Appendixes

Appendix A
The North American Defense Industrial Base: Canadian and Mexican Contributions

Introduction

Since the beginning of World War II, Canada and the United States have engaged in extensive defense industrial cooperation that has resulted in the partial integration of their defense bases. With sharp cuts in defense spending in both countries, however, this partnership faces major challenges. Will the two countries intensify their collaboration or turn instead to greater protectionism? In planning for the future U.S. defense technology and industrial base (DTIB), Congress will want to consider Canada's contribution to U.S. defense procurement and wartime preparedness, as well as the political and economic consequences of various policy options affecting the Canadian portion of the base. There is also a need to consider the implications for the DTIB of growing U.S. economic integration with Mexico, including the production and assembly of defense products and the potential relocation of some subtier industries across the border.

The concept of a North American Defense Industrial Base (NADIB) was never a clear U.S. policy objective but has evolved on an ad-hoc basis over the past four decades. In the early 1960s, Canada agreed to buy its major weapon systems from the United States if three conditions were met:

1. the absence of a domestic production capability for the system in question,
2. a price that was "not prohibitive," and
3. tariff-free access by Canadian component suppliers and subcontractors to the U.S. defense market.

Since then, U.S.-Canadian defense industrial collaboration has developed according to guidelines laid down in numerous agreements negotiated by the two governments as specific needs arose. Collectively known as the Defense Development and Defense Production Sharing Arrangements (DD/DPSA), these accords have created a degree of interdependence between the U.S. and Canadian defense industries. In 1990, direct sales of Canadian defense goods to the U.S. Department of Defense were nearly Can$450 million, while subcontracting by Canadian firms to U.S. prime contractors rounded out the total to about Can$l billion.[1]

Over the past decade, U.S. defense contractors have also begun to perform production and assembly work in Mexico, taking advantage of the special customs arrangements established under the Mexican Government's *maquiladora* (assembly plant) program to benefit from the low labor costs available across the border. As the United States, Canada, and Mexico move toward the creation of a continental free-trade zone, trade in dual-use and defense products among the three countries is likely to increase. In that context, a North American industrial base, and an associated expanded NADIB, may ultimately emerge.

At present, however, the NADIB is still far from being fully integrated. U.S.-Canada defense trade has long been constrained by protectionist legislation in both countries, as well as by the small size of Canada's defense industry. Moreover, the prospect of significant cuts in U.S. defense spending and declining arms sales to Western Europe may increase domestic pressures to protect the U.S. defense market, injecting new tensions into the U.S.-Canada relationship.

This appendix surveys the structure of the Canadian defense **industry and its contribution to the NADIB, the history of U.S. defense-industrial cooperation with Canada, the developing partnership with Mexico, and the effect on these relationships of shrinking defense budgets and markets. The appendix concludes with a discussion of whether expanded defense-industrial cooperation with Canada and Mexico could help the United States maintain a downsized yet cost-effective defense technology and industrial base.**

The Canadian Defense Industry

The Canadian defense industrial base is much smaller and more fragmented than that of the United States, and is also more diversified into the civilian sector. The Canadian aerospace industry, for example, depends on defense business for only 30 percent of its revenue, compared to more than 60 percent for similar industries in Japan, Europe, and the United States.[2]

Since the early 1960s, Canada has pursued a strategy of purchasing almost all of its major platforms and weapon systems from foreign sources (mainly the United States[3])

[1]Data provided by Canadian Embassy, Washington, DC.

[2]David Hughes, "Canadian Aerospace Industry Prepares for Rising Competition, Falling Defense Sales," *Aviation Week & Space Technology, vol. 134, No.* 11, Mar. 18, 1991, p. 68.

[3]In 1987, Canada acquired Can$1.7 billion in defense equipment from the United States, or 77 percent of the total Can$2.2 billion defense procurement budget. Source: Max Reid, Counselor for Defence Programs, Canadian Embassy, Washington DC.

while developing and manufacturing high-quality defense subsystems and components in selected areas where Canada possesses technological strengths. Within the context of this acquisition strategy, the Canadian Government has sought to secure domestic or multiple foreign sources for "critical" items of defense equipment and to maintain a defense-industrial base capable of producing the consumables of war(e.g., ammunition and spare parts) and repairing and overhauling foreign-sourced weapons.

The Canadian defense industry employs between 80,000 and 90,000 people. Although the industry accounts for less than 1 percent of Canada's total GNP, employment, and exports, it dominates a few industrial sectors. More than 65 percent of employment in shipbuilding, for example, is tied to defense contracts.[4] Since the Canadian defense procurement budget is small (about US$2.2 billion in 1990), the industry relies heavily on export markets. In 1988, 30 percent of sales in the aerospace and defense electronics fields were domestic, 49 percent were to the United States, and 21 percent to the rest of the world.[5]

Of roughly 1,000 potential suppliers of defense products, about 250 firms are active producers, all of them in the private sector. Only a few are large corporations with annual sales of more than $100 million; most are relatively small suppliers or subcontractors employing between 25 and 50 people. Like Canadian industry generally, the defense industry is concentrated geographically: the large majority of electronics and aerospace firms are located in the provinces of Ontario and Quebec, and shipbuilding is based primarily in the Atlantic region. The secession of Quebec from the rest of Canada might have a serious effect on the Canadian defense industrial base if Quebec insisted on full sovereignty, which is only a remote possibility. Even so, the aerospace industry is unlikely to leave Quebec, and the industrial ties developed over 50 years between Quebec and the United States would continue.

