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Canadian Working Group on HIV and Rehabilitation

A Population-Based Economic Analysis of Episodic Work Benefits

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RiskAnalytica

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1. Executive Summary

Background

An increasing number of Canadians are living with episodic disabilities, including mental illness, cancer, lupus, multiple sclerosis, diabetes, and HIV/AIDS. Episodic disabilities are characterized by periods of illness and wellness, making it a challenge for individuals living with them to earn an adequate and secure income. Most have to rely on government and private programs. These programs, however, often define disability in terms of permanent or extended inability to work so individuals who qualify for these programs effectively become trapped into continued dependence on the assistance program.

Participants of the Episodic Disabilities Network have identified *income security* and *labour force participation* as two key issues faced by people living with episodic disabilities in Canada. A flexible income support program is needed to address episodic disabilities and increase labour force participation. A step towards decreasing disincentives to resuming work was taken with the implementation of Automatic Reinstatement of benefits in January 2005; however it is believed that more flexibility is necessary to encourage greater labour force participation.

This report provides an economic assessment of a more flexible Canada Pension Plan Disability (CPP-D) benefit program. The new policy would allow persons with disabilities who resume work to retain a portion of their previous CPP-D benefits.

Method

A simulation framework called Life at Risk™ is used to analyse the effects of a CPP-D policy that allows persons with disabilities who resume work to retain a portion of their previous CPP-D benefits. The Life at Risk™ platform incorporates demographic, chronic disease and economic models to yield a risk management analysis of the value of health policy decisions such as CPP-D. The models are flexible in the sense that they can be adapted to the requirements of the user. The key assumptions can be changed by users as their opinions on these assumptions change.

This report considers a 28 year simulation period, from 2006 to 2033, that focuses on the economic impact of the changed CPP-D program by estimating the change in key economic variables, such as wages, corporate profits, consumer spending and total tax revenues. The change in the cost to the government of making CPP-D payments is calculated, allowing for a calculation of the gross benefit of the new CPP-D policy.

The primary CPP-D factors used to derive the gross economic value of a new CPP-D policy include:

- The types of diseases that have caused labour force disability leading to CPP-D recipients. The diseases included in this analysis are cancer, circulatory diseases, mental illness, HIV/AIDS and chronic obstructive pulmonary disease.

- The portion of usual CPP-D entitlement that could be retained if a CPP-D recipient partially returned to work. These results assumed that a CPP-D recipient would lose a portion of their usual CPP-D entitlement equal to the percentage of normal working hours that the CPP-D recipient was able to work in a given year. That is, if a CPP-D

recipient was able to work for 30% of the normal working hours in 2007, then that CPP-D recipient would be entitled to 70% of their usual CPP-D entitlement (the entitlement they would have received if they had not worked);

- The percentage of currently eligible CPP-D recipients that can be induced to enter back into the Canadian workforce by virtue of a new CPP-D policy. The modelled return to work assumptions (based on an survey of stakeholders' opinions) are:

Simulation Range	18-34 years		35-50 years		50-64 years	
	Males	Females	Males	Females	Males	Females
95% Lower Bound	38.1%	39.4%	33.7%	35.3%	23.2%	24.7%
Expected	45.4%	46.8%	40.6%	43.0%	28.2%	30.7%
95% Upper Bound	53.2%	54.7%	47.4%	51.0%	34.3%	38.9%

- A "worst-case" scenario where only 10% (the same for both genders and all age groups) of current CPP-D recipients will go back to work under the new CPP-D policy. This scenario was analysed to understand the effects of a new CPP-D policy when CPP-D recipients are not very responsive to the change in policy.

- The percentage of work that CPP-D recipients could work if they choose to under the new CPP-D policy. The modelled percentage of work ranges between 0% and 43.3%, with an expected value of 20%. That is, on average, a CPP-D recipient who chooses to return to work under the new CPP-D policy would be able to work 20% of normal working hours.

It is important to note that the results contained in the report are for the gross economic gain expected from a new CPP-D policy. The net employee and economic benefits are not covered in this analysis as it is not currently known how many extra CPP-D recipients will be generated by a new CPP-D policy. An influx of applicants may occur if the new CPP-D policy is more attractive to disabled employees that had found the previous CPP-D policy unattractive. Further work needs to be performed in this area in order to obtain a more comprehensive understanding of the ultimate benefits or costs that accrue from a new CPP-D policy.

Key Assumptions

The key assumptions used to carry out the analysis are as follows: First, a growth in new CPP-D recipients in a response to a new CPP-D policy has not been accounted for. Second, it is assumed that CPP-D recipients who decide to go back to work will find work. Third, the model focused only on the Federal CPP-D program and has not taken into account other sources of income for CPP-D recipients. This results in the assumption that a change in CPP-D policy will not have an impact on CPP-D recipients' other types of income. Fourth, the incremental income that a CPP-D recipient will gain by going back to work is based on the national wage average (for the age and gender of that CPP-D recipient). Fifth, the new policy assumes that the amount of partial work a CPP-D recipient was able to conduct during the year is calculated in arrears, with the CPP-D recipient having to make a refund of any CPP-D entitlements that are lost due to the CPP-D recipient's capacity to do work at the beginning of the next year. This results in an average time value of money lost on such funds equal to $e^{r/2} \times W \times CPPD$ where *W* is the

work ability of a CPP-D recipient expressed as a percentage, *CPPD* is the CPP-D entitlement received for the year, and *r* is the Federal Government interest rate, which has been assumed to be 3.65%. Sixth, four separate economic disability stages were identified to cover the disability spectrum (0% to 100%) and characterized by normal distributions (See Appendix IX).

Results

The following tables summarize the results of the Life at Risk™ simulations for the new CPP-D policy scenario. The results show the expected, lower 95% confidence interval boundary, and upper 95% confidence interval boundary for persons with disabilities that are assumed to go back to work (in each age group and of each gender).

Estimated CPP-D Recipients Going Back to Work from new CPP-D Policy Scenario

Range	Cumulative from 2007 to 2011	Cumulative from 2007 to 2016	Yearly Average 2007 to 2030
95% Lower Bound	214,391	482,256	57,020
Expected	262,150	589,835	69,782
95% Upper Bound	319,995	720,880	85,447

This table shows the estimated number of CPP-D recipients that will go back to work under the new CPP-D policy (using the expected assumptions of the percentage of CPP-D recipients in each age group and of each gender that will go back to work). The first column contains the cumulative number of recipients that will go back to work in the 5 year period from 2007 to 2011, under the new policy (the sum of the number of recipients that will go back to work in each of these years). The second column shows the cumulative number of recipients that will go back to work in the 10 year period from 2007 to 2016. The final column shows the average number of recipients that will go back to work in each year from 2007 to 2030 under the new policy.

The results of the analysis lead to the conclusion that the number of disabled people going back to work under the changed CPP-D policy will have a significant positive impact on the economy in every year of the forecast period. The economic activity generated by higher labour force participation results in higher total taxation revenues for the federal and provincial governments (compared to the case where there is no change in CPP-D policy). Also, the cost of making CPP-D payments is lower as the government will only need to pay a portion of CPP-D benefits to those CPP-D recipients that go back to work.

The following table shows the gross economic benefits[1] that accrue from incremental taxation revenue and a reduction in CPP-D payments arising from a new CPP-D policy for Canadian and provincial governments (in total), in 2005 present valued dollar terms (using the expected assumptions of the percentage of CPP-D recipients in each age group and of each gender that will go back to work).

Range	Cumulative from 2007 to 2011	Cumulative from 2007 to 2016	Yearly Average 2007 to 2030
95% Lower Bound	$951 million	$1.94 billion	$192 million
Expected	$1.19 billion	$2.54 billion	$278 million
95% Upper Bound	$1.42 billion	$3.10 billion	$349 million

[1]Employees who are not currently eligible CPPD recipients (as they may have chosen to work despite being partially disabled by a disease) but will choose to become CPPD recipients under a new CPP policy have not been accounted for.

The results of the worst-case scenario[2] also show that there are gross economic benefits derived from a new CPP-D policy. The total cumulative benefit expected to accrue to the government from incremental taxation revenue and a reduction in CPP-D payments from 2007 to 20011 is $372 million, in 2005 present valued dollar terms. From 2007 to 2016 the cumulative total benefit is $800 million, and the yearly average from 2007 to 2030 is $89 million.

Conclusion

The results of this analysis unambiguously show that a new and flexible CPP-D policy has significant gross employee and economic benefits associated with its implementation. Further, such a new and flexible CPP-D policy will encourage many persons with disabilities to participate in the Canadian labour force to a greater extent as allowed by their health.

[2] The scenario conducted under the assumption that only 10% of current CPP-D recipients (in all age groups and both genders) will go back to work under a new CPP-D policy.

2. Background

An increasing number of Canadians are living with *episodic disabilities*, including mental illness, cancer, lupus, multiple sclerosis, diabetes, and HIV/AIDS. Episodic disabilities are characterized by alternating and often unpredictable periods of illness and wellness. Individuals living with these disabilities face significant obstacles to finding and maintaining employment. This makes it a challenge for them to keep an adequate and secure income. People in Canada living with disabilities earn less money than people without disabilities. In 2001, the average annual income for working age adults with disabilities was $22,451, compared to $31,509 for those without disabilities. Median annual income for working age adults with disabilities was $15,044, compared to $25,058 for those without disabilities.[3]

A lack of secure employment and health benefits leads many people living with episodic disabilities to rely on government and private programs, such as Employment Insurance sickness benefits, the Canada/Quebec Pension Plan disability benefit, long-term disability insurance, provincial social assistance programs, and health benefits. Approximately half a million persons with disabilities are attached to the system of income support in Canada.[4] However, these programs often define disability in terms of permanent or extended inability to work. Individuals who qualify for these programs face disincentives to resuming work and thus effectively become trapped into continued dependence on the assistance program. Those persons who consider returning to work may fear the possibility of losing disability income and health benefits, that they will be fired if their health interferes with their work, and that disability benefits will be difficult to reinstate during subsequent periods of bad health. Stigma experienced in the workplace by employer or employees also acts as a potential return-to-work barrier. Such concerns may discourage persons with episodic disabilities from participating in the labour force to the full extent that their health allows.

Participants of the Episodic Disabilities Network[5] have identified *income security* and *labour force participation* as two key issues faced by people living with episodic disabilities in Canada. A flexible income support program is needed to address the support needs of persons with episodic disabilities and increase labour force participation. In order to investigate these issues, the Canadian Working Group on HIV and Rehabilitation (CWGHR) is sponsoring the project "Labour Force Participation and Social Inclusion for People Living with HIV and Other Episodic Disabilities." Its goal is to research, recommend, then design and develop pilot sites to test the evidence-based model(s) that will contribute to labour force participation and social inclusion of people living with HIV and other episodic disabilities. Part of this process involves:

- Identifying various flexible employment/income support options in Canada and other countries and conducting an in-depth policy and program analysis of the options to determine best practice models

[3] Statistics Canada, Participation and Activity Limitation Survey, 2001
[4] 2001 Parliamentary Subcommittee on the Status of Persons with Disabilities
[5] A group of disabilities communities that recognized that income support plans and workplace policies were not addressing the specific episodic nature of their disabilities. The participating organizations are: ARCH: A Legal Resource Centre for Persons with Disabilities, Canadian Association of Nurses in AIDS Care, Canadian Association of Physical Medicine and Rehabilitation, Canadian Breast Cancer Network, Canadian Cancer Society – Ontario, Canadian HIV/AIDS Legal Network, Canadian Working Group on HIV and Rehabilitation (CWGHR), COCQ-sida, Lupus Canada, Multiple Sclerosis Society of Canada, Muscular Dystrophy Canada, Ontario Breast Cancer Research Initiative.

- Understanding the costs and benefits of selected models of employment/income support options; and
- Identifying learning needs and knowledge gaps of HR, employers and vocational rehabilitation professionals related to episodic disabilities

This paper contributes to the process by providing an economic assessment of policies that encourage labour force participation. The paper focuses on the economic impact of changes to the Canada Pension Plan disability (CPP-D) benefits program when considering the disability associated with five diseases: Cancer, Circulatory diseases (CD), Chronic Obstructive Pulmonary disease (COPD), HIV/AIDS, and Mental Illnesses.[6] A step towards decreasing the disincentives to resuming work was taken with the implementation of Automatic Reinstatement of benefits in January 2005. However, it is believed that more flexibility is necessary to encourage greater labour force participation. Using a Monte Carlo simulation framework, the effect of a more flexible CPP-D policy on key economic variables, such as wages, corporate profits, consumer spending and total tax revenues, is evaluated. Also, the change in the cost of making CPP-D payments is calculated, allowing for a calculation of the gross benefit or cost of the flexible CPP-D policy.

By quantifying the gross benefit or cost that can be expected from the implementation of a changed policy with respect to the currently employed policies, our analysis will provide stakeholders with information to assist them in determining whether such a policy will pay for itself (in terms of the economic benefits that result); or whether the policy will require a net injection of funds.

3. Scope of the report

This report focuses on public disability income support and does not include analysis of private income support policies. For many individuals, applying for CPP-D is a precondition of eligibility for private long-term disability plans or for provincial disability support programs.[7]

The report analyses how a CPP-D policy change will influence current and simulated CPP-D recipients using historical data. This report does not include the potential impact of an influx of new CPP-D claimants being created by a new policy; that is, people who would not have claimed CPP-D under the current policy but may apply for benefits under the new policy. For example, in the case of a policy that pays a portion of benefits to persons who work part-time, workers with mild disability who currently work full time may shift to working part-time and apply for disability benefits. This is a latent CPP-D exposure that may emerge with a new policy and will represent a currently un-quantified risk for agents who fund CPP-D in Canada.

For this reason, the results of the analysis show the *gross* benefits that can be expected from a new CPP-D policy. That is, the benefit that accrues from the effect of the new policy on the current CPP-D population is calculated. The gross costs (of additional CPP-D payments) that may occur if there is an influx of applicants for CPP-D benefits under a new policy cannot be calculated, given the lack of understanding as to how large this group of people may be. A

[6] Due to the absence of crucial data on the prevalence, incidence, mortality, and survivability of certain episodic disabilities, a minimum dataset could not be formed for other disabilities.

[7] Joan Anderson and Glen Brown, *HIV & Disability Insurance in Canada: An Environmental Scan*, CWGHR March 2005, p 13.

calculation of the *net* value of a new CPP-D policy would require and understanding of these gross costs. (*Net Value* = *Gross Benefit – Gross Cost*)

Also, the analysis does not account for the certain potential benefits that may result from increased labour force participation.

4. Method

RiskAnalytica's unique approach to mathematical modeling was used to assess the potential costs and benefits that are associated with a more flexible CPP-D benefit program. This section outlines the methods that were used to perform the quantitative analysis. For a detailed explanation, see Appendixes IX and X.

The analysis makes use of models that are flexible in the sense that they can be adapted to the requirements of the user. Since there are several unknown variables under consideration, the models were built so that variables can be changed by the user. Generally, assumptions are predominantly hard-coded into models of this size. However, the models were built in such a way that key assumptions can be changed by users as their opinions on these assumptions change.

The models make use of all relevant data on the CPP-D program and beneficiaries that is publicly available. More data would allow for the incorporation of certain factors into the analysis. For example, there is a possibility that person's with disabilities earn a lower average wage than the national average (when comparing persons in a particular age group and gender). This kind of effect cannot be discerned from the data that is currently available.

The approach used is forward looking to the extent that it maps the near, medium and long term impacts of potential policies upon, in this case, economic factors. The forward looking nature of RiskAnalytica's quantitative framework allows various timing effects, which may not show up in the short term, to be integrated within the analysis.

For each of the diseases: Cancer, Circulatory diseases (CD), Chronic Obstructive Pulmonary disease (COPD), HIV/AIDS, and Mental Illnesses, a *base case* simulation was developed. The base case is a scenario in which there is no change in the current CPP-D policy over the forecast period (the next 28 years). This status quo scenario serves as a base against which to compare the proposed policy changes in a meaningful way.

Several scenarios in which CPP-D policy is changed will be analysed. One proposal to make the policy more flexible is to allow recipients who return to work part-time to retain a portion of their benefits. The analysis will consider:

- The economic impacts that follow from a change in labour force participation due to the change in policy. These include: the expected changes in wage-based productivity, corporate profits, consumer spending, total Federal taxation, total Provincial and Territorial taxation, as well as the cost of CPP-D payments.
- The time required for a change in labour force participation to have significant economic impacts.

The potential value of the proposed scenarios will be given in net present value terms.

4.1 Monte Carlo Approach to Cost-Benefit Analysis

The analysis took a societal perspective and simulated the direct and indirect benefits and costs associated with a more flexible policy. A CPP-D policy that allows disability beneficiaries to retain a portion of their benefits if they go back to work encourages increased labour force participation by persons with episodic disabilities.

Monte Carlo is the name given to a class of simulation approaches to decision making in which probability distributions describe certain system parameters. In many of these cases, an analytical solution is not possible because of the way in which the probabilities must be manipulated. In other cases, the Monte Carlo approach is preferred because of the level of detail it exhibits. Decision situations to which Monte Carlo methods may be applied are characterized by empirical or theoretical distributions. The Monte Carlo approach utilizes these distributions to generate random outcomes. These outcomes are then combined in accordance with the economic analysis technique to find the distribution of the net present value of a policy scenario.[8] Simulation methods in general are often referred to as Monte Carlo experiments, because they involve generating random numbers, as do games played in casinos.

The Monte Carlo simulation framework offers decision makers a powerful and flexible tool for evaluating policy choices as it presents both the range, as well as the expected value, of the collective impact of various risks. It is useful when there are many variables with significant uncertainties. The simulation process is essentially one of indirect experimentation in which alternative courses of action are tested before they are implemented. [9]

The economic evaluation compared the costs and benefits of increased labour force participation expected to result from more flexible CPP-D policy. This was done by considering the different possibilities that could result from greater labour force participation using Monte Carlo analysis, simulated over a 28 year forecast period (from 2006 to 2033). Monte Carlo analysis is being used increasingly in the health care sector to assess the costs and benefits of different policies and programs.[10]

Several different scenarios were simulated to analyse a new CPP-D policy that would allow CPP-D recipients to retain a portion of their disability benefits if they went back to work. The more hours they are able to work, the smaller the percentage of their disability payment that they are able to retain. The first three scenarios differ in their assumption about the percentages of persons with disabilities (in each age group and of each gender) that go back to work under the policy. The scenarios are called “Lower Bound”, “Expected”, and “Upper Bound”, where the percentage of persons with disabilities assumed to go back to work is higher in each scenario, respectively. Persons impacted by potential policy changes may merit the definition of having an episodic disability, chronic disability or the current definition of disability used by CPP-D. As a result all charts and exhibits used throughout this report refer to all three definitions.

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[8] Economic Decision Analysis. W.J.Fabrycky, G.J.Thuesen, and D.Verma, Prentice Hall Inc. 1998, p275.
[9] Economic Decision Analysis. W.J.Fabrycky, G.J.Thuesen, and D.Verma, Prentice Hall Inc. 1998, p300.
[10] Several studies that use a Monte Carlo simulation framework to assess costs and benefits are:
“A Monte Carlo simulation of advanced HIV disease: application to prevention of CMV infection” Paltiel AD, Scharfstein JA, Seage GR 3rd, Losina E, Goldie SJ, Weinstein MC, Craven DE, Freedberg KA. Med Decis Making. 1998 Apr-Jun;18 (2 Suppl): S93-105; “Cost-Effectiveness of Detecting and Treating Diabetic Retinopathy” J. C. Javitt and L. P. Aiello *Ann Intern Med* 1996; 164-169;
“Cost-Benefit Analysis of a Strategy to Vaccinate Healthy Working Adults Against Influenza.” Kristin L. Nichol *Arch Intern Med*. 2001;161:749-759.

The assumptions on what percentage of persons with disabilities would resume work due to the new CPP-D policy in each scenario were based upon the input of stakeholders knowledgeable in each of the disease categories. A survey was conducted that required each disability specialist to complete two tables which reflected their opinion of the percentage of CPP-D recipients that will return to work when a policy is implemented. The tables to be completed reflected:

- Table 1: Males: CPP-D Disability Scenarios: Percentage of CPP-D Recipients Going Back to Work (Policy Take Up Rate between 0-100%). For the age groups 18-34 years, 35-50 years, 50-64 years, The disability specialist's Low Estimate, Expected Estimate, and Upper Estimate of the CPP-D recipients that will return to work when a policy is implemented;
- Table 2: Females: CPP-D Disability Scenarios: Percentage of CPP-D Recipients Going Back to Work (Policy Take Up Rate between 0-100%). For the age groups 18-34 years, 35-50 years, 50-64 years, The disability specialist's Low Estimate, Expected Estimate, and Upper Estimate of the CPP-D recipients that will return to work when a policy is implemented;

Using the data collected from the survey, a probability distribution representing the responses was created. Each disease specialist's responses were weighted by the proportion of CPP-D recipients disabled by that disease category. A simple Monte Carlo algorithm was then used to randomly sample from within the distribution and simulate a set of assumptions for each of the Lower, Expected, and Upper Bound scenarios. (See Appendix VIII for a detailed explanation.)

In addition to the Lower Bound, Expected, and Upper Bound assumption scenarios based on the survey of stakeholders, five other scenarios were simulated. These scenarios assume that both genders and all age groups have the same back to work percentage. That is, among all CPP-D recipients, the same percentage will go back to work following a change in CPP-D policy. The scenarios are:

- 10% of recipients (of both genders and all age groups) will take advantage of the new policy
- 20% of recipients will take advantage of the new policy
- 30% of recipients will take advantage of the new policy
- 40% of recipients will take advantage of the new policy
- 50% of recipients will take advantage of the new policy

The scenario where 10% of recipients go back to work can be considered to be a worst case scenario. That is, the scenario is analysed to understand the effects of a new CPP-D policy when CPP-D recipients are not very responsive to the change in policy.

4.2 Key Assumptions

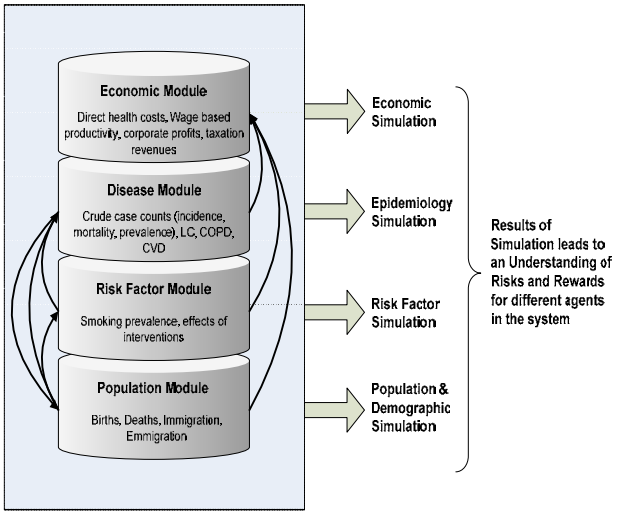
Several assumptions were necessary to carry out the analysis. The key assumptions are as follows:

- A growth in new CPP-D recipients in a response to a new CPP-D policy has not been accounted for;
- CPP-D recipients who decide to go back to work will find work;
- The model focused only on the Federal CPP-D program and has not taken into account other sources of income for CPP-D recipients. This results in the assumption that a change in CPP-D policy will not have an impact on CPP-D recipients' other types of income;
- The incremental income that a CPP-D recipient will gain by going back to work will accrue at the national age and gender wage average of that CPP-D recipient;
- The new policy assumes that the amount of partial work a CPP-D recipient was able to conduct during the year is calculated in arrears with the CPP-D recipient having to make a refund of any CPP-D entitlements that are lost due to the CPP-D recipient's capacity to do work at the beginning of the next year. This results in an average time value of money lost on such funds equal to $e^{r/2} \times W \times CPPD$ where *W* is the work ability of a CPP-D recipient expressed as a percentage, *CPPD* is the CPP-D entitlement received for the year, and *r* is the Federal Government interest rate, which has been assumed to be 3.65%.
- Four separate economic disability stages were identified to cover the disability spectrum (0% to 100%) and characterized by normal distributions. (See Appendix IX).

