OFFICE OF THE
PARLIAMENTARY BUDGET OFFICER

CANADA

BUREAU DU
DIRECTEUR PARLEMENTAIRE DU BUDGET

Methodology for Estimating the Fiscal Impact of the Costs Incurred by the Government of Canada in Support of the Mission in Afghanistan

Ottawa, Canada
October 9, 2008
www.parl.gc.ca/pbo-dpb

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Abbreviations

Abbreviation	Full Form
ADM	Assistant Deputy Minister
CAD	Canadian Dollars
CBO	Congressional Budget Office (United States)
CF	Canadian Forces
CIDA	Canadian International Development Agency
CRS	Congressional Research Service (United States)
CSC	Correctional Service of Canada
DND	Department of National Defence (Canada)
DPR	Departmental Performance Report
FAC	Foreign Affairs Canada
FY	Fiscal Year
GC	Government of Canada
IED	Improvised Explosive Device
N/A	Not Available
NPV	Net Present Value
OEF	Operation Enduring Freedom
PBO	Parliamentary Budget Officer (Canada)
PTSD	Post Traumatic Stress Disorder
RCMP	Royal Canadian Mounted Police
RPP	Report on Plans and Priorities
TBD	To Be Determined
TBS	Treasury Board Secretariat
UOR	Unforecasted Operational Requirement
US	United States of America
USD	United States Dollars
VA	Veterans Affairs (United States)
VAC	Veterans Affairs Canada

Executive Summary

The objective of this paper is to describe the methodology used by the Office of the Parliamentary Budget Officer (PBO) to capture the *incremental costs* to the fiscal framework of the Canadian mission in Afghanistan. Incremental costs are defined as those that would not have been incurred except for the operation; or conversely, they can be interpreted as the total savings to the Government of Canada (GC) if it were not involved in the Afghanistan mission.

In the absence of Canada's mission, costs are incurred for regular salaries, allowances, peacetime maintenance costs, and capital asset depreciation, to name a few. There are several incremental costs attributable to the Afghanistan mission including: accelerated capital asset depreciation and increased reset costs; fuel, operations and maintenance costs due to increased operational tempo in a theatre of war; increased death and disability (veterans) benefits payout; reservists pay; imminent danger pay and all incremental personnel costs related specifically to operations in Afghanistan.

There are significant challenges to estimating the cost of the war to the Government of Canada, within a reasonable level of assurance. One cannot simply sum the voted parliamentary appropriations by the various departments involved, because the Government's Estimates do not isolate the money allocated for the mission. Even if they did, the actual cost to the Crown will likely exceed the parliamentary appropriations due to: accelerated depreciation of military assets in the theatre of war; and incurred and unfunded liabilities due to mission-specific deaths and disabilities already incurred or that may be incurred in the future. There is an additional complication using parliamentary appropriations for costing purposes in that departmental figures are reported using a mix of cash and accrual accounting treatment.

This methodology paper contains a detailed discussion of estimating direct and indirect costs, various costs incurred by different government departments engaged in supporting the Afghanistan mission, cost drivers and the relationship between cost drivers and costs in a steady state versus a theatre of war situation. The overall estimation approaches include *bottom-up* and *top-down.* The bottom-up approach using detailed financial information from departments, while the *top-down* approach uses statistical analysis such as trend and regression analysis to examine the correlation between cost drivers and costs. When other techniques or data are unavailable, expert opinions can be used to support the development of a consensus cost estimate by benchmarking against the experiences of other countries.

Given the significant challenges in war costing, including the forecasting of future costs, the PBO's approach and methodology will provide a cost range based on a particular set of assumptions and with an examination of the sensitivities as a result of changes in these assumptions. Our view is that given the fiscal materiality of the Afghanistan mission, parliamentary and public debate would likely benefit from various cost estimates and ranges.

This report concludes with a number of recommendations for departmental reporting such as the inclusion of the Net Present Value of future unfunded liabilities; the use of a common costing methodology across departments; and, the delineation of mission costs by fiscal year. In the view of the PBO, such changes to parliamentary reporting would significantly improve the fiscal transparency of the Government's Estimates regarding the costing of Canada's mission in Afghanistan.

1. Introduction

Following the events of September 11 2001, Canada opted to join the global coalition in the war on terror. Canada's involvement in Afghanistan has taken place including a number of operations such as Operation Enduring Freedom, Operation Apollo, Operation Anaconda, Operation Athena, and Operation Archer. In 2004, Canada expanded its scope of involvement in Afghanistan by committing resources towards aid and supporting democratic development. By 2006, Canada had adopted a "whole of government approach" to the effort, involving Foreign Affairs, the Canadian International Development Agency (CIDA), and the RCMP, through the Provincial Reconstruction Team (PRT), in order to aid security as well as reconstruction and development. Canada's involvement continues to this date.

The objective of this paper is to explain the methodology adopted by the Office of the PBO in determining the estimated fiscal impact of Canada's mission in Afghanistan.

2. Types of Costs Incurred by Canada

There are four different cost elements that are closely tied to a determination of the total cost of the Canada's mission in Afghanistan. These can be divided into five main categories: personnel; operations and maintenance (O&M); capital expenditure; development and aid related grants and contributions; and, incurred payment liabilities due to deceased and disabled personnel, and medical costs. Each of these cost categories fulfills a distinct purpose in fulfilling the mission.

1. Personnel costs pay for Canadian diplomatic crew, military, civilian police and labour from other government departments;
2. Operations and maintenance expenditures fund the costs of operating overseas;
3. Capital funding provides the resources to purchase major equipment or facilities to undertake specific activities;
4. Grants and contributions provide resources to NGOs, or other specialized agencies, to perform certain functions to assist in channeling development related aid. The cost of classified operations conducted by Special Forces on deployed operations is embedded in the Department of National Defence's cost estimates of each deployed operation; and,
5. Incurred payment liabilities due to deceased and disabled personnel, and medical costs.

A summary description of each category is provided below.

2.1. Personnel Costs

Personnel costs on deployed operations are generally the most significant costs associated with the mission, and yet the least flexible expenditure category. Consequently, the preliminary and most significant step in the federal decision-making process is the determination of the required number of personnel (Canadian military, civilian police, CIDA, Foreign Affairs and other government departments) that will be employed overseas, and the level of support from departments that will be supporting the overseas personnel on Canadian soil. As a result, the requirement for quantities of equipment, as well as operations and maintenance expenses, largely flow from decisions regarding personnel strengths.

Personnel costs consist of both direct and indirect costs. These are further sub-divided into voted and statutory categories. Direct costs are costs that either vary directly with the number of personnel or with the pay level of an individual. Direct costs include the (voted) salary of an individual, as well as the (statutory) costs of the government share of Military, RCMP or Public Service pension plans, the employer share of pension plans (CPP/QPP) and Employment Insurance (EI). Indirect personnel costs are costs that do not vary directly with either the number of personnel or with the pay level of an individual. An example of indirect costs (statutory) would be the provincial health care plans.

The GC provides a broad range of allowances and benefits for federal employees working overseas. This includes Foreign Service premiums, hazard allowances and financial assistance to return home on vacation while deployed overseas, and in the case of military personnel, tax free status up to a certain level while deployed in special duty areas. All these costs, including the tax loss to the Crown on account of the tax-free status are incremental costs related specifically to the deployed operation.

2.2. Operations and Maintenance Costs (O&M)

Operations and Maintenance costs consist largely of the following elements:

- equipment repairs and spares;
- fuel, oil and lubrication related costs;
- troop and equipment rotation transportation costs (back and forth between the theatre of operation and unit base);
- any other capital expenditures that fall below the DND classification of capital expenditure (i.e. equipment that costs less than $30,000);
- base support and facilities costs including food, logistics, housing, communications, materials, supplies; and,
- medical and hospital costs in-theatre and elsewhere.

It is important to recognize that these costs are largely variable, and increase or decrease depending on the number of people and equipment involved and their activity rate.

The repair of damaged equipment is a cost to the operation. However, DND is funded with a certain amount of O&M to maintain existing fleets. The incremental cost to repair and maintain damaged equipment resulting from the Afghanistan mission is derived from the higher activity rate and the increased damage from operations. This relationship means that increased use of the equipment will bring an increased demand for spare parts and maintenance. At the same time, the ability to sustain the operational tempo will be decided by the level of O&M support. Maintaining serviceability is difficult in a deployed environment, with a supply chain that extends thousands of kilometres back to Canada. Discounting the effects of age on equipment, historical rates of usage for spare parts in the Canadian Forces Supply System are good predictors of the level of demand for spare parts. [1]

Operational policy in rotating troop contingents and their equipment will also have a significant impact on the O&M costs. Whether the units are rotated with or without their equipment; whether the equipment is repaired and overhauled in theatre of war, or whether damaged equipment has to be shipped back to Canada or the manufacturer for repairs will significantly affect O&M costs.