Canada produces only a few stand-alone defense systems, including remotely piloted vehicles, the Swiss-designed Light Armored Vehicle (LAV), and the Canadian Patrol Frigate. Most Canadian defense companies are specialized in the production of electronic subsystems, munitions, and precision-machined parts and components (e.g., aircraft wing assemblies) for export to U.S. and European prime contractors. Aerospace equipment and electronics account for 70 percent of total defense sales, followed by shipbuilding, wheeled armored vehicles, and munitions. Areas in which the Canadian defense industry

Photo credit: Canadair, Surveillance *Systems Division*

The CL-227 Sentinel unmanned airborne surveillance system, manufactured by Canadair in Montreal, performs battlefield reconnaissance under remote control. It has a top speed of 130 knots, and an endurance of up to *4* hours.

is **on the technological leading edge include small gas-turbine engines, reconnaissance drones, avionics, flight simulators, structural components for aircraft, military communications equipment, acoustic antisubmarine warfare systems, remote sensing, ballistic computers and fire-control systems, and equipment suitable for use under Arctic conditions. (Table A-1 lists the U.S. defense contracts awarded to the Canadian industry from 1987 to 1989.)**

Leading Canadian-owned defense contractors include Spar Aerospace (developer of the Space Shuttle robot arm), CAE-Link (a leader in simulation technology), and Indal Technologies (which produces shipboard helicopter recovery systems). Nevertheless, many of the largest Canadian defense contractors are foreign-owned. About 54 percent of the industry is in U.S. hands, while another 10 percent is European-owned, primarily by British corporations.[6] Seven of the top 10 Canadian firms (by sales) in the aerospace and defense electronics sectors are U.S.-owned, including Boeing's De Havilland Division, McDonnell Douglas Canada, Litton Systems Canada, RCA Canada, Raytheon Canada, Garrett Canada, and Pratt & Whitney Canada. These subsidiaries enjoy varying degrees of autonomy from their U.S. parents. For example, Pratt & Whitney, with 9,500 employees, is the largest aerospace concern in Canada; it has an all-

[4]James Fergusson, *Canadian Defence Trade and Europe: Methodological Concerns and Empirical Evidence,* Centre for Studies in Defence Resources Management, Solicited Research Report #4 (Kingston, Canada: National Defence College, fall 1990), p. 18.

[5]David Leyton-Brown, "The Impact of European Market Integration on Canadian-American Defence Industrial Cooperation," Centre for Studies in Defence Resources Management, Solicited Research Report ##5 (Kingston, Canada: National Defence College, fall 1990), p. 2.

[6]Ibid.

Table A-1—U.S. Defense Contracts Awarded to Canadian Companies, 1987-1989 (millions of Canadian dollars)

Company	Year	Contractor	Value	Product
Canadian Marconi	1987	U.S. Air Force	0.5	Demonstration: Microwave Landing System Avionics
Canadian Marconi		U.S. Air Force	NA	Airborne Microwave Landing System Receiver
Canadian Marconi		U.S. Army	NA	CMA-2016 Helicopter Flight Computer System
Hermes		U.S. Navy	11.0	AN/SSQ-53B Sonobuoy
Menasco		McDonnell Douglas	2.7	C-1 7 Nosewheel and Steering System
Indal Technologies		U.S. Navy	10.0	Shipboard Helicopter Recovery System (RAST)
Garrett		U.S. Air Force/Canada	4.0	Study of Next Gen. Environmental Control System
Leigh instruments		U.S./Spain/Canada	9.4(est)	Recording/Radio Communication Systems for F-18
Adanac	1988	U.S. Navy	9.0	Program Management System--Antisubmarine Warfare
Adanac		U.S. Navy	12.0	Shipboard Helicopter Recovery System (BEAR TRAPS)
Canadian Marconi		Sikorsky	9.0	Helicopter Cockpit Display Systems
CAE-Link		U.S. Army	60.0(est)	Blackhawk/Chinook Helicopter Simulator
Northern Telecom		U.S. Air Force	147.0	Integrated Digital Telecommunications Systems
Hermes		U.S. Navy	10.0	AN/SSQ-62B Sonobuoys
Astra Pyrotechnics		U.S. Dept. of Defense	1.6	Signal Cartridges
Spar Aerospace		U.S. Navy	NA	AN-SAR-8 Shipboard Infra-Red System
Hawker Siddley		Textron-Lycanning	6.1 (est)	ALF502R Jet Pipes and TF40 Engines
Canadian International	1989	U.S. Dept. Defense	2.4	DEW Line Transmission Systems
Computing Devices		U.S. Navy	NA	Antisubmarine Warfare Interface Convertor Units
Computing Devices		U.S. Navy	NA	Unmanned Air Vehicles (with Teledyne Corp.)
Canadian Marconi		Lockheed	3.2	Next-Generation U.S. Navy Microwave Landing System
Canadian Marconi		Lockheed	3.2	Microwave Landing System for P-7A
Canadian Marconi		U.S. Army	58.0	AN/GRC-226(V) Radio Sets
Canadian Marconi		U.S. Air Force	1.2	Airborne Navigational Equipment
Dowty		U.S. Lockheed	200.0	P-7A Landing Gear
Donlee Precision		U.S. Navy	1.5	Jet Turbine Shafts
Litton Systems		Kerry Electronics	1.0	LED Switches-Boeing Military Aircraft
Oerlikon		U.S. Army	NA	Air Defense and Anti-Tank System (ADATS)
Heroux		U.S. Air Force	2.5	Landing Gear for CSA/B, C-130, KC-135R
Bristol		U.S. Air Force	4.6	F-5 Horizontal Stabilizers

NA = Not available

SOURCE: James Fergusson, Canadian *Defense Trade and Europe:* Methodological Concerns *and Empirical Evidence,* Center for Studies in Defense Resources Management, Solicited Research Report #4 (Kingston, Canada: National Defence College, fall 1990), table Viii.