4.3 Life at Risk

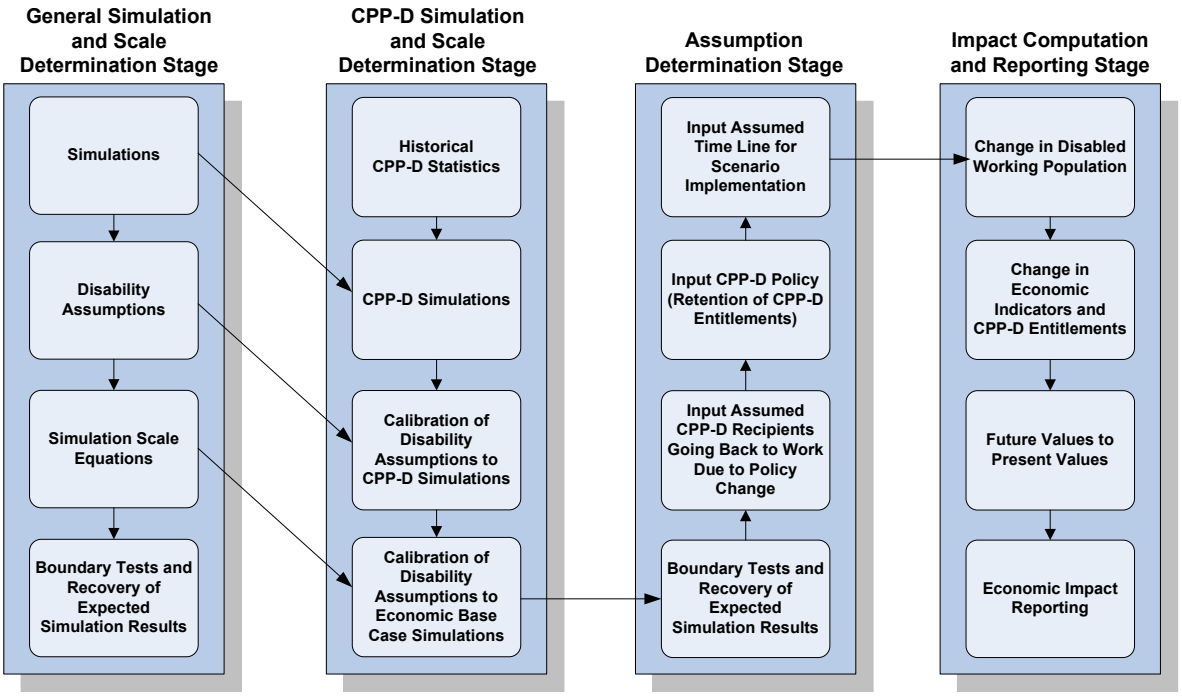
The Life at Risk simulation engine used to conduct the analysis consists of four modules. They are: a population module, a risk factor module, a disease module and an economic module. The modules are connected with one another through inputs but otherwise act as independent functions. For the purposes of assessing the economic costs or benefits of a change in CPP-D policy, the risk factor module is not relevant and was not used in the analysis.

The following diagram represents the four modules and their interactions:



In this study, the model focuses on 5 diseases and their associated disability levels. They are Cancer, Circulatory disease (CD), Chronic Obstructive Pulmonary disease (COPD), HIV/AIDS, and Mental Illnesses. Given the initial disease prevalence conditions, the model simulates all of the possible future disease prevalence trajectories for each disease.

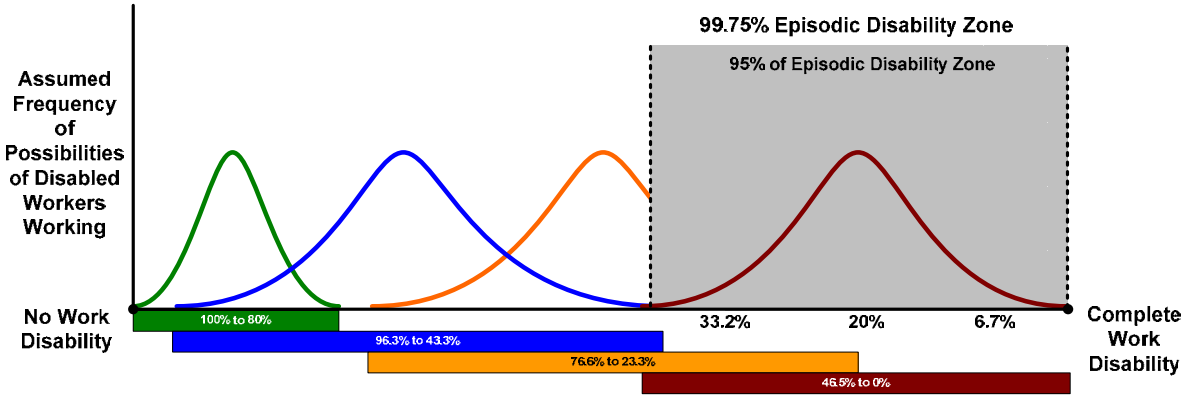
The results of the population, disease prevalence, and economic simulations are then manipulated to allow for a dynamic assessment of different CPP-D assumptions and policies. The following flowchart is a stepwise representation of the modeling process undertaken to perform the CPP-D policy impact analysis:



In order to understand the economic effects of a new CPP-D policy, it is necessary to distinguish between persons with a disability and healthy individuals, from an economic perspective. Economic disability is defined as the inverse of an individual's ability to work. The part of the population which is both employed and currently living with the disease is decomposed into the economic disability ranges between 0 (totally disabled[11]) and 1 (healthy[12]). Four separate economic disability stages were identified to cover the disability spectrum (0% to 100%) and characterized by normal distributions (See Appendix X).

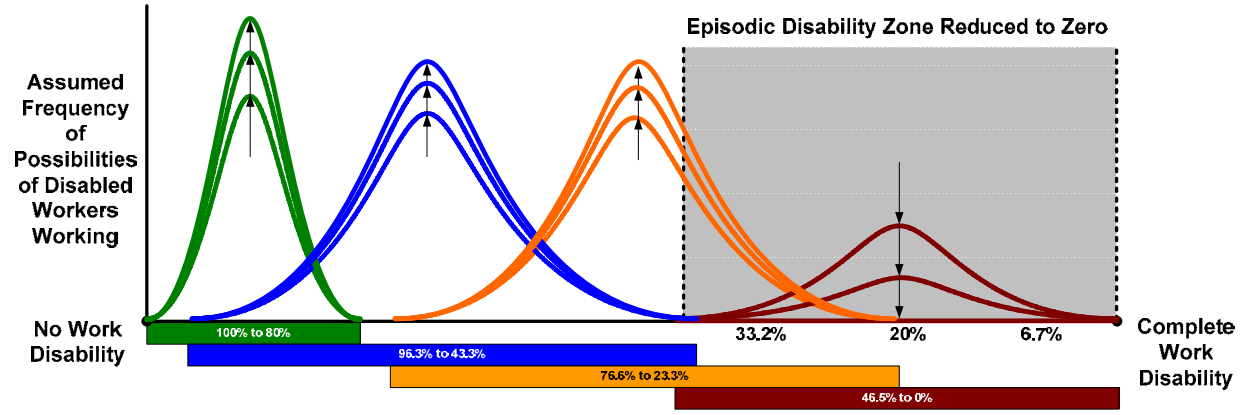
The 4th economic stage is the Episodic Disability Zone. That is, this stage represents all people who are disabled enough to collect a full disability pension. The following diagram depicts the economic disability stages and the Episodic Disability Zone.

[11] That is, able to work 0% of the time.
[12] That is, able to work 100% of the time (of regular work hours).



Potential Work Ability Outcomes per Disease/ Age Group/ Gender

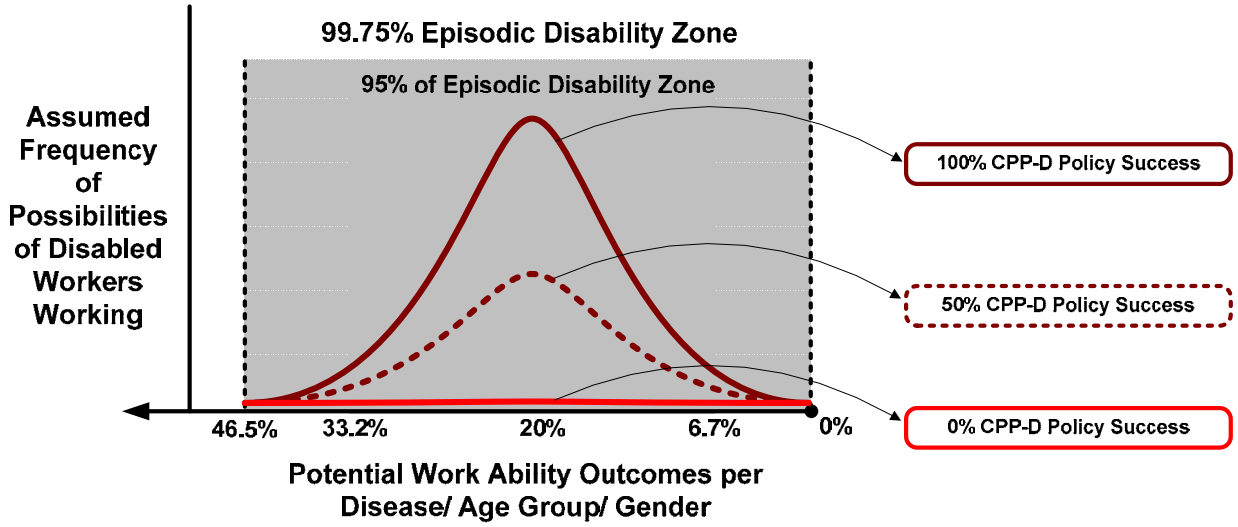
Next, the distribution of the number of persons working in the Episodic Disability Zone is set to zero. This is an initial condition that fulfills the requirement that no disabled people within stage 4 are employed. It represents the base case, where all individuals who are eligible for CPP-D benefits receive their payment and do not work. The next diagram shows how this affects the distribution of possible workers in the other three stages.



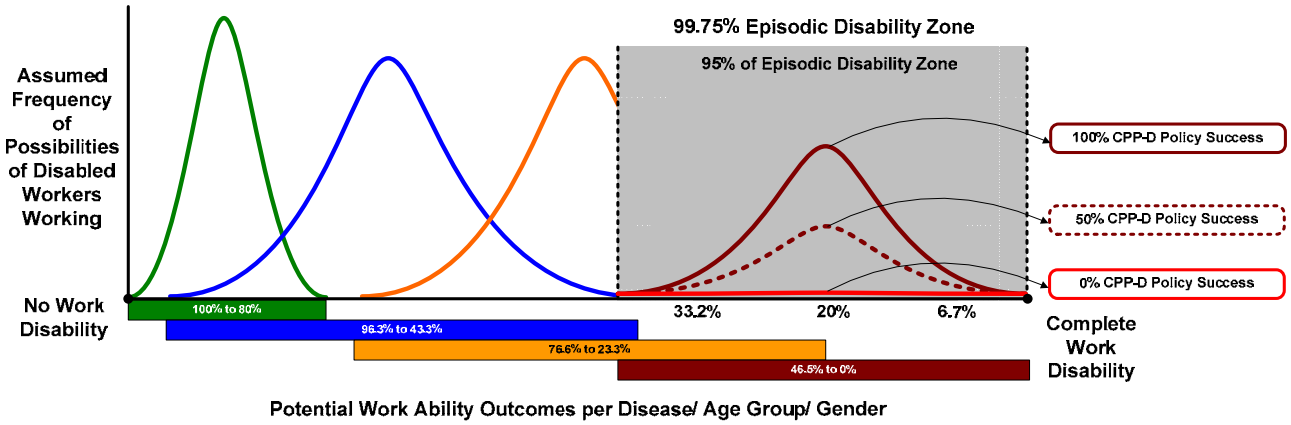
Potential Work Ability Outcomes per Disease/ Age Group/ Gender

Now, only the 1st, 2nd, and 3rd economic stages represent the pool of employed persons.

The CPP-D policy impact analysis model is then calibrated against age group, gender, disease prevalence, labour force, and CPP-D recipient historical data. In combination with simulations of future possible states of the world for disease prevalence, labour force, and CPP-D recipients (within age groups and gender), the stage 4 disability normal distribution can now be changed to indicate the level of success of a changed CPP-D policy as follows:



Next, changes in CPP-D policy can be analysed using the assumptions of how many persons with disabilities in the Episodic Disability zone will resume work under the new policy. (Three different scenarios with different assumptions are analysed.) Changes from the assumption that no persons in the Episodic Disability Zone are working generate economic results across all of the economic scales. The following diagram illustrates this:



5. Results

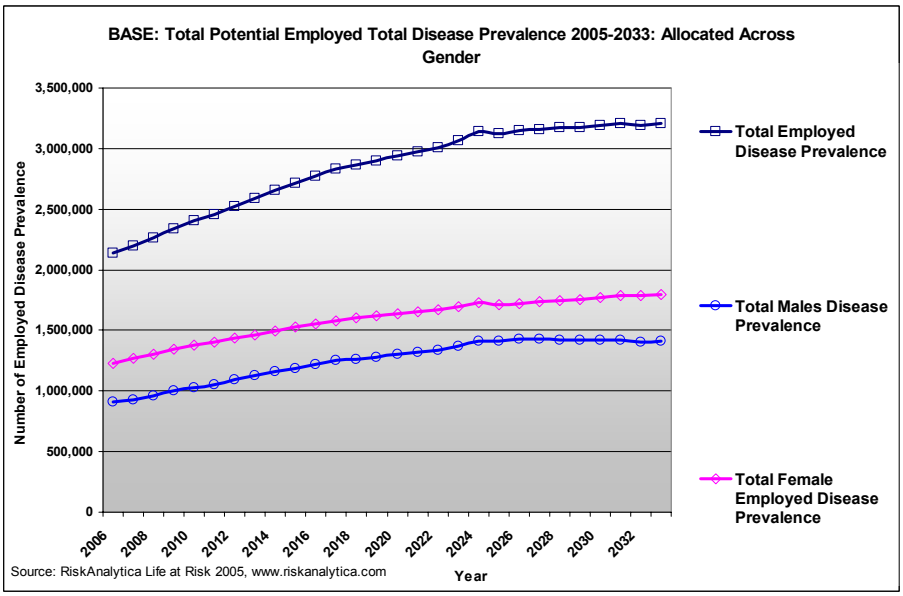
5.1 Base Simulation Results

The Base simulation was conducted to analyse disease prevalence and its effect on the economy in the case where there is no change in current CPP-D policy.

The number of persons in the labour force that will be affected by one of the diseases: Cancer, Circulatory diseases (CD), Chronic Obstructive Pulmonary Disease, HIV/AIDS, and Mental Illnesses was simulated for 16 age groups and both genders. The results show that the impact of disease upon employees is increasing and will continue to increase for about the next 20 years. Over the next 10 years, from 2006 to 2015, the total disease prevalence among potential members of labour force is expected to increase by 27% (from 2,138,673 persons affected to 2,715,077 persons). Over the next 20 years, the total disease prevalence is expected to increase by 46%.

Total disease prevalence increases until about 2025 and then begins to level off. This can be explained by the movement of the baby boom generation through the labour force. Also, disease prevalence will be higher among females for all years in the forecast period. The following diagram shows the total disease prevalence among potentially employable people over the forecast period (the period from 2006 to 2033).

Exhibit 1: Base: Total Potential Employed Total Disease Prevalence

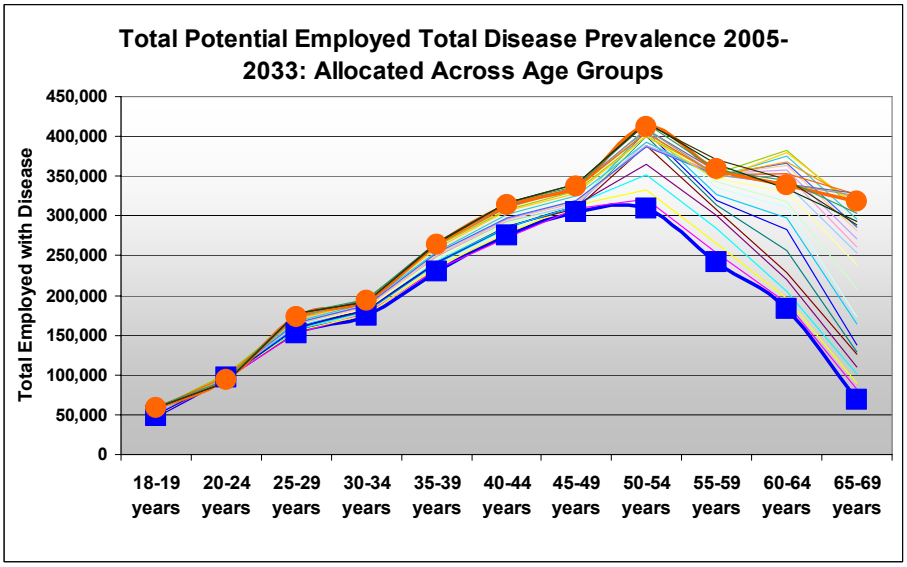


The top line shows the total disease prevalence in every year (for all 5 disease categories, all age groups, and both genders). The pink line shows the disease prevalence for females and the blue line the disease prevalence among males.

A large part of the total disease prevalence is accounted for by members of the disease force between the ages of 50 and 65 years. This result of the simulation is expected as elderly

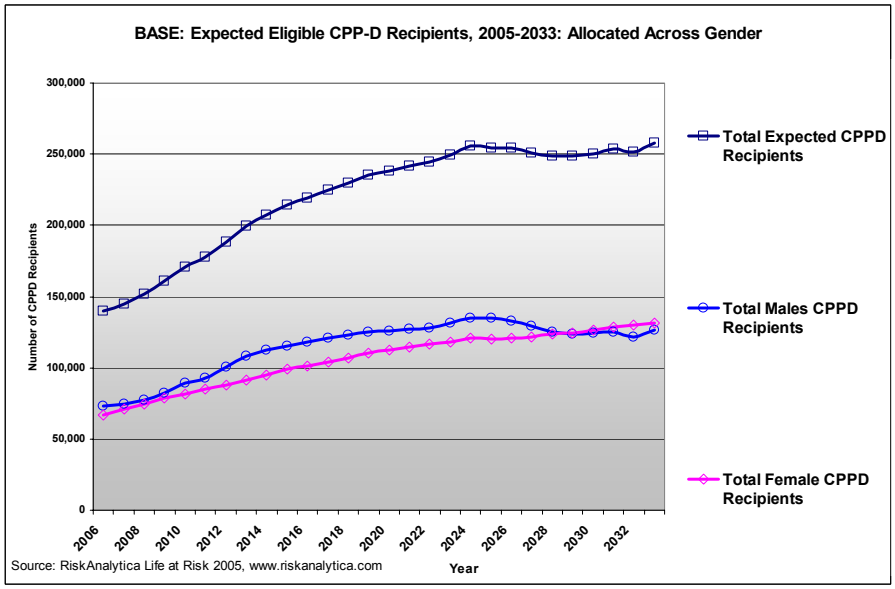
persons are more prone to chronic and episodic diseases. The next diagram shows the total disease prevalence among potentially employable people for each of the 16 age groups.[13]

Exhibit 2: Base: Potential Employed Disease Prevalence Allocated Across Age Groups



The number of persons that will be eligible for CPP-D (due to disability from one of the five disease categories) was simulated. The results show that the impact of disease upon the CPP-D program is increasing. The number of expected CPP-D recipients will increase in each of the next 20 years. Over the next 10 years, from 2006 to 2015, number of persons eligible for CPP-D will increase by 54% (from 139,489 persons to 214,402 persons). Over the next 20 years, the number of eligible CPP-D recipients is expected to increase by 82%. The next diagram shows the simulated total number of persons eligible for CPP-D over the forecast period.

Exhibit 3: Base: Expected Eligible CPP-D Recipients

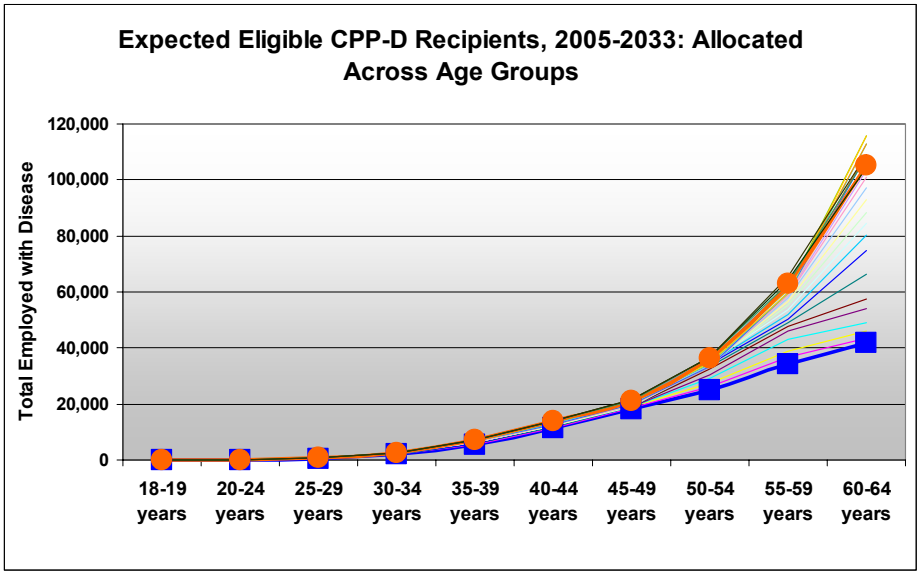


[13] The age groups are: 18&19 years, 20-24 years, 25-29 years, continuing in 5 years groups until 85-89 years, and 90 years and over.

The top line shows the total expected eligible CPP-D recipients in every year (for all 5 disease categories, all age groups, and both genders). The pink line shows the female expected eligible CPP-D recipients and the blue line the male expected eligible CPP-D recipients. This diagram represents the potential number of persons that can be affected by a change in CPP-D policy.

The number of expected eligible CPP-D recipients is higher for more elderly age groups. In each year of the forecast period, there are more middle aged expected CPP-D recipients than young expected eligible CPP-D recipients; and there are more elderly expected CPP-D recipients than middle aged expected eligible CPP-D recipients. The next diagram shows the breakdown of expected eligible CPP-D recipients across age groups.

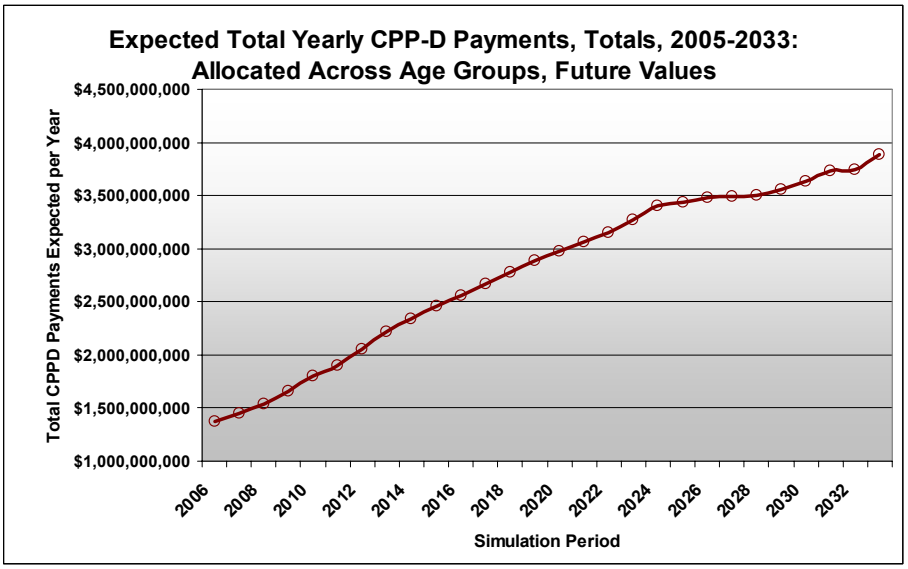
Exhibit 4: Base: Expected Eligible CPP-D Recipients Allocated Across Age Groups



The bulk of expected eligible CPP-D recipients are between 50 and 64 years old. In 2006, persons in the age groups 50-54, 55-59, and 60-64 account for 73% of the total number of expected eligible CPP-D recipients. The three age groups account for 81% of the total in 2015, and for 83% of the total expected eligible CPP-D recipients in 2025.

The results of the simulation show that increasing total disease prevalence and an increasing number of expected eligible CPP-D recipients will results in higher CPP-D payments. In 2006, the total amount paid to CPP-D beneficiaries is expected to be approximately $1,370 million. In 2015 this amount will be $2,463 million, an increase of 80%. The amount paid in CPP-D benefits is expected to be $3,439 million in 2025, an increase of 151% from 2006. The following diagram shows the expected total amount of CPP-D payments made in every year of the forecast period.

Exhibit 5: Base: Expected Total Yearly CPP-D Payments



The above exhibits show the aggregate results of the simulations. The analysis was done separately, however, for each of the five disease categories. This led to an understanding of how each disease contributes to disease prevalence, disability among those eligible for CPP-D, and to changes in government revenue and spending on CPP-D benefits.

The results show that Mental Illnesses account for the largest share of disease prevalence in the labour force for the age groups from 18 to 54 years old (See Appendix II). For persons 55 to 69 years old, Circulatory Diseases account for the largest share of disease prevalence from 2006 to 2022/2023 and Cancer is the largest contributor to disease prevalence from 2022/2023 until the end of the forecast period.

Also, persons with Mental Illnesses make up the largest share of individuals expected to be eligible for CPP-D over the forecast period. (The percentage with Mental Illnesses ranges from 56% in 2006 to 48% in 2033. See Appendix II) CD makes up the second largest share of expected eligible CPP-D recipients from 2006 to 2020, and HIV/AIDS makes up the second largest share from 2020 to 2033.

