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Arctic Offshore Patrol Ships: Adrift in Inflationary Waters

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Construction of the Arctic Offshore Patrol Ships (AOPS), also known as the *Harry DeWolf*-class, is scheduled to begin September 2015 at the newly refurbished Irving Shipbuilding yard in Halifax. With a delivery date of 2018 these vessels are expected to join the Royal Canadian Navy (RCN) five years later than originally intended.

The AOPS have been subjected to sustained criticism since their announcement, much of which stems from the political origin of these vessels. During the 2005 federal election campaign the Conservative Party announced it would have three armed icebreakers built as the centrepiece of its Arctic policy, with the intention to project Canadian sovereignty into the Arctic. The RCN apparently balked at accepting icebreakers.[1] When the Conservatives formed the government they made it clear that naval funding could be curtailed, and a compromise was reached – instead of icebreakers, offshore patrol vessels capable of operating in ice up to one metre thick were substituted. Prime Minister Stephen Harper announced the AOPS in 2007, allocating $3.1 billion to build the ships and setting aside an additional $4.3 billion to support the operation and maintenance of the ships over 25 years. Icebreaking capability was traded for increased numbers and flexibility to operate in non-Arctic waters so that the ship could play a three-ocean maritime control role in Canada's exclusive economic zones (EEZs) – a role that the *Kingston*-class coastal defence vessels are unable to provide. The AOPS platform represents a more capable but less numerous replacement for the *Kingston*-class, satisfying the government pledge to 'defend' Arctic sovereignty and fitting into the overall naval recapitalization program.

The scaling down of the icebreakers to the less ice-capable AOPS design has led to the ships being criticized as "slush breakers" and "a dumb idea." Ardent critics want to scrap the program entirely arguing that the design is too compromised, yielding too little icebreaking capability for Arctic operations and too slow a speed for a patrol vessel.[2] Others argue that the AOPS is a step in the right direction in providing Canada with a three-ocean navy but that they are too lightly armed as a weapons platform, and incapable of war-fighting.[3] The AOPS are indeed lightly armed, but the rationale is that the ships will not be primarily focused on fighting wars and breaking ice, but rather doing constabulary patrol work.

Arctic Offshore Patrol Ship naming ceremony held at Africville, NS, 26 June 2015.

The thrust of this article is not the controversy surrounding the roles and capabilities of the AOPS but the negative effects of time and inflation on the AOPS program. A report issued late 2014 by the Parliamentary Budget Officer (PBO) found that the AOPSs were not just behind schedule but already over budget. Instead of the six to eight ships originally intended, only four could possibly be afforded with the funding available.[4] The increased price level for these ships is due to inflation, an economic term that simplifies reality by encompassing all the variables that lead to a general price increase. This includes everything from technical issues related to the design of the ships to increases in the wages of the shipyard workers. The longer a budget takes to be spent, the less that budget can buy.

In the case of AOPS, the impact of inflation can be combated in two general ways. The first way is to reduce the level of ambition of the vessels themselves, making them less capable and therefore cheaper. This has been done. For example, the top sustained cruising speed of the AOPS was reduced from an intended 20 to 17 knots.[5] The other option to stay within budget is simply to decrease the number of ships delivered. This has also been done, with expected ship numbers officially being reduced to five or six ships. This article examines how delays in construction have hollowed out the budget to build the AOPS due to inflation, resulting in the expected delivery of fewer, less capable ships.

How Does Inflation Harm the AOPS Program?

The government of Canada currently increases the budget of the Department of National Defence (DND) by 2% per year to help offset the effects of inflation. This is roughly in line with the Consumer Price Index (CPI) which encompasses common expenses such as clothing and shelter. The problem, however, is that military hardware inflates at a higher rate than this. A 2006 RAND Corporation study, for example, found that warship costs have inflated at a rate of between 7 and 11% per annum on average over the last 50 years.[6] This range has been accepted as appropriate to the Canadian context.