Canadian **board of directors and behaves more like a Canadian firm than a foreign subsidiary.**

Canada's current defense industrial base has both strengths and weaknesses. Its strengths include a relatively new industrial plant compared with those of other Western countries, close proximity to the United States, a relatively secure location (compared to Europe), a local supply of strategic raw materials, and access to foreign technology through U.S. and European ownership. The small size of the base also makes it relatively manageable from the standpoint of the Canadian Government, although the base has been shaped by its dependence on foreign military and technological requirements.[7] Weaknesses of the Canadian base include the small size of the domestic defense market, overconcentration in certain market niches, and the Canadian Government's modest support for defense R&D, which could render the industry's niche markets vulnerable to foreign competition.[8]

During the early 1980s, the Canadian Government invested considerable resources in rebuilding or expanding key elements of the domestic defense industrial base, with the goal of restoring a selective capability for the design and production of weapon systems. The Canadian Government also invested in the defense industry to promote high-technology innovation, regional industrial development, and skilled employment. This revitalized defense base includes naval shipbuilding and naval electronics subsystems for the Canadian Patrol Frigate program; the integration of production facilities for military trucks, utility vehicles, and light armored vehicles; the capability to manufacture small arms such as the M-16; the phased development of a light to medium helicopter industry; continued expansion of the design

[7] R.B. Byers et al., *Canada and Defence Industrial Preparedness: Options and Prospects* (North York, Ontario: York University Centre for International and Strategic Studies, April 1987), p. 120.

[8] Only about 5 percent of the US$2.2 billion Canadian defense budget is devoted to R&D. In 1989, the Canadian defense industry invested US$637 million in R&D, as well as US$449 million in plant and equipment. Source: David Hughes, "Canadian Aerospace Industry Prepares for Rising Competition" op. cit., footnote 2, p. 68.

and production of small gas-turbine engines; and a significant improvement in ability of the defense industry to undertake large-scale integration projects.[9]

Nevertheless, the plummeting domestic defense requirements caused by the end of the cold war, combined with softening export markets, have raised concerns that the Canadian Government's substantial investment in the defense industry may be wasted. Few new programs are being launched to replace ongoing weapons programs, and many Canadian defense contractors are already increasing their share of nondefense work. The aerospace industry is expected to reduce the military portion of its sales from 30 to 20 percent of the total. 10 As defense firms turn increasingly to the civil sector, Canada is losing critical elements of its defense industrial base. For example, Canadian Marconi Co. (CMC) recently closed its manufacturing facility in Montreal for military-standard printed circuit boards, eliminating Canada's only domestic source of these vital components.[11]

The U.S.-Canada Relationship

With the exception of the late 1970s, when Canada acquired the German *Leopard I tank*, defense trade with the United States has dwarfed that with any other country. In 1989, for example, the United States accounted for 84.7 percent of Canadian defense imports and 80 percent of Canadian defense exports.[12] Canada is also a major supplier of strategic raw materials used in U.S. defense production: of the 35 critical materials not available domestically, Canada provides 23. Finally, the Canadian defense industrial base is heavily integrated into the U.S. base at the subtier level. Thus, according to Canadian analyst David Leyton-Brown: "Without access to the U.S. market, it seems fair to say that there would not be a Canadian defence industry. "[13] Although the volume of Canadian participation in U.S. defense contracts is relatively modest, amounting to about US$800 million in 1990, or only 0.5 percent of the total Department of Defense (DoD) procurement budget, this figure does not include the large volume of cross-border trade in dual-use components.

U.S.-Canada defense cooperation began during World War II, when Canadian industry manufactured large quantities of warships, guns, and aircraft.[14] The two governments pooled their industrial resources to reduce duplication and enhance the effectiveness of the allied war effort. In 1940, Prime Minister Mackenzie King and President Franklin Roosevelt met at Ogdensburg, NY, and signed an agreement establishing a senior advisory group on North American security called the Permanent Joint Board on Defense. The following year, the two leaders issued the Hyde Park Declaration, which directed each country to buy military goods from the other on the basis of complementarily, competitive advantage, and specialization. During World War II alone, the U.S. and Canada procured from each other equipment worth a total of $8.65 billion (in 1990 U.S. dollars).

With post-war demobilization, the Canadian defense industrial base began to erode. Although defense production expanded briefly during the Korean War, NATO's short-war nuclear strategy had little need for defense industrial mobilization. A further watershed in Canadian defense-industrial policy came in 1959, when the Canadian Government canceled the production of an advanced all-weather interceptor called the *AVROArrow. The* most ambitious defense R&D effort in Canadian history, the program succumbed to cost overruns, numerous design changes, the excessive technical demands of the Royal Canadian Air Force, the lack of export potential, and poor government planning.[15] Because of the small size Of the domestic defense market, the Canadian Government concluded that it could no longer afford to develop advanced weapon systems and platforms unless it became a major arms exporter, which would have conflicted with its foreign-policy goals.