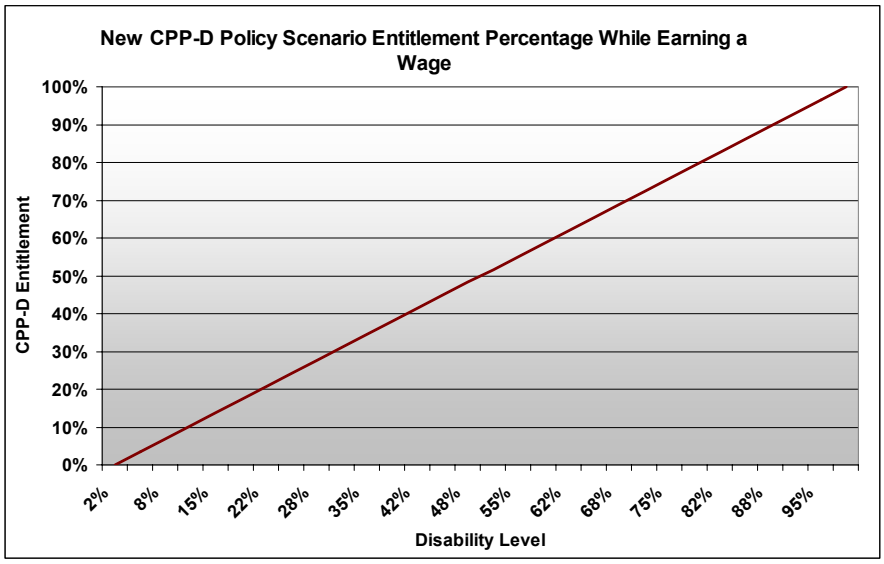
As can be expected from the above numbers, the simulation results show that the largest percentage of total CPP-D payments made in the years 2006 to 2033 will be on persons who are disabled due to mental illnesses. The smallest percentage will be spent on persons disabled due to respiratory diseases.

5.2 Scenario Simulation Results

The scenario simulations were conducted to analyse the effects of a more flexible CPP-D policy. The new policy would pay persons with disabilities who resume work a portion of their previous CPP-D benefits. The structure of the new CPP-D policy is such that persons with disabilities who return to work will receive a disability benefit that is inversely proportional (linear) with the amount of work they do. For example, a person who returns to work and works 25% of the time is considered to have an *economic disability* level of 75%. So, under the new policy, this person

will be allowed to retain 25% of the CPP-D entitlement they used to receive before they returned to work.

Exhibit 6: New CPP-D Policy: Entitlement Percentage While Earning a Wage

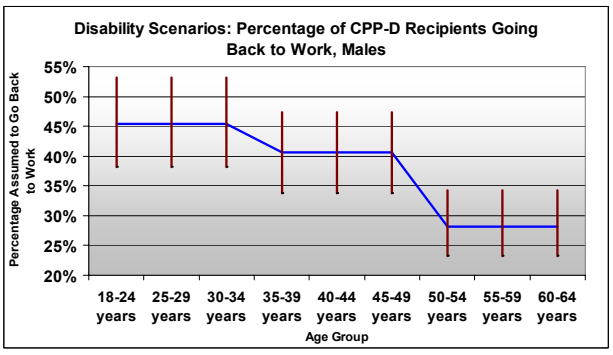


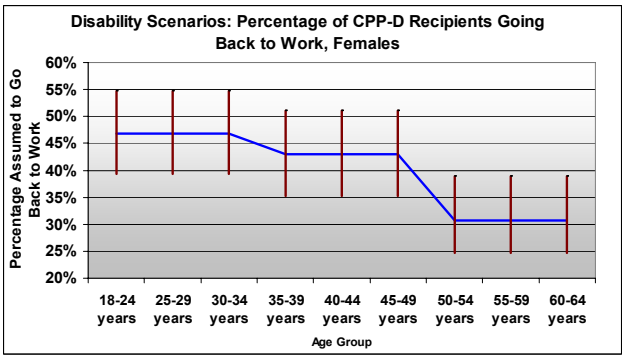
The new CPP-D policy was assumed to encourage a certain percentage of CPP-D recipients to resume work. Three scenarios were analysed: A Lower Bound Scenario, an Expected Scenario, and an Upper Bound Scenario. In each of the three scenarios, a different percentage of CPP-D recipients was assumed to go back to work.

The following diagrams show the assumptions that were used in the three scenarios. The assumptions are made separately for males and females and for three age groups: 18-34 years, 35-50 years, and 50-64 years. The blue lines indicated the assumptions used in the Expected Scenario.

Exhibit 7: New CPP-D Policy: Percentage of CPP-D Recipients Going Back to Work

The results of the simulations show the effects of the new CPP-D policy compared to the current policy. That is, the results show the changes that are expected to occur when the new policy is implemented.





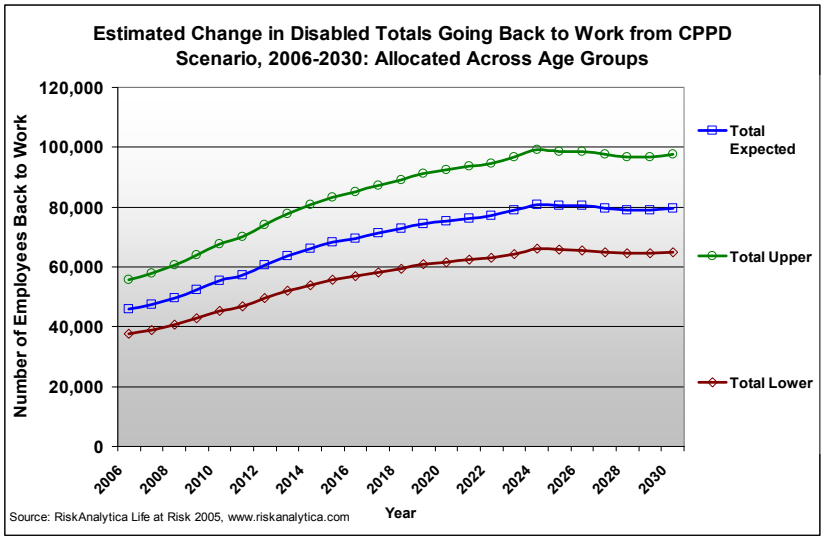
5.2.1 Expected Assumptions Scenario

In the Expected Scenario, the assumptions are:

- For males 18-34 years old: 45.4% will take advantage of the new policy (resume work)
- 35-50 years old: 40.6%
- 50-64 years old: 28.2%
- For females 18-34 years old: 46.8% will take advantage of the new policy (resume work)
- 35-50 years old: 43.0%
- 50-64 years old: 30.7%

The number of persons, in each age group and gender, who go back to work as a result of the new policy, was simulated. In this scenario, a total of 45,834 persons can be expected to go back to work in 2006 under the new policy (that would not resume work under current CPP-D policy). This represents 32.9% of the total eligible CPP-D recipients that can be expected in 2006 with no change in policy. By 2024, the number of people going back to work is 80,797 (31.9% of total eligible CPP-D recipients with no change in policy). The results for the remaining years are shown by the blue line in the diagram below.

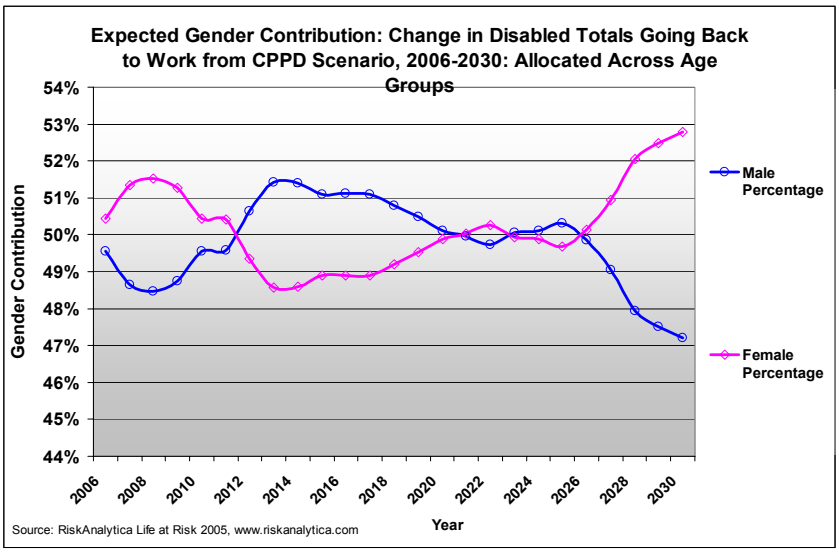
Exhibit 8: Estimated Change in Disabled Totals Going Back to Work



The red line in the above diagram corresponds to the total number of persons that will resume work in the Lower Bound Scenario (Section 4.2.2) and the green line corresponds to the total number of persons that will resume work in the Upper Bound Scenario (Section 4.2.3).

The shape of the curves is due in part to the ageing Canadian population. At first, the new policy induces an increasing number of persons to resume work. This effect then levels off as the baby boom generation moves out of the workforce due to old age.

Exhibit 9: Gender Contribution of Expected Change in Disabled Totals Going Back to Work

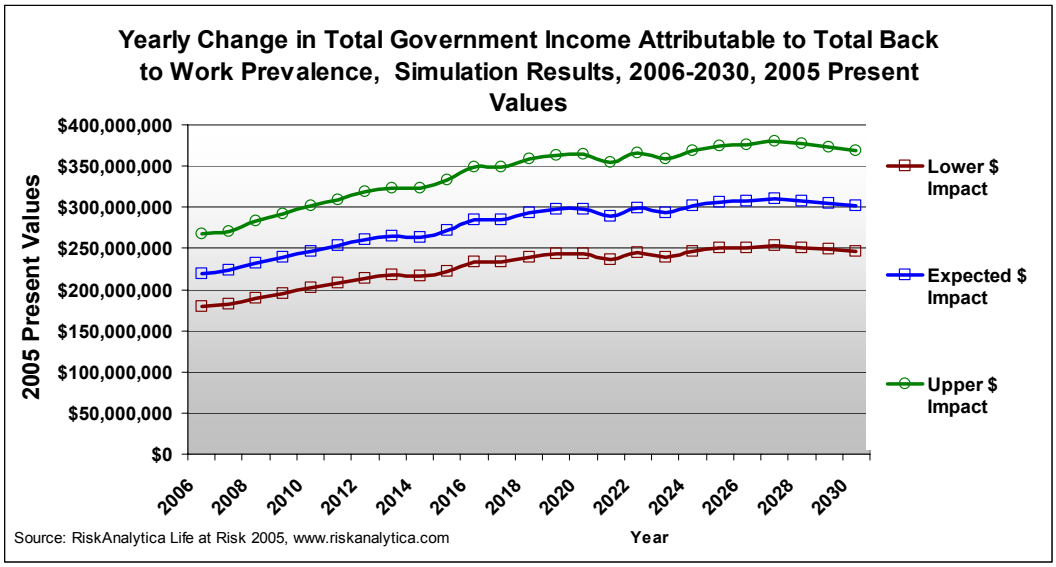


The above diagram breaks down the number of persons who will resume work under the new policy into males and females. Initially, a greater number of females than males take advantage of the policy. Then, as the baby boom generation moves through the workforce, more males resume work (from around 2012). Later, more females take advantage of the new CPP-D policy. This is because men are victim to the bulk of chronic disease and tend to be affected by disease earlier in their lives than females. Also, women are becoming more prominent in the labour force and live longer than males.

The results of the simulation show that there will be an economic benefit from implementing the new CPP-D policy in each year of the forecast period. The following diagram shows the change in the government's total income in each year (compared to the current policy) under the new policy. The government's net income is the change in its taxation revenues less the change in the CPP-D payments it makes.

The total gain the government can expect in each year varies from about $218 million in 2006 to $301 million in 2030 (in present valued dollars). The blue line in the diagram below shows the expected change in total income due to the new policy in this scenario over the whole forecast period.

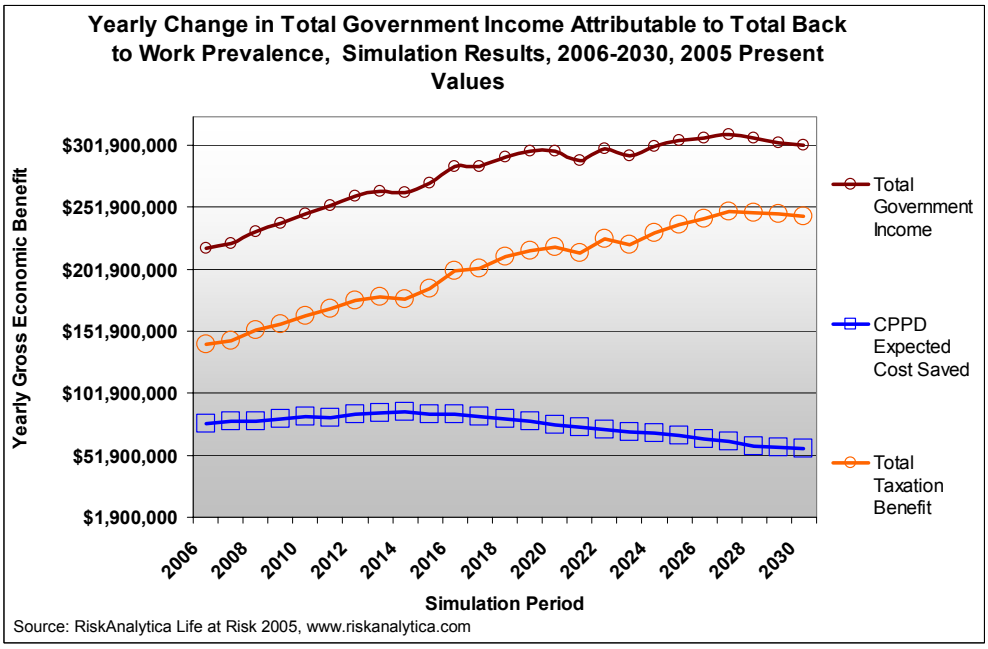
Exhibit 10: Yearly Change in Total Government Income



The red line in the diagram above corresponds to the expected change in total income in the Lower Bound Scenario (Section 4.2.2) and the green line corresponds to the expected change in total income in the Upper Bound Scenario (Section 4.2.3).

The next diagram shows the break down of the change in total government income in this (Expected Assumptions) scenario.

Exhibit 11: Breakdown of Expected Yearly Change in Total Government Income



The red line is the expected change in taxation revenue and the blue line is the expected change in CPP-D costs, under the new policy. We see that the CPP-D costs savings increase at first (varying from approximately $77 million in 2006 to $81 million in 2018) and then level off

(approx $57 million in 2030). This is due to the movement of the baby boom generation through the workforce. CPP-D costs are responsive to direct changes in labour force participation.

Also, the change in taxation revenue due to the new policy increases over time. This is because the positive effects of an increase in labour force participation on the economy are cumulative. The economy strengthens over time, and thus taxation revenues increase over time.

5.2.2 Lower Bound Assumptions Scenario

In the Lower Bound Scenario, the assumptions are:

- For males 18-34 years old: 38.1% will take advantage of the new policy
- 35-50 years old: 33.7%
- 50-64 years old: 23.2%
- For females 18-34 years old: 39.4% will take advantage of the new policy
- 35-50 years old: 35.3%
- 50-64 years old: 24.7%

With this set of assumptions, there is an economic benefit from implementing the new CPP-D policy in every year of the forecast period (See Exhibit 5). The expected gain in government income varies from approximately $179 million in 2006 to $254 million in 2027.

In every year of the forecast period, the total gain in this Lower Bound Scenario is lower than in the Expected Scenario Simulation. Since fewer persons with disabilities go back to work in the Lower Bound Scenario, there will be a smaller positive effect on the economy and thus government taxation revenue will not increase as much as in the Expected Scenario. Also, there is a smaller CPP-D cost saving in the Lower Bound Scenario than in the Expected Scenario since more people continue to not work at all and will get full disability benefits.

5.2.3 Upper Bound Assumptions Scenario

In the Upper Bound Scenario, the assumptions are:

- For males 18-34 years old: 53.2% will take advantage of the new policy
- 35-50 years old: 47.4%
- 50-64 years old: 34.3%
- For females 18-34 years old: 54.7% will take advantage of the new policy
- 35-50 years old: 51.0%
- 50-64 years old: 38.9%

There is an economic benefit from implementing the new CPP-D policy in every year of the forecast period in this scenario (See Exhibit 5). The expected gain in government income varies from approximately $219 million in 2006 to $310 million in 2027.

In every year of the forecast period, the net gain in this Upper Bound Scenario is greater than in the Expected Scenario Simulation. Since more persons with disabilities go back to work (at least part-time) in the Upper Bound Scenario, there will be a greater positive effect on the economy and thus government taxation revenue will increase more than in the Expected Scenario. Also, there is a greater CPP-D cost saving in the Upper Bound Scenario than in the Expected Scenario since more people resume work to some extent and will get partial CPP-D benefits (instead of full benefits).

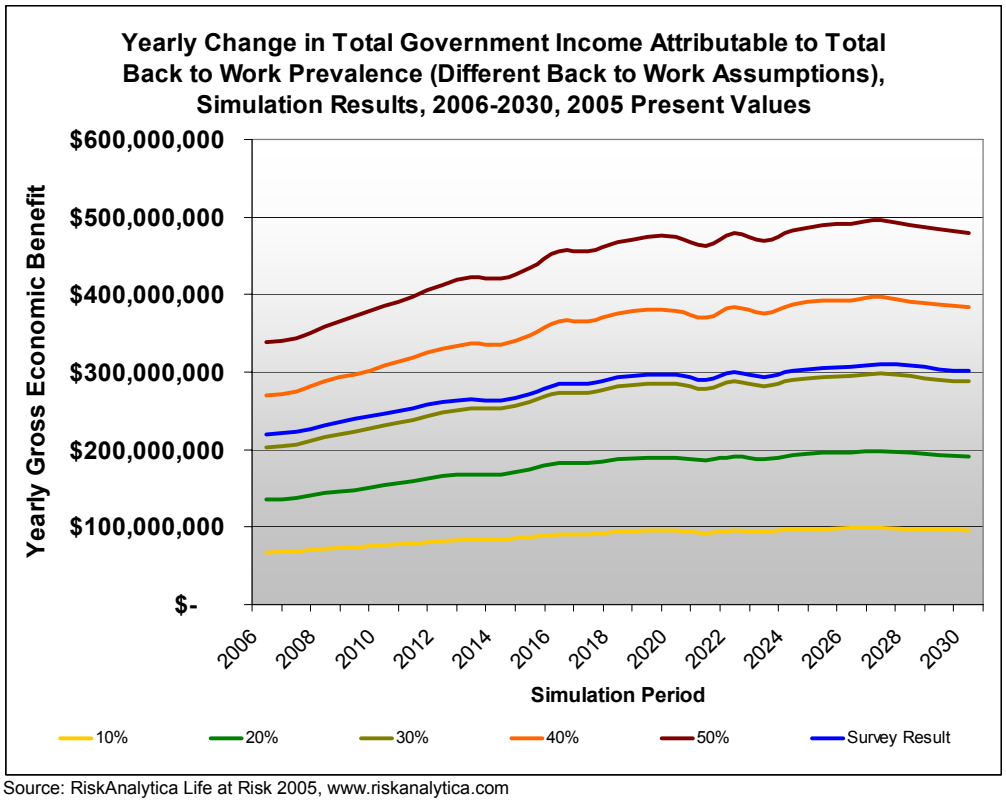
5.2.4 Economic Simulation Results for Different Back to Work Assumptions

In addition to the Lower Bound, Expected, and Upper Bound assumption scenarios based on the results of a survey of stakeholders, five other scenarios were simulated. These scenarios assume that both genders and all age groups have the same back to work percentage. That is, among all CPP-D recipients, the same percentage will go back to work following a change in CPP-D policy. The scenarios are:

1. 10% of recipients (both genders and all age groups) will take advantage of the new policy
2. 20% of recipients will take advantage of the new policy
3. 30% of recipients will take advantage of the new policy
4. 40% of recipients will take advantage of the new policy
5. 50% of recipients will take advantage of the new policy

The scenario where 10% of recipients go back to work can be considered to be a worst case scenario. That is, the scenario is analysed to understand the effects of a new CPP-D policy when CPP-D recipients are not very responsive to the change in policy. In this scenario, there is an economic benefit from implementing the new CPP-D policy in every year of the forecast period. The results are graphed as follows:

Exhibit 12: Back to Work Assumption Scenarios: Breakdown of Expected Yearly Change in Total Government Income



Source: RiskAnalytica Life at Risk 2005, www.riskanalytica.com

In each year, there is an increase in total taxation revenue (compared to the current CPP-D policy). In 2006, the expected change in total taxation revenue is approximately $43 million. In 2015, this will increase to approximately $59 million (an increase of 37% from 2006) and in 2025 the expected change in taxation revenue will be approximately $76 million (an increase of 77%

from 2006). There is also a saving in CPP-D costs in each year from 2006 to 2030. In 2006 the expected cost saving is approximately $24 million, and it increases every year until 2015, when it is approximately $27 million. From 2016 onwards, the CPP-D cost saving is lower in each year until it reaches approximately $18 million in 2030.

The total gain the government can expect in each year varies from about $67 million in 2006 to $99 million in 2027 (in present valued dollars). In 2015, the expected total gain in government income is approximately $87 million (a 30% increase from 2006) and in 2025 the expected total gain is approximately $98 million (a 46% increase from 2006).

In each of the scenarios in which 20%, 30%, 40%, and 50% of CPP-D recipients, respectively, go back to work under a new policy, the economic simulation results show that the expected change in total government income is positive in each year of the forecast period. (See Appendix VII for the results.)

6. Conclusion

The results of the analysis lead to the conclusion that the number of disabled people going back to work under the changed CPP-D policy will have a significant positive impact on the economy in every year of the forecast period. In each scenario, the economy activity generated by higher labour force participation results in higher total taxation revenues for the federal and provincial governments (compared to the case where there is no change in CPP-D policy). Also, the cost of making CPP-D payments is lower in each scenario. Under the changed policy, when persons with disabilities resume work, the government will pay them only a portion of their previous benefits. The government is able to decrease its CPP-D payments costs since it will not have to make full disability payments to as many persons with disabilities. Thus, the benefit to the government of the new policy (change in total taxation revenues less change in CPP-D payments) will be positive in every year of the forecast period.

In the Lower Bound Scenario, where the percentage of persons with disabilities assumed to go back to work is lowest, the number of persons estimated to resume work is large enough to have positive economic effects. The simulation results show that, in 2006, expected total taxation revenue will increase by approximately $116 million, CPP-D costs will decrease by approximately $63 million, and the change in total government income under the new policy is expected to be approximately $180 million. In 2011 the total change in government income is approximately $207 million, and in 2030 it is approximately $274 million.

In the Expected Assumptions Scenario, expected total taxation revenue will increase by approximately $142 million, CPP-D costs will decrease by approximately $78 million, and the change in net government income under the new policy is expected to be approximately $219 million in 2006. In 2011, the total change in government income is approximately $253 million and, in 2030 it is approximately $302 million.

The greatest economic benefits occur in the Upper Bound Scenario, where the percentage of persons with disabilities assumed to go back to work is highest. In 2006, expected total taxation revenue will increase by approximately $172 million, CPP-D costs will decrease by approximately $95 million, and the change in total government income under the new policy is expected to be approximately $267 million. In 2011, the net change in government income is approximately $309 million and, in 2030 it is approximately $369 million.

In the “worst-case” scenario (where it is assumed that only 10% of CPP-D recipients of both genders and all age groups go back to work), there is still an economic benefit from implementing the new CPP-D policy in every year of the forecast period. In 2006, the expected total taxation revenue will increase by approximately $44 million, CPP-D costs will decrease by approximately $24 million, and the change in net government income under the new policy is expected to be approximately $67 million. In 2011, the net change in government income is approximately $80 million and, in 2030 it is approximately $96 million.

These figures show that, in both the short, medium, and long term, it will be beneficial to the government to implement a disability benefit program that encourages persons with disabilities to participate in the labour force to a greater extent as allowed by their health. It is important to note that the results contained in the report are for the gross economic gain expected from a new CPP-D policy. The net employee and economic benefits are not covered in this analysis as it is not currently known how many extra CPP-D recipients will be generated by a new CPP-D policy. An influx of applicants may occur if the new CPP-D policy is more attractive to disabled employees that had found the previous CPP-D policy unattractive. Further work needs to be performed in this area in order to obtain a more comprehensive understanding of the ultimate benefits or costs that accrue from a new CPP-D policy.