2.3. Capital Costs

According to DND's cost manual, capital costs are defined as investments in tangible assets with an economic life that exceeds one year and costs over $30,000. Capital expenditures are used to purchase new equipment for the armed forces, in addition to both replacing old equipment and providing new capabilities. Capital costs may also be incurred by CIDA, Foreign Affairs for reconstruction and development activities such as construction or betterment of the embassy building or hospitals, and the purchase of new vehicles.

Determining the Afghanistan mission's incremental capital costs to the GC would require examination of the following:

- **Capital equipment procured specifically for the Afghanistan mission:** This would entail delineating the capital costs specific to the mission from the ongoing capital procurement required for the modernization of the forces. In other words, this delineation of Afghanistan specific capital purchases would require a comparison of the trend in baseline funding during the steady state and post fiscal year 2001-02.
- **Unforecasted Operational Requirement/Capital Procurement:** Certain capital equipment will be required for deployed operations that are not in the Canadian Forces (CF) inventory. There is an Unforecasted

[1] Congressional Budget Office (2001), *"The Effects of Aging on the Costs of Operating and Maintaining Military Equipment*", Congressional Budget Office Washington http://www.cbo.gov/ftpdocs/29xx/doc2982/AgingCostsOM.pdf

Operational requirement (UOR) process within DND that will procure, on a priority basis, capital equipment. The decision must be made whether this purchase will be part of the deployed operation cost, or part of the established departmental capital procurement budget. Factors, such as whether the equipment is theatre-specific, or whether it will be a permanent part of the CF inventory will be important considerations in this regard.

- **Upgradation (Betterment of Military Equipment):** Equipment maintenance and overhaul can sometimes result in extra capabilities added to the asset. This will increase the net residual shelf life of the asset, and should be reflected in the capital expenditures budget instead of the O&M budget.
- **Destroyed Capital Equipment:**[2] Capital equipment damaged beyond economic repair in-theatre reduces the capability for the forces. The un-depreciated value of the asset is written-off and charged against the cost of the operation.
- **Future Capital Expenditure Pressures:** On account of damage, obsolescence and premature retirement of capital assets, there would be future capital expenditure pressures. The GC does not actually incur a liability, if it opts not to not fund this future expenditure. However, there is an assumption of returning the various government departments and their capabilities to their pre-mission levels.

2.4. Grants and Contributions

The GC provides aid to Afghanistan as part of the ongoing mission. This is channelled through direct and indirect means. Direct aid takes the form of, for example, building a hospital in Afghanistan. Indirect aid (grants and contributions) is channelled through organisations such as the Red Cross, and the UN.

2.5. Death and Disabilities from Service in Deployed Operations

In support of CF personnel that have been injured or disabled resulting from service in Afghanistan, the GC has a range of support programs. Furthermore, many of the injured or disabled personnel qualify for veterans' pensions resulting from their service in a deployed operation. As a result, the GC is liable for paying various annuities to CF personnel for periods of time that would include several decades. The benefit payments to CF personnel and their families are administered by various departments such as DND, Treasury Board Secretariat (TBS), and Veterans Affairs Canada (VAC).

The benefits payments are considered a cost to the deployed operation, only *if* additional payments are made beyond the scope of the insurance coverage the Canadian Forces members would have received regardless of the mission. In addition, if the insurance premiums are being paid by the departments themselves and not the members, and additional re-insurance premiums or incremental premium payments are being made, then these would be considered direct incremental costs to the Afghanistan mission. The cost can be determined by calculating the net present value (NPV) of each pension or payment. With the appropriate data, the NPV for the pension can be calculated by the Office of the Chief Actuary in the Office of the Superintendent of Financial Institutions (OSFI) or TBS' Pension Group.

[2] This is a non-cash expense. Actual cash expense will occur in out years when the asset is replaced.

The entire cost incurred due to these various payments is fully incremental to the mission in Afghanistan, since it would not have been incurred in peacetime conditions. Intense activity levels and operations tempo may also result in follow-on long-term medical problems that are not currently reflected or accounted for in the books of the various departments. Illnesses such as Post-Traumatic Stress Disorders (PTSD) sometimes may take decades to be reported.

Please see the appendices for a detailed analysis of the various methodologies to be employed by the Office of the PBO for estimating costs related to deaths and disabilities.

3. Future Costs

The GC will incur future unfunded liabilities[3] as a result of **current** and **future** deaths and disabilities in the Afghanistan mission. This is discussed in detail in *Appendix I: Mercer Canada Report*.

[3] Unfunded liabilities will be the present value of all future payments.

4. Methodology for Estimating the Incremental Cost of the Afghanistan Mission

The previous sections of the paper described the types of costs incurred by various GC departments in support of the Afghanistan mission. Government departments incur some of the costs noted above in the steady state[4]. However in a theatre of war or deployed state, these same costs tend to increase significantly due to cost drivers specific to the theatre of war such as operational tempo, rotation of troops and equipment, rate of deaths and disability, activity rate of equipment such as aircraft and tanks, and capital expenditures particular to that mission.

Therefore, estimating the incremental costs of the deployment requires a discussion of the cost drivers and costs in the context of how their relationship changes in a steady state versus a theatre of war or deployed state as well as the underlying accounting assumptions for expense recognition purposes, including accelerated depreciation of capital assets in the theatre of war.

[4] Steady state refers to a normal period, i.e. no war or deployment.

5. Relationship Between Cost Drivers

The relationship between the cost drivers and the costs in a steady state and deployed state are summarised below. The Office of the PBO's cost assessment methodology will attempt to break down incremental costs for the Afghanistan mission via at least two methodologies; a **top-down approach**, that attempts to glean incremental expenditures from the publicly available parliamentary appropriations and other data, and a **bottom-up approach** where incremental expenditures are constructed from additional information obtained from the GC departments and agencies involved. Either method will also bring out the benefits and shortcomings of the other. In a few cases, we offer a few more estimation methodologies to more accurately determine the costs incurred.

5.1. Top-down Method

The top-down method involves exclusively scrutinizing publicly available information from the Estimates documents including the Departmental Performance Reports (DPR), the Reports on Plans and Priorities (RPP), and attempting to calculate the possible incremental expenditures of the mission in Afghanistan from the relevant departments. This method will be used for assessing the costs incurred by all departments wherever possible. The top-down methodology could lack an acceptable level of accuracy due to the quality of reporting and inherent data limitations contained in DPRs and RPPs.

5.2. Bottom-up Method

The bottom-up method involves working with the various GC departments and agencies involved to obtain financial and non-financial data from their financial information systems and arrive at a costing model that will more precisely portray the various cost drivers and their interaction in deployed state. The bottom-up method will be the most precise in terms of calculating costs that have already been incurred. It will also provide strong relationship indicators about the future cost modelling. However, this method will rely solely on the ability and willingness of the involved departments to furnish the requisite and relevant financial and operating data on a timely basis.

Deployed personnel: The Canadian Forces consist of full-time regular force personnel, and a reserve force, that are comprised of four components, the Primary Reserve, the Supplementary Reserve, the Cadet Instructor Cadre, and the Canadian Rangers[5]. Reservists, who are volunteers, can number up to twenty percent in some deployments.[6] Many members of the reservists are capable of fulfilling Regular Force tasks.[7]	
Impact in Steady State	There are certain costs, which are fixed and would be incurred in any case, even in the absence of a deployed operation. These are costs such as salaries and allowances of regular military personnel and other departments such as CIDA, Foreign Affairs, RCMP, and VAC. Reservists, however, are paid only for the duration for which they report to duty.
Impact in Deployed State	All allowances and benefits payable on account of deployment will be incremental costs. Incremental costs will include the full costs of reservists during training and deployment, as well as the forces hired to support the mission in Afghanistan, i.e. personnel costs associated with hiring above the normal steady state baseline. Additional recruitment bonuses provided over and beyond peacetime rates are also incremental to the mission in Afghanistan, since they are the costs of the recruitment process for the mission.
Cost Assessment Methodology	Top-down: Personnel related costs, namely salaries and allowances are embedded in the Operating Expenditures vote[8] in the parliamentary appropriations, and need to be more clearly delineated. Bottom-up: Detailed breakdown of the costs relating to salaries, allowances, bonuses will be obtained from the DND.