Canadian defense officials responded to this situation by offering to purchase most major weapon systems from the United States, in return for duty-free access to the U.S. market for Canadian producers of defense-related parts, components, and subsystems. Washington also granted Canadian subcontractors the opportunity to compete for U.S. defense contracts on the same basis as American firms.[16] This ***quid pro quo*** **was** implemented through a series of negotiated memoranda of understanding and

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[9]Lt.Gen. A.J.G.D. de Chastelain, "The Need for Sustainment," *Canadian Defence Quarterly,* June 1989, p. 19.

[10]David Hughes, op. cit., footnote 2, p. 68.

[11]"Survival At All Costs: Canadian Industry Is Rapidly Reshaping Itself To Combat Declining Defence Markets," *Jane's Defense Weekly,* Oct. 20, 1990, p. 775.

[12]Data compiled by the Canadian Department of External Affairs. See Fergusson, op. cit., footnote 4, tables VII and XVII.

[13]Leyton-Brown, op. Cit., footnote 5, pp. 23.

[14]During World War II, Canadian industry produced over 17,000 aircraft, 38,000 tanks and armored vehicles, over 800,000 wheeled vehicles, and 480 naval ships, although it relied heavily on the United States and Great Britain for technical data packages and key subsystems such as aircraft engines. See de Chastelain, op. cit., footnote 9, p. 15.

[15]"The Canadian Defence Industrial Base: The Policy Environment," *Canadian Defence Industry Guide 1990/91* (Toronto: BaxterPublishing, 1990), p. 6.

[16]William Johnston, "Canadian Defence Industrial Policy and Practice: A History," *Canadian Defence Quarterly,* June 1989, p. 25.

letters of agreement that came to be known collectively as the Defense Production Sharing Arrangements (DPSA). The accords had the effect of exempting Canadian defense products from U.S. Buy American tariffs, as well as U.S. duties on Canadian defense goods produced under subcontracts for U.S. prime contractors.

The DPSA agreements laid out five fundamental objectives for U.S.-Canada defense-industrial cooperation:

1. greater integration of military production between the two countries,
2. improved standardization of military equipment,
3. wider dispersal of production facilities,
4. establishment of supplemental sources of supply for wartime mobilization, and
5. a greater flow of defense supplies and equipment between the two countries.[17]

A June 1963 supplement to the DPSA also called for the maintenance, over the long term, of a' 'rough balance" in reciprocal defense procurement at increasing levels.[18]

The two governments recognized that for the production-sharing arrangement to remain viable, the Canadian defense industry would need to retain an indigenous development capability. For this reason, the DPSA was supplemented by the Defense Development Sharing Arrangement (DDSA). This agreement provides for the use of Canadian-developed technology where it can meet U.S. defense requirements; in such cases, both countries share in funding the development work, with the United States contributing not less than 25 percent of the cost of an R&D project. An example of a successful DDSA project is the AN/GRC-103 tactical radio, developed by Canadian Marconi, which is now standard equipment in the U.S. and Canadian armed forces.

The DD/DPSA accords continue to provide the framework for peacetime defense-industrial cooperation between the U.S. and Canadian defense establishments. This relationship is managed by a bilateral Steering Committee that meets on an annual basis and is co-chaired by the U.S. Deputy Under Secretary of Defense for International Programs and the Canadian Assistant Deputy Foreign Minister for International Trade and Development. The Steering Committee is supported by several subcommittees and working groups. Unfortunately, the large number of participating agencies from both governments has often made it difficult for the Steering Committee to develop clear directives and guidelines.

Types of Defense Trade

There are two types of U.S.-Canada defense trade: 1) government-mediated contracts issued to Canadian industry by the U.S. Department of Defense (DoD), and 2) commercial subcontracts negotiated directly between U.S. and Canadian firms.

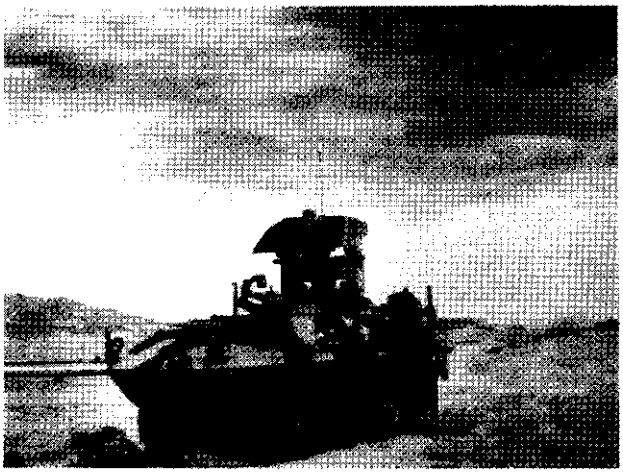

Photo credit: GM Canada

The Light Armored Vehicle (L./W), manufactured by General Motors Canada, was procured as a non-developmental item by the U.S. Marine Corps and used in Kuwait. The Marines have bought five versions; the antitank version is shown here.

The first category involves bids by Canadian companies on contract tenders from DoD. In order to facilitate participation by Canadian firms in U.S. defense contracts, the Canadian Government established an entity called the Canadian Commercial Corp. (CCC), which acts as a conduit for contracts between Canadian defense contractors and DoD. The CCC obtains Requests for Proposal from the Ottawa office of the Defense Contract Administration (part of the U.S. Defense Logistics Agency). The CCC then solicits bids from Canadian contractors and submits them to DoD. When a Canadian bid is successful, the Pentagon negotiates with the CCC, which issues a contract to the Canadian firm. This back-to-back contract meets all the terms and conditions of the U.S. contract while allowing the Canadian company to meet the labor and environmental laws of Canada.