Appendix I. Base Simulation Results

Exhibit 13: Base: Expected Total Yearly CPP-D Payments, Future Values

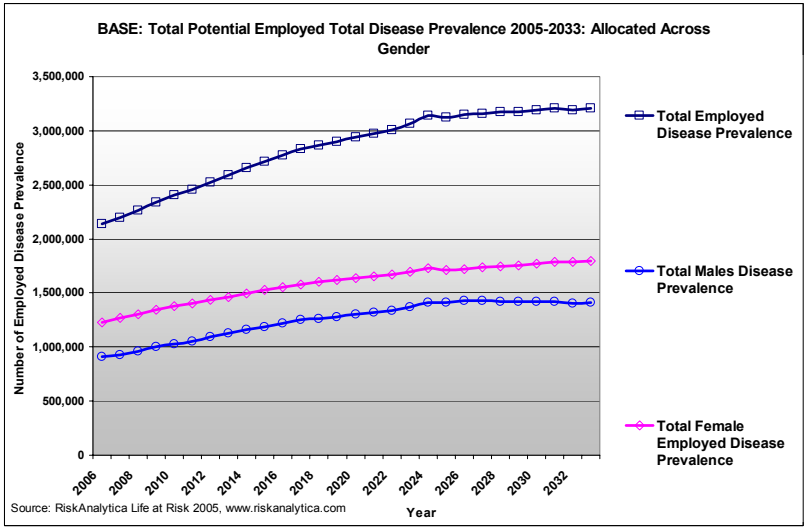
BASE: Expected Total Yearly CPP-D Payments, Totals, 2005-2033: Allocated Across Age Groups, Future Values

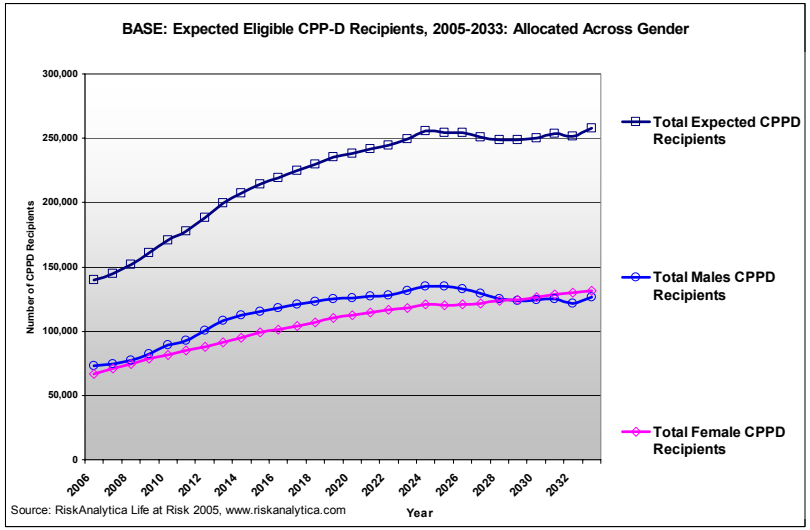
Year	Total 18-19 years	Total 20-24 years	Total 25-29 years	Total 30-34 years	Total 35-39 years	Total 40-44 years	Total 45-49 years	Total 50-54 years	Total 55-59 years	Total 60-64 years	Total
2006	$351,024	$678,382	$4,451,154	$15,043,602	$43,192,876	$95,477,437	$168,921,919	$245,407,606	$352,635,576	$444,374,084	$1,370,533,660
2007	$360,403	$703,074	$4,565,775	$15,587,690	$44,440,078	$96,008,399	$173,309,249	$259,752,164	$383,306,605	$470,881,804	$1,448,915,241
2008	$374,361	$750,485	$4,794,110	$15,893,352	$45,648,852	$99,732,926	$178,284,981	$276,565,669	$413,865,855	$505,515,933	$1,541,426,526
2009	$389,778	$789,039	$5,013,277	$16,748,540	$47,510,524	$103,329,904	$182,386,105	$298,563,070	$463,009,400	$545,998,064	$1,663,737,700
2010	$399,744	$825,724	$5,231,729	$17,413,896	$48,674,997	$105,403,104	$184,850,854	$315,238,187	$505,070,619	$613,244,382	$1,796,353,238
2011	$407,796	$840,006	$5,419,257	$17,993,676	$49,803,270	$107,200,913	$184,837,593	$343,055,674	$530,233,627	$659,235,949	$1,899,027,761
2012	$419,507	$875,247	$5,614,513	$18,222,709	$50,278,854	$108,324,220	$188,256,087	$358,498,941	$552,707,945	$772,828,252	$2,056,026,276
2013	$430,421	$885,844	$5,778,795	$18,866,739	$51,504,841	$109,879,659	$191,021,059	$369,711,782	$577,362,198	$887,245,354	$2,212,686,693
2014	$440,857	$934,461	$5,955,463	$19,445,457	$52,884,035	$111,884,427	$194,320,149	$381,306,749	$607,539,965	$967,370,832	$2,342,082,394
2015	$458,945	$968,052	$6,188,027	$19,959,061	$54,265,322	$114,542,508	$198,373,588	$389,317,665	$640,034,653	$1,038,996,547	$2,463,104,368
2016	$477,936	$1,008,881	$6,355,329	$20,297,735	$55,287,905	$116,666,704	$199,887,981	$389,356,601	$668,141,127	$1,101,666,585	$2,559,146,784
2017	$477,989	$1,011,665	$6,517,373	$20,851,965	$56,750,590	$119,113,623	$203,768,818	$392,455,125	$694,446,285	$1,177,773,500	$2,673,166,933
2018	$492,666	$1,038,889	$6,666,522	$21,587,687	$58,142,705	$121,775,097	$205,992,340	$392,060,503	$720,598,728	$1,249,793,259	$2,778,148,396
2019	$490,145	$1,035,165	$6,815,684	$21,976,342	$59,280,037	$124,680,635	$211,189,478	$396,120,399	$743,486,483	$1,323,661,745	$2,888,736,113
2020	$506,987	$1,068,300	$6,955,998	$22,550,031	$60,291,404	$126,586,490	$214,949,314	$401,412,101	$761,236,421	$1,379,837,986	$2,975,395,032
2021	$522,114	$1,090,509	$7,097,604	$22,825,922	$61,587,270	$128,256,548	$218,398,899	$406,838,443	$776,284,105	$1,440,390,582	$3,063,291,994
2022	$539,685	$1,120,916	$7,280,480	$23,563,655	$63,092,674	$131,542,257	$222,663,503	$413,234,805	$792,164,450	$1,495,436,743	$3,150,639,167
2023	$554,380	$1,143,621	$7,550,648	$24,549,954	$64,919,114	$135,788,266	$229,743,720	$427,204,536	$805,297,979	$1,573,321,800	$3,270,074,018
2024	$577,299	$1,191,338	$7,854,937	$25,728,302	$67,832,122	$140,476,726	$236,805,264	$443,036,546	$834,841,648	$1,644,750,858	$3,403,095,040
2025	$581,403	$1,184,985	$7,962,265	$25,811,814	$68,311,442	$141,673,957	$238,525,583	$448,935,887	$833,519,105	$1,673,206,797	$3,439,713,237
2026	$601,526	$1,210,116	$8,205,803	$26,478,086	$70,474,156	$145,895,982	$247,313,098	$462,314,467	$863,923,802	$1,654,506,956	$3,480,923,993
2027	$619,352	$1,229,754	$8,452,335	$27,253,479	$71,963,362	$148,385,352	$251,779,723	$470,034,639	$885,873,793	$1,625,531,246	$3,491,123,035
2028	$617,116	$1,221,156	$8,606,151	$27,800,575	$73,439,509	$151,416,131	$255,292,192	$482,129,687	$914,385,197	$1,590,766,459	$3,505,674,173
2029	$635,370	$1,241,784	$8,738,664	$28,238,518	$74,321,244	$153,794,348	$258,783,435	$489,055,983	$919,293,111	$1,626,385,116	$3,560,487,573
2030	$654,634	$1,254,029	$8,882,919	$28,755,339	$75,204,874	$156,571,667	$263,802,698	$500,945,920	$957,362,494	$1,638,726,901	$3,632,161,477
2031	$675,962	$1,275,512	$9,257,144	$29,329,446	$76,778,483	$159,939,423	$267,709,071	$513,761,912	$970,078,510	$1,703,835,964	$3,732,641,427
2032	$671,505	$1,262,240	$9,413,899	$29,600,255	$77,868,803	$162,191,637	$273,421,976	$523,028,447	$1,008,514,080	$1,657,743,033	$3,743,715,875
2033	$696,860	$1,291,936	$9,567,186	$30,159,610	$79,186,730	$164,994,138	$277,446,364	$529,010,279	$1,043,922,318	$1,750,486,093	$3,886,761,514

For each year from 2006 to 2033, this chart shows the total expected amount of money that the government will pay in CPP-D benefits to each age group due to disability caused by one or more of the diseases: Cancer, Circulatory diseases (CD), Chronic Obstructive Pulmonary disease (COPD), HIV/AIDS, and Mental Illnesses.

The final column shows the total amount of money they will pay in each year. The amounts are in future dollars.

The following two diagrams show the break down of Total Employed Disease Prevalence and Eligible CPP-D recipients into male and female.





The diagram on the left shows that disease prevalence will be higher among females than among males; in all years from 2006 to 2033.

The diagram on the right shows that more males will be eligible for CPP-D than females until about 2029, after which time the opposite will be true.

Exhibit 14: Base: Expected Total Yearly CPP-D Payments, Males, Future Values

BASE: Expected Total Yearly CPP-D Payments, Males, 2005-2033: Allocated Across Age Groups, Future Values

Year	Male 18-19 years	Male 20-24 years	Male 25-29 years	Male 30-34 years	Male 35-39 years	Male 40-44 years	Male 45-49 years	Male 50-54 years	Male 55-59 years	Male 60-64 years	Total Male
2006	$103,873	$250,131	$2,466,259	$7,594,013	$19,072,118	$41,390,243	$75,811,369	$120,100,571	$193,151,500	$261,304,149	$721,244,226
2007	$104,556	$253,903	$2,478,526	$7,678,881	$19,282,113	$40,918,047	$77,128,528	$125,588,195	$210,996,471	$263,639,161	$748,068,381
2008	$109,656	$270,174	$2,602,370	$7,988,488	$19,822,943	$42,101,556	$80,515,068	$135,747,677	$225,201,482	$277,194,611	$791,554,025
2009	$114,952	$282,011	$2,723,019	$8,459,704	$20,684,262	$43,366,266	$83,267,542	$147,757,611	$255,775,933	$295,984,665	$858,415,965
2010	$118,708	$295,886	$2,841,449	$8,787,730	$21,253,601	$44,107,711	$85,139,688	$151,592,640	$279,584,047	$349,720,808	$943,442,269
2011	$122,935	$304,360	$2,948,806	$9,123,538	$21,670,014	$44,268,471	$85,495,477	$166,915,088	$291,081,783	$375,605,036	$997,535,510
2012	$127,296	$320,698	$3,055,518	$9,425,412	$22,083,792	$44,792,096	$86,266,729	$172,730,641	$302,303,953	$463,674,016	$1,104,780,151
2013	$132,170	$327,440	$3,139,776	$9,714,029	$22,534,271	$45,176,654	$86,564,967	$175,911,627	$313,153,258	$553,124,083	$1,209,778,276
2014	$136,174	$350,718	$3,220,193	$9,945,873	$23,133,307	$45,841,609	$87,684,055	$180,301,012	$325,508,180	$603,642,186	$1,279,763,306
2015	$141,590	$366,192	$3,353,057	$10,254,517	$23,712,457	$46,701,868	$87,808,797	$181,754,034	$337,122,304	$647,323,394	$1,338,538,209
2016	$147,154	$382,813	$3,437,001	$10,549,820	$24,422,922	$47,467,286	$87,880,002	$180,553,843	$346,992,198	$689,101,284	$1,390,934,324
2017	$151,910	$398,710	$3,516,584	$10,837,263	$24,986,471	$48,305,564	$88,906,088	$182,719,206	$356,529,246	$736,613,741	$1,452,964,783
2018	$155,308	$410,380	$3,603,774	$11,094,309	$25,578,416	$49,151,847	$89,126,872	$181,575,105	$366,801,939	$773,366,931	$1,500,864,881
2019	$158,499	$420,091	$3,678,368	$11,360,887	$26,092,121	$49,927,525	$91,034,446	$184,697,039	$374,598,800	$808,527,667	$1,550,495,443
2020	$162,408	$437,240	$3,754,503	$11,633,735	$26,637,609	$50,735,607	$92,554,600	$182,728,000	$382,555,585	$833,750,007	$1,584,949,293
2021	$166,294	$447,900	$3,840,850	$11,853,413	$27,263,270	$51,547,783	$93,707,661	$181,505,557	$389,760,621	$866,372,175	$1,626,465,524
2022	$171,476	$464,130	$3,941,840	$12,193,237	$27,830,507	$52,584,996	$95,036,004	$183,268,497	$397,470,833	$892,937,768	$1,665,899,289
2023	$179,621	$486,260	$4,132,466	$12,780,218	$29,101,706	$55,009,544	$98,105,910	$188,646,434	$405,157,933	$946,365,956	$1,739,966,048
2024	$188,511	$512,314	$4,308,664	$13,399,341	$30,578,469	$57,443,326	$101,618,972	$196,854,593	$417,309,399	$989,905,598	$1,812,119,186
2025	$192,308	$522,292	$4,404,465	$13,668,101	$31,140,610	$58,423,878	$103,682,251	$200,526,910	$411,165,313	$1,013,599,691	$1,837,325,819
2026	$199,159	$539,648	$4,581,562	$14,244,656	$32,421,648	$60,584,615	$108,372,532	$208,890,045	$427,438,546	$983,085,186	$1,840,357,597
2027	$202,962	$549,321	$4,721,330	$14,510,092	$33,061,826	$61,631,275	$110,323,916	$209,348,398	$432,680,381	$947,346,796	$1,814,376,296
2028	$207,973	$560,939	$4,802,318	$14,837,303	$33,562,026	$62,762,872	$111,807,054	$215,675,256	$445,220,272	$888,520,804	$1,777,956,817
2029	$211,454	$571,673	$4,876,781	$15,060,845	$34,162,215	$63,790,874	$113,018,883	$216,690,594	$438,498,910	$902,239,904	$1,789,122,132
2030	$214,403	$578,263	$4,964,441	$15,348,730	$34,714,010	$64,700,437	$114,843,002	$222,429,462	$458,797,145	$895,628,676	$1,812,218,568
2031	$219,380	$587,500	$5,169,413	$15,603,071	$35,176,745	$65,853,112	$116,415,702	$226,367,294	$456,994,742	$932,639,690	$1,855,026,649
2032	$224,063	$600,893	$5,257,355	$15,901,603	$35,722,009	$66,747,274	$119,311,063	$231,582,587	$475,568,386	$867,031,721	$1,817,946,953
2033	$230,407	$615,671	$5,341,413	$16,199,281	$36,370,163	$67,737,632	$121,003,199	$233,589,355	$489,766,756	$943,776,258	$1,914,630,136

For each year from 2006 to 2033, this chart shows the total expected amount of money that the government will pay in CPP-D benefits to males in each age group due to disability caused by one or more of the diseases: Cancer, Circulatory diseases (CD), Chronic Obstructive Pulmonary disease (COPD), HIV/AIDS, and Mental Illnesses.

The final column shows the total amount of money they will pay to males in each year. The amounts are in future dollars.

Exhibit 15: Base: Expected Total Yearly CPP-D Payments, Females, Future Values

BASE: Expected Total Yearly CPP-D Payments, Females, 2005-2033: Allocated Across Age Groups, Future Values

Year	Female 18-19 years	Female 20-24 years	Female 25-29 years	Female 30-34 years	Female 35-39 years	Female 40-44 years	Female 45-49 years	Female 50-54 years	Female 55-59 years	Female 60-64 years	Total Female
2006	$247,151	$428,250	$1,984,895	$7,449,589	$24,120,758	$54,087,194	$93,110,550	$125,307,035	$159,484,075	$183,069,935	$649,289,433
2007	$255,847	$449,170	$2,087,250	$7,908,809	$25,157,965	$55,090,352	$96,180,721	$134,163,969	$172,310,134	$207,242,642	$700,846,860
2008	$264,705	$480,311	$2,191,740	$7,904,863	$25,825,909	$57,631,371	$97,769,913	$140,817,992	$188,664,373	$228,321,323	$749,872,501
2009	$274,826	$507,028	$2,290,258	$8,288,836	$26,826,262	$59,963,639	$99,118,563	$150,805,458	$207,233,466	$250,013,399	$805,321,736
2010	$281,036	$529,839	$2,390,280	$8,626,165	$27,421,396	$61,295,393	$99,711,166	$163,645,547	$225,486,572	$263,523,575	$852,910,969
2011	$284,861	$535,646	$2,470,450	$8,870,138	$28,133,256	$62,932,442	$99,342,115	$176,140,586	$239,151,844	$283,630,913	$901,492,252
2012	$292,212	$554,550	$2,558,996	$8,797,297	$28,195,062	$63,532,124	$101,989,358	$185,768,300	$250,403,991	$309,154,235	$951,246,125
2013	$298,251	$558,404	$2,639,019	$9,152,710	$28,970,570	$64,703,004	$104,456,092	$193,800,155	$264,208,941	$334,121,272	$1,002,908,417
2014	$304,684	$583,743	$2,735,271	$9,499,584	$29,750,728	$66,042,818	$106,636,094	$201,005,736	$282,031,786	$363,728,645	$1,062,319,089
2015	$317,355	$601,860	$2,834,970	$9,704,545	$30,552,866	$67,840,640	$110,564,791	$207,563,631	$302,912,349	$391,673,153	$1,124,566,159
2016	$330,782	$626,068	$2,918,328	$9,747,915	$30,864,983	$69,199,417	$112,007,978	$208,802,759	$321,148,928	$412,565,301	$1,168,212,461
2017	$326,079	$612,955	$3,000,789	$10,014,701	$31,764,119	$70,808,059	$114,862,731	$209,735,919	$337,917,039	$441,159,759	$1,220,202,150
2018	$337,358	$628,509	$3,062,748	$10,493,378	$32,564,289	$72,623,250	$116,865,468	$210,485,398	$353,796,789	$476,426,328	$1,277,283,515
2019	$331,646	$615,074	$3,137,317	$10,615,455	$33,187,916	$74,753,110	$120,155,032	$211,423,360	$368,887,683	$515,134,077	$1,338,240,670
2020	$344,580	$631,060	$3,201,495	$10,916,297	$33,653,795	$75,850,883	$122,394,715	$218,684,100	$378,680,836	$546,087,979	$1,390,445,740
2021	$355,820	$642,608	$3,256,754	$10,972,509	$34,324,000	$76,708,765	$124,691,237	$225,332,886	$386,523,484	$574,018,407	$1,436,826,470
2022	$368,209	$656,786	$3,338,640	$11,370,417	$35,262,167	$78,957,261	$127,627,499	$229,966,308	$394,693,617	$602,498,975	$1,484,739,878
2023	$374,759	$657,361	$3,418,183	$11,769,736	$35,817,408	$80,778,723	$131,637,810	$238,558,101	$400,140,046	$626,955,844	$1,530,107,969
2024	$388,787	$679,024	$3,546,273	$12,328,961	$37,253,654	$83,033,401	$135,186,292	$246,181,953	$417,532,249	$654,845,259	$1,590,975,854
2025	$389,096	$662,693	$3,557,800	$12,143,714	$37,170,832	$83,250,079	$134,843,332	$248,408,976	$422,353,792	$659,607,105	$1,602,387,418
2026	$402,368	$670,468	$3,624,240	$12,233,430	$38,052,509	$85,311,367	$138,940,566	$253,424,422	$436,485,257	$671,421,770	$1,640,566,396
2027	$416,391	$680,434	$3,731,005	$12,743,387	$38,901,536	$86,754,077	$141,455,807	$260,686,241	$453,193,412	$678,184,450	$1,676,746,740
2028	$409,143	$660,217	$3,803,833	$12,963,272	$39,877,483	$88,653,259	$143,485,138	$266,454,432	$469,164,925	$702,245,655	$1,727,717,356
2029	$423,917	$670,110	$3,861,884	$13,177,673	$40,159,029	$90,003,473	$145,764,552	$272,365,389	$480,794,201	$724,145,212	$1,771,365,441
2030	$440,231	$675,767	$3,918,478	$13,406,608	$40,490,865	$91,871,230	$148,959,697	$278,516,459	$498,565,349	$743,098,226	$1,819,942,909
2031	$456,583	$688,012	$4,087,731	$13,726,375	$41,601,738	$94,086,311	$151,293,369	$287,394,618	$513,083,767	$771,196,274	$1,877,614,777
2032	$447,442	$661,346	$4,156,544	$13,698,652	$42,146,794	$95,444,362	$154,110,914	$291,445,860	$532,945,695	$790,711,312	$1,925,768,922
2033	$466,453	$676,265	$4,225,773	$13,960,329	$42,816,567	$97,256,506	$156,443,165	$295,420,923	$554,155,562	$806,709,835	$1,972,131,378

For each year from 2006 to 2033, this chart shows the total expected amount of money that the government will pay in CPP-D benefits to females in each age group due to disability caused by one or more of the diseases: Cancer, Circulatory diseases (CD), Chronic Obstructive Pulmonary disease (COPD), HIV/AIDS, and Mental Illnesses.

The final column shows the total amount of money they will pay to females in each year. The amounts are in future dollars.

Appendix II. Base Simulation Results – Disease Contributions

The following charts provide more information on the disease prevalence that can be expected in the labour force in 2006 to 2033 (for the five categories: Cancer, Circulatory diseases (CD), Respiratory Diseases, HIV/AIDS, and Mental Illnesses).

Exhibit 16: Base: Primary Disease Contribution

BASE PRIMARY DISEASE CONTRIBUTION: Percentage of Total Employed Prevalence: 2006-2033: Allocated Across Age Groups

	18-19 years		20-24 years		25-29 years		30-34 years		35-39 years		40-44 years		45-49 years		50-54 years		55-59 years		60-64 years		65-69 years	
2006	92%	Mental	89%	Mental	88%	Mental	82%	Mental	78%	Mental	71%	Mental	61%	Mental	48%	Mental	43%	Circulatory	45%	Circulatory	50%	Circulatory
2007	91%	Mental	89%	Mental	88%	Mental	82%	Mental	78%	Mental	71%	Mental	61%	Mental	48%	Mental	42%	Circulatory	44%	Circulatory	50%	Circulatory
2008	91%	Mental	89%	Mental	88%	Mental	82%	Mental	78%	Mental	71%	Mental	60%	Mental	48%	Mental	42%	Circulatory	44%	Circulatory	49%	Circulatory
2009	91%	Mental	89%	Mental	88%	Mental	82%	Mental	78%	Mental	71%	Mental	60%	Mental	49%	Mental	41%	Circulatory	43%	Circulatory	49%	Circulatory
2010	91%	Mental	89%	Mental	87%	Mental	82%	Mental	78%	Mental	71%	Mental	60%	Mental	49%	Mental	41%	Circulatory	43%	Circulatory	49%	Circulatory
2011	90%	Mental	88%	Mental	87%	Mental	82%	Mental	77%	Mental	70%	Mental	59%	Mental	49%	Mental	40%	Circulatory	42%	Circulatory	49%	Circulatory
2012	90%	Mental	88%	Mental	87%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	48%	Mental	40%	Circulatory	42%	Circulatory	48%	Circulatory
2013	90%	Mental	88%	Mental	87%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	48%	Mental	39%	Circulatory	42%	Circulatory	47%	Circulatory
2014	90%	Mental	87%	Mental	87%	Mental	81%	Mental	77%	Mental	69%	Mental	58%	Mental	48%	Mental	39%	Circulatory	42%	Circulatory	47%	Circulatory
2015	90%	Mental	87%	Mental	86%	Mental	81%	Mental	77%	Mental	69%	Mental	58%	Mental	48%	Mental	38%	Circulatory	41%	Circulatory	47%	Circulatory
2016	90%	Mental	87%	Mental	86%	Mental	81%	Mental	77%	Mental	69%	Mental	59%	Mental	48%	Mental	37%	Circulatory	41%	Circulatory	47%	Circulatory
2017	89%	Mental	87%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	48%	Mental	36%	Circulatory	40%	Circulatory	47%	Circulatory
2018	89%	Mental	87%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	48%	Mental	36%	Circulatory	40%	Circulatory	46%	Circulatory
2019	89%	Mental	87%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	49%	Mental	35%	Circulatory	39%	Circulatory	45%	Circulatory
2020	89%	Mental	87%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	49%	Mental	35%	Circulatory	38%	Circulatory	45%	Circulatory
2021	89%	Mental	87%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	49%	Mental	34%	Circulatory	37%	Circulatory	44%	Circulatory
2022	89%	Mental	86%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	49%	Mental	33%	Circulatory	37%	Circulatory	43%	Circulatory
2023	89%	Mental	86%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	49%	Mental	33%	Cancer	37%	Cancer	42%	Circulatory
2024	89%	Mental	86%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	49%	Mental	34%	Cancer	38%	Cancer	42%	Cancer
2025	89%	Mental	86%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	49%	Mental	34%	Cancer	38%	Cancer	43%	Cancer
2026	89%	Mental	86%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	49%	Mental	35%	Cancer	39%	Cancer	43%	Cancer
2027	89%	Mental	86%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	49%	Mental	35%	Cancer	40%	Cancer	44%	Cancer
2028	89%	Mental	86%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	49%	Mental	36%	Cancer	40%	Cancer	45%	Cancer
2029	89%	Mental	86%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	49%	Mental	36%	Cancer	41%	Cancer	45%	Cancer
2030	89%	Mental	86%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	49%	Mental	36%	Cancer	41%	Cancer	46%	Cancer
2031	89%	Mental	86%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	50%	Mental	37%	Cancer	42%	Cancer	47%	Cancer
2032	89%	Mental	86%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	50%	Mental	37%	Cancer	42%	Cancer	48%	Cancer
2033	88%	Mental	86%	Mental	86%	Mental	81%	Mental	77%	Mental	70%	Mental	59%	Mental	50%	Mental	37%	Cancer	42%	Cancer	48%	Cancer

This chart shows which disease persons in each age group are most likely to be affected by. That is, the chart indicates the disease that has the highest prevalence in that age group (of the five disease categories) and the percentage of people that have that particular disease. For example: the Base Simulation results show that total expected number of persons aged 18-19 years old with one of the five diseases is 48,276. (See Exhibit 12.) The above chart shows that 92% of these individuals (44,414 persons aged 18-19) will have a mental illness.