This article constructs three scenarios based on this range of inflation – the first scenario uses a 9% fixed inflator (see Table 1) and the second scenario uses a 7% fixed inflator (see Table 2). As the AOPS is primarily designed to fulfil a constabulary rather than a war-fighting role, armed with only a 25 mm cannon and a limited suite of sensors, I have ruled out the 11% rate of inflation that would be applied to complex warships. Available documentation does not make clear whether DND's 2% annual funding increase applies to the AOPS budget, but I have applied it in the third scenario (see Table 3). Readers should note that the DND budget increase was 1.5% until FY 2011-12, when the government increased it to the current 2%. This number is supposed to jump to 3% during FY 2017-18. Although this is a seemingly small figure, this third adjusted scenario demonstrates the effects that these increases have on a 7% fixed inflator over time.

The Treasury Board's *Estimates* give us intermittent glimpses of the AOPS program spending to the nearest dollar. The patrol ships first appeared in *Supplementary Estimates (A) 2007-8*, which committed $14.4 million (M) for the initial design work out of a total AOPS budget of $3.074 billion.[7] Dividing the total budget by 6 yields an individual ship cost of $512.27M if the purchase order is 6 ships (remember that the price per unit goes up as the number of units goes down) and dividing it by 8 leads to a unit cost of $384.2M. These unit costs serve as a starting point for the inflation scenarios built around an initial estimate of 6 to 8 ships.

The Treasury Board *Estimates* for fiscal year (FY) 2008-9 did not mention the AOPS, but outside sources state that the delivery date of the ships was pushed back an additional year (to 2014) because of the substantial planning required to produce a vessel with the speed and seakeeping of a standard coastal patrol craft with an ice-strengthened hull shaped for operations in ice-covered waters. By FY 2010-11, the AOPS delivery date had been pushed back to 2016. AOPS appeared again in the 2011-12 *Estimates*, which committed another $14.54M to the program.[8] By this time, AOPS was tied into the larger National Shipbuilding Procurement Strategy (NSPS). It was experiencing ongoing development troubles, and the delivery date for the first ship was pushed back until 2018.


Credit: Corporal Anthony Chand, Formation Imaging Services

After the naming ceremony, Rear-Admiral Ron Lloyd, Deputy Command RCN, in a conversation with Army veteran Peter Douglas.

By FY 2012-13, a new constraint on the AOPS program became apparent in the budget: docking infrastructure. Originally a separate program, the supporting infrastructure required at Esquimalt, Halifax and Nanisivik was now folded into the AOPS budget, reducing the funds available to build the ships themselves.[9] Construction of the ships was scheduled to begin in 2015, with the initial delivery date of 2018 remaining the same. AOPS does not appear in the *Estimates* of FY 2014-15, so it appears that this remains the case.

Eight years of inflation give us a range of outcomes across the three scenarios, from the worst case scenario (using a 9% fixed inflator) of the budget being able to afford 4.4 to 3.3 ships (Table 1) to the best case inflation scenario of the $3.1 billion budget being able to afford 5.7 to 4.3 ships (Table 3). The 7% fixed inflator scenario yields between 5.0 to 3.7 ships (Table 2). To look at it from the opposite perspective, by how much would the original $3.1 billion budget need to be increased to afford the initial goal of between 6 and 8 ships? In the best case scenario the budget would have to be increased to a little over $4.3 billion to afford 6 to 8 ships in FY 2014-15. The worst case 9% fixed inflator scenario would require a budget of approximately $5.6 billion. The 7% fixed inflator would require a budget of over $4.9 billion to afford the desired number of ships, an increase of $1.8 billion above the original $3.1 billion budget. In this 7% inflation scenario, the original per unit cost of $512.27M and $384.20M for 6 and 8 ships respectively has increased to $822.59M and $616.94M, an increase of nearly 38% over the eight years in question.