Operational tempo: Operational tempo reflects the actual nature and intensity of the military operations.	
Impact in Steady State	In a steady state, operational tempo is stable and predictable, and relates mostly to peacetime training and exercises.
Impact in Deployed State	The tempo or the intensity of the combat operations is heightened in deployed state, and has a direct impact on both direct costs (such as fuel and other O&M due to wear and tear) as well as depreciation of the assets. Increased activity from transport planes or trucks for the troop deployment, or increased combat air patrols from fighter planes, increased wear and tear and usage of the engines and radars and other such mechanical and electronic equipment would cause the equipment to be replaced faster than in peacetime conditions. Thus increased tempo of operations would have a direct bearing on all the aspects of carrying out mission objectives in Afghanistan. Increased operational tempo is also likely to result in increased death and disability related costs[9].
Cost Assessment Methodology	Top-down: Operations related costs, namely mission expenses, maintenance and spares, fuel, etc., are embedded in the Operating Expenditures vote in the parliamentary appropriations. Bottom-up: Detailed breakdown of the costs relating to the above will be obtained from the DND.

[5] The source of funding for members of the regulars and reservists on deployed operations is different.

[6] McDonald, Corinne (1999) The Canadian Armed Forces: The Role of the Reserves, PRB 99-11E, (Library of Parliament – Political and Social Affairs Division, Ottawa), http://dsp-psd.pwgsc.gc.ca/Collection-R/LoPBdP/BP/prb9911-e.htm#3.%20Deploymenttxt, Accessed 20 June 2008.

[7] DND (1994) White Paper on Defence, http://www.forces.gc.ca/admpol/content.asp?id={3EBC39F6-F41B-40C5-B6B5-B54E185F014F} Accessed 20 June 2008.

[8] "How to read Parts I and II of the Estimates: The Government Expense Plan and the Main Estimates", From http://www.parl.gc.ca/information/library/PRBpubs/prb0754-e.pdf

[9] The deconstruction of particular operations and their drivers is beyond the scope of this paper. Please see the appendices for a detailed analysis of the various methodologies to be employed by the Office of the PBO for estimating costs related to deaths and disabilities.

Activity rate of equipment and rotation: Activity rate of equipment and the accounting method used for reportage in the public books should indicate the estimated life of the equipment. DND uses straight-line depreciation for capital assets over the meaningful life of the equipment.	
Impact in Steady State	In a steady state, the activity rate of military equipment such as aircraft, helicopters, tanks, armoured vehicles and others tend to be much lower and stable. Peacetime utilization of capital assets would also determine the useful life of the asset. This may not necessarily coincide with the straight-line depreciation used for the accounting treatment. For example, the Sea King helicopter fleet is being used even after their accounting-based useful life has long expired.
Impact in Deployed State	In the theatre of war, the activity rate of military equipment tends to be much higher leading to accelerated depreciation due to wear and tear, and damage. Also, the higher the rotation of equipment and personnel, the higher the cost of flying or shipping them back to Canada. Whether the equipment for the contingents is shipped or flown with the personnel will also impact the costs of transportation in deployed conditions.
Cost Assessment Methodology	Top-down: Equipment activity rate is not available in the Estimates documents. Bottom-up: Detailed breakdown of the costs relating to the above will be obtained from the DND.

Price of fuel and utilities: The cost of energy to the defence budget including all fuels and utility consumption historically accounts for approximately three percent of the budget. This category is extremely sensitive to price fluctuations. Military forces, unlike corporations in the private sector, have only limited short- to medium-term flexibility to modify their use of fuels in undertaking military operations.	
Impact in Steady State	N/A
Impact in Deployed State	In a deployed state, fuel costs would be higher on account of accelerated operational tempo. Furthermore, the fuel costs could also be higher on account that the Forces have to buy the fuel at increased world prices.
Cost Assessment Methodology	Top-down: Fuel and utilities related costs are embedded in the Operating Expenditures vote in the parliamentary appropriations. Bottom-up: Detailed breakdown of the costs relating to the above will be obtained from the DND.

Betterment of equipment and reset:[10] Reset refers to the servicing and overhaul of equipment that restores the equipment back to its "as-new" state. In accounting terms, this would extend the shelf life of the equipment past its original shelf life at procurement. Betterment, on the other hand, refers to servicing and overhaul of equipment that not only restores the equipment to its "as-new" state, but also increases the capability. For example, replacement of a V-4 engine with a V-6 engine, or a new radar installation on existing equipment would represent "betterment".	
Impact in Steady State	In a steady state, there may be expenses related to betterment or upgrade of equipment. This expense should be made against the capital expenditures budget, and the depreciation expenses should be adjusted accordingly.
Impact in Deployed State	In a deployed state, there are significant incremental costs as a result of reset and overhaul of equipment due to damage relating to the intensity of operations. Reset costs, all of which are incremental costs of the war, refer to costs incurred by the military to restore the asset to pre-war condition.
Cost Assessment Methodology	Top-down: Betterment related costs may be embedded in the Operating Expenditures vote in the parliamentary appropriations, despite the fact that these expenditures are actually capital expenses; or in the Capital Expenditure vote. Bottom-up: Detailed breakdown of the costs relating to the above will be obtained from the DND, to be accounted to the mission in Afghanistan.

[10] US DoD definition – funds to restore units to pre-war condition – that includes not only the repair and replacement of equipment damaged in war or that is not worth fixing, but also to upgrade equipment to meet future needs. According to CRS Report for Congress dated April 11, 2008, the largest single reason for the increase in war costs between FY2004 and FY 2007 is the amount requested and received by DoD for reset. Although repairs and replacement costs may go up over time due to war operations, it appears that much of the growth reflects a broadening of the definition of what is required. In FY 2008, DoD requested $46 billion for reset.

Training: The Canadian Forces have an established level of annual training. Funding within the baseline is already provided through the departmental budget. Each command/force (Army, Navy, Air Force, etc.) of the Canadian Forces is trained and tasked with fulfilling certain missions, as specified from time to time. The CF may have to re-train before deployment, to better reflect the specific needs of the mission at hand. Re-training for a new mission may affect the CFs' ability to conduct a different type of operation in the future.	
Impact in Steady State	Participation in deployed operations overseas can increase the requirement for theatre-specific training, or for more in-depth and specialized training than is normally required. In peacetime, the tempo of operations has little effect if there is no deployed mission in progress. However if the rotation policy during a deployment requires that the lessons and tactics be trickled down, then there would be modifications to the basic courses and training imparted to members and new recruits.
Impact in Deployed State	In the case of the Canadian Forces, preparation and training of military personnel to operate in a region where asymmetrical threats predominate[11] requires several months of training and the incremental training costs are substantial. The mission in Afghanistan can be construed as a unique mission for the Canadian forces, since they have not had to fight and train for asymmetrical warfare or conflict[12].
Cost Assessment methodology	Top-Down: Training related costs are likely to be embedded in the Operating Expenditures vote in the parliamentary appropriations, despite the fact that these expenditures are actually capital expenses. Bottom-up: Detailed breakdown of the costs relating to the above will be obtained from the DND, to be accounted to the mission in Afghanistan.

[11] A discussion of emerging trends in conflicts that emphasises the changing environment Canadian personnel face in the 21st Century is in Hammes, Thomas X. (2007) "Fourth Generation Warfare Evolves, Fifth Emerges" *Military Review* (May – June 2007) Pages 14-23. http://www.au.af.mil/au/awc/awcgate/milreview/hammes-4gw_and-5th.pdf accessed 21 July 2008.

[12] According to the latest 2006-07 DND DPR (from http://www.tbs-sct.gc.ca/dpr-rmr/2006-2007/inst/dnd/dnd01-eng.asp), the role of Canadian Forces is stated as *"Protect Canadians at home and defend our sovereignty; Defend North America in co-operation with the United States; and Contribute to international peace and security"*. It is not clear whether the stated goal of the Canadian forces is to have full-spectrum combat and operations capabilities. If this is the case, it is unclear as to whether the training expense incurred on account of asymmetrical warfare is indeed incremental to the mission in Afghanistan, since this would be part of the baseline funding to sustain the Canadian Forces anyways. Furthermore, given the fact that the Canadian Forces have been in Afghanistan for the better part of this decade, it is questionable whether incremental training expense is still required, since the experience and learning for asymmetrical warfare would be part of the standard training by now, unless DND desires to discard asymmetrical warfare training after the mission is closed.