Notice that mental illnesses account for the largest share of disease prevalence among younger and middle age groups (each group from 18 to 54 years) while cancer and CD account for the largest share of disease prevalence in those aged 55 to 69 years old.

Exhibit 17: Base: Secondary Disease Contribution

BASE SECONDARY DISEASE CONTRIBUTION: 2006-2033: Allocated Across Age Groups

	18-19 years		20-24 years		25-29 years		30-34 years		35-39 years		40-44 years		45-49 years		50-54 years		55-59 years		60-64 years		65-69 years	
2006	5%	Circulatory	6%	Circulatory	7%	Circulatory	10%	Circulatory	11%	Circulatory	16%	Circulatory	22%	Circulatory	32%	Circulatory	26%	Mental	26%	Cancer	30%	Cancer
2007	5%	Circulatory	6%	Circulatory	7%	Circulatory	10%	Circulatory	11%	Circulatory	15%	Circulatory	22%	Circulatory	31%	Circulatory	26%	Mental	27%	Cancer	30%	Cancer
2008	5%	Circulatory	6%	Circulatory	7%	Circulatory	10%	Circulatory	11%	Circulatory	16%	Circulatory	22%	Circulatory	31%	Circulatory	27%	Mental	28%	Cancer	31%	Cancer
2009	5%	Circulatory	6%	Circulatory	7%	Circulatory	9%	Circulatory	11%	Circulatory	15%	Circulatory	22%	Circulatory	30%	Circulatory	28%	Mental	28%	Cancer	31%	Cancer
2010	5%	Circulatory	6%	Circulatory	7%	Circulatory	9%	Circulatory	11%	Circulatory	15%	Circulatory	22%	Circulatory	30%	Circulatory	28%	Mental	29%	Cancer	32%	Cancer
2011	6%	Circulatory	6%	Circulatory	7%	Circulatory	10%	Circulatory	12%	Circulatory	15%	Circulatory	22%	Circulatory	29%	Circulatory	28%	Mental	30%	Cancer	33%	Cancer
2012	6%	Circulatory	6%	Circulatory	7%	Circulatory	10%	Circulatory	12%	Circulatory	16%	Circulatory	22%	Circulatory	29%	Circulatory	28%	Mental	30%	Cancer	33%	Cancer
2013	6%	Circulatory	7%	Circulatory	7%	Circulatory	10%	Circulatory	12%	Circulatory	16%	Circulatory	22%	Circulatory	29%	Circulatory	28%	Cancer	31%	Cancer	34%	Cancer
2014	6%	Circulatory	7%	Circulatory	7%	Circulatory	9%	Circulatory	12%	Circulatory	16%	Circulatory	21%	Circulatory	28%	Circulatory	29%	Cancer	32%	Cancer	35%	Cancer
2015	6%	Circulatory	7%	Circulatory	7%	Circulatory	9%	Circulatory	12%	Circulatory	16%	Circulatory	21%	Circulatory	28%	Circulatory	29%	Cancer	32%	Cancer	36%	Cancer
2016	6%	Circulatory	7%	Circulatory	7%	Circulatory	9%	Circulatory	12%	Circulatory	15%	Circulatory	21%	Circulatory	27%	Circulatory	30%	Cancer	33%	Cancer	36%	Cancer
2017	6%	Circulatory	7%	Circulatory	7%	Circulatory	9%	Circulatory	12%	Circulatory	15%	Circulatory	21%	Circulatory	27%	Circulatory	30%	Cancer	34%	Cancer	37%	Cancer
2018	6%	Circulatory	7%	Circulatory	7%	Circulatory	9%	Circulatory	11%	Circulatory	15%	Circulatory	20%	Circulatory	26%	Circulatory	31%	Cancer	34%	Cancer	38%	Cancer
2019	6%	Circulatory	7%	Circulatory	7%	Circulatory	9%	Circulatory	11%	Circulatory	15%	Circulatory	20%	Circulatory	26%	Circulatory	31%	Cancer	35%	Cancer	39%	Cancer
2020	6%	Circulatory	7%	Circulatory	7%	Circulatory	9%	Circulatory	11%	Circulatory	15%	Circulatory	20%	Circulatory	25%	Circulatory	32%	Cancer	35%	Cancer	40%	Cancer
2021	6%	Circulatory	7%	Circulatory	6%	Circulatory	9%	Circulatory	11%	Circulatory	15%	Circulatory	20%	Circulatory	25%	Circulatory	33%	Cancer	36%	Cancer	40%	Cancer
2022	6%	Circulatory	7%	Circulatory	7%	Circulatory	9%	Circulatory	11%	Circulatory	14%	Circulatory	20%	Circulatory	24%	Circulatory	33%	Cancer	37%	Cancer	41%	Cancer
2023	7%	Circulatory	7%	Circulatory	7%	Circulatory	9%	Circulatory	11%	Circulatory	14%	Circulatory	19%	Circulatory	24%	Circulatory	33%	Circulatory	36%	Circulatory	41%	Cancer
2024	7%	Circulatory	8%	Circulatory	7%	Circulatory	9%	Circulatory	11%	Circulatory	14%	Circulatory	19%	Circulatory	24%	Circulatory	32%	Circulatory	35%	Circulatory	42%	Circulatory
2025	7%	Circulatory	8%	Circulatory	7%	Circulatory	9%	Circulatory	10%	Circulatory	14%	Circulatory	19%	Circulatory	23%	Circulatory	32%	Circulatory	35%	Circulatory	41%	Circulatory
2026	7%	Circulatory	8%	Circulatory	7%	Circulatory	9%	Circulatory	10%	Circulatory	14%	Circulatory	19%	Circulatory	23%	Circulatory	31%	Circulatory	34%	Circulatory	41%	Circulatory
2027	7%	Circulatory	8%	Circulatory	7%	Circulatory	9%	Circulatory	10%	Circulatory	14%	Circulatory	19%	Circulatory	23%	Cancer	31%	Circulatory	33%	Circulatory	40%	Circulatory
2028	7%	Circulatory	8%	Circulatory	7%	Circulatory	8%	Circulatory	10%	Circulatory	14%	Circulatory	19%	Circulatory	24%	Cancer	30%	Circulatory	32%	Circulatory	39%	Circulatory
2029	7%	Circulatory	8%	Circulatory	7%	Circulatory	8%	Circulatory	10%	Circulatory	14%	Circulatory	19%	Circulatory	24%	Cancer	30%	Circulatory	32%	Circulatory	38%	Circulatory
2030	7%	Circulatory	8%	Circulatory	7%	Circulatory	8%	Circulatory	10%	Circulatory	14%	Circulatory	18%	Circulatory	24%	Cancer	30%	Mental	31%	Circulatory	38%	Circulatory
2031	7%	Circulatory	8%	Circulatory	7%	Circulatory	8%	Circulatory	10%	Circulatory	13%	Circulatory	18%	Cancer	24%	Cancer	30%	Mental	31%	Circulatory	37%	Circulatory
2032	7%	Circulatory	8%	Circulatory	7%	Circulatory	8%	Circulatory	9%	Circulatory	13%	Circulatory	18%	Cancer	24%	Cancer	30%	Mental	30%	Circulatory	36%	Circulatory
2033	7%	Circulatory	8%	Circulatory	6%	Circulatory	8%	Circulatory	9%	Cancer	13%	Circulatory	19%	Cancer	24%	Cancer	30%	Mental	30%	Circulatory	35%	Circulatory

This chart indicates the disease has the second highest prevalence in each age group and the percentage of people (with one or more of the five diseases) that have that particular disease. For example: the Base Simulation results show that total expected number of persons aged 18-19 years old with one of the five diseases is 48,276. (See Exhibit 12.) The above chart shows that 5% of these individuals will have a circulatory disease.

Exhibit 18: Base: Expected Total Yearly CPP-D Payments: Disease Contribution

BASE: Expected Total Yearly CPP-D Payments, Totals, 2006-2033: Future Values

Year	Total Disease Prevalence	Cancer Percent of Total Disease Prevalence	Diseases of the Circulatory System Percent of Total Disease Prevalence	Mental Disorders Percent of Total Disease Prevalence	Endocrine, Nutritional, Metabolic, Immunity Disorders Percent of Total Disease Prevalence	Diseases of the Respiratory System Percent of Total Disease Prevalence
2006	$1,370,533,660	12%	23%	55%	6%	4%
2007	$1,448,915,241	12%	22%	55%	7%	4%
2008	$1,541,426,526	12%	22%	55%	8%	3%
2009	$1,663,737,700	12%	21%	55%	8%	3%
2010	$1,796,353,238	13%	21%	54%	9%	3%
2011	$1,899,027,761	13%	21%	53%	10%	3%
2012	$2,056,026,276	13%	21%	52%	11%	3%
2013	$2,212,686,693	13%	21%	50%	12%	3%
2014	$2,342,082,394	14%	21%	50%	13%	2%
2015	$2,463,104,368	14%	21%	49%	14%	2%
2016	$2,559,146,784	14%	20%	49%	15%	2%
2017	$2,673,166,933	14%	20%	48%	16%	2%
2018	$2,778,148,396	14%	20%	48%	16%	2%
2019	$2,888,736,113	14%	19%	48%	17%	2%
2020	$2,975,395,032	14%	19%	47%	18%	2%
2021	$3,063,291,994	14%	18%	47%	19%	2%
2022	$3,150,639,167	14%	18%	47%	19%	2%
2023	$3,270,074,018	15%	17%	47%	20%	2%
2024	$3,403,095,040	15%	17%	46%	20%	2%
2025	$3,439,713,237	15%	17%	46%	20%	2%
2026	$3,480,923,993	15%	16%	46%	21%	2%
2027	$3,491,123,035	15%	16%	47%	21%	2%
2028	$3,505,674,173	15%	15%	47%	21%	2%
2029	$3,560,487,573	15%	15%	47%	21%	2%
2030	$3,632,161,477	15%	15%	47%	22%	2%
2031	$3,732,641,427	15%	14%	47%	22%	2%
2032	$3,743,715,875	16%	14%	47%	22%	2%
2033	$3,886,761,514	16%	14%	47%	22%	2%

The leftmost chart shows the total expected amount of money that the government will pay in CPP-D benefits due to disability caused by one or more of the five diseases under consideration, for each year from 2006 to 2033.

For each of the five disease categories, the other charts indicate what percentage of the total CPP-D payment amount is due to a particular disease. For example: the 2nd chart shows that in 2006, Cancer will account for 12% of the total expected CPP-D payment amount. That is, 12% of the $1,370,533,660 spent on CPP-D benefits will be paid to persons who are disabled due to Cancer.

The scenario simulations were conducted to analyse the outcome of a changed CPP-D policy that provides partial disability payments to persons who work part-time.

Appendix III. Total Expected Scenario Simulation Results

The Expected Scenario Simulation was conducted based on the expected assumptions of the percentage of CPP-D recipients who will go back to work when the CPP-D policy is changed. The assumptions are as follows:

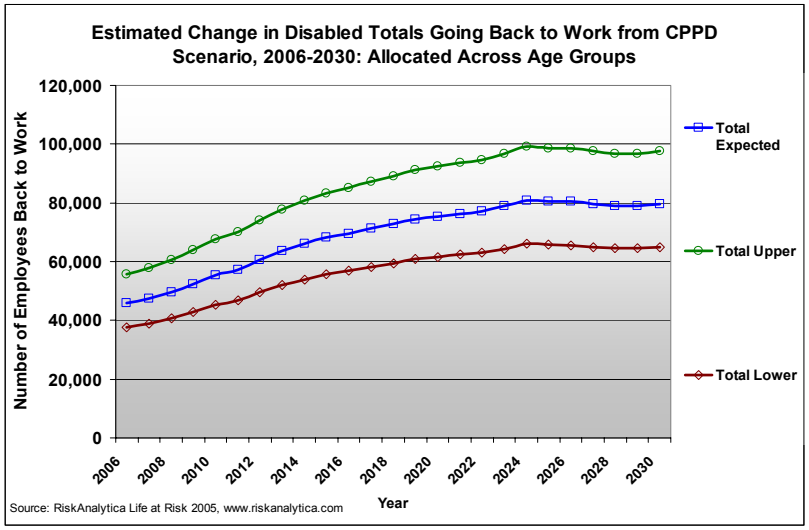
- For males 18-34 years old: 45.4% will take advantage of the new policy
- 35-50 years old: 40.6%
- 50-64 years old: 28.2%
- For females 18-34 years old: 46.8% will take advantage of the new policy
- 35-50 years old: 43.0%
- 50-64 years old: 30.7%

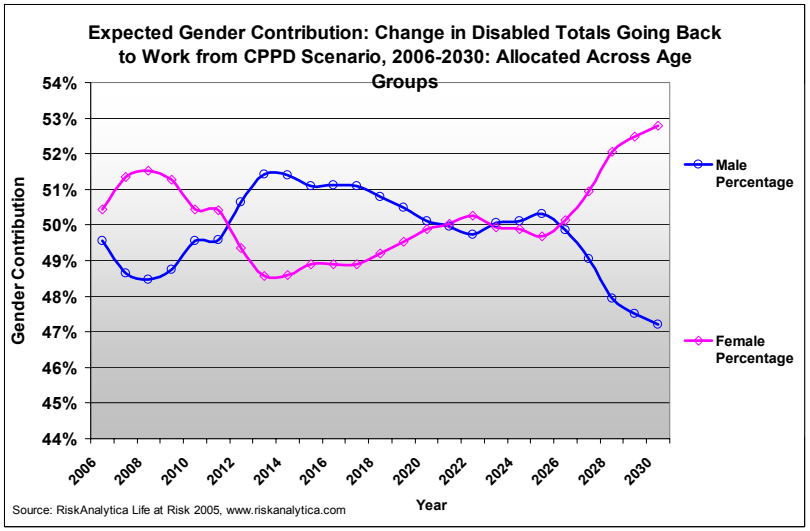
Exhibit 19: Expected: Estimated Change in Disabled Totals Going Back to Work

Expected Back to Work Assumptions
Estimated Change in Disabled Totals Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Total 18-19 years	Total 20-24 years	Total 25-29 years	Total 30-34 years	Total 35-39 years	Total 40-44 years	Total 45-49 years	Total 50-54 years	Total 55-59 years	Total 60-64 years	Total	Males	Females
2006	23	44	286	936	2,325	4,801	7,703	7,390	10,075	12,252	45,834	22,716	23,118
2007	23	44	289	954	2,363	4,769	7,805	7,714	10,772	12,804	47,537	23,129	24,408
2008	23	47	299	957	2,396	4,892	7,924	8,090	11,450	13,538	49,616	24,052	25,564
2009	24	48	307	992	2,462	5,005	8,001	8,605	12,594	14,394	52,434	25,556	26,878
2010	24	50	315	1,015	2,490	5,042	8,005	8,965	13,516	15,869	55,291	27,399	27,892
2011	24	50	321	1,032	2,516	5,064	7,902	9,612	13,966	16,785	57,273	28,393	28,880
2012	24	51	328	1,028	2,507	5,052	7,948	9,904	14,326	19,310	60,480	30,624	29,856
2013	25	51	332	1,047	2,536	5,061	7,965	10,072	14,730	21,768	63,588	32,706	30,881
2014	25	52	336	1,062	2,571	5,088	8,001	10,241	15,259	23,351	65,988	33,921	32,067
2015	25	53	344	1,073	2,605	5,144	8,069	10,312	15,829	24,678	68,131	34,816	33,315
2016	26	55	348	1,073	2,620	5,173	8,029	10,167	16,268	25,740	69,498	35,521	33,977
2017	26	54	351	1,085	2,655	5,215	8,083	10,099	16,645	27,075	71,287	36,429	34,858
2018	26	54	353	1,105	2,686	5,265	8,069	9,946	17,000	28,285	72,789	36,971	35,818
2019	25	53	355	1,107	2,704	5,323	8,169	9,902	17,265	29,494	74,397	37,555	36,842
2020	26	54	357	1,117	2,715	5,336	8,209	9,899	17,394	30,268	75,375	37,774	37,602
2021	26	54	358	1,113	2,738	5,338	8,236	9,897	17,453	31,095	76,307	38,120	38,187
2022	27	55	361	1,130	2,770	5,406	8,292	9,910	17,524	31,775	77,249	38,420	38,829
2023	27	55	369	1,158	2,813	5,508	8,447	10,099	17,526	32,880	78,881	39,487	39,394
2024	27	56	377	1,194	2,901	5,625	8,595	10,321	17,881	33,818	80,797	40,496	40,301
2025	27	55	376	1,179	2,884	5,600	8,545	10,306	17,575	33,838	80,385	40,444	39,941
2026	28	55	381	1,189	2,937	5,693	8,746	10,456	17,921	32,954	80,360	40,070	40,290
2027	28	55	386	1,205	2,961	5,716	8,792	10,484	18,090	31,886	79,603	39,043	40,560
2028	27	54	387	1,209	2,984	5,760	8,802	10,597	18,374	30,766	78,959	37,855	41,104
2029	28	54	387	1,208	2,981	5,776	8,810	10,599	18,190	30,958	78,991	37,538	41,453
2030	28	54	387	1,211	2,978	5,806	8,868	10,700	18,635	30,881	79,547	37,560	41,987

This chart shows change in the total expected number of persons with disabilities in each age group that resume work to some extent (part-time or full-time) under the new CPP-D policy (compared to the current CPP-D policy).





The diagram on the left displays the number of persons who will resume work under the new CPP-D policy. The blue line shows the total expected number of persons that will resume work in this scenario and represents the “Total” column in the chart on the previous chart. The red line corresponds to the total number of persons that will resume work in the Lower Bound Scenario (See Appendix IV) and the green line corresponds to the total number of persons that will resume work in the Upper Bound Scenario (See Appendix V). The shape of the curve is due in part to the ageing Canadian population. The new policy induces an increasing number of persons to resume work at first. This effect then levels off as the baby boom generation moves out of the workforce due to old age.

The diagram on the right breaks down the number of persons who will resume work under the new policy into males and females. Initially, a greater number of females than males take advantage of the policy. Then, as the baby boom generation moves through the workforce, more males resume work (from around 2012) and then, later, more females take advantage of the new CPP-D policy. This is because men are victim to the bulk of chronic disease and tend to be affected by disease earlier in their lives than females. Also, women are becoming more prominent in the labour force and live longer than males.

Exhibit 20: Expected: Estimated Change in Full-Time Equivalents Totals Going Back to Work

Expected Back to Work Assumptions
Estimated Change in Totals Full Time Equivalents Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Total 18-19 years	Total 20-24 years	Total 25-29 years	Total 30-34 years	Total 35-39 years	Total 40-44 years	Total 45-49 years	Total 50-54 years	Total 55-59 years	Total 60-64 years	Total Person	Males	Females
2006	5	9	57	187	465	961	1,541	1,478	2,015	2,451	9,169	4,544	4,625
2007	5	9	58	191	473	954	1,561	1,543	2,155	2,561	9,510	4,627	4,883
2008	5	9	60	191	479	979	1,585	1,618	2,291	2,708	9,926	4,812	5,114
2009	5	10	61	199	493	1,001	1,601	1,721	2,520	2,880	10,489	5,113	5,377
2010	5	10	63	203	498	1,009	1,601	1,794	2,704	3,175	11,061	5,481	5,580
2011	5	10	64	206	503	1,013	1,581	1,923	2,794	3,358	11,457	5,680	5,777
2012	5	10	66	206	502	1,011	1,590	1,981	2,866	3,863	12,099	6,126	5,973
2013	5	10	66	210	507	1,012	1,593	2,015	2,947	4,355	12,721	6,543	6,178
2014	5	10	67	212	514	1,018	1,601	2,049	3,053	4,671	13,201	6,786	6,415
2015	5	11	69	215	521	1,029	1,614	2,063	3,167	4,937	13,630	6,965	6,665
2016	5	11	70	215	524	1,035	1,606	2,034	3,254	5,149	13,903	7,106	6,797
2017	5	11	70	217	531	1,043	1,617	2,020	3,330	5,416	14,261	7,288	6,973
2018	5	11	71	221	537	1,053	1,614	1,990	3,401	5,658	14,561	7,396	7,165
2019	5	11	71	221	541	1,065	1,634	1,981	3,454	5,900	14,883	7,513	7,370
2020	5	11	71	224	543	1,067	1,642	1,980	3,480	6,055	15,079	7,557	7,522
2021	5	11	72	223	548	1,068	1,648	1,980	3,492	6,221	15,265	7,626	7,639
2022	5	11	72	226	554	1,081	1,659	1,983	3,506	6,357	15,454	7,686	7,768
2023	5	11	74	232	563	1,102	1,690	2,020	3,506	6,578	15,780	7,899	7,881
2024	5	11	75	239	580	1,125	1,719	2,065	3,577	6,765	16,163	8,101	8,062
2025	5	11	75	236	577	1,120	1,710	2,062	3,516	6,769	16,081	8,091	7,990
2026	6	11	76	238	588	1,139	1,750	2,092	3,585	6,592	16,076	8,016	8,060
2027	6	11	77	241	592	1,144	1,759	2,097	3,619	6,379	15,925	7,811	8,114
2028	5	11	77	242	597	1,152	1,761	2,120	3,676	6,155	15,796	7,573	8,223
2029	6	11	77	242	596	1,155	1,762	2,120	3,639	6,193	15,802	7,509	8,293
2030	6	11	77	242	596	1,162	1,774	2,140	3,728	6,178	15,913	7,514	8,399

This chart shows the number of *full-time equivalent* persons in each age group that resume work under the new CPP-D policy. A full time equivalent person represents a number of persons working part-time who, together, make up a full-time worker.

$Full-time\ equivalent = \sum_{g}\sum_{a}(D_{old} - D_{new})_{a,g}$ where D_{old} is the disability level (percentage) of a person under the current CPP-D policy, D_{new} is the disability level (percentage) of a person under the new CPP-D policy, *a* is the age of the person, and *g* is the gender of the person.