Table 1. Assuming 9% inflation

FY	Unit Cost ($)	# of Ships	Unit Cost ($)	# of Ships
2007-08 (original budget $3.1 billion)	512,270,000	6.0	384,200,000	8.0
2008-09	558,370,000	5.5	418,780,000	7.3
2009-10	608,620,000	5.1	456,470,000	6.7
2010-11	663,400,000	4.6	497,550,000	6.2
2011-12	723,110,000	4.3	542,330,000	5.7
2012-13	788,190,000	3.9	591,140,000	5.2
2013-14	859,120,000	3.6	644,340,000	4.8
2014-15	936,440,000	3.3	702,330,000	4.4
Additional funding		3.6		4.7

Table 2. Assuming 7% Inflation

FY	Unit Cost ($)	# of Ships	Unit Cost ($)	# of Ships
2007-08 (original budget $3.1 billion)	512,270,000	6.0	384,200,000	8.0
2008-09	548,130,000	5.6	411,090,000	7.5
2009-10	586,490,000	5.2	439,870,000	7.0
2010-11	627,550,000	4.9	470,660,000	6.5
2011-12	671,480,000	4.6	503,610,000	6.1
2012-13	718,480,000	4.3	538,860,000	5.7
2013-14	768,770,000	4.0	576,580,000	5.3
2014-15	822,590,000	3.7	616,940,000	5.0
Additional funding		4.0		5.4

Table 3. Adjusted Inflation (Assuming 7% inflation minus annual DND funding increase)

FY	Unit Cost ($)	# of Ships	Unit Cost ($)	# of Ships
2007-08 (original budget $3.1 billion)	512,270,000	6.0	384,200,000	8.0
2008-09	540,440,000	5.7	405,330,000	7.6
2009-10	570,170,000	5.4	427,620,000	7.2
2010-11	601,530,000	5.1	451,140,000	6.8
2011-12	622,670,000	4.9	467,000,000	6.6
2012-13	653,800,000	4.7	490,350,000	6.3
2013-14	686,490,000	4.5	514,860,000	6.0
2014-15	720,820,000	4.3	540,610,000	5.7
Additional funding		4.6		6.2

New developments have to be factored into the calculations of the scenarios. Despite the budget crunch brought on by the 'Great Recession' in FY 2009-10 (with the effects reverberating through the defence budget since FY 2011-12), the government finalized the deal with Irving Shipbuilding and committed an additional $400 million to the $3.1 billion budgeted for the construction of the AOPS program at the start of 2015.[10] The costs of the docking infrastructure program, however, must be subtracted from this figure. The PBO report pegged the cost at $274M but there is uncertainty about the actual cost of the program.[11] Media reports have circulated a figure of $258 million for the deep water port at Nanisivik alone. Plans for Nanisivik have been scaled back to save money but still meet the government's operational requirements. The current plans for Nanisivik are now reported to be $116M.[12] The *Estimates* reveal that $29.87M was spent on docking infrastructure in FY 2012-13 and an additional $164.66M for docking infrastructure and further ship design in FY 2013-14.[13] It is reasonable to deduce that the $116M for Nanisivik is embedded in this figure. Rounding the FY 2012-13 figure to $30M and adding it to the budget for Nanisivik yields a total of $146M. What seems like $400M in additional spending becomes $254M after the docking infrastructure program costs are subtracted.

The funding scenarios suggest how many ships can be built as of the end of 2015. However, the first ship will not be delivered to the RCN until 2018. To see how many ships can be purchased by this time, the three scenarios can be projected forward three years using the revised numbers. Under the worst case scenario of 9% inflation, between 3.7 and 2.7 AOPS could be built, or half the numbers the government currently estimates it can afford (see Table 4, which continues from Table 1). The second scenario of 7% fixed inflation results in between 4.4 and 3.3 ships being constructed (see Table 5 which continues Table 2). The best case scenario (i.e., the one with the lowest inflator) suggests between 5.4 and 4.1 vessels could be constructed (see Table 6 which continues Table 3). These tables demonstrate how a small annual DND funding increase equates to a full ship over this period.

The adjusted inflation rate of approximately 5% (see Table 6) is the most in line with current government estimates. Based on this rate, can 5 ships be delivered or 6? The answer is 5, and probably only 4 as things currently stand. However, it should be noted that the early government numbers were too optimistic. It is possible that further