Foreign exchange: On average, the demand for foreign currency in the Department of National Defence spending ranges between 8% and 11%.	
Impact in Steady State	In a steady state, DND is exposed to foreign exchange risks resulting from long-term procurement contracts.
Impact in Deployed State	In a deployed state, the foreign exchange risks could be pronounced given that fuel, which accounts for a significant portion of O&M expenditures, would be incurred in overseas markets where the commodity prices can be higher than in Canada[13].
Cost Assessment methodology	Top-Down: Foreign exchange related costs are likely to be embedded in the Operating Expenditures vote in the parliamentary appropriations. Bottom-up: Detailed breakdown of the costs relating to the above will be obtained from the DND.

[13] In fiscal year 2006-2007, 10.8% of defence expenditure was outside Canada. Director Strategic Finance and Costing 2008, *DND Estimated Expenditure by Electoral District and Province,* Page vi.

Depreciation and accrual accounting[14]: Under accrual accounting, the use of capital assets is recognized by being expensed (depreciated) over the time that they are expected to be used (useful life). Accrual accounting is particularly relevant for DND that has a planning horizon that spans several decades and has capital assets of about $51 billion[15]. The depreciation of capital assets has a real and significant impact on the GC fiscal framework as the government would need to earmark funds for asset replacement. This asset replacement may actually happen after the mission may have ceased; however the asset replacement is a direct incrementality to the mission.	
Impact in Steady State	DND uses a straight-line method to calculate each asset's depreciation schedule and annual rate. It is not clear as to how the total useful life of the asset is calculated. However, the depreciation schedule of capital assets in peacetime conditions would possibly have an effect on the annual appropriations of that asset.
Impact in Deployed State	In a theatre of war, asset depreciation is significantly front-ended on account of hostile operating conditions, increased activity rate and age of the equipment itself. The front ending of depreciation would put increased strain on the fiscal framework as the government would now be required to spend monies to replace the asset in a year or two as opposed to at the end of the normal economic life of the asset. As a result, the estimated life expectancy of those specific weapon systems can reasonably be expected to decline[16]. The actual capital asset may not be up for replacement when its accounting life expires; if there have been betterments and modifications to the asset during maintenance. Adjustments should be made to the expected useful life of that equipment based on engineering assessments of that equipment. If there is a need to replace that particular class of capital assets faster than was originally envisaged, then it would become a direct incrementality to the Afghanistan mission.[17]
Cost Assessment Methodology	An analysis of specific cases is required. Please refer to the appendices for more details.

[14] For a more thorough discussion on depreciation and accrual accounting, please see the appendices.

[15] DND (2007) *Departmental Financial Statements 2006-2007, p*age 16.

[16] Korb, Lawrence J., Max A. Bergmann and Loren B. Thompson (2006) *Marine Corps Equipment After Iraq* (Center for American Progress, Washington and Lexington Institute, Washington). http://www.americanprogress.org/issues/2006/08/marine_equipment.pdf, accessed 3 July 2008.

[17] For example, Canada up-armoured the Leopard-1A3 tanks with MEXAS armour for an unknown amount around the year 2000. 18 Leopard Crew gunnery trainers were also purchased at the same time. These tanks would have come up for replacement in the year 2015, due to complete obsolescence, and lack of logistics support and spare parts. However, in the fiscal year 2006-07, Canada decided to retire the Leopard-1A3 (C2) fleet with a completely new fleet of Leopard-2A6M tanks acquired from the Netherlands for a package deal of $1.25 billion, due to the unsuitability of the Leopard-1A3 (C2) fleet to the conditions in Afghanistan (http://www.cbc.ca/canada/story/2007/05/17/tanks.html). Thus, the Leopard-1A3 (C2) fleet was technically front-ended from the year 2015 to the year 2007, an accelerated depreciation incremental to the Afghanistan mission. Also, the deployment of the new Leopard-2A6M fleet of tanks to Afghanistan will be front-ended beginning their deployment from August 16, 2007, the official date of deployment.

6. Cost Assessment Criteria

To be applicable in a broad range of circumstances, an estimation methodology needs to be based upon certain core criteria. At a basic level, cost assessment criteria should include completeness, reasonableness, consistency, documentation, and credibility[18]. To ensure completeness, all key cost drivers must be both identified and included. In addition, costs should be noted by fiscal year and reported in either budget year dollars or constant year dollars, with the results analyzed. Reasonableness implies that the assumptions used are realistic and appropriate. Reasonableness also implies that an appropriate costing methodology is used in the given circumstances, and that historical costs are well documented. Consistency is derived from applying factors and techniques in a systematic manner over time. Effective documentation is achieved by providing sufficient information that the costs can be replicated by others. Finally, credibility is enhanced by external validation of the cost methodology, as well as through the level of expertise, knowledge and experience of the analysts.

[18] Office of the Secretary of Defense Cost Analysis Improvement Group (1992), "*Operating and Support Cost Estimating Guide",* (Department of Defense, Washington). Page 3-2.

7. Cost Benchmarks

To effectively interpret information, such information must be put into context. This context can be provided by analyzing the costs of deployed operations from a variety of perspectives, and by analyzing their influences. These can include:

- **Combination of the Annual Support to DND Deployed Operations Account (SDOA) and Deployed Operations Account (DOA) funding** – Is a good indicator of in-year deployed operations costs, as they must be contracted and incurred (i.e. DND National Procurement (NP) costs for increased demand for capital equipment spare parts due to increased activity rates) during a fiscal year.
- **Average monthly deployed troop strengths (by operation)** – The number of military personnel deployed in a given month is a dominant cost driver, influencing a multitude of operations and maintenance costs. Shifts in the average monthly troop strength can be used to compare against other variables over time.
- **Average monthly deployed troop strengths (by operation)** – The number of military personnel deployed in a given month is a dominant cost driver, influencing a multitude of operations and maintenance costs. Shifts in the average monthly troop strength can be used to compare against other variables over time.
- **Monthly usage rate of major deployed equipment fleets** - The monthly usage of major deployed equipment fleets in comparison to average peace-time rates provides an indicator of the intensity of usage of that equipment.
- **Annual comparison of percentage of major fleets deployed overseas** – An annual comparison of major equipment fleets deployed overseas over several fiscal years provides an indicator of fleets that need to be analyzed carefully for incremental expenditure.
- **Annual incremental funding** – The annual incremental funding allocated in the "in-year" through the federal Supplementary Estimates process – related to the deployed operation - provides a benchmark to evaluate the increased activity above the baseline that this deployed operation has generated.
- **Value of absorbed costs** – The value that each department absorbed in incremental costs related to overseas operations each fiscal year is another measure of the impact of the deployed operations on the department.
- **The level and intensity of the deployed operations to each department** - Can be measured through the annual percentage of incremental costs in comparison to the existing baseline budget. The level and intensity of the deployed operation on the department illustrates the pervasiveness that the deployed operation has on the department. This benchmark can also include a comparison with previous significant deployments.
- **Percentage of mission costs spent on contractors** – The increasing use of contractors on deployed operations to undertake various support functions overseas will impact on costs and on the level of effort by departments in sustaining the mission. An elevated level of contractors is an indication of the level of maturity in the mission and of relative cost stability.

8. Conclusions and Recommendations

Given the fiscal materiality of the expenditures and to provide enhanced fiscal transparency to Parliament, the Office of the Parliamentary Budget Officer recommends that the incremental cost to the Canadian government for support to Afghanistan be clearly delineated and reported as a separate line item by individual departments using a common costing methodology. All parliamentary appropriations for the Afghanistan mission should be shown as a separate line item in the Estimates to avoid co-mingling of funds, which renders it very difficult to make cost assessments. For example, all the war-related funding in the U.S. is separately appropriated through Supplementary Estimates and can be tracked easily.