Exhibit 21: Expected: Yearly Change in Total Government Income Attributable to Total Back to Work Prevalence

Expected Back to Work Assumptions

Yearly Change in Total Government Income Attributable to Total Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Gain Side

Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper
2006	$134,894,417	$141,544,868	$148,195,320
2007	$137,078,071	$144,228,067	$151,378,062
2008	$144,875,172	$152,871,323	$160,867,475
2009	$149,147,443	$157,859,585	$166,571,728
2010	$154,477,962	$164,029,538	$173,581,115
2011	$159,972,689	$170,444,839	$180,916,989
2012	$165,290,693	$176,748,648	$188,206,602
2013	$167,244,199	$179,523,429	$191,802,659
2014	$165,221,149	$178,072,407	$190,923,664
2015	$172,292,638	$186,493,393	$200,694,148
2016	$184,986,524	$201,147,259	$217,307,994
2017	$185,215,737	$202,370,866	$219,525,995
2018	$193,312,397	$212,301,193	$231,289,989
2019	$196,813,963	$217,323,230	$237,832,497
2020	$197,819,346	$219,695,119	$241,570,892
2021	$192,192,860	$214,755,290	$237,317,720
2022	$201,547,005	$226,674,140	$251,801,274
2023	$195,642,898	$221,556,277	$247,469,657
2024	$203,088,758	$231,679,588	$260,270,418
2025	$207,232,960	$238,255,793	$269,278,627
2026	$209,065,510	$242,362,272	$275,659,035
2027	$212,450,488	$248,467,297	$284,484,105
2028	$210,034,902	$247,958,959	$285,883,017
2029	$206,544,538	$246,289,260	$286,033,983
2030	$203,107,350	$244,786,685	$286,466,021

Cost Side

Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved
2006	$66,123,013	$77,785,579	$88,698,164
2007	$65,163,494	$78,864,880	$91,773,198
2008	$64,416,380	$79,654,447	$94,021,929
2009	$64,459,020	$81,469,717	$97,367,768
2010	$64,798,282	$82,962,661	$100,283,589
2011	$63,268,372	$82,470,587	$100,426,513
2012	$64,060,574	$84,670,255	$103,984,881
2013	$64,546,878	$86,472,312	$106,989,957
2014	$63,715,299	$86,526,305	$107,965,270
2015	$62,168,636	$85,480,187	$107,408,648
2016	$60,736,200	$84,774,677	$107,273,710
2017	$58,897,523	$83,194,151	$105,807,403
2018	$56,543,997	$80,975,879	$102,983,738
2019	$54,580,663	$79,045,453	$100,605,840
2020	$52,096,167	$76,705,379	$97,420,802
2021	$50,155,711	$74,735,813	$94,817,631
2022	$48,036,137	$72,265,974	$91,468,476
2023	$46,493,166	$71,090,523	$89,683,929
2024	$45,319,829	$70,238,181	$88,634,427
2025	$43,017,697	$67,567,071	$85,070,566
2026	$40,505,788	$64,552,105	$81,122,798
2027	$38,904,579	$62,726,702	$78,690,846
2028	$36,449,460	$59,680,287	$74,622,637
2029	$35,105,791	$58,316,834	$72,865,032
2030	$34,022,070	$57,022,318	$71,200,954

Net Gain or Cost

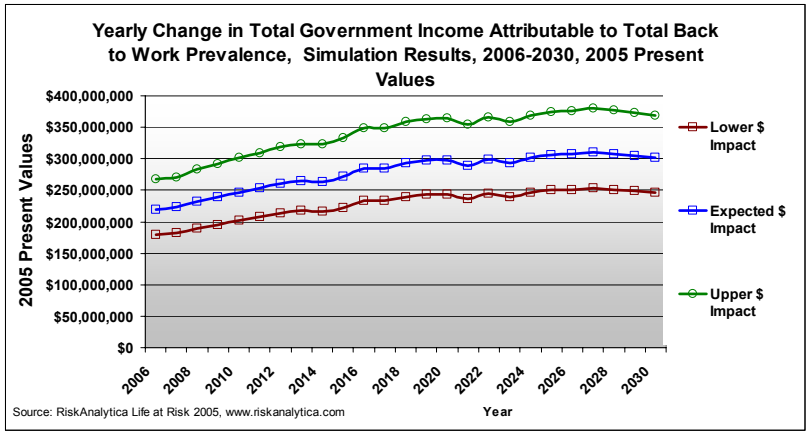
Year	Lower 95%	Simulated Expected	95% Upper
2006	$186,270,814	$218,882,202	$249,420,476
2007	$184,624,721	$223,147,562	$259,504,604
2008	$188,296,034	$231,924,832	$273,165,690
2009	$189,723,520	$238,827,674	$284,810,943
2010	$193,495,434	$246,694,829	$297,618,700
2011	$194,899,356	$253,125,131	$307,734,744
2012	$198,099,174	$261,197,654	$320,536,287
2013	$198,694,999	$265,231,099	$327,725,530
2014	$194,983,383	$263,870,054	$328,869,526
2015	$197,968,363	$271,760,367	$341,465,480
2016	$203,986,445	$284,928,153	$360,985,979
2017	$201,427,204	$285,147,708	$363,490,779
2018	$204,129,182	$292,886,220	$373,414,846
2019	$203,241,651	$296,967,727	$380,403,975
2020	$199,439,625	$297,040,061	$380,348,193
2021	$191,984,276	$289,363,533	$370,470,080
2022	$195,777,952	$299,500,339	$383,834,304
2023	$187,664,342	$293,152,667	$375,517,961
2024	$189,933,993	$301,497,229	$387,094,492
2025	$188,834,517	$305,426,692	$392,613,913
2026	$187,112,654	$307,375,644	$395,203,043
2027	$186,249,507	$310,449,747	$399,604,259
2028	$179,968,568	$307,621,117	$396,784,978
2029	$174,855,558	$303,968,928	$392,973,317
2030	$169,655,717	$301,747,470	$392,399,498

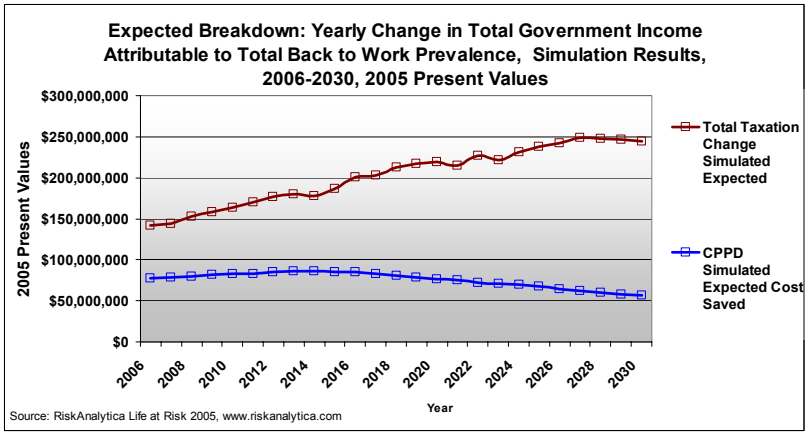
The chart on the left shows the change in government taxation revenue that results from the number of persons with disabilities who resume work due to the new CPP-D policy. Increased labour force participation has a positive effect on taxation revenue through both increased income tax revenue and corporate tax revenue. The middle column shows the expected value of the changed taxation revenue (the most likely path), the left column the 95% shows lower confidence bounds, and the right column shows the upper 95% confidence bounds.

The chart in the centre shows the change in the total CPP-D payments the government will have to make every year under the new CPP-D policy. Since the new policy results in a certain percentage of persons with disabilities resuming work and receiving partial benefits (instead of not working at all and receiving full disability benefits), the government pays out less in disability overall. This is a cost saving.

The chart on the right shows the net gain or cost to the government under the new policy. This is the difference between the change in taxation revenue and CPP-D payment costs. Under the new policy, the government will make a net gain in every year.

All amounts are in present valued dollars.



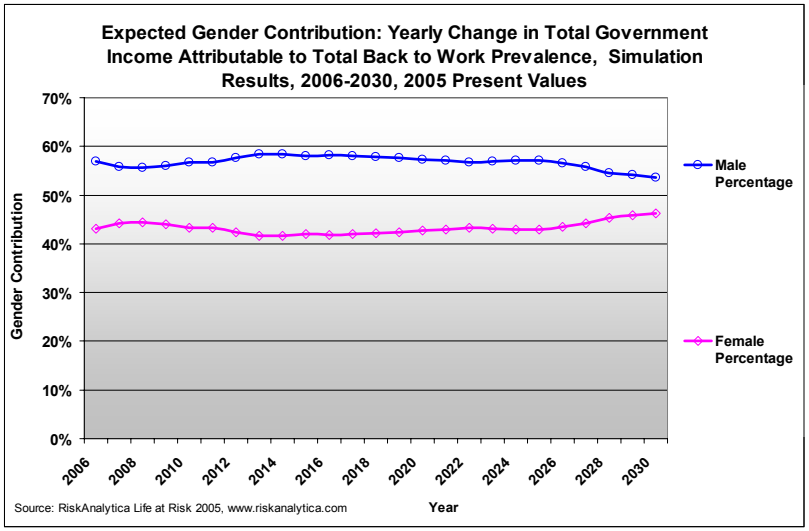


The diagram on the left shows the change in the government's net income (change in taxation revenue less change in CPP-D payment costs) due to the new CPP-D policy, in each year from 2006 to 2031. The blue line shows the expected value of the change in net income (the most likely path), and the red and green lines show the 95% lower confidence bound and the upper 95% confidence bound, respectively.

We see that the government can expect a net gain in each year, varying from about $218 million in 2006 to $301 million in 2030 (in present valued dollars).

The diagram on the right shows the expected change in taxation revenue (the red line) and the expected change in CPP-D costs (the blue line) separately. We see that the CPP-D costs savings increase at first (varying from approximately $77 million in 2006 to $81 million in 2018) and then level off (approx $57 million in 2030). This is again due to the movement of the baby boom generation through the workforce. CPP-D costs are responsive to direct changes in labour force participation. Thus, as fewer persons take advantage of CPP-D benefits in the future, costs will level off.

Also, the change in taxation revenue due to the new policy increases over time. This is because the positive effects of an increase in labour force participation on the economy are cumulative. The economy strengthens over time, and thus taxation revenues increase over time.



This diagram shows the percentage of the change in government taxation revenue that is due to males (the blue line) and the percentage that is due to females (the pink line).

It shows that the economic activity generated by males who return to work due to the new CPP-D policy accounts for a larger share of the increase in taxation revenue, over the entire forecast period. This is due in part to the fact that, on average, males earn higher incomes than females in the workforce.

However, the percentage contribution of females draws closer to that of males in the long term. This is because females are entering the labour force at a faster rate and their average wages are beginning to increase.

The simulation results for males and females (change in number of persons with disabilities going back to work, change in full-time equivalents, change in government income) follow.

Male Total Expected Scenario Simulation results

The following charts show the results of the Expected Scenario Simulation for males only.

Exhibit 22: Expected: Estimated Change in Males with Disabilities Going Back to Work

Expected Back to Work Assumptions
Estimated Change in Males with a Disability Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Male 18-19 years	Male 20-24 years	Male 25-29 years	Male 30-34 years	Male 35-39 years	Male 40-44 years	Male 45-49 years	Male 50-54 years	Male 55-59 years	Male 60-64 years	Total
2006	7	16	156	465	994	2,014	3,348	3,460	5,306	6,950	22,716
2007	6	16	155	463	992	1,966	3,363	3,566	5,702	6,900	23,129
2008	7	16	160	474	1,007	1,997	3,466	3,799	5,988	7,138	24,052
2009	7	17	165	494	1,037	2,031	3,539	4,076	6,692	7,499	25,556
2010	7	17	169	505	1,052	2,040	3,573	4,122	7,197	8,717	27,399
2011	7	18	172	515	1,059	2,021	3,543	4,473	7,372	9,212	28,393
2012	7	18	176	524	1,066	2,019	3,529	4,562	7,533	11,189	30,624
2013	7	18	178	531	1,074	2,011	3,497	4,580	7,678	13,132	32,706
2014	8	19	179	535	1,088	2,014	3,497	4,626	7,852	14,101	33,921
2015	8	20	184	543	1,102	2,026	3,458	4,597	8,002	14,878	34,816
2016	8	20	185	550	1,120	2,033	3,417	4,501	8,103	15,583	35,521
2017	8	21	187	555	1,132	2,043	3,413	4,489	8,192	16,389	36,429
2018	8	21	188	559	1,144	2,053	3,378	4,397	8,292	16,930	36,971
2019	8	21	189	564	1,152	2,059	3,407	4,408	8,332	17,415	37,555
2020	8	22	190	568	1,161	2,065	3,420	4,299	8,372	17,669	37,774
2021	8	22	191	569	1,173	2,072	3,418	4,209	8,393	18,065	38,120
2022	8	22	193	576	1,183	2,087	3,423	4,188	8,421	18,319	38,420
2023	8	23	199	594	1,221	2,155	3,489	4,249	8,446	19,102	39,487
2024	9	24	204	613	1,267	2,222	3,568	4,371	8,559	19,660	40,496
2025	9	24	205	615	1,274	2,232	3,594	4,388	8,297	19,806	40,444
2026	9	24	210	631	1,309	2,285	3,709	4,505	8,486	18,901	40,070
2027	9	24	213	632	1,318	2,295	3,728	4,450	8,452	17,920	39,043
2028	9	24	213	636	1,321	2,308	3,731	4,519	8,557	16,537	37,855
2029	9	24	213	635	1,328	2,316	3,723	4,475	8,292	16,522	37,538
2030	9	24	213	637	1,332	2,319	3,736	4,528	8,536	16,226	37,560

This chart shows change in the total expected number of males with disabilities in each age group that resume work to some extent (part-time or full-time) under the new CPP-D policy (compared to the current CPP-D policy).

Exhibit 23: Expected: Estimated Change in Male Full-Time Equivalents Going Back to Work

Expected Back to Work Assumptions
Estimated Change in Males Full Time Equivalents Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Male 18-19 years	Male 20-24 years	Male 25-29 years	Male 30-34 years	Male 35-39 years	Male 40-44 years	Male 45-49 years	Male 50-54 years	Male 55-59 years	Male 60-64 years	Total Person
2006	1	3	31	93	199	403	670	692	1,061	1,390	4,544
2007	1	3	31	93	198	393	673	713	1,141	1,380	4,627
2008	1	3	32	95	201	400	693	760	1,198	1,428	4,812
2009	1	3	33	99	208	406	708	815	1,339	1,500	5,113
2010	1	3	34	101	211	408	715	825	1,440	1,744	5,481
2011	1	4	35	103	212	404	709	895	1,475	1,843	5,680
2012	1	4	35	105	213	404	706	913	1,507	2,238	6,126
2013	1	4	36	106	215	402	700	916	1,536	2,627	6,543
2014	2	4	36	107	218	403	700	926	1,571	2,821	6,786
2015	2	4	37	109	220	405	692	920	1,601	2,976	6,965
2016	2	4	37	110	224	407	684	900	1,621	3,117	7,106
2017	2	4	37	111	226	409	683	898	1,639	3,279	7,288
2018	2	4	38	112	229	411	676	880	1,659	3,387	7,396
2019	2	4	38	113	230	412	681	882	1,667	3,484	7,513
2020	2	4	38	114	232	413	684	860	1,675	3,535	7,557
2021	2	4	38	114	235	414	684	842	1,679	3,614	7,626
2022	2	4	39	115	237	417	685	838	1,685	3,665	7,686
2023	2	5	40	119	244	431	698	850	1,690	3,821	7,899
2024	2	5	41	123	253	445	714	874	1,712	3,933	8,101
2025	2	5	41	123	255	446	719	878	1,660	3,962	8,091
2026	2	5	42	126	262	457	742	901	1,698	3,781	8,016
2027	2	5	43	126	264	459	746	890	1,691	3,585	7,811
2028	2	5	43	127	264	462	746	904	1,712	3,308	7,573
2029	2	5	43	127	266	463	745	895	1,659	3,305	7,509
2030	2	5	43	127	267	464	747	906	1,708	3,246	7,514

This chart shows the number of full-time equivalent males in each age group that resume work under the new CPP-D policy. A full time equivalent male represents a number of males working part-time who, together, make up a full-time worker.

$Full-time\ equivalent\ male = \sum_{g \neq f} \sum_{a} (D_{old} - D_{new})_{a,g}$ where D_{old} is the disability level (percentage) of a person under the current CPP-D policy, D_{new} is the disability level (percentage) of a person under the new CPP-D policy, *a* is the age of the person, and *g* is the gender of the person.

Exhibit 24: Expected: Yearly Change in Total Government Income Attributable to Male Back to Work Prevalence

Expected Back to Work Assumptions

Yearly Change in Total Government Income Attributable to Male Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Gain Side

Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper
2006	$81,745,501	$85,775,649	$89,805,797
2007	$81,685,533	$85,946,253	$90,206,972
2008	$85,994,279	$90,740,595	$95,486,910
2009	$88,668,844	$93,848,253	$99,027,662
2010	$92,788,496	$98,525,731	$104,262,967
2011	$95,883,200	$102,159,917	$108,436,634
2012	$100,560,648	$107,531,514	$114,502,381
2013	$102,752,372	$110,296,550	$117,840,728
2014	$101,326,585	$109,207,985	$117,089,386
2015	$104,928,251	$113,576,679	$122,225,106
2016	$112,495,185	$122,322,954	$132,150,723
2017	$112,399,860	$122,810,606	$133,221,352
2018	$116,610,447	$128,064,922	$139,519,396
2019	$118,060,365	$130,363,006	$142,665,647
2020	$117,670,320	$130,682,845	$143,695,370
2021	$113,685,836	$127,031,954	$140,378,073
2022	$118,564,791	$133,346,422	$148,128,053
2023	$115,443,855	$130,734,676	$146,025,496
2024	$119,608,857	$136,447,388	$153,285,920
2025	$122,087,033	$140,363,497	$158,639,960
2026	$121,921,326	$141,339,093	$160,756,861
2027	$121,988,897	$142,669,719	$163,350,541
2028	$118,010,363	$139,318,402	$160,626,441
2029	$114,741,870	$136,821,291	$158,900,712
2030	$111,977,617	$134,956,365	$157,935,114

Cost Side

Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved
2006	$32,747,562	$38,665,587	$43,969,880
2007	$32,154,520	$38,848,564	$44,988,927
2008	$31,845,251	$39,237,802	$46,090,341
2009	$31,514,447	$39,697,102	$47,180,954
2010	$32,728,152	$41,530,768	$49,961,194
2011	$31,833,655	$41,112,237	$49,660,282
2012	$33,348,029	$43,624,447	$53,156,811
2013	$33,822,488	$44,844,271	$55,058,036
2014	$33,543,653	$45,025,372	$55,753,024
2015	$32,482,090	$44,091,253	$54,961,233
2016	$31,886,873	$43,936,814	$55,089,435
2017	$31,121,892	$43,241,237	$54,453,815
2018	$29,652,588	$41,772,898	$52,472,709
2019	$28,387,590	$40,400,137	$50,780,986
2020	$26,780,469	$38,791,658	$48,537,479
2021	$25,843,886	$37,920,429	$47,467,467
2022	$24,550,976	$36,291,183	$45,313,016
2023	$24,114,965	$36,259,127	$44,958,409
2024	$23,414,476	$35,649,755	$44,226,244
2025	$22,218,942	$34,277,328	$42,394,639
2026	$20,812,136	$32,597,204	$40,258,985
2027	$19,700,069	$31,160,186	$38,425,694
2028	$17,892,908	$28,802,612	$35,389,303
2029	$17,191,926	$27,994,798	$34,356,911
2030	$16,588,421	$27,162,617	$33,305,156

Net Gain or Cost

Year	Lower 95%	Simulated Expected	95% Upper
2006	$105,617,300	$124,462,839	$141,531,111
2007	$103,223,365	$124,529,390	$144,213,429
2008	$105,130,562	$128,950,067	$151,158,649
2009	$106,386,686	$133,595,994	$158,643,775
2010	$110,550,076	$139,963,634	$168,222,602
2011	$111,366,196	$143,382,804	$173,059,435
2012	$115,294,748	$150,752,332	$183,829,897
2013	$117,096,057	$154,893,054	$190,125,564
2014	$114,818,160	$153,928,439	$190,666,773
2015	$116,021,576	$157,707,985	$196,951,372
2016	$119,761,532	$165,837,354	$208,763,225
2017	$118,697,801	$165,488,293	$209,082,143
2018	$119,734,189	$169,574,273	$214,110,381
2019	$118,725,485	$171,008,132	$216,884,728
2020	$115,676,691	$170,073,295	$215,271,009
2021	$110,709,130	$165,105,750	$209,356,963
2022	$112,825,719	$169,829,193	$215,201,668
2023	$108,158,713	$166,974,112	$211,224,812
2024	$109,534,840	$171,919,577	$218,167,850
2025	$109,743,759	$174,489,657	$221,135,647
2026	$107,764,191	$173,990,771	$220,609,419
2027	$105,579,355	$173,133,228	$220,050,227
2028	$99,565,727	$168,010,230	$214,107,366
2029	$96,343,939	$164,480,934	$209,885,940
2030	$92,917,446	$161,995,457	$208,016,001

The chart on the left shows the change in government taxation revenue that results from the number of males with disabilities who resume work due to the new CPP-D policy. There is an increase in taxation revenue each year (compared to the current policy). The middle column shows the expected value of the changed taxation revenue (the most likely path), the left column the 95% shows lower confidence bounds, and the right column shows the upper 95% confidence bounds.

The chart in the centre shows the change in the total CPP-D payments to males the government will have to make every year under the new CPP-D policy. There is a cost saving in ever year (compared to the current policy).

The chart on the right shows the net gain or cost to the government under the new policy. This is the difference between the change in taxation revenue and CPP-D payment costs. Under the new policy, the government will make a net gain in every year.

All amounts are in present valued dollars.

Female Total Expected Scenario Simulation results

The following charts show the results of the Expected Scenario Simulation for females only.

Exhibit 25: Expected: Estimated Change in Females with Disabilities Going Back to Work

Expected Back to Work Assumptions
Estimated Change in Females with a Disability Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Female 18-19 years	Female 20-24 years	Female 25-29 years	Female 30-34 years	Female 35-39 years	Female 40-44 years	Female 45-49 years	Female 50-54 years	Female 55-59 years	Female 60-64 years	Total
2006	16	28	130	471	1,331	2,787	4,355	3,930	4,769	5,301	23,118
2007	16	29	134	491	1,371	2,803	4,442	4,147	5,070	5,905	24,408
2008	17	30	139	483	1,389	2,895	4,458	4,291	5,462	6,400	25,564
2009	17	31	143	499	1,425	2,974	4,462	4,529	5,903	6,896	26,878
2010	17	32	146	511	1,438	3,002	4,432	4,844	6,319	7,151	27,892
2011	17	32	149	517	1,457	3,043	4,360	5,139	6,594	7,573	28,880
2012	17	33	152	504	1,441	3,033	4,419	5,342	6,793	8,121	29,856
2013	17	32	154	516	1,462	3,050	4,469	5,493	7,052	8,636	30,881
2014	17	33	157	527	1,483	3,074	4,504	5,615	7,407	9,250	32,067
2015	18	34	160	530	1,503	3,117	4,611	5,715	7,827	9,800	33,315
2016	18	34	162	523	1,499	3,140	4,612	5,666	8,165	10,157	33,977
2017	18	33	164	529	1,524	3,172	4,670	5,610	8,453	10,686	34,858
2018	18	33	165	545	1,542	3,212	4,691	5,549	8,707	11,354	35,818
2019	17	32	166	543	1,552	3,264	4,762	5,494	8,933	12,079	36,842
2020	18	32	167	549	1,554	3,270	4,790	5,601	9,022	12,599	37,602
2021	18	32	167	543	1,565	3,266	4,818	5,688	9,061	13,030	38,187
2022	18	33	168	554	1,587	3,319	4,869	5,722	9,103	13,456	38,829
2023	18	32	170	564	1,592	3,352	4,958	5,850	9,080	13,777	39,394
2024	19	33	173	581	1,634	3,402	5,027	5,950	9,322	14,158	40,301
2025	18	31	171	563	1,610	3,368	4,951	5,918	9,278	14,032	39,941
2026	19	31	171	558	1,628	3,408	5,037	5,951	9,434	14,053	40,290
2027	19	31	173	572	1,643	3,421	5,063	6,033	9,638	13,966	40,560
2028	18	30	174	573	1,663	3,452	5,071	6,078	9,817	14,229	41,104
2029	19	30	174	573	1,653	3,460	5,086	6,124	9,898	14,436	41,453
2030	19	29	174	574	1,646	3,487	5,132	6,172	10,099	14,656	41,987

This chart shows change in the total expected number of females with disabilities in each age group that resume work to some extent (part-time or full-time) under the new CPP-D policy (compared to the current CPP-D policy).

Exhibit 26: Expected: Estimated Change in Female Full-Time Equivalents Going Back to Work

Expected Back to Work Assumptions

Estimated Change in Females Full Time Equivalents Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Female 18-19 years	Female 20-24 years	Female 25-29 years	Female 30-34 years	Female 35-39 years	Female 40-44 years	Female 45-49 years	Female 50-54 years	Female 55-59 years	Female 60-64 years	Total Person
2006	3	6	26	94	266	558	871	786	954	1,060	4,625
2007	3	6	27	98	274	561	889	830	1,014	1,181	4,883
2008	3	6	28	97	278	579	892	858	1,093	1,280	5,114
2009	3	6	29	100	285	595	893	906	1,181	1,379	5,377
2010	3	6	29	102	288	601	887	969	1,264	1,431	5,580
2011	3	6	30	103	291	609	872	1,028	1,319	1,515	5,777
2012	3	7	30	101	288	607	884	1,069	1,359	1,625	5,973
2013	3	6	31	103	293	610	894	1,099	1,411	1,728	6,178
2014	3	7	31	105	297	615	901	1,123	1,482	1,850	6,415
2015	4	7	32	106	301	624	922	1,143	1,566	1,961	6,665
2016	4	7	32	105	300	628	923	1,134	1,633	2,032	6,797
2017	4	7	33	106	305	635	934	1,122	1,691	2,138	6,973
2018	4	7	33	109	309	643	938	1,110	1,742	2,271	7,165
2019	3	6	33	109	310	653	953	1,099	1,787	2,416	7,370
2020	4	6	33	110	311	654	958	1,120	1,805	2,520	7,522
2021	4	6	33	109	313	653	964	1,138	1,813	2,607	7,639
2022	4	7	34	111	317	664	974	1,145	1,821	2,692	7,768
2023	4	6	34	113	318	671	992	1,170	1,817	2,756	7,881
2024	4	7	35	116	327	681	1,006	1,190	1,865	2,832	8,062
2025	4	6	34	113	322	674	990	1,184	1,856	2,807	7,990
2026	4	6	34	112	326	682	1,008	1,190	1,887	2,811	8,060
2027	4	6	35	115	329	684	1,013	1,207	1,928	2,794	8,114
2028	4	6	35	115	333	691	1,014	1,216	1,964	2,846	8,223
2029	4	6	35	115	331	692	1,017	1,225	1,980	2,888	8,293
2030	4	6	35	115	329	698	1,027	1,235	2,020	2,932	8,399

This chart shows the number of full-time equivalent females in each age group that resume work under the new CPP-D policy. A full time equivalent female represents a number of females working part-time who, together, make up a full-time worker.