Under the bilateral arrangements, the Canadian Government undertakes to ensure quality control, certifies price and delivery, and assumes contract liability should a Canadian company fail to fulfill a contract. The CCC also audits Canadian companies that receive U.S. contracts according to uniform auditing standards and rules worked out with DoD. The advantage of this system for Canadian companies is that they can operate under Canadian law and use their normal business practices without having to learn the intricacies of the U.S. defense

[17]Byers et al., op. cit., footnote 7, p. 106.

[18]Fergusson, op. cit., footnote 4, p. 38.

procurement system. U.S. prime contractors also benefit from the Canadian Government's pledge that subcontracts awarded to Canadian companies will be fulfilled U.S. subcontractors complain, however, that the Canadian Government's guarantee gives Canadian firms an unfair competitive advantage in bidding for DoD contracts.

The second type of U.S.-Canadian defense trade involves a large volume of direct cross-border supply and subcontracting relationships between U.S. and Canadian firms. After Canada tightened its export controls on goods of U.S. origin, there was no longer a need to require permits for cross-border transfers of dual-use products. As a result, this type of defense trade is not handled through government agencies such the Defense Logistics Agency or the CCC. Instead, company-to-company defense trade is simply aggregated into the general trade figures, and there is no easy way to disaggregate it.[19] The Canadian Embassy in Washington estimates that roughly 60 to 65 percent of all U.S.-Canada defense trade is in the form of commercial contracts between Canadian suppliers and U.S. primes or subcontractors. While the Canadian Embassy attempts to monitor this trade, it lacks the resources to do so completely.

Fragmentary data suggest that because of the high level of integration between the two economies at the subtier level, as well as the flow of goods between parent companies and subsidiaries, there is a much higher level of cross-border trade in parts and components between U.S. and Canadian firms than the official defense-trade statistics would suggest. Certain suppliers provide "dual-use" goods (e.g., structural components or fasteners) that have no clear defense application until they are actually incorporated into a weapon system. Moreover, Canadian firms producing subsystems for U.S. prime contractors often procure parts from U.S. subtier suppliers. According to one estimate, 56 percent of all materials and supplies incorporated into Canadian defense products come from U.S. industry sources.[20] This estimate suggests that participation by Canadian firms in U.S. defense contracts provides expanded business opportunities for U.S. subtier suppliers, although the exact magnitude of this multiplier effect cannot be determined.

Obstacles to Defense Trade

In theory, the **mutual benefits provided by the DD/DPSA regime should have resulted in a highly integrated North American Defense Industrial Base, with extensive access by Canadian firms to the U.S. market and a rough balance in defense trade between the two countries. Despite some notable achievements, however, Canadian-American defense trade has experienced persistent problems.**

First, the long-term balance in defense trade promised in 1963 has not been achieved. During the Vietnam War, Canadian defense sales to the United States surged dramatically. Between 1%5 and 1971, Canada had a positive defense-trade balance with the United States of nearly US$500 million. This major imbalance came at a time when U.S.-Canadian political relations were strained by Ottawa's official criticism of the war. In response, U.S. officials concerned with the balance-of-payments deficit joined forces with protectionists and conservatives in Congress to pass a series of laws restricting U.S. defense purchases from Canada.[21] Rising U.S. protectionism in turn convinced the Trudeau government to seek greater trade and political links with Western Europe, including the purchase of the German *Leopard I* tank and an Italian 127mm naval gun for Canada's four *Tribal-class* destroyers.[22]

In 1975, the defense-trade balance shifted in favor of the United States when a major reequipment of the Canadian forces resulted in orders for 18 Lockheed CP-140 *Aurora* maritime reconnaissance aircraft and 138 McDonnell Douglas CF-18 ***Hornet*** **fighters.[23] Over the past decade, the United States has consistently recorded a defense-trade surplus (see figure A-1) because Canadian purchases of major U.S. weapon systems are still being paid off. In 1989, for example, Canadian defense imports from the United States were 1.4 times greater in value than Canadian defense exports to U.S. customers.[24] Increased defense sales to the United States remain an important Canadian policy objective.**

The U.S.-Canada Free Trade Agreement (FTA), which entered into force on January 1, 1989, explicitly excludes pure defense products such as combat systems, although it does cover government procurement of dual-use items.

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[19] Fergusson, op. cit., footnote 4, p. 8.

[20] Canadian Embassy, *Canada-U.S. Defence Economic Cooperation* (Washington, DC, June 8, 1989), p. 9.

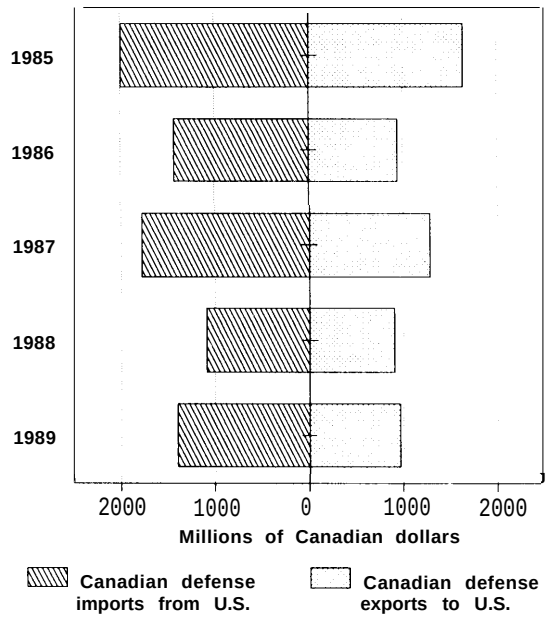
[21] Center for Strategic and International Studies, *Partners in Defense: U.S.-Canadian Cooperation in Meeting the Security Challenges of the 1990s*, October 1990, p. 9.