The Office of the PBO recommends that the departments involved in the Afghanistan mission provide cost estimates at multiple troop levels and employ the following parliamentary reporting format to promote fiscal transparency and support enhanced parliamentary dialogue and debate:

8.1. Recommended Departmental Reporting Format

- **Standard costs** – Where available, standard costs should be used for personnel and equipment[19]. In general, standard costs provide a common basis of cost analysis to evaluate the financial impact of activity changes or the costs of specific activities.
- **Cost reporting** - Costs should be reported in both **full** costs and **incremental** costs. Full costs are defined as "the sum of all costs, variable and fixed, direct and indirect, cash and non-cash, incurred by the GC in the supply of a service". Incremental costs are defined as "additional and variable costs incurred as a direct result of supplying a service. These costs result from additional resources or a reallocation of existing resources."
- **Annual costs** – Costs will be reported separately by fiscal year (FY), commencing in FY 2001-02 through to FY 2007-08. In addition, an estimate should be provided for FY 2008-09. A separate estimate for the present value of future liabilities incurred during the period of FY 2001-02 through to FY 2008-09 should also be provided.
- **Future liabilities** – All estimated long-term liabilities related to personnel, resulting from departmental in-theatre support to Afghanistan which will be incurred in future Fiscal Years, needs to be estimated and reported in terms of a Net Present Value[20]. Estimates for annuities (i.e. a Veteran's Affairs pension for a disabled soldier) should be provided by either government or private sector actuaries. A consolidated model can be built through the use of data and assumptions provided by Veterans Affairs using Afghanistan veteran population data. This model should also take into account increased utilization of health and other services, as the veterans become older. Please refer to its detailed section on the methodology for assessing death and disability related liabilities (*"Appendix I: Mercer Canada Report")*.

[19] The Department of National Defence produces an annual cost factors manual that provides standard costs for personnel, equipment and facilities, Director, Strategic Finance and Costing (2008), 2008-2009, DND *Cost Factors Manual.*

[20] The concept that money has a time value is one of the pre-eminent concepts in financial analysis. This concept acknowledges the cost of interest on a debt over a specific period of time, or the benefit of interest earned on funds invested. In the case of a current activity, where liabilities for expenses will be incurred for decades into the future, this concept becomes important in determining future costs.

The Office of the PBO further recommends that departments should:

- report by fiscal year from 2001-02 through to 2007-08, as well as an estimate for 2008-09;
- report annual costs by phases of deployment (pre-deployment, deployment, employment, re-deployment and reconstitution of equipment). Estimated recapitalization costs from a given fiscal year that are expected to be incurred in future fiscal years, should be reported separately as a future-year expense; and,
- report accrued long-term costs separately.
- Report costs separately in terms of full costs and incremental costs and by both Budget Year (BY) and Constant Year (CY) dollars (2007).
- Report the annual incremental amount absorbed by department, as well as the total budget allocation at year-end.
- For the Canadian Forces, report the number of personnel deployed monthly as a portion of the overall number of annual military personnel.
- Report the average monthly cost of operations for the reporting period of 2001-02 through to 2007-08.
- Report annual incremental funding allocated in the Supplementary Estimates process related to the deployed operation in percentage to overall departmental funding.
- Report the annual "accrual room" by department, generated from the write-off of heavily damaged or destroyed equipment on deployed operations.
- Report the annual "accrual room" by department, generated from the write-down of capital assets resulting from the reduced life expectancy of equipment that has been used intensely and for long periods on deployed operations.
- Report the net present value of annuities and programs for disabled personnel resulting from service in Afghanistan, and of the cost of annuities for the families of personnel killed in that country while in the service of Canada.

Appendix I: Mercer Canada Report

The PBO engaged Mercer Canada to provide a cost estimate of the liabilities to the Crown on account of deaths, disabilities, medical and PTSD[21] cases due to the Canadian Mission in Afghanistan. Mercer Canada provided the PBO with a report including their methodology, assumptions and order of magnitude cost estimates.

The relevant excerpts from the Mercer Canada Report are reproduced below.

> Methodology and Assumptions
>
> This section provides a summary of the methods and assumptions used to perform our cost estimates. More detail can be found in **Appendix C**.
>
> ***Death benefits***
>
> The methods used to value the Death Benefits provided under the CFSA and the VAC programs were as follows:
>
> **CFSA**
>
> - Supplementary Death Benefit (SDB)
>
> The SDB under the CFSA provides for a lump sum death benefit equal to two times salary. For each death resulting from the conflict in Afghanistan, the death benefit was based on an assumed average salary of $52,000 (for fiscal year 2007-2008 and adjusted by 3% for other years) based on information provided by DND on death casualties. In addition, an administrative expense of 5% was assumed.
>
> - Survivor pension
>
> The CFSA also provides for a survivor pension to an eligible spouse and/or dependent children. Using an average demographic profile derived from the CFSA actuarial valuation report, we estimated the net difference between the present value of a survivor pension and the accrued retirement pension. Our estimates indicated that the net difference between the two is not material. Therefore, the value of the CFSA survivor benefits has not been included for the purpose of our estimate.

[21] PTSD stands for Post-Traumatic Stress Disorder

VAC

- Lump sum award

  Under the New Veterans Charter, a lump sum amount of $250,000 is payable for service-related deaths occurred on or after April 1, 2006. The amount payable is indexed each January 1. For the purpose of our cost estimate, we have used the number of actual and estimated future deaths each year and applied the lump sum amount, including indexation. While the value of VAC's death benefits for deaths occurred prior to April 1, 2006 was based on a survivor pension rather than a lump sum award, we have used the value of the lump sum award as being representative of the approximate value of the pre-April 1, 2006 benefits. This simplifying assumption does not have a material impact on our cost estimates.

- Earnings Loss Benefit

  The New Veterans Charter provides for an Earnings Loss Benefit that may be paid to eligible survivors and their dependents. The costs of this program cannot be separately identified from the Earnings Loss Benefit available to disabled veterans, so they have been implicitly included with the costs of the other VAC benefits described in the following section.

All CF deaths incurred in Afghanistan have been deemed to represent an incremental cost for the purpose of our estimate. A more refined estimate could exclude expected costs attributable to non-service-related deaths. However, this would not have a material impact on the results of this study.

Disability and Health Care Benefits

CFSA Disability pension

A CF member released for medical reasons may be entitled to a CFSA disability pension, if the member's medical condition meets the definition of disability under the CFSA. However, the CFSA disability benefit is an offset to the SISIP LTD plan. Therefore, rather than valuing this benefit separately, the CFSA disability costs have been included with the costs of the SISIP LTD plan as described later in this report.

VAC benefits

The VAC benefits include disability benefits and access to numerous health, financial and rehabilitation benefits and awards. Substantial changes were made to the VAC program effective April 1, 2006. Given that it may take a long period of time following the occurrence of an event before a medical condition or disability related to this event manifests itself, the majority of claims for benefits related to the events from the war in Afghanistan will be filed under the provisions of the new VAC program. Therefore, for the purpose of our estimate, we have used the provisions of the New Veterans Charter for determining the cost of all claims related to the war in Afghanistan. This simplifying assumption does not have a material impact our cost estimates.

Two key elements need to be determined for the purpose of valuing the VAC benefits. The first one has to do with claims incidence; i.e. for any given year of military operations in Afghanistan, we must estimate the number of claims that will eventually occur. The second key element of the cost assessment is to determine the present value of the claims that will eventually be paid. These two key elements are discussed further below.

- **Claims incidence**

The claims incidence is particularly difficult to estimate. As previously mentioned, it may take a long period of time following the occurrence of an event before a medical condition or disability related to this event manifests itself. Therefore, the claims reported so far in relation to the Afghanistan conflict only represent a small fraction of the total claims that can be expected to arise in future years.

A key component of our claims incidence assumption is based on the claims distribution assumption developed by the Office of the Superintendent of Financial Institutions (OSFI) for the purpose of their Actuarial Report on the Future benefits for Veterans as at March 31st, 2008. The expected claim distribution pattern derived from OSFI's report related to the emergence of future disability awards is summarized in the table below. The table illustrates the expected proportion of claims (Disability awards, Veterans Independence Program (VIP) and Health Care Treatment Benefit (HCTB) claims) to be awarded in future years in relation to events occurred in fiscal year 2008-2009.

Fiscal Year of emergence	Proportion of claims reported in future years in relation to 2008-2009 events
2008-2009	3.3%
2009-2010	11.7%
2010-2011	8.3%
2011-2012	6.7%
2012-2013	5.0%
2013-2014 to 2022-2023	19.0%
2023-2024 and beyond	46.0%
All	100.0%

This claims distribution assumption was developed by OSFI based on their analysis of VAC claims submitted in relation to prior years' events, including both wartime and peacetime clients.

As can be seen from the above table, only about a third of claims related to 2008-2009 events are expected to be reported within the next five years. Nearly half the claims related to 2008-2009 events are expected to emerge more than 15 years from now.

Another main source of information used to derive our incidence assumption was the number of claims reported by VAC as of August 31, 2008. As of that date, VAC's reports indicated 841 clients

with Afghanistan service only and 683 clients with Afghanistan and other CF service. Finally, we also used reports produced by DND which provided us with additional information on the number of injuries occurred in Afghanistan by year of occurrence.