$Full-time\ equivalent\ female = \sum_{g \neq m} \sum_{a} (D_{old} - D_{new})_{a,g}$ where D_{old} is the disability level (percentage) of a person under the current CPP-D policy, D_{new} is the disability level (percentage) of a person under the new CPP-D policy, ***a*** is the age of the person, and ***g*** is the gender of the person.

Exhibit 27: Expected: Yearly Change in Total Government Income Attributable to Female Back to Work Prevalence

Expected Back to Work Assumptions

Yearly Change in Total Government Income Attributable to Female Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Gain Side				Cost Side				Net Gain or Cost			
Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper	Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved	Year	Lower 95%	Simulated Expected	95% Upper
2006	$53,148,916	$55,769,219	$58,389,523	2006	$33,375,450	$39,119,992	$44,728,284	2006	$80,653,513	$94,419,362	$107,889,365
2007	$55,392,538	$58,281,814	$61,171,090	2007	$33,008,974	$40,016,316	$46,784,272	2007	$81,401,357	$98,618,172	$115,291,175
2008	$58,880,892	$62,130,728	$65,380,564	2008	$32,571,129	$40,416,646	$47,931,588	2008	$83,165,472	$102,974,764	$122,007,042
2009	$60,478,599	$64,011,333	$67,544,066	2009	$32,944,573	$41,772,614	$50,186,814	2009	$83,336,834	$105,231,680	$126,167,169
2010	$61,689,466	$65,503,807	$69,318,148	2010	$32,070,130	$41,431,893	$50,322,396	2010	$82,945,358	$106,731,195	$129,396,098
2011	$64,089,489	$68,284,922	$72,480,355	2011	$31,434,717	$41,358,350	$50,766,231	2011	$83,533,161	$109,742,326	$134,675,310
2012	$64,730,045	$69,217,133	$73,704,221	2012	$30,712,546	$41,045,808	$50,828,070	2012	$82,804,426	$110,445,322	$136,706,390
2013	$64,491,827	$69,226,879	$73,961,931	2013	$30,724,390	$41,628,042	$51,931,921	2013	$81,598,941	$110,338,045	$137,599,965
2014	$63,894,564	$68,864,421	$73,834,279	2014	$30,171,646	$41,500,933	$52,212,246	2014	$80,165,223	$109,941,615	$138,202,753
2015	$67,364,387	$72,916,714	$78,469,042	2015	$29,686,547	$41,388,934	$52,447,415	2015	$81,946,787	$114,052,382	$144,514,108
2016	$72,491,339	$78,824,305	$85,157,270	2016	$28,849,327	$40,837,864	$52,184,275	2016	$84,224,913	$119,090,799	$152,222,754
2017	$72,815,877	$79,560,260	$86,304,642	2017	$27,775,631	$39,952,914	$51,353,589	2017	$82,729,403	$119,659,416	$154,408,636
2018	$76,701,950	$84,236,271	$91,770,592	2018	$26,891,409	$39,202,980	$50,511,029	2018	$84,394,993	$123,311,947	$159,304,464
2019	$78,753,598	$86,960,224	$95,166,850	2019	$26,193,073	$38,645,316	$49,824,854	2019	$84,516,166	$125,959,595	$163,519,247
2020	$80,149,026	$89,012,274	$97,875,522	2020	$25,315,697	$37,913,721	$48,883,323	2020	$83,762,934	$126,966,766	$165,077,184
2021	$78,507,024	$87,723,336	$96,939,647	2021	$24,311,824	$36,815,385	$47,350,164	2021	$81,275,146	$124,257,783	$161,113,117
2022	$82,982,214	$93,327,717	$103,673,221	2022	$23,485,162	$35,974,791	$46,155,460	2022	$82,952,232	$129,671,146	$168,632,636
2023	$80,199,043	$90,821,602	$101,444,160	2023	$22,378,201	$34,831,396	$44,725,521	2023	$79,505,629	$126,178,555	$164,293,149
2024	$83,479,901	$95,232,199	$106,984,498	2024	$21,905,353	$34,588,426	$44,408,183	2024	$80,399,153	$129,577,652	$168,926,643
2025	$85,145,927	$97,892,297	$110,638,666	2025	$20,798,756	$33,289,743	$42,675,926	2025	$79,090,758	$130,937,035	$171,478,265
2026	$87,144,184	$101,023,179	$114,902,174	2026	$19,693,651	$31,954,901	$40,863,812	2026	$79,348,462	$133,384,873	$174,593,625
2027	$90,461,591	$105,797,578	$121,133,564	2027	$19,204,510	$31,566,516	$40,265,151	2027	$80,670,152	$137,316,519	$179,554,032
2028	$92,024,538	$108,640,557	$125,256,576	2028	$18,556,552	$30,877,676	$39,233,335	2028	$80,402,841	$139,610,886	$182,677,612
2029	$91,802,668	$109,467,969	$127,133,271	2029	$17,913,865	$30,322,036	$38,508,122	2029	$78,511,619	$139,487,995	$183,087,377
2030	$91,129,733	$109,830,320	$128,530,907	2030	$17,433,649	$29,859,701	$37,895,799	2030	$76,738,271	$139,752,013	$184,383,497

The chart on the left shows the change in government taxation revenue that results from the number of females with disabilities who resume work due to the new CPP-D policy. There is an increase in taxation revenue each year (compared to the current policy). The middle column shows the expected value of the changed taxation revenue (the most likely path), the left column the 95% shows lower confidence bounds, and the right column shows the upper 95% confidence bounds.

The chart in the centre shows the change in the total CPP-D payments to females the government will have to make every year under the new CPP-D policy. There is a cost saving in ever year (compared to the current policy).

The chart on the right shows the net gain or cost to the government under the new policy. This is the difference between the change in taxation revenue and CPP-D payment costs. Under the new policy, the government will make a net gain in every year.

All amounts are in present valued dollars.

Appendix IV. Total Lower Bound Scenario Simulation Results

The Lower Bound Scenario Simulation was conducted based on the lower assumptions of the percentage of CPP-D recipients who will go back to work when the CPP-D policy is changed. The assumptions are as follows:

- For males 18-34 years old: 38.1% will take advantage of the new policy
- 35-50 years old: 33.7%
- 50-64 years old: 23.2%
- For females 18-34 years old: 39.4% will take advantage of the new policy
- 35-50 years old: 35.3%
- 50-64 years old: 24.7%

Exhibit 28: Lower: Estimated Change in Disabled Totals Going Back to Work

Lower Back to Work Assumptions
Estimated Change in Disabled Totals Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Total 18-19 years	Total 20-24 years	Total 25-29 years	Total 30-34 years	Total 35-39 years	Total 40-44 years	Total 45-49 years	Total 50-54 years	Total 55-59 years	Total 60-64 years	Total	Males	Females
2006	19	37	241	787	1,917	3,960	6,354	6,009	8,202	9,983	37,508	18,745	18,763
2007	19	37	243	802	1,949	3,933	6,438	6,271	8,770	10,427	38,889	19,085	19,804
2008	20	39	251	805	1,976	4,035	6,537	6,578	9,321	11,022	40,582	19,846	20,736
2009	20	41	258	834	2,031	4,128	6,601	6,997	10,254	11,717	42,880	21,085	21,796
2010	20	42	265	853	2,054	4,157	6,604	7,288	11,005	12,925	45,214	22,602	22,613
2011	20	42	270	867	2,075	4,176	6,520	7,814	11,370	13,671	46,826	23,419	23,407
2012	21	43	275	864	2,068	4,166	6,557	8,051	11,663	15,739	49,448	25,255	24,193
2013	21	43	279	880	2,092	4,173	6,571	8,187	11,991	17,752	51,988	26,968	25,020
2014	21	44	283	893	2,121	4,195	6,600	8,324	12,419	19,043	53,943	27,968	25,975
2015	21	45	289	902	2,148	4,241	6,655	8,380	12,880	20,125	55,687	28,704	26,983
2016	22	46	292	902	2,161	4,265	6,622	8,262	13,236	20,992	56,800	29,284	27,516
2017	21	45	295	912	2,190	4,300	6,666	8,207	13,540	22,081	58,258	30,031	28,226
2018	22	46	297	929	2,215	4,341	6,655	8,082	13,828	23,064	59,477	30,477	29,001
2019	21	45	298	930	2,230	4,389	6,737	8,047	14,042	24,046	60,785	30,958	29,827
2020	22	46	300	939	2,239	4,399	6,770	8,043	14,147	24,673	61,577	31,138	30,439
2021	22	46	301	935	2,258	4,401	6,792	8,039	14,194	25,345	62,334	31,423	30,910
2022	22	46	304	950	2,284	4,457	6,838	8,049	14,252	25,897	63,100	31,671	31,429
2023	23	46	310	974	2,320	4,541	6,966	8,203	14,254	26,800	64,436	32,550	31,886
2024	23	47	317	1,004	2,393	4,638	7,089	8,383	14,542	27,565	66,001	33,382	32,619
2025	23	46	316	991	2,379	4,617	7,048	8,371	14,291	27,584	65,666	33,340	32,327
2026	23	47	320	1,000	2,423	4,694	7,214	8,494	14,572	26,856	65,643	33,034	32,609
2027	24	46	325	1,012	2,443	4,714	7,251	8,515	14,708	25,979	65,018	32,189	32,829
2028	23	45	325	1,016	2,462	4,749	7,259	8,608	14,938	25,053	64,479	31,212	33,267
2029	23	45	325	1,016	2,459	4,763	7,266	8,608	14,786	25,207	64,499	30,951	33,548
2030	24	45	325	1,017	2,457	4,788	7,314	8,691	15,148	25,140	64,948	30,969	33,979

This chart shows change in the total expected number of persons with disabilities in each age group that resume work to some extent (part-time or full-time)under the new CPP-D policy (compared to the current CPP-D policy).

Exhibit 29: Lower: Estimated Change in Total Full-Time Equivalents Going Back to Work

Lower Back to Work Assumptions
Estimated Change in Totals Full Time Equivalents Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Total 18-19 years	Total 20-24 years	Total 25-29 years	Total 30-34 years	Total 35-39 years	Total 40-44 years	Total 45-49 years	Total 50-54 years	Total 55-59 years	Total 60-64 years	Total Person	Males	Females
2006	4	7	48	157	384	792	1,271	1,202	1,641	1,997	7,503	3,750	3,753
2007	4	7	49	160	390	787	1,288	1,254	1,754	2,086	7,780	3,818	3,962
2008	4	8	50	161	395	807	1,308	1,316	1,865	2,205	8,118	3,970	4,148
2009	4	8	52	167	406	826	1,321	1,400	2,051	2,344	8,578	4,218	4,360
2010	4	8	53	171	411	832	1,321	1,458	2,202	2,586	9,045	4,521	4,524
2011	4	8	54	174	415	835	1,304	1,563	2,275	2,735	9,368	4,685	4,683
2012	4	9	55	173	414	833	1,312	1,611	2,333	3,149	9,892	5,052	4,840
2013	4	9	56	176	418	835	1,315	1,638	2,399	3,551	10,400	5,395	5,005
2014	4	9	57	179	424	839	1,320	1,665	2,484	3,810	10,791	5,595	5,196
2015	4	9	58	180	430	848	1,331	1,676	2,577	4,026	11,140	5,742	5,398
2016	4	9	58	180	432	853	1,325	1,653	2,648	4,199	11,363	5,858	5,505
2017	4	9	59	182	438	860	1,334	1,642	2,709	4,417	11,654	6,008	5,647
2018	4	9	59	186	443	868	1,331	1,617	2,766	4,614	11,898	6,097	5,802
2019	4	9	60	186	446	878	1,348	1,610	2,809	4,810	12,160	6,193	5,967
2020	4	9	60	188	448	880	1,354	1,609	2,830	4,936	12,318	6,229	6,089
2021	4	9	60	187	452	880	1,359	1,608	2,840	5,070	12,470	6,286	6,184
2022	4	9	61	190	457	892	1,368	1,610	2,851	5,181	12,623	6,336	6,287
2023	5	9	62	195	464	908	1,394	1,641	2,851	5,361	12,890	6,512	6,379
2024	5	9	63	201	479	928	1,418	1,677	2,909	5,514	13,203	6,678	6,525
2025	5	9	63	198	476	924	1,410	1,675	2,859	5,518	13,137	6,670	6,467
2026	5	9	64	200	485	939	1,443	1,699	2,915	5,373	13,132	6,608	6,523
2027	5	9	65	203	489	943	1,451	1,704	2,942	5,197	13,007	6,439	6,567
2028	5	9	65	203	492	950	1,452	1,722	2,988	5,012	12,899	6,244	6,655
2029	5	9	65	203	492	953	1,454	1,722	2,958	5,043	12,903	6,192	6,711
2030	5	9	65	204	491	958	1,463	1,739	3,030	5,029	12,993	6,195	6,797

This chart shows the number of full-time equivalent persons in each age group that resume work under the new CPP-D policy. A full time equivalent person represents a number of persons working part-time who, together, make up a full-time worker.

Exhibit 30: Lower: Yearly Change in Total Government Income Attributable to Total Back to Work Prevalence

Lower Back to Work Assumptions

Yearly Change in Total Government Income Attributable to Total Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Gain Side

Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper
2006	$110,559,601	$116,010,317	$121,461,034
2007	$112,150,765	$118,000,551	$123,850,338
2008	$118,348,774	$124,880,843	$131,412,913
2009	$121,896,336	$129,016,661	$136,136,985
2010	$126,251,281	$134,057,564	$141,863,848
2011	$130,696,959	$139,252,658	$147,808,357
2012	$135,281,579	$144,659,300	$154,037,022
2013	$136,943,245	$146,997,749	$157,052,254
2014	$135,083,492	$145,590,578	$156,097,663
2015	$140,932,816	$152,548,822	$164,164,829
2016	$151,618,280	$164,863,909	$178,109,538
2017	$151,701,189	$165,752,119	$179,803,050
2018	$158,232,930	$173,775,921	$189,318,912
2019	$161,051,143	$177,833,697	$194,616,251
2020	$161,770,611	$179,659,949	$197,549,287
2021	$157,169,513	$175,620,386	$194,071,259
2022	$165,035,110	$185,610,258	$206,185,406
2023	$160,234,378	$181,457,813	$202,681,247
2024	$166,070,225	$189,449,588	$212,828,950
2025	$169,440,692	$194,806,012	$220,171,332
2026	$170,915,205	$198,135,969	$225,356,733
2027	$173,663,178	$203,104,360	$232,545,542
2028	$171,796,364	$202,816,043	$233,835,723
2029	$168,868,041	$201,362,793	$233,857,544
2030	$166,106,918	$200,193,454	$234,279,990

Cost Side

Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved
2006	$53,595,374	$63,059,783	$71,911,172
2007	$53,353,407	$64,577,806	$75,154,209
2008	$52,609,486	$65,060,181	$76,800,040
2009	$52,627,584	$66,516,116	$79,490,966
2010	$53,006,691	$67,864,835	$82,034,734
2011	$52,106,033	$67,913,773	$82,692,942
2012	$52,497,082	$69,388,781	$85,219,965
2013	$52,435,642	$70,245,072	$86,911,126
2014	$51,976,097	$70,573,714	$88,052,321
2015	$51,026,780	$70,154,325	$88,147,023
2016	$49,508,443	$69,091,916	$87,419,396
2017	$47,806,252	$67,520,245	$85,869,486
2018	$46,436,960	$66,494,077	$84,562,085
2019	$45,043,880	$65,219,045	$82,999,505
2020	$43,109,993	$63,462,169	$80,594,701
2021	$40,916,873	$60,972,407	$77,368,165
2022	$39,420,172	$59,295,006	$75,053,372
2023	$37,999,306	$58,099,643	$73,304,396
2024	$37,074,513	$57,452,101	$72,505,914
2025	$34,995,826	$54,953,550	$69,189,225
2026	$33,366,760	$53,164,034	$66,817,050
2027	$31,710,541	$51,116,414	$64,133,769
2028	$29,861,568	$48,886,674	$61,140,259
2029	$28,524,498	$47,378,740	$59,216,269
2030	$27,765,752	$46,529,885	$58,118,075

Net Gain or Cost

Year	Lower 95%	Simulated Expected	95% Upper
2006	$152,832,241	$179,821,561	$205,094,017
2007	$150,994,175	$182,030,518	$211,316,500
2008	$154,128,828	$189,984,481	$223,872,563
2009	$155,255,231	$195,317,737	$232,833,025
2010	$158,495,532	$202,300,238	$244,235,586
2011	$159,543,532	$207,376,771	$252,235,749
2012	$162,229,453	$213,734,879	$262,168,697
2013	$162,677,663	$217,500,827	$268,991,339
2014	$159,537,783	$216,772,446	$270,779,857
2015	$162,077,847	$222,532,241	$279,640,015
2016	$167,172,342	$233,362,470	$295,556,698
2017	$164,973,106	$233,374,508	$297,381,707
2018	$166,742,603	$239,803,386	$306,097,875
2019	$166,425,550	$242,776,765	$310,762,752
2020	$163,359,086	$242,725,037	$310,488,318
2021	$156,932,789	$236,606,188	$302,986,296
2022	$159,973,693	$244,777,973	$313,760,573
2023	$153,249,785	$239,357,403	$306,603,987
2024	$155,462,894	$246,469,332	$316,369,568
2025	$154,383,644	$249,841,174	$321,248,011
2026	$153,001,781	$250,674,095	$322,024,361
2027	$151,531,450	$253,843,096	$327,360,997
2028	$147,436,529	$251,193,274	$323,735,665
2029	$142,651,676	$248,795,863	$322,067,022
2030	$138,622,212	$246,589,791	$320,767,523

The chart on the left shows the change in government taxation revenue that results from the number of persons with disabilities who resume work due to the new CPP-D policy. In all cases, there is an increase in taxation revenue in every year of the forecast period.

The chart in the centre shows the change in the total CPP-D payments the government will have to make every year under the new CPP-D policy. There is a cost saving in every year of the forecast period.

The chart on the right shows the net gain or cost to the government under the new policy. This is the difference between the change in taxation revenue and CPP-D payment costs. Under the new policy, the government will make a net gain in every year. The expected gain varies from approximately $179 million in 2006 to $254 million in 2027.

Notice that, in every year of the forecast period, the net gain in this Lower Bound Scenario is lower than in the Expected Scenario Simulation. Since fewer persons with disabilities go back to work in the Lower Bound Scenario, there will be a smaller positive effect on the economy and thus government taxation revenue will not increase as much as in the Expected Scenario. Also, there is a smaller CPP-D cost saving in the Lower Bound Scenario than in the Expected Scenario since more people continue to not work at all and will get full disability benefits.

Male Total Lower Scenario Simulation results

The following charts show the results of the Lower Bound Scenario Simulation for males only.

Exhibit 31: Lower: Estimated Change in Males with disabilities Going Back to Work

Lower Back to Work Assumptions
Estimated Change in Males with a Disability Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Male 18-19 years	Male 20-24 years	Male 25-29 years	Male 30-34 years	Male 35-39 years	Male 40-44 years	Male 45-49 years	Male 50-54 years	Male 55-59 years	Male 60-64 years	Total
2006	5	13	131	390	825	1,672	2,779	2,847	4,365	5,718	18,745
2007	5	13	130	388	823	1,632	2,791	2,934	4,691	5,676	19,085
2008	6	14	134	398	836	1,658	2,877	3,126	4,927	5,872	19,846
2009	6	14	138	414	861	1,686	2,938	3,353	5,505	6,169	21,085
2010	6	15	142	423	873	1,693	2,966	3,391	5,921	7,172	22,602
2011	6	15	145	433	879	1,678	2,941	3,680	6,065	7,579	23,419
2012	6	15	148	440	885	1,676	2,929	3,753	6,198	9,205	25,255
2013	6	15	149	446	891	1,669	2,902	3,768	6,317	10,804	26,968
2014	6	16	151	449	903	1,672	2,903	3,806	6,460	11,601	27,968
2015	6	17	154	456	914	1,682	2,870	3,782	6,583	12,240	28,704
2016	7	17	156	461	930	1,688	2,836	3,703	6,667	12,820	29,284
2017	7	18	157	466	939	1,696	2,833	3,693	6,740	13,484	30,031
2018	7	18	158	470	949	1,704	2,804	3,617	6,822	13,928	30,477
2019	7	18	159	473	956	1,709	2,828	3,627	6,855	14,327	30,958
2020	7	18	159	477	964	1,714	2,838	3,537	6,888	14,536	31,138
2021	7	18	160	478	974	1,720	2,837	3,462	6,905	14,862	31,423
2022	7	19	162	484	982	1,732	2,841	3,446	6,928	15,071	31,671
2023	7	19	167	499	1,013	1,789	2,896	3,496	6,948	15,716	32,550
2024	7	20	171	514	1,051	1,845	2,962	3,596	7,041	16,174	33,382
2025	7	20	172	516	1,057	1,852	2,984	3,610	6,826	16,294	33,340
2026	8	20	176	529	1,087	1,897	3,079	3,707	6,982	15,549	33,034
2027	8	20	179	531	1,094	1,905	3,095	3,661	6,954	14,743	32,189
2028	8	20	179	534	1,097	1,915	3,097	3,718	7,040	13,605	31,212
2029	8	21	179	533	1,102	1,922	3,091	3,682	6,822	13,592	30,951
2030	8	20	179	535	1,106	1,925	3,101	3,725	7,023	13,349	30,969

This chart shows change in the total expected number of males with disabilities in each age group that resume work to some extent (part-time or full-time) under the new CPP-D policy (compared to the current CPP-D policy).

Exhibit 32: Lower: Estimated Change in Male Full-Time Equivalents Going Back to Work

Lower Back to Work Assumptions
Estimated Change in Males Full Time Equivalents Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Male 18-19 years	Male 20-24 years	Male 25-29 years	Male 30-34 years	Male 35-39 years	Male 40-44 years	Male 45-49 years	Male 50-54 years	Male 55-59 years	Male 60-64 years	Total Person
2006	1	3	26	78	165	334	556	569	873	1,144	3,750
2007	1	3	26	78	165	326	558	587	939	1,136	3,818
2008	1	3	27	80	167	332	576	625	986	1,175	3,970
2009	1	3	28	83	172	337	588	671	1,101	1,234	4,218
2010	1	3	28	85	175	339	593	678	1,184	1,435	4,521
2011	1	3	29	87	176	336	588	736	1,213	1,516	4,685
2012	1	3	30	88	177	335	586	751	1,240	1,841	5,052
2013	1	3	30	89	178	334	581	754	1,264	2,161	5,395
2014	1	3	30	90	181	335	581	761	1,292	2,321	5,595
2015	1	3	31	91	183	336	574	757	1,317	2,449	5,742
2016	1	3	31	92	186	338	567	741	1,334	2,565	5,858
2017	1	4	31	93	188	339	567	739	1,348	2,697	6,008
2018	1	4	32	94	190	341	561	724	1,365	2,786	6,097
2019	1	4	32	95	191	342	566	726	1,371	2,866	6,193
2020	1	4	32	95	193	343	568	707	1,378	2,908	6,229
2021	1	4	32	96	195	344	568	693	1,381	2,973	6,286
2022	1	4	32	97	196	347	568	689	1,386	3,015	6,336
2023	1	4	33	100	203	358	579	699	1,390	3,144	6,512
2024	1	4	34	103	210	369	592	719	1,409	3,236	6,678
2025	1	4	34	103	211	371	597	722	1,366	3,260	6,670
2026	2	4	35	106	217	379	616	742	1,397	3,111	6,608
2027	2	4	36	106	219	381	619	732	1,391	2,949	6,439
2028	2	4	36	107	219	383	619	744	1,408	2,722	6,244
2029	2	4	36	107	220	385	618	737	1,365	2,719	6,192
2030	2	4	36	107	221	385	620	745	1,405	2,670	6,195

This chart shows the number of full-time equivalent males in each age group that resume work under the new CPP-D policy. A full time equivalent male represents a number of males working part-time who, together, make up a full-time worker.