[22] At that time, the Leopard I represented the latest technology. The U.S. M-1 tank was still in advanced engineering development, and production models would not have been available in the period requested by the Canadian Armed Forces. Moreover, the Leopard I could be supported in Europe, where all of Canada's heavy armor was deployed. These purchases have remained anomalies, however, since all of Canada's other tracked armored vehicles and military aircraft have been purchased from the United States.

[23] Johnston, op. cit., footnote 16, p. 26.

[24] Canadian Embassy, op. cit., footnote 20, p. 6.

Figure A-1--Canada-U.S. Defense Trade Under the DD/DPSA Agreement, 1985-1989



SOURCE: James Fergusson, *Canadian De fence Trade and Europe: Methodological Concerns and Empirical Evidence,* Center for Studies in Defence Resources Management, Solicited Research Report #4 (Kingston, Canada: National Defence College, Fall 1990), Table VI.

The **rationale for excluding most defense products from the FTA was that they were already covered by the DD/DPSA agreements and represented a relatively small trade volume compared to most commercial sectors. Because the DD/DPSA agreements do not have treaty status, however, they are vulnerable to protectionist laws and nontariff barriers imposed by each country.**

A variety of protectionist U.S. laws affect Canadian defense contractors, including U.S.-owned subsidiaries based in Canada. These statutes include the recurring amendments to the annual Defense Appropriations Act, which are incorporated into the Defense Federal Acquisition Regulation Supplement (DFARS). For example, the Berry Amendment prohibits the Department of Defense from procuring food, clothing, fibers, and tools from foreign sources; the Bayh Amendment restricts foreign R&D contracting; and the Byrnes-Tollefson Amendment rules out foreign construction of any naval vessel. (This law has even been applied to block the sale by a Canadian company of small *Zodiac* motorboats to the U.S. Navy.) The Small Business Act requires that some procurement contracts be set aside in whole or in part for small or disadvantaged U.S. companies, thereby precluding Canadian participation. Finally, U.S. public law imposes constraints on the cross-border flow of defense-related information, and U.S. National Disclosure Policy specifies areas of sensitive defense technology that cannot be disclosed to foreign countries, including Canada. These various nontariff barriers are estimated to prevent Canadian firms from bidding on some $65 billion in U.S. defense contracts for which they would otherwise be eligible.[25]

The Canadian Government also imposes restrictions on cross-border defense trade. Tariffs are levied on U.S. defense goods that enter Canada, either under direct sales or government-sponsored Foreign Military Sales (FMS) contracts.[26] Moreover, depending on the technology and the importance of the product, Canada generally favors domestic suppliers. Only when procurement from Canadian sources is uneconomical or impractical does the government turn to outside sources of supply.

Another obstacle to U.S.-Canada defense industrial cooperation has been Canada's insistence on offsets in its acquisition of major weapons systems.[27] Beginning with the purchase of the CP-140 *Aurora* maritime reconnaissance aircraft from Lockheed in **1975, the Canadian Government instituted a policy that foreign contractors competing for a Major Crown Project (worth more than Can$100 million) are expected to offer benefits to Canadian industry, such as technology transfer and production-sharing arrangements. This policy was shaped to a large extent by Ottawa's desire to use large military procurement programs to foster industrial expansion in the less-developed provinces, to enhance the overall international competitiveness of Canadian industry, and as a payback to the domestic economy for large outlays of taxpayers' money for foreign-sourced equipment.**

In addition to barriers created by legislation and industrial-benefits policy, U.S.-Canada defense trade has been hampered by ignorance on the part of government and industry officials about the bilateral defense-industrial relationship. Canadian Embassy officials contend that they must often intervene to inform DoD contracting officers that under the DD/DPSA agreements, Canadian companies are to be treated differently than other foreign firms.

Joint Industrial Preparedness Planning

A memorandum of understanding (MOU) signed in 1970 gave Canadian firms the opportunity to participate

[25]Interview with Michael Slack, a defense analyst at the Centre for International and Strategic Studies, York University, Ontario, Canada.

[26]~~ customs regulations permit the refund of duties only for Us. components used for the manufacture of Canadian goods that are then reexported in new condition. Nevertheless, under the Free Trade Agreement, these tariffs will be phased out over a 10-year period ending in 1999.

[27]According to such arrangements, the seller of defense equipment provides the purchasing country with subcontracts, production sharing, technology, and other direct benefits to the Canadian economy that help offset the cost of the contract.

in the U.S. Industrial Preparedness Planning program (IPPP), in which manufacturers commit themselves to respond to a U.S. demand for surge or mobilization production in wartime. About 86 Canadian firms are currently considered as "planned producers" for specialized components, assemblies, and parts. Participation in the IPPP program guarantees Canadian firms the opportunity to bid on any U.S. defense contract over $10,000 on an equal footing with U.S. firms, and also limits the percentage of the contract that can be set aside for U.S. small business. These measures help ensure that the participating Canadian firms could contribute effectively to U.S. surge production in an emergency.

In 1985, President Reagan and Prime Minister Mulroney reaffirmed their commitment to the DD/DPSA agreements and pledged to reduce the legislative and administrative barriers to cross-border defense trade. The first tangible step in the direction of enhanced cooperation came in March 1987, when the United States and Canada established a joint North American Defense Industrial Base Organization (NADIBO). This body has no direct role in peacetime weapons acquisition. Instead, NADIBO is an emergency surge/mobilization planning organization that gathers information, performs analyses, maintains a large database, and coordinates the activities of several Federal departments and agencies with an interest in defense industrial preparedness. There are two plenary meetings a year: a spring planning session that brings together industrial-base planners from the two governments, and a fall workshop to which industry representatives are invited.