Using OSFI's claims distribution outlined above, along with the number of Afghanistan service-related clients reported to VAC so far and DND's reported injuries, we derived an assumption with respect to the incidence of VAC claims related to service in Afghanistan.

Note that the claims incidence shown in **Appendix C** is related to disability awards. The incidence related to other VAC benefits is not shown separately, but is directly linked to the incidence assumed for the disability awards benefits (e.g. based on OSFI's methodology, the incidence of VIP and HCTB benefits is assumed to be 48% and 50% of the disability awards benefits respectively).

Since the data available to derive this assumption was limited and there is a high degree of uncertainty with respect to the actual emergence of future claims related to current events, the methodology described above was used for our low estimate. For the purpose of the high estimate, it was assumed that the incidence of claims would be 50% higher than assumed under the low estimate.

Finally, all claims related to service in Afghanistan are assumed to represent an incremental cost.

- **Present Value of future VAC claims**

The second key element is assessing the present value of future benefits payable under VAC as a result of a service-related illness or injury. For this purpose, we have relied on the results of OSFI's actuarial valuation of VAC benefits as of 2008. In their report, OSFI determines the net present value of all VAC benefits expected to be paid in the future as a result of service-related events occurring in the current year. This net present value is referred to as the Government Service Costs (GSC) in OSFI's valuation report.

The GSC is the sum of the actuarial present value (PV) of all VAC benefits arising from events in the year, regardless of when the claim is made. In order to calculate the PV, economic, demographic, and other assumptions are made. The economic assumptions include interest, inflation, and indexation of certain benefits. Demographic assumptions are made regarding the number of new disability claimants, VIP claimants and new claimants under each of the other programs. Of note is that the incidence of post-traumatic stress disorder is not an explicit assumption, but rather is implicit in the overall disability assumption. Other demographic assumptions are made such as mortality rate, marital status etc. The highlights of the main economic assumptions used by OSFI for their valuation are provided in **Appendix C**.

From OSFI's report, we can derive that the average PV per new VAC client is $131,000 in relation to events occurred in FY 2008-2009. This value is derived by using the GSC reported by OSFI for FY 2008-2009 events divided by the total number of new VAC clients expected to emerge from 2008-

2009 events (i.e. GSC of $393.0 million divided by 3,000 new entrants assumed by OSFI). Note that we have added 20% related to claims administration costs[22] which are not factored in OSFI estimates, resulting in an assumed PV of $157,000 per claim incurred as a result of 2008-2009 service. This amount was used for our low estimate.

For the high estimate, we have assumed that the severity/amount of claims related to Afghanistan service would be 30% higher than the average for all VAC clients. In addition, we have adjusted the general and health care inflation to use a more conservative trend assumption by using the results of the sensitivity analysis found in table 6 of the OSFI valuation report. The resulting assumed PV per new VAC client with Afghanistan service of $225,000 for 2008-2009 service was used for our high estimate.

These costs were used for FY 2008-2009. Costs for other years included in our study were derived from the 2008-2009 estimate, adjusted by 3% per year for previous and future years.

Service Income Security Insurance Plan (SISIP)

The main employer-paid benefit provided under SISIP that may be impacted by service-related disabilities is the long-term disability (LTD) program. Under this program, a member released from the CF may be entitled to a benefit equivalent to 75% of salary reduced by certain offsets, provided they meet the definition of disability under the SISIP LTD plan. Note that while members contribute to the cost of this program, it is assumed for the purpose of our estimate that any incremental cost related to service-related disabilities would be borne by the employer. As with the VAC benefits, the two key assumptions needed to derive the cost of this program are claims incidence and the PV of the costs of the program.

- **Claims Incidence**

There is little data available to estimate the actual number of incurred SISIP LTD claims that may be related to the conflict in Afghanistan. There can be a lag of several months to several years between the time an injury occurs and a CF member is released from the Force (notification to the insurer is only provided about 6 months prior to release). In addition, there are potential claims related to current events that may not manifest themselves until several years from now.

Manulife Financial (SISIP's insurer) indicated that 78 LTD claims were reported over the last two years that can be attributed to service in Afghanistan. In addition, we understand that medical releases and LTD claims are expected to increase substantially this year compared to previous years, but have no information as to what extent this increase may be linked to operations in Afghanistan.

Unfortunately, the lack of data, as well as potential claims lag, makes it difficult to establish a solid assumption with respect to the incidence of LTD claims that may be linked to service in Afghanistan.

[22] While VAC's operation costs are higher than 20%, these operation costs would be comprised of fixed and variable costs. We have used 20% as an approximation of the variable costs related to the administration of these additional claims.

Nevertheless, based on the information available, and claim patterns that can generally be expected from the LTD program, we have established an LTD incidence assumption using a fairly wide range between our low and high estimate to account for the uncertainty in the claims level.

For the purpose of our low estimate, we have assumed that the incidence of SISIP-LTD claims resulting from service in Afghanistan represents 10% of the incidence of VAC-related claims for the low estimate and 25% for the high estimate.

- **Present value of claims**

The present value of LTD claims (i.e. the value of future LTD benefit payments for incurred and future claims) has been estimated based on the same methods and assumptions used by the insurer for the purposes of establishing an LTD actuarial reserve for a new claim. However, the reserve amounts have been adjusted to remove the impact of any CFSA disability offset such that the resulting value represents the combined value of CFSA disability and SISIP LTD benefits. The reserve amounts have also been adjusted to remove the impact of Pension Act offsets as they are no longer applicable to new claims.

Other employer-paid SISIP benefits (i.e. ADIP) have not been valued as they do not have a material impact on the results of this cost estimate.

Time Loss due to disability

In addition to the insured LTD payment provided under the SISIP LTD plan, there may be a cost associated with time loss prior to release. SISIP's insurer indicated that it takes about 2 years on average between the date an event occurs and the actual release date from the CF. Some of that time would represent paid time loss prior to being released from the CF. There was no information available related to potential paid time loss. We have assumed that on average, paid time loss represents 6 months of pay for our low estimate and 18 months of pay for our high estimate. We have increased these amounts by 25% to account for pension, benefits and other payroll costs.

There are other events that could result in paid time loss, but not necessarily in a medical release, for instance, an injured member who recovers and returns to active duty. However, there was not information available to allow us to take these potential time losses into account in our estimate. The impact is likely not material to the results of this study.

Public Service Health Care Plan

Released CF members may be entitled to benefits under the Public Service Health Care Plan (PSHCP). To the extent that medical costs of released members are higher than average as a result of service in Afghanistan, these added costs should also be factored in as additional costs to the Crown. Due to time constraints and lack of data, these costs have not been assessed for the purpose of the present estimate.

Other costs not valued

In addition, the following costs were not valued:

- Any structural costs, such as repatriation costs or the costs of recruitment and training of new members of the Canadian Forces (not within the scope of the study)
- Incremental medical costs prior to release from the Canadian Forces (insufficient data)

Appendix A

Benefits payable on death

This table provides a description and cost of the benefits payable on service-related deaths. Only those benefits deemed to be material have been included in this table. Descriptions of the other death benefits payable can be found in the table at the end of this Appendix.

Act	Benefit
Canadian Forces Superannuation Act	▪ Supplementary Death Benefit (SDB) – For service and non-service-related deaths for members and reservists ▫ 2 times salary rounded to the nearest $250
Pension Act Survivor Benefits; for deaths pre-April 1, 2006	▪ A fixed amount for the survivor and for children, payable until date deceased member would have attained age 65 ▪ Equal to 75% of the of the Class 1 Disability Pension ▪ Amount of survivor pension in 2007: – Survivor: $1,665/month – One child: $577/month – Two children: $999/month – Each Additional child: $333/month ▪ Indexed wage based/CPI based *Note: value of death benefit under the New Veterans Charter described below used as an approximation of value of pre-April 1, 2006 benefit*
Canadian Forces Members and Veterans Re-establishment and Compensation Act (New Veterans Charter); for deaths post-March 31, 2006	▪ Death Benefit – For sudden (within 30 days of injury) deaths of members and reservists incurred during service ▫ Amount is $250,000 as of April 1, 2006, indexed each January 1 ▪ Earnings Loss Benefit – May be paid to eligible survivor and children – Payment is equal to 75% of the deceased member's imputed income less the amount paid to the survivor from prescribed sources (Pension Act, CFSA, CPP etc.) – Payment is made until the date the deceased member would have reached age 65 – If no survivor, but orphans exist: ▫ 40% of ELB above *Note: the ELB was valued with the disability benefits*

Benefits payable on disability

This table provides a description and cost of the benefits payable on service-related disabilities. Only those benefits deemed to be material have been included in this table. Descriptions of the other disability benefits payable can be found in the table following this one.