Table 4. Inflation Rate of 9% Projected to 2018

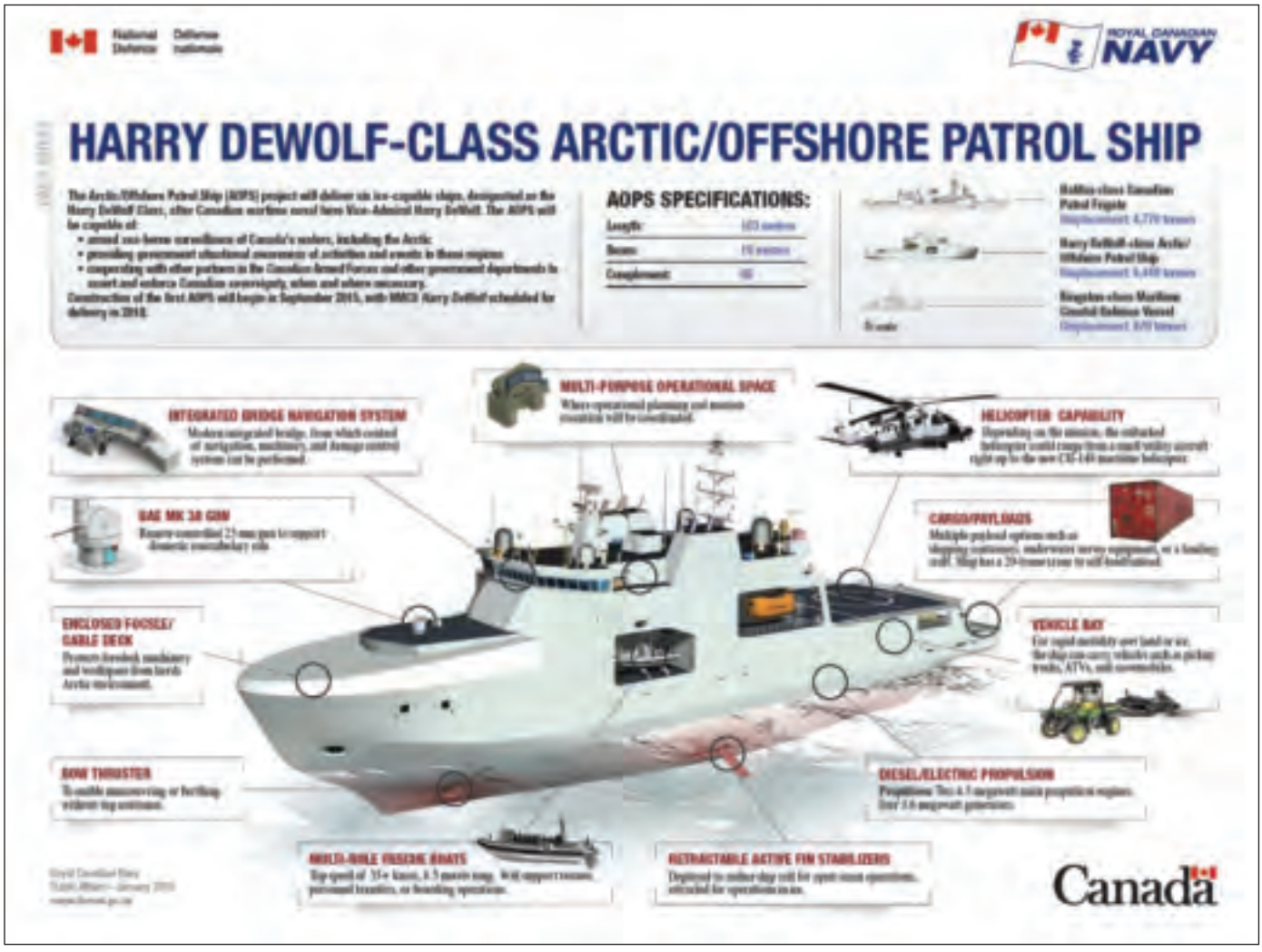
FY	Unit Cost ($)	# of Ships	Unit Cost ($)	# of Ships
2015-16	1,020,730,000	3.3	765,540,000	4.3
2016-17	1,112,600,000	3.0	834,440,000	4.0
2017-18	1,212,730,000	2.7	909,540,000	3.7

Table 5. Inflation Rate of 7% Projected to 2018

FY	Unit Cost ($)	# of Ships	Unit Cost ($)	# of Ships
2015-16	880,180,000	3.8	660,130,000	5.0
2016-17	941,790,000	3.5	706,340,000	4.7
2017-18	1,007,710,000	3.3	755,780,000	4.4