Through NADIBO, the two governments have focused primarily on joint industrial preparedness planning (lPP) as a means of identifying deficiencies and bringing about corrective actions aimed at strengthening the North American Defense Industrial Base. For example, an Ammunition Task Force has discussed the ammunition supply problem and possible joint solutions. NADIBO also organized a joint task force on surge production of precision-guided munitions (PGMs) to determine whether Canadian firms could manufacture components for which the United States was already dependent on offshore sources of supply. Of the 284 critical items assessed in the study, an actual or potential Canadian production capability was identified for 239 (or 84 percent) of the required components and raw materials. A similar analysis of the M1A1 Abrams tank revealed that the necessary production technology existed in Canada for all but one of the 129 subsystems.[28]

Despite such joint planning efforts, however, NADIBO's effectiveness has been limited by its lack of executive authority and financial resources, and the participation of a large number of government agencies with divergent interests. As a result, the organization has been unable to generate the clear directives and guidelines needed to coordinate the activities of procurement managers and industrial-base planners. According to Col. Clement Lavoie, head of the Canadian Directorate of Defence Industrial Resources, joint production base analyses have had little real impact because "IPP is not always at the forefront of decisionmaking in the materiel acquisition process.' '[29]

Both Canada and the United States face the challenge of restructuring their defense industries to meet the expected requirements of their armed forces at significantly lower levels of defense spending. Because Canadian defense companies now export 70 percent of sales, mainly to the United States, impending cuts in U.S. defense spending will have a significant impact on the Canadian defense industrial base. In addition, the economic integration of the European Community by the end of 1992 may displace North American defense contractors from parts of the European market, while U.S. prime contractors that do make military sales to Europe will increasingly be required to negotiate offsets involving subcontracts to European firms rather than Canadian ones. As a result, Canadian defense companies can expect to face increased economic competition from both U.S. and European firms in the vital U.S. defense market, as well as growing protectionism designed to reserve more of that market for U.S. industry.

U.S. Defense Production in Mexico

The third largest U.S. trade partner, with bilateral commerce worth $52 billion in 1989, Mexico has long been an attractive location for U.S. industry because of its extremely low labor costs. In 1965, in an effort to relieve unemployment near the U.S. border, the Mexican Government established special customs treatment and liberal foreign-investment regulations for foreign assembly plants operating on Mexican territory. These assembly plants, known as *maquiladoras,* may be 100-percent foreign-owned and managed. They can import into Mexico duty-free the raw materials, machinery, parts, and other components used in the assembly or manufacture of products, which must then be exported back to their country of origin or to a third country. Since U.S. customs regulations provide for duty-free reentry into the United States of goods assembled in another country from components of U.S. origin, duty must be paid only on those components not of U.S. origin and the value added by assembly or manufacture in Mexico.

[28]Supply and Services Canada, *The Defence Industrial Base Review 1987* (Ottawa: SuPply and Services Canada, 1987), P. 10.

[29]Col. Clement E. Lavoie, "U.S./Canada Armament Cooperation and the North American Defense IndustrialBase—A Challenge for the 1990s" (Washington DC: Industrial College of the Armed Forces, Fort McNair, 1990), p. 13.

In 1982, a major devaluation of the Mexican peso **with respect to the dollar** made production of **labor-intensive goods in Mexico highly attractive, resulting in a tripling of the size of the duty-free assembly program between 1982 and 1988. Today, some 1,795 *maquiladoras* annually** generate more than $12 billion in products and over $2 billion of value-added income for Mexico. The majority are foreign-owned, primarily by U.S. companies but also by firms from Japan, Sweden, France, Canada, Taiwan, Hong Kong, and Korea.[30]

Several U.S. defense contractors have established *maquiladoras in the* border area for the production of wiring harnesses and PC boards for missiles, radars, aircraft, and telecommunications equipment, including Emerson Space, GE Aerospace, Stuart-Warner, General Dynamics, TRW, and Westinghouse. Some more diversified defense contractors, such as Rockwell International, use Mexican assembly plants for commercial rather than defense business: Rockwell's four plants produce controllers for machine tools and data modems for fax machines.[31] Still, the plants owned by U.S. prime contractors may only be the tip of the iceberg. Numerous second-and third-tier suppliers of defense components may also operate ***maquiladoras,*** **although such dual-use production is difficult to track**

The governments of the United States and Mexico are currently negotiating a free trade agreement that would eliminate restrictions on the flow of goods, services, and investment between the two countries. A North American free-trade zone encompassing the United States, Canada, and Mexico would constitute the world's largest market, with annual production totaling more than $6 trillion and almost 370 million consumers. U.S. objectives in the negotiations with Mexico include a reduction of tariffs to zero over a period of years, the elimination of most nontariff barriers on goods and services, an open investment climate, and full protection of intellectual property rights.[32] The proposed agreement has become highly controversial in Congress: advocates contend that it would stimulate economic growth and increase net employment on both sides of the border, thereby promoting political stability in Mexico; opponents counter that it could cause severe job losses in the United States, accelerate the decline of ailing U.S. manufacturing industries, and lead to severe industrial pollution along the U.S.-Mexican border.