Act	Benefit
Canadian Forces Superannuation Act	▪ Disability Pension – Prior to 1 April, 2007: ▫ Less than 10 years of service: return of contributions or cash termination allowance ▫ 10 years of service or more: immediate annuity – Post 31 March, 2007 ▫ Less than 2 years of service: return of contributions ▫ At least 2 years but less than 10 years of service: at option of member, 1) deferred annuity or 2) transfer value if under age 50 ▫ 10 years of service or more: immediate annuity - Immediate annuity is an unreduced pension payable immediately - Annual amount is 2% of highest average of annual pensionable earnings *Note: Implicitly valued with SISIP LTD (described below)*
New Veterans Charter *Note: for purposes of this report, benefits are assumed to be paid under the New Veterans Charter*	▪ For disabilities post-31 March, 2006: ▪ Disability Award – For service-related injury or non-service- related injury aggravated by service – A fraction of disability measured in fifths – Additional award for loss or loss of use of 1 of paired organs or limbs ▪ Equal to $250,000 x disability % less disability awards already paid ▪ Health Care Benefits – Still serving disabled members must access health care benefits available through the Spectrum of Care until released – Released members are eligible to the extent benefits are not available through other programs 1) Other Health Purchased Services - 14 Programs of choice including prescription drugs 2) Long-term care - Intermediate care or chronic care at contract or community facilities or St. Anne's Hospital 3) Veterans Independence Program - Home care program ▪ Funds for grounds maintenance, housekeeping, personal care etc. ▪ Financial Advice – Lump sum to maximum of $500

Act	Benefit
	▪ Temporary and Extended Earnings Loss Benefit – Can be paid to disabled veteran where a rehabilitation need is determined – Payment is equal to 75% of the disabled veteran's imputed income less income from prescribed sources (Pension Act, CFSA, CPP etc) – Payment is made until the earlier of the date the rehabilitation is complete or cancelled or the date the disabled veteran reaches age 65 ▪ Supplementary Retirement Benefit – 2% of extended earnings loss benefit ▪ Permanent Impairment Allowance – Payable for physical or mental health problems that are creating a permanent and severe impairment for which rehabilitation services have been approved and for which the Veteran has received a disability award – Award is based on 3 grades – Payment is made until death or no longer severely impaired ▪ Canadian Forces Income Support Benefit – Paid to low income veterans, survivors and orphans ▪ Basic monthly amount in 2007 was $1,227 ▪ Health Care rehabilitation – Medical and psycho-social rehab – For clients with a condition resulting from service – All reasonable expenses reimbursed for up to one year
	▪ Vocational Rehabilitation – For clients with a condition resulting from service – Assists clients identify and achieve vocational goals – All reasonable expenses reimbursed for up to one year
SISIP LTD	▪ 75% of pre-disability earnings – Paid from date of medical release to age 65 as long as qualifies under the definition of disability of the plan (must be totally disabled to qualify for payments beyond 24 months) *Note: CFSA disability pensions are offsets from the SISIP LTD; they have been implicitly valued with SISIP LTD by ignoring the offset*

Appendix B

Exclusions from cost estimate

Act/Program	Benefit
Canadian Forces Members and Veterans Re-establishment and Compensation Act (New Veterans Charter)	▪ Clothing Allowance ▪ Detention Benefit ▪ Funeral and Burial Assistance
Canadian Forces Superannuation Act	▪ Survivor Benefits ▪ Severance Pay, Unused leave ▪ Moving Expenses ▪ Allowance in Lieu of Operational Allowance
Children of Deceased Veterans Education Assistance Act	▪ Education Assistance for surviving dependant children
SISIP FS	▪ Accidental Dismemberment Insurance Program ▪ General Officers' Insurance Plan (GOIP and Res GOIP) ▪ Military Post-Retirement Life Insurance Plan (MPRLIP) ▪ Health Care Benefits ▪ Any member-paid coverage

Appendix C

Main Assumptions

Historical and Projected Deployed Strength

Fiscal year	Exposure[1]
2001-02	3,000
2002-03	5,600
2003-04	2,000
2004-05	900
2005-06	2,300
2006-07	2,500
2007-08	2,500
2008-09	2,500
2009-10	2,500
2010-11	2,500

[1] Historical and projected exposure on deployed strength as provided by the Office of the Parliamentary Budget Officer

For benefits payable on death

Average salary in 2007/2008	$52,000 (derived from information provided by DND)
Annual salary increase	3% per annum
Deaths since beginning of conflict	As reported by DND
Expected mortality rate	1.4% per year (based on recent experience)
Annual increase to lump-sum death benefit payable under the New Veterans Charter	3% per annum
Administration expenses	5% added to cost of all death benefits

For benefits payable on disability

- **VAC benefits**

Some of the cost estimates performed in this report relies on the methods and assumptions used by OSFI for the purposes of their Actuarial Report on the Future Benefits for Veterans, as at March 31, 2008.

The following is a high-level description of the economic assumptions used by OSFI to determine the Government Service Cost (GSC) of the Veteran's Affairs Benefits:

Economic assumptions		
Ultimate rates (i.e. fiscal year 2014 and onwards)	Interest:	4.05%
	CPI:	2.00%
	Wages:	2.90%
	Health Care trend*:	3.5%

* Including utilization

- **SISIP LTD**

The assumptions used are those used by Manulife for the purposes of calculating actuarial reserves for a new approved claim.

- Average cost per claim in 2007-2008: $143,000 (excluding C/QPP offset)

These costs were extrapolated to other years by using an adjustment of 3% per annum.

Variable Assumptions for purposes of low and high estimates

Claims incidence rate (as % of exposure)				
	Low estimate		High estimate	
	SISIP-LTD	VAC Benefit	SISIP-LTD	VAC Benefit
Fiscal Year				
2001-02	3.0%	30.0%	11.3%	45.0%
2002-03	2.0%	20.0%	7.5%	30.0%
2003-04	2.0%	20.0%	7.5%	30.0%
2004-05	2.0%	20.0%	7.5%	30.0%
2005-06	3.5%	35.0%	13.1%	53.0%
2006-07	3.5%	35.0%	13.1%	53.0%
2007-08	3.5%	35.0%	13.1%	53.0%
2008-09	3.5%	35.0%	13.1%	53.0%
2009-10	3.5%	35.0%	13.1%	53.0%
2010-11	3.5%	35.0%	13.1%	53.0%

Other assumptions				
	Low estimate		High estimate	
	SISIP-LTD	VAC Benefit	SISIP-LTD	VAC Benefit
Claims severity	No adjustment	No adjustment	+20%	+30%
Economic assumptions	No adjustment	No adjustment	Included in 20% above	CPI +1% HC trend +2%
Claims duration	Time loss:	Low estimate - 6 months High estimate - 18 months		

Appendix II: CAPEX, Asset Depreciation, and Accrual Accounting

Capital expenditure towards the mission in Afghanistan revolves around a few important issues, namely:

- acquisitions of new equipment for the mission;
- new acquisitions and expenses for in-theatre deployments (Unforecasted Operational Requirement - UOR);
- betterment (in-field or out-of-field) enhancements to equipment;
- depreciation schedules applied to existing and new inventory; and,
- replacement of obsolete equipment.

DND has recently switched to the accrual accounting method for depreciation and expense recognition purposes. Under accrual accounting, assets are depreciated on a straight-line basis over the useful lifetime of the asset[23]. (However, a majority of assets are still under cash-based accounting). Whether the straight-line based depreciation is meaningful for all classes of assets is questionable, and it might be more prudent to allocate equipment under different models, based on the actual net useful value of the asset. One of the major challenges of depreciation and expense allocation over the lifetime of the asset is how to recognize the difference between peacetime deployment and utilization, and war-time or mission deployment in different parts of the world, including domestic operations in Canada.