Table 6. Adjusted Rate Projected to 2018

FY	Unit Cost ($)	# of Ships	Unit Cost ($)	# of Ships
2015-16	756,850,000	4.4	567,640,000	5.9
2016-17	787,130,000	4.2	590,340,000	5.6
2017-18	818,620,000	4.1	613,960,000	5.4



Credit: RCN, DND

*Some features of the **Harry deWolf**-class Arctic Offshore Patrol Ship.*

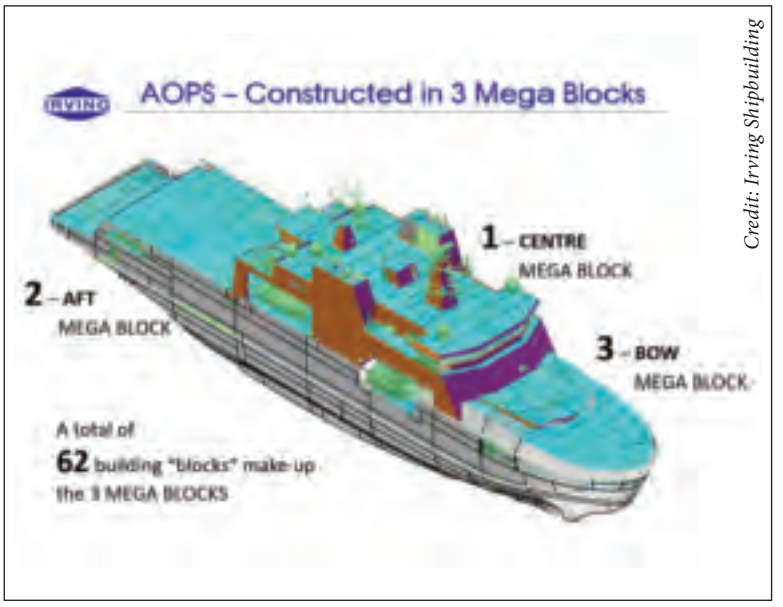
revisions could be made to the AOPS program over the next years, which could result either in less ships delivered or additional funding committed to meet the current goal of 5 to 6 ships.

Several things can be said about the possibility of additional AOPS funding. First, the Harper government's 2015 commitment of an additional $400 million in funding for the construction phase of the program, despite constraints on the federal and DND budgets, demonstrates the centrality of AOPS to the government's Arctic policy. Construction of the vessels will begin in September, one month before the scheduled federal election. If the Conservatives remain in power, they may choose to allocate additional funds to support the program – a consideration that raises the question of path dependency. The AOPS is very much a signature Conservative program. Has the AOPS program progressed to the point that a Liberal or New Democratic government could not scale back or cancel it, robbing the Conservatives of a legacy?

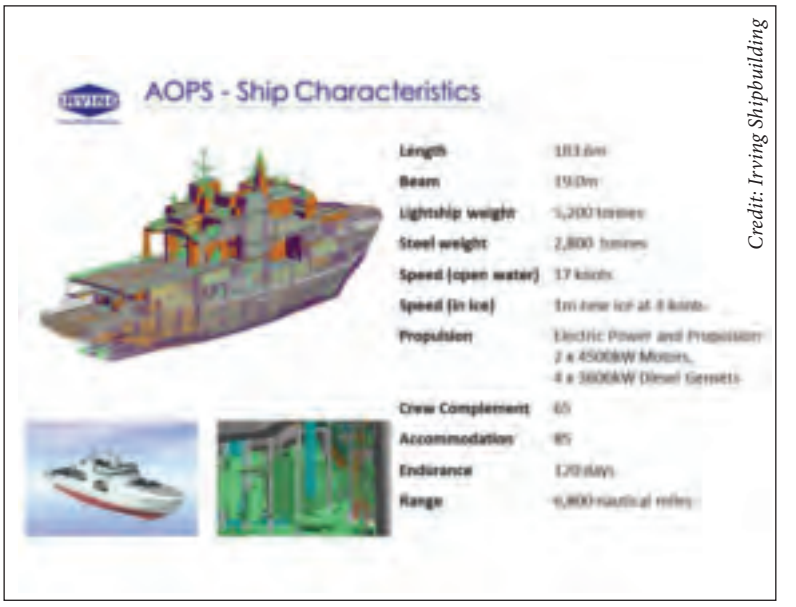
Second, the decision to arrange the NSPS so that the AOPS are built before the Canadian Surface Combatant (CSC) Project, the backbone of the future RCN, may have a negative impact on the latter capital program. While an argument could be made that upfront costs (modernization of facilities) and lessons learned by Canada's resurrected shipyards in building the AOPS first will go some way to alleviate the costs of the warships, the historical record provided by the RAND Corporation study suggests