If negotiated, a free trade agreement with Mexico would accelerate the current integration of the U.S. and Mexican industrial bases.[33] Both the U.S. and Canadian governments are concerned, however, that a U. S.-Mexican free trade agreement might enable third countries to use Mexico as a staging area for a new surge of exports to North America, performing minimal assembly work in Mexico in order to gain duty-free access to U.S. and Canadian markets. In order to rule out this possibility, the United States plans to negotiate strict rules of origin that will reserve preferential market access to the signatory countries. Furthermore, whether or not defense trade is explicitly included in a U.S.-Mexico free trade agreement, dual-use components and subsystems assembled in Mexico could be exported to the United States or Canada and then, under the provisions of the U.S.-Canadian DD/DPSA agreements, transshipped duty-free across the U.S.-Canada border. It may therefore be necessary to amend the DD/DPSA to cover such contingencies.

Policy Considerations

An important issue facing Congress is whether to promote the further integration of the U.S. and Canadian defense industries and the emerging Mexican defense industrial base. Such integration involves tradeoffs between the overall U.S. national interest in efficient weapons procurement and industrial mobilization capacity and the interests of local communities in the United States that are economically dependent on defense production. The issue of NADIB integration is also part of the larger debate over whether the Nation should place greater reliance on U.S. domestic firms or on defense-industrial interdependence with allies.

Canada is unique among U.S. allies in that it is both a leading purchaser of major U.S. weapon systems and a key supplier of subsystems, components, and materials to the U.S. defense industry. Although the Canadian defense industrial base is small, it can supply DoD and U.S. prime contractors with some products of higher quality and lower price than competing U.S. firms. Moreover, since Canada relies extensively on U.S. weapon systems, there is a large overlap in requirements between the two countries. At the same time, there is little direct competition for export sales, which complicates cooperation with the major European allies. Further, the existence of a second, technologically sophisticated defense industry on the North American continent gives the United States a valuable source of surge and mobilization capacity in crisis or war.

The objective of greater NADIB integration would be to rationalize defense production within the North American continent by enabling both countries to specialize in the areas where they are most proficient. Congress could help achieve this goal by removing some or all of the

[30] Committee for the Promotion of Investment in Mexico, An *Overview of the Maquiladora Industry in Mexico* (mimeo), January 1990, p. 3.

[31] Telephone interview with Ray Garcia, Rockwell hlt-tied.

[32] U.S. Department of State, Bureau of Public Affairs, "US-Mexico Free Trade Agreement," *gist,* December 1990.

[33] See Clark W. Reynolds, "Integrating the U.S. and Mexican Economies," *Business Mexico,* vol. 7, No. 4, December 1990, pp. 11-15,69.

existing legislative and policy barriers to free trade in defense and dual-use products between the two countries and by appropriating funds for the codevelopment and coproduction of defense equipment by U.S. and Canadian firms. The repeal of U.S. protectionist legislation might be made conditional on Ottawa's willingness to drop its offset requirements.

Such congressional action would need to be supplemented with additional measures by the executive branch. For example, the U.S. and Canadian defense departments might seek improved coordination in defense R&D policy and a more liberal policy on cross-border transfers of technology so that the research of both countries could be utilized more efficiently. Joint U.S.-Canadian industrial preparedness planning might also be expanded.

Greater NADIB integration would offer political, economic, and military/strategic benefits for the United States and Canada. First, both countries could benefit from the exchange of technological know-how in areas of complementary advantage. Second, because of geographical proximity and the high degree of commonality in the critical defense items employed by the U.S. and Canadian armed forces, security of wartime supply for both countries could be enhanced. Third, gaining access to some of the Canadian defense products now excluded from the U.S. market by protectionist legislation could enable DoD to obtain items of superior quality or reduced cost.

Greater NADIB integration would entail some drawbacks, however. First, at a time of shrinking defense budgets, awarding defense contracts to companies across the border would be politically difficult for either government if domestic firms are hurt. Second, there are clear political limits to integration. Canada and the United States are both sovereign nations with their own interests, foreign policies, and public laws, which would have to be respected in any bilateral arrangements.

Opponents of greater NADIB integration argue that Congress should seek to minimize the adverse effects on the U.S. economy of defense-spending cuts by adopting a "Buy American" policy that would close the U.S. defense market to Canadian firms. Such protectionist measures would enable U.S. companies to preserve a larger share of a shrinking defense market, ensuring that taxpayer money allocated to defense is reinvested in the U.S. economy and American jobs. Nevertheless, a unilateral cutback in defense industrial cooperation with Canada would have a negative effect on overall U. S.-Canada relations. Conceivably, it could provoke retaliatory actions by the Canadian Parliament, such as the refusal to purchase major U.S. weapons systems in the future or even calls for the repeal of the Free Trade Agreement.

Increased defense-industrial integration with Mexico would also have benefits and costs. On the plus side, relocation of labor-intensive manufacturing and assembly operations to Mexico could enable U.S. defense contractors to lower their labor input expenses and thereby reduce overall procurement costs to DoD. On the minus side, some U.S. manufacturers (particularly at the subtier level) will have difficulty competing and may thus be forced out of the defense business. Further, greater reliance on Mexican assemblers might entail some risk to security of wartime supply.

As a practical matter, however, the shift of some defense manufacturing and assembly work to plants based in Mexico would probably have little adverse effect on the ability of the U.S. defense industry to mobilize in a crisis. Because of stringent military specifications and restrictions on classified work manufacturing and assembly in Mexico is likely to remain limited to labor-intensive production of noncritical dual-use items, such as subassemblies and subcomponents.