When building a reasonable model to properly explain a useful depreciation schedule for any asset class, one needs to account for the heightened and sustained rate of activity and utilization of equipment under actual in-theatre conditions, which is likely to result in more wear-and-tear, more repairs and expenses, and accelerated expiry of the useful life of the asset. Under such a scenario, one of the most crucial issues to predict is the net useful life of any asset under any operational condition. To this end, an investigation of the drivers that affect the net useful life of the asset can be broadly defined by the following data:

- the total purchase cost of the asset, including any spares and maintenance expenditure that has been allocated under a capital budget and not under the O&M Budget;
- the manufacturer specified life of the asset in terms of its utilization benchmarks, i.e. number of total kilometres driven for assets such as cars and trucks, to number of hours flown for aircraft, etc. (for equipment such as tanks, the utilization benchmark would be a multi-factor model involving individual benchmarks such as number of shells fired, number of kilometres driven, number of engine overhauls, etc.);
- the actual utilization of the assets in real-time conditions, according to the specified benchmarks;
- the probability of asset obsolescence due to learnings from the mission, or change in doctrine, or revolution in affairs in the weapons systems (for example: replacement of dumb gravity bombs with precision guided munitions can significantly reduce the relative utility of the dumb bombs – an accelerated depreciation, or in other words, a complete write-off of the entire inventory); and,
- the betterments or resets applied to vehicles, specified in terms of the actual benchmark metric; i.e. if a vehicle was repaired and overhauled in a program such as a mid-life upgrade, then the actual number of benchmark metric units added to the asset would be added to the net useful life of the asset.

Therefore, in addition to specifying the depreciation expense for any asset on the balance sheet as purely a dollar figure, an additional entry could be maintained with the net useful life of the asset in terms of its *utilization benchmark*. For a jet engine, it could be total number of flying hours; for a truck, total number of kilometres driven; and, for radar, total number of operating hours, and so on. This can be best explained by an example.

Assume that in the fiscal year 2000-01, a truck was purchased at a cost of $20,000, with a manufacturer specified life of 300,000 kilometres (km). Also assume that normal peace-time utilization rate of this asset is specified to be 20,000 km per year. Thus, kilometres are the utilization benchmark in this case.

[23] From the "2007-2008 DND Cost Factors Manual", Department of National Defence, A-FN-007-000/AG-001

1. **Scenario A:** No war-deployment scenario.
   Under this scenario, the asset will be driven for approximately 20,000 km each year on average, leading to a net shelf life of 15 years. Based on the manufacturer recommendation of a useful shelf life of 300,000 km, this asset will be brought up for replacement after a 15 year life. However, if the asset is used irregularly, its expiry will vary depending upon the nature of the utilization. If the truck is driven for an average of 30,000 km/year, then the depreciation schedule will be an accelerated one, resulting in expiry of the truck after 10 years, or 2010. This will result in 300,000 km available on the balance sheet in the year 2000, falling to zero kilometres of net useful life in the year 2010.

2. **Scenario B**: War or mission deployment scenario in the fiscal year 2005, after the asset was used in peace-time conditions at about 20,000 km per year.
   Under this scenario, the net useful life of the asset, is reduced by approximately 20,000 * 5 = 100,000 km, leaving us with 200,000 km of net useful life for the truck, giving us with a net useful life of 200,000 km on the balance sheet.
   Given the intensity of war-like deployment and scenario, one can calculate from the daily logs the actual utilization of the asset. Assuming that the truck was driven at an average annual utilization rate of 100,000 km per year, the truck will be up for expiry within 200,000/100,000 = 2 years, i.e. in the year 2007 itself. This will likely result in a procurement of new trucks as replacement units in the year 2007.
   NB: The expenses relating to fuel, maintenance, lubrication, etc. will be under standard operations and maintenance budget, and will be correctly recognized as an expense.

   On the 10th of March, 2005, Defense Secretary Donald Rumsfeld testified before the House Armed Services Committee that *"U.S. military equipment such as tanks, helicopters and Bradley Fighting Vehicles are* ***wearing out at from two to six times the peacetime rate****, leading the Pentagon to request $12 billion for equipment repairs in the fiscal 2005 emergency supplemental budget."* This gives one of the most direct references to the accelerated depreciation caused by war-time deployment of capital assets[24].

3. **Scenario C (Reset case):** War or mission deployment scenario in the fiscal year 2005, after the asset was used in peace-time conditions, at about 20,000 km per year. Also, at the end of the first year of deployment (i.e. 2006), the vehicle was impacted by war-related damage (such as enemy combatant fire, or landmine hit, small-arms fire, etc.), requiring extensive repair and overhaul including additional expenses related to replacing damaged equipment such as seats, windows, chassis strengthening, engine replacement, etc. This expense would most probably be incurred under an O&M budget. However, during repairs and maintenance, the work almost completely restored the useful life of the vehicle to about 280,000 km, from the earlier pre-deployment life of 200,000 km. This will require an expense in the capital expenditure account, rather than the O&M account, and also an updating of the net useful life on the balance sheet.

4. **Scenario D (Betterment case):** War or mission deployment scenario in the fiscal year 2005, after the asset was used in peace-time conditions, at about 20,000 km per year. Also, at the end of the first year of deployment (i.e. 2006), the vehicle was impacted by war-related damage (such as enemy combatant fire, or landmine hit, small-arms fire, etc.), requiring extensive repair and overhaul including additional expenses related to replacing damaged equipment such as seats, windows, chassis strengthening, engine replacement, etc. This expense would most probably be incurred under an O&M budget. However, during repairs and maintenance, the work not only restored the useful life of the vehicle, but also outfitted the vehicle with a newer and more efficient engine, and other equipment that actually extended the useful life of the vehicle beyond the manufacturer specified 300,000 km, to about 400,000 km, from the earlier pre-deployment life of 200,000 km. This will require an expense in the capital expenditure account, rather than the O&M account, and also an update of the net useful life on the balance sheet. This is a special case of the reset case.

[24] http://www.washingtonpost.com/wp-dyn/articles/A25751-2005Mar10.html

5. **Scenario E (write-off case):** War or mission deployment in the fiscal year 2005, after the asset was used in peace-time conditions, at about 20,000 km per year. Also at the end of the first year of deployment (i.e. 2006), the vehicle was severely impacted by war related damage, resulting in a total write-off, without recovery. This will require a write-off on the balance sheet, and also an update of the net useful life of the asset being written off.

6. **Scenario F (obsolescence case):** Assume the asset was used in peace-time conditions, at about 20,000 km per year. In the year 2006, the vehicle was deemed totally obsolete due to a revolution in war-fighting; assume that trucks are now being replaced by armoured personnel carriers. This would require a complete write-off on the balance sheets, and also the net useful life of the asset being written off. In addition, any new equipment (such as the armoured personnel carriers) being procured and deployed in war immediately will be subjected to the same accelerated depreciation schedule.

Therefore, it is evident that such a depreciation schedule is very useful in predicting the net incremental war cost of the asset, due to the fact that:

- increased utilization will result in accelerated expense recognition; and,
- this will further lead to accelerated expiry of the asset, useful in predicting future procurement costs for replacement assets, even if these assets are not rotated on a war deployment.

This model can be correctly depicted for any kind of asset, if the log books are correctly maintained about the average useful and net residual life of individual assets. The net depreciation expense for this equipment can be neatly summarized as given in the linear equation below:

$$\hat{y} = Ax_1 + Bx_2 + Cx_3 + Dx_{4+} \varepsilon$$

Where, $\hat{y}$ is the net annual accounting depreciation expense for the particular asset,
x_1 is the net annual residual life of the asset,
x_2 is the net reset/betterment of the asset,
x_3 is the net write-offs of the asset, and
x_4 is the net obsolescence factor of the asset, and
ε is the margin of error

The values for the coefficients A, B, C and D give the net annual effect of the four variables on the depreciation expense, respectively.

When summarized and averaged over a whole fleet of assets of a single type, the variables of this equation are embedded in the usage log books of the asset itself. In such a scenario for a fleet-wide regression, this equation is compacted into

$$\hat{y} = Ax_1 + Dx_4 + \varepsilon$$

Where, $\hat{y}$ is the average annual depreciation expense for the particular asset fleet,
x_1 is the average annual residual life of the asset fleet, accounting for existing assets, resets, betterments and write-offs, and new acquisitions within that accounting period,
x_4 is the net factor obsolescence of the asset, and
ε is the margin of error

This is a very exhaustive model, yet very powerful in terms of capturing all the accrual accounting issues. It is necessary to reflect the Reset, Betterment, Write-off, and Obsolescence cases under the capital expenditure account, because this will give a much better accrual accounting figure, and help DND and Parliament better understand future capital expenditures, as the depreciation is re-allocated over the net useful residual life of the asset. *Not doing so will cause an exaggeration in the Operations & Maintenance budget while under-reporting the capital budget, it will also be very difficult to predict and justify the replacement timeframe of the asset without such a model.* Many deductions could be made as to the benefits and drawbacks of following such a procedure.

ISBN 978-1-100-11107-0