilateral acquisition. Third, NATO could address concerns about the acquisition of nuclear weapons by terrorist groups by having a strong presence in the region, and strengthening its geopolitical ties. This is particularly important in Iran, where a less armed and more constrained Tehran means a lesser likelihood of erratic proxies attaining nuclear weapons, and the less likelihood of a Middle Eastern nuclear arms race.

NATO's *raison d'être* must not be something static, but constantly changing and in flux with the security situation of the day. Incorporating specific Middle Eastern states into NATO, or at least encouraging more involvement in alliance politics, can serve as a pragmatic way to maintain the alliance's relevance on the international stage. Expanding membership and more extensive partnerships could have the positive impact of containing the spread of nuclear weapons in the Middle East. If NATO is to adapt to contemporary security challenges, and maintain its relevance beyond the Cold War, it must constantly reimagine its contributions to world security.

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