Credit: Corporal Anthony Chand, Formation Imagery Services

Minister of Public Works and Government Services Diane Findley (centre-right), Member of Parliament Scott Armstrong (centre-left), President of Irving Shipbuilding Kevin McCoy (mid-right), Deputy Commander of the RCN Rear-Admiral Ron Lloyd (mid-left), with Mario Chassion (right) and Blair Graham (left) during the ceremony for the first piece of steel being cut for the new navy ships in the Irving Marine Fabrications building in Burnside, Nova Scotia, 18 June 2015.



Proposed Arctic Offshore Patrol Ship construction modules.



Arctic Offshore Patrol Ship characteristics.

that the general rate of inflation will continue regardless. Plus, the CSCs are true warships with complex systems which are prone to high rates of inflation. Delaying their construction will exacerbate the cumulative effects of inflation on the budget, necessitating additional funding or reduced numbers with reduced capabilities.

Third, all three inflation scenarios show that military inflation exceeds the growth rate of the Canadian economy, which grew on average by about 1.66% per year between 2007 and 2014.[14] In the short term this problem is manageable through fixed funding increases or ad hoc injections of cash into stretched budgets. If this trend continues, however, the pressure on DND's capital budget will become increasingly acute in delivering future military hardware, in particular ships like the Canadian Surface Combatant or the next generation fighter selected in the CF-18 Replacement Project. According to this logic, defence spending will have to take up a larger proportion of overall government spending to keep apace of inflation. From this standpoint, this case study of the AOPS budget and developments surrounding the program may serve as a harbinger of larger challenges to come.

Notes

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2. Criticisms of the AOPS can be found in the following sources: Jack Layton, "Sovereignty is More than Slushbreakers," *Northern News Services Ltd.*, 25 May 2007; Murray Brewster, "Tory Arctic Ship Plan should be Sunk, Replaced with Real Icebreakers: Senator," *The Toronto Star*, 15 March 2012; Michael Byers and Stewart Webb, "Titanic Blunder: Arctic/Offshore Patrol Ships on Course for Disaster," *Canadian Centre for Policy Alternatives*, 11 April 2013; and Michael Byers, "Why Canada's Search for an Icebreaker is an Arctic Embarrassment," *The Globe and Mail*, 21 January 2014.
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4. Erin K. Barkel and Rod Story, "Budget Analysis for the Acquisition of a Class of Arctic/Offshore Patrol Ships," Office of the Parliamentary Budget Officer, 28 October 2014, available at www.pbo-dpb.gc.ca/files/files/AOPS_EN.pdf.
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7. Treasury Board Secretariat of Canada, *Supplementary Estimates (A), 2007-2008*, available at www.tbs-sct.gc.ca/est-pre/20072008/sups/A/docs/index-eng.pdf.
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11. Barkel and Story, "Budget Analysis for the Acquisition of a Class of Arctic/Offshore Patrol Ships," p. 2.
12. David Pugliese, "Nanisivik Naval Facility was Originally Supposed to Cost $258 million but DND Balked at Price Tag," *Ottawa Citizen*, 8 September 2014.
13. See Treasury Board Secretariat of Canada, *Supplementary Estimates (C), 2012-2013*, available at www.tbs-sct.gc.ca/ems-sgd/sups/c/20122013/index-eng.pdf; and Treasury Board Secretariat of Canada, *Supplementary Estimates (B), 2013-2014*, available at www.tbs-sct.gc.ca/ems-sgd/sups/b/20132014/seb-bsdb-eng.pdf.
14. See the World Bank, *GDP Growth (Annual 1%)*, available at http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG.

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