Exhibit 33: Lower: Yearly Change in Total Government Income Attributable to Male Back to Work Prevalence

Lower Back to Work Assumptions

Yearly Change in Total Government Income Attributable to Male Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Gain Side				Cost Side				Net Gain or Cost			
Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper	Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved	Year	Lower 95%	Simulated Expected	95% Upper
2006	$67,430,790	$70,755,206	$74,079,622	2006	$26,931,533	$31,803,086	$36,170,436	2006	$87,215,153	$102,867,858	$117,047,108
2007	$67,247,100	$70,754,710	$74,262,320	2007	$26,298,205	$31,776,518	$36,802,983	2007	$85,147,261	$102,523,098	$118,579,749
2008	$70,657,469	$74,557,294	$78,457,119	2008	$26,091,791	$32,151,611	$37,769,626	2008	$86,809,055	$106,670,949	$125,192,078
2009	$72,989,796	$77,253,346	$81,516,895	2009	$26,360,858	$33,207,714	$39,470,702	2009	$87,816,542	$110,132,221	$130,677,652
2010	$76,405,745	$81,130,013	$85,854,281	2010	$26,977,194	$34,234,622	$41,186,146	2010	$91,263,314	$115,580,235	$138,945,566
2011	$78,925,118	$84,091,723	$89,258,328	2011	$26,655,528	$34,426,105	$41,585,464	2011	$91,773,865	$118,330,485	$142,947,999
2012	$82,974,924	$88,726,747	$94,478,571	2012	$27,348,599	$35,777,157	$43,596,191	2012	$95,076,773	$124,344,502	$151,650,040
2013	$84,748,363	$90,970,669	$97,192,975	2013	$27,671,708	$36,689,517	$45,046,992	2013	$96,527,502	$128,052,393	$157,440,828
2014	$83,370,728	$89,855,483	$96,340,238	2014	$27,727,641	$37,218,445	$46,086,604	2014	$94,603,390	$127,160,721	$157,745,635
2015	$86,446,763	$93,571,904	$100,697,045	2015	$26,878,971	$36,485,457	$45,480,475	2015	$95,709,558	$129,907,142	$162,101,244
2016	$92,914,043	$101,031,171	$109,148,299	2016	$26,322,045	$36,268,757	$45,475,154	2016	$98,944,944	$136,877,847	$172,218,834
2017	$92,812,704	$101,409,240	$110,005,777	2017	$25,425,826	$35,326,593	$44,487,252	2017	$97,877,570	$136,799,232	$173,064,234
2018	$96,229,853	$105,682,371	$115,134,890	2018	$24,524,463	$34,548,045	$43,397,984	2018	$98,527,449	$139,685,255	$176,467,244
2019	$97,253,615	$107,388,061	$117,522,506	2019	$23,732,368	$33,774,399	$42,453,800	2019	$97,970,614	$140,533,289	$177,886,254
2020	$96,921,686	$107,639,732	$118,357,778	2020	$22,408,221	$32,457,351	$40,613,463	2020	$95,372,474	$139,712,629	$176,563,597
2021	$93,703,600	$104,703,909	$115,704,218	2021	$21,044,791	$30,877,863	$38,653,670	2021	$91,086,452	$135,828,140	$172,234,556
2022	$97,739,422	$109,924,727	$122,110,032	2022	$20,328,924	$30,049,109	$37,521,705	2022	$92,896,438	$139,771,493	$177,095,073
2023	$95,220,687	$107,832,899	$120,445,112	2023	$19,771,881	$29,727,635	$36,862,855	2023	$88,989,722	$137,504,473	$174,020,341
2024	$98,518,352	$112,387,763	$126,257,174	2024	$19,288,772	$29,366,998	$36,435,360	2024	$90,822,669	$141,366,029	$178,852,421
2025	$100,570,466	$115,625,894	$130,681,321	2025	$18,325,369	$28,269,404	$34,967,925	2025	$90,323,113	$143,996,899	$182,686,434
2026	$100,437,771	$116,433,966	$132,430,161	2026	$17,325,238	$27,134,156	$33,516,229	2026	$88,586,514	$143,249,009	$181,750,591
2027	$100,404,393	$117,425,987	$134,447,580	2027	$16,240,308	$25,686,305	$31,680,018	2027	$86,764,330	$142,564,032	$181,342,068
2028	$97,134,572	$114,673,263	$132,211,953	2028	$14,783,865	$23,796,225	$29,243,018	2028	$82,252,174	$138,293,686	$176,065,111
2029	$94,606,960	$112,811,883	$131,016,806	2029	$14,041,224	$22,862,642	$28,063,650	2029	$79,501,821	$135,472,585	$172,798,904
2030	$92,409,345	$111,372,520	$130,335,694	2030	$13,619,270	$22,299,254	$27,347,497	2030	$76,635,558	$133,589,806	$171,563,252

The chart on the left shows the change in government taxation revenue that results from the number of males with disabilities who resume work due to the new CPP-D policy. The middle column shows the expected value of the changed taxation revenue (the most likely path), the left column the 95% shows lower confidence bounds, and the right column shows the upper 95% confidence bounds. There is an increase in taxation revenue each year of the forecast period (compared to the current policy).

The chart in the centre shows the change in the total CPP-D payments to males the government will have to make every year under the new CPP-D policy. There is a cost saving in ever year of the forecast period (compared to the current policy).

The chart on the right shows the net gain or cost to the government under the new policy. This is the difference between the change in taxation revenue and CPP-D payment costs. Under the new policy, the government will make a net gain in every year.

All amounts are in present valued dollars.

Female Total Lower Scenario Simulation results

The following charts show the results of the Lower Bound Scenario Simulation for females only.

Exhibit 34: Lower: Estimated Change in Females with Disabilities Going Back to Work

Lower Back to Work Assumptions
Estimated Change in Females with a Disability Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Female 18-19 years	Female 20-24 years	Female 25-29 years	Female 30-34 years	Female 35-39 years	Female 40-44 years	Female 45-49 years	Female 50-54 years	Female 55-59 years	Female 60-64 years	Total
2006	14	23	109	396	1,093	2,288	3,575	3,162	3,837	4,265	18,763
2007	14	24	113	414	1,125	2,301	3,646	3,337	4,079	4,751	19,804
2008	14	25	117	407	1,140	2,377	3,660	3,452	4,394	5,149	20,736
2009	14	26	120	420	1,170	2,442	3,663	3,644	4,749	5,548	21,796
2010	14	27	123	430	1,180	2,464	3,638	3,897	5,084	5,754	22,613
2011	14	27	125	435	1,196	2,498	3,579	4,134	5,305	6,093	23,407
2012	14	27	128	424	1,183	2,490	3,628	4,298	5,465	6,534	24,193
2013	15	27	130	434	1,200	2,504	3,669	4,419	5,674	6,948	25,020
2014	15	28	132	444	1,217	2,523	3,698	4,518	5,959	7,442	25,975
2015	15	28	135	446	1,234	2,559	3,785	4,598	6,297	7,885	26,983
2016	15	29	137	441	1,231	2,577	3,786	4,559	6,569	8,172	27,516
2017	15	28	138	445	1,251	2,604	3,834	4,514	6,801	8,597	28,226
2018	15	28	139	459	1,266	2,637	3,851	4,465	7,006	9,135	29,001
2019	15	27	140	457	1,274	2,680	3,909	4,420	7,187	9,718	29,827
2020	15	27	140	462	1,275	2,685	3,932	4,506	7,259	10,137	30,439
2021	15	27	141	457	1,284	2,681	3,955	4,576	7,290	10,483	30,910
2022	15	27	142	466	1,303	2,724	3,997	4,603	7,324	10,826	31,429
2023	15	27	143	475	1,307	2,752	4,070	4,707	7,306	11,084	31,886
2024	16	27	146	489	1,342	2,793	4,127	4,787	7,500	11,391	32,619
2025	15	26	144	474	1,322	2,765	4,064	4,761	7,465	11,289	32,327
2026	16	26	144	470	1,336	2,797	4,135	4,788	7,591	11,306	32,609
2027	16	26	146	482	1,349	2,809	4,157	4,854	7,754	11,236	32,829
2028	15	25	147	482	1,365	2,834	4,163	4,890	7,898	11,448	33,267
2029	16	25	146	482	1,357	2,841	4,175	4,927	7,964	11,615	33,548
2030	16	25	146	483	1,351	2,863	4,213	4,966	8,125	11,791	33,979

This chart shows change in the total expected number of females with disabilities in each age group that resume work to some extent (part-time or full-time) under the new CPP-D policy (compared to the current CPP-D policy).

Exhibit 35: Estimated Change in Total Female Full-Time Equivalents Going Back to Work

Lower Back to Work Assumptions
Estimated Change in Females Full Time Equivalents Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Female 18-19 years	Female 20-24 years	Female 25-29 years	Female 30-34 years	Female 35-39 years	Female 40-44 years	Female 45-49 years	Female 50-54 years	Female 55-59 years	Female 60-64 years	Total Person
2006	3	5	22	79	219	458	715	633	768	853	3,753
2007	3	5	23	83	225	460	729	668	816	950	3,962
2008	3	5	23	81	228	475	732	691	879	1,030	4,148
2009	3	5	24	84	234	488	733	729	950	1,110	4,360
2010	3	5	25	86	236	493	728	780	1,017	1,151	4,524
2011	3	5	25	87	239	500	716	827	1,061	1,219	4,683
2012	3	5	26	85	237	498	726	860	1,093	1,307	4,840
2013	3	5	26	87	240	501	734	884	1,135	1,390	5,005
2014	3	6	26	89	243	505	740	904	1,192	1,489	5,196
2015	3	6	27	89	247	512	757	920	1,260	1,577	5,398
2016	3	6	27	88	246	516	757	912	1,314	1,635	5,505
2017	3	6	28	89	250	521	767	903	1,360	1,720	5,647
2018	3	6	28	92	253	528	770	893	1,401	1,828	5,802
2019	3	5	28	91	255	536	782	884	1,438	1,944	5,967
2020	3	5	28	93	255	537	787	901	1,452	2,028	6,089
2021	3	5	28	91	257	536	791	916	1,458	2,097	6,184
2022	3	5	28	93	261	545	800	921	1,465	2,166	6,287
2023	3	5	29	95	261	551	814	942	1,462	2,217	6,379
2024	3	5	29	98	268	559	826	958	1,500	2,279	6,525
2025	3	5	29	95	264	553	813	952	1,493	2,258	6,467
2026	3	5	29	94	267	560	827	958	1,518	2,262	6,523
2027	3	5	29	96	270	562	832	971	1,551	2,248	6,567
2028	3	5	29	96	273	567	833	978	1,580	2,290	6,655
2029	3	5	29	97	271	568	835	986	1,593	2,324	6,711
2030	3	5	29	97	270	573	843	993	1,625	2,359	6,797

This chart shows the number of full-time equivalent females in each age group that resume work under the new CPP-D policy. A full time equivalent female represents a number of females working part-time who, together, make up a full-time worker.

Exhibit 36: Lower: Yearly Change in Total Government Income Attributable to Female Back to Work Prevalence

Lower Back to Work Assumptions

Yearly Change in Total Government Income Attributable to Female Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Gain Side

Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper
2006	$43,128,811	$45,255,111	$47,381,412
2007	$44,903,665	$47,245,841	$49,588,018
2008	$47,691,305	$50,323,550	$52,955,794
2009	$48,906,540	$51,763,315	$54,620,090
2010	$49,845,536	$52,927,551	$56,009,566
2011	$51,771,841	$55,160,935	$58,550,029
2012	$52,306,655	$55,932,553	$59,558,452
2013	$52,194,882	$56,027,080	$59,859,279
2014	$51,712,764	$55,735,095	$59,757,425
2015	$54,486,052	$58,976,918	$63,467,784
2016	$58,704,237	$63,832,738	$68,961,239
2017	$58,888,485	$64,342,879	$69,797,273
2018	$62,003,078	$68,093,550	$74,184,022
2019	$63,797,528	$70,445,637	$77,093,745
2020	$64,848,925	$72,020,217	$79,191,509
2021	$63,465,913	$70,916,477	$78,367,041
2022	$67,295,687	$75,685,531	$84,075,374
2023	$65,013,691	$73,624,913	$82,236,135
2024	$67,551,873	$77,061,825	$86,571,776
2025	$68,870,226	$79,180,119	$89,490,011
2026	$70,477,433	$81,702,003	$92,926,573
2027	$73,258,785	$85,678,373	$98,097,962
2028	$74,661,792	$88,142,781	$101,623,769
2029	$74,261,081	$88,550,909	$102,840,738
2030	$73,697,573	$88,820,935	$103,944,296

Cost Side

Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved
2006	$26,663,841	$31,256,698	$35,740,735
2007	$27,055,202	$32,801,288	$38,351,226
2008	$26,517,694	$32,908,570	$39,030,413
2009	$26,266,727	$33,308,403	$40,020,264
2010	$26,029,497	$33,630,214	$40,848,588
2011	$25,450,505	$33,487,667	$41,107,477
2012	$25,148,483	$33,611,624	$41,623,774
2013	$24,763,934	$33,555,555	$41,864,134
2014	$24,248,456	$33,355,269	$41,965,717
2015	$24,147,810	$33,668,868	$42,666,549
2016	$23,186,399	$32,823,159	$41,944,242
2017	$22,380,426	$32,193,652	$41,382,234
2018	$21,912,497	$31,946,032	$41,164,101
2019	$21,311,512	$31,444,646	$40,545,704
2020	$20,701,773	$31,004,818	$39,981,239
2021	$19,872,082	$30,094,544	$38,714,495
2022	$19,091,248	$29,245,896	$37,531,667
2023	$18,227,425	$28,372,008	$36,441,540
2024	$17,785,741	$28,085,103	$36,070,554
2025	$16,670,457	$26,684,146	$34,221,300
2026	$16,041,522	$26,029,878	$33,300,822
2027	$15,470,233	$25,430,110	$32,453,752
2028	$15,077,703	$25,090,449	$31,897,241
2029	$14,483,274	$24,516,098	$31,152,619
2030	$14,146,483	$24,230,632	$30,770,578

Net Gain or Cost

Year	Lower 95%	Simulated Expected	95% Upper
2006	$65,617,088	$76,953,704	$88,046,909
2007	$65,846,914	$79,507,419	$92,736,751
2008	$67,319,773	$83,313,533	$98,680,486
2009	$67,438,688	$85,185,515	$102,155,373
2010	$67,232,218	$86,720,003	$105,290,020
2011	$67,769,667	$89,046,286	$109,287,750
2012	$67,152,680	$89,390,377	$110,518,657
2013	$66,150,161	$89,448,434	$111,550,511
2014	$64,934,393	$89,611,724	$113,034,222
2015	$66,368,290	$92,625,099	$117,538,771
2016	$68,227,398	$96,484,623	$123,337,864
2017	$67,095,535	$96,575,276	$124,317,473
2018	$68,215,154	$100,118,131	$129,630,631
2019	$68,454,936	$102,243,476	$132,876,498
2020	$67,986,612	$103,012,408	$133,924,721
2021	$65,846,337	$100,778,048	$130,751,740
2022	$67,077,256	$105,006,481	$136,665,499
2023	$64,260,062	$101,852,930	$132,583,646
2024	$64,640,225	$105,103,303	$137,517,147
2025	$64,060,531	$105,844,275	$138,561,577
2026	$64,415,267	$107,425,086	$140,273,771
2027	$64,767,120	$111,279,064	$146,018,930
2028	$65,184,354	$112,899,588	$147,670,553
2029	$63,149,855	$113,323,278	$149,268,118
2030	$61,986,654	$112,999,985	$149,204,271

The chart on the left shows the change in government taxation revenue that results from the number of females with disabilities who resume work due to the new CPP-D policy. The middle column shows the expected value of the changed taxation revenue (the most likely path), the left column the 95% shows lower confidence bounds, and the right column shows the upper 95% confidence bounds. There is an increase in taxation revenue each year of the forecast period (compared to the current policy).

The chart in the centre shows the change in the total CPP-D payments to females the government will have to make every year under the new CPP-D policy. There is a cost saving in ever year of the forecast period (compared to the current policy).

The chart on the right shows the net gain or cost to the government under the new policy. This is the difference between the change in taxation revenue and CPP-D payment costs. Under the new policy, the government will make a net gain in every year.

All amounts are in present valued dollars.

Appendix V. Total Upper Bound Scenario Simulation Results

The Upper Bound Scenario Simulation was conducted based on the lower assumptions of the percentage of CPP-D recipients who will go back to work when the CPP-D policy is changed. The assumptions are as follows:

- For males 18-34 years old: 53.2% will take advantage of the new policy
- 35-50 years old: 47.4%
- 50-64 years old: 34.3%

- For females 18-34 years old: 54.7% will take advantage of the new policy
- 35-50 years old: 51.0%
- 50-64 years old: 38.9%

Exhibit 37: Upper: Estimated Change in Disabled Totals Going Back to Work

Upper Back to Work Assumptions
Estimated Change in Disabled Totals Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Total 18-19 years	Total 20-24 years	Total 25-29 years	Total 30-34 years	Total 35-39 years	Total 40-44 years	Total 45-49 years	Total 50-54 years	Total 55-59 years	Total 60-64 years	Total	Males	Females
2006	26	51	335	1,095	2,739	5,657	9,074	9,188	12,496	15,171	55,833	27,290	28,543
2007	27	52	338	1,117	2,784	5,620	9,194	9,593	13,360	15,874	57,958	27,795	30,163
2008	27	55	349	1,120	2,823	5,766	9,334	10,058	14,204	16,791	60,527	28,910	31,617
2009	28	56	359	1,161	2,901	5,899	9,424	10,696	15,618	17,858	64,002	30,731	33,271
2010	28	58	369	1,188	2,934	5,942	9,428	11,151	16,761	19,664	67,523	32,969	34,554
2011	28	58	376	1,208	2,964	5,969	9,307	11,952	17,322	20,800	69,985	34,180	35,805
2012	29	59	383	1,203	2,954	5,955	9,362	12,318	17,770	23,900	73,933	36,893	37,040
2013	29	59	388	1,226	2,988	5,965	9,383	12,530	18,275	26,916	77,758	39,427	38,331
2014	29	61	394	1,243	3,029	5,997	9,425	12,742	18,936	28,872	80,729	40,904	39,825
2015	30	63	403	1,255	3,069	6,063	9,506	12,832	19,650	30,514	83,385	41,992	41,393
2016	30	64	407	1,256	3,086	6,098	9,459	12,654	20,202	31,824	85,080	42,850	42,230
2017	30	63	410	1,269	3,128	6,147	9,523	12,569	20,674	33,475	87,290	43,953	43,336
2018	30	64	413	1,293	3,164	6,206	9,508	12,379	21,119	34,979	89,157	44,612	44,544
2019	30	62	416	1,295	3,185	6,275	9,625	12,323	21,453	36,488	91,153	45,320	45,832
2020	30	63	417	1,308	3,198	6,290	9,673	12,325	21,615	37,455	92,376	45,585	46,790
2021	31	64	419	1,302	3,226	6,292	9,705	12,326	21,689	38,483	93,536	46,006	47,530
2022	31	64	423	1,323	3,263	6,373	9,771	12,344	21,777	39,332	94,701	46,369	48,332
2023	31	64	431	1,356	3,313	6,493	9,954	12,581	21,778	40,692	96,693	47,657	49,036
2024	32	66	441	1,398	3,417	6,630	10,128	12,856	22,223	41,852	99,043	48,873	50,170
2025	32	65	440	1,380	3,397	6,600	10,069	12,836	21,848	41,870	98,535	48,808	49,727
2026	32	65	446	1,392	3,459	6,709	10,305	13,020	22,277	40,796	98,500	48,343	50,158
2027	33	65	452	1,410	3,487	6,737	10,358	13,058	22,493	39,493	97,586	47,091	50,495
2028	32	63	453	1,415	3,515	6,788	10,370	13,198	22,847	38,143	96,824	45,645	51,179
2029	32	63	453	1,414	3,511	6,808	10,380	13,202	22,628	38,388	96,879	45,259	51,620
2030	33	63	453	1,417	3,507	6,844	10,448	13,327	23,179	38,306	97,576	45,285	52,292

This chart shows change in the total expected number of persons with disabilities in each age group that resume work to some extent (part-time or full-time) under the new CPP-D policy (compared to the current CPP-D policy).

Exhibit 38: Upper: Estimated Change in Total Full-Time Equivalents Going Back to Work

Upper Back to Work Assumptions
Estimated Change in Totals Full Time Equivalents Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Total 18-19 years	Total 20-24 years	Total 25-29 years	Total 30-34 years	Total 35-39 years	Total 40-44 years	Total 45-49 years	Total 50-54 years	Total 55-59 years	Total 60-64 years	Total Person	Males	Females
2006	5	10	67	219	548	1,132	1,815	1,838	2,500	3,035	11,169	5,459	5,710
2007	5	10	68	223	557	1,124	1,839	1,919	2,673	3,176	11,594	5,560	6,034
2008	5	11	70	224	565	1,153	1,867	2,012	2,842	3,359	12,108	5,783	6,325
2009	6	11	72	232	580	1,180	1,885	2,140	3,124	3,573	12,804	6,148	6,656
2010	6	12	74	238	587	1,189	1,886	2,231	3,353	3,934	13,508	6,596	6,912
2011	6	12	75	242	593	1,194	1,862	2,391	3,465	4,161	14,000	6,838	7,163
2012	6	12	77	241	591	1,191	1,873	2,464	3,555	4,781	14,790	7,380	7,410
2013	6	12	78	245	598	1,193	1,877	2,507	3,656	5,385	15,555	7,887	7,668
2014	6	12	79	249	606	1,200	1,885	2,549	3,788	5,776	16,150	8,183	7,967
2015	6	13	81	251	614	1,213	1,902	2,567	3,931	6,104	16,681	8,401	8,281
2016	6	13	81	251	617	1,220	1,892	2,531	4,041	6,366	17,020	8,572	8,448
2017	6	13	82	254	626	1,230	1,905	2,514	4,136	6,697	17,462	8,793	8,669
2018	6	13	83	259	633	1,242	1,902	2,477	4,225	6,998	17,836	8,925	8,911
2019	6	12	83	259	637	1,255	1,926	2,465	4,292	7,299	18,235	9,066	9,169
2020	6	13	83	262	640	1,258	1,935	2,466	4,324	7,493	18,480	9,119	9,360
2021	6	13	84	260	645	1,259	1,941	2,466	4,339	7,698	18,712	9,203	9,508
2022	6	13	85	265	653	1,275	1,955	2,469	4,357	7,868	18,945	9,276	9,669
2023	6	13	86	271	663	1,299	1,991	2,517	4,357	8,140	19,343	9,534	9,810
2024	6	13	88	280	684	1,326	2,026	2,572	4,446	8,373	19,814	9,777	10,037
2025	6	13	88	276	680	1,320	2,014	2,568	4,371	8,376	19,712	9,764	9,948
2026	6	13	89	278	692	1,342	2,061	2,605	4,456	8,161	19,705	9,671	10,034
2027	7	13	90	282	698	1,348	2,072	2,612	4,500	7,901	19,522	9,421	10,101
2028	6	13	91	283	703	1,358	2,074	2,640	4,571	7,631	19,370	9,131	10,238
2029	6	13	91	283	702	1,362	2,076	2,641	4,527	7,679	19,381	9,054	10,327
2030	7	13	91	283	702	1,369	2,090	2,666	4,637	7,663	19,520	9,059	10,461

This chart shows the number of full-time equivalent persons in each age group that resume work under the new CPP-D policy. A full time equivalent person represents a number of persons working part-time who, together, make up a full-time worker.

Exhibit 39: Upper: Yearly Change in Total Government Income Attributable to Total Back to Work Prevalence

Upper Back to Work Assumptions

Yearly Change in Total Government Income Attributable to Total Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Gain Side

Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper
2006	$163,768,984	$171,842,985	$179,916,986
2007	$166,504,761	$175,189,654	$183,874,546
2008	$175,961,035	$185,672,921	$195,384,807
2009	$181,299,009	$191,889,219	$202,479,428
2010	$187,897,576	$199,515,531	$211,133,487
2011	$194,363,443	$207,086,884	$219,810,325
2012	$201,045,223	$214,981,682	$228,918,142
2013	$203,785,912	$218,748,069	$233,710,227
2014	$201,443,900	$217,112,641	$232,781,382
2015	$209,827,434	$227,121,893	$244,416,352
2016	$225,723,260	$245,442,826	$265,162,391
2017	$226,013,807	$246,947,751	$267,881,696
2018	$235,852,552	$259,020,005	$282,187,459
2019	$240,466,859	$265,525,035	$290,583,212
2020	$241,589,914	$268,306,037	$295,022,160
2021	$234,853,173	$262,423,698	$289,994,224
2022	$246,389,347	$277,107,037	$307,824,727
2023	$238,960,634	$270,611,553	$302,262,473
2024	$247,785,815	$282,669,095	$317,552,376
2025	$252,695,102	$290,523,631	$328,352,161
2026	$255,035,113	$295,653,212	$336,271,311
2027	$259,448,483	$303,432,879	$347,417,275
2028	$256,766,426	$303,128,362	$349,490,299
2029	$252,615,910	$301,226,003	$349,836,096
2030	$248,360,154	$299,325,745	$350,291,336

Cost Side

Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved
2006	$81,096,122	$95,358,770	$108,707,316
2007	$79,661,079	$96,388,030	$112,150,557
2008	$79,456,199	$98,230,904	$115,936,741
2009	$78,861,166	$99,649,423	$119,078,279
2010	$79,267,520	$101,477,388	$122,652,224
2011	$78,030,259	$101,698,768	$123,833,676
2012	$78,982,306	$104,398,204	$128,221,084
2013	$79,210,422	$106,112,489	$131,288,901
2014	$78,487,072	$106,596,443	$133,017,922
2015	$76,701,690	$105,466,141	$132,528,549
2016	$74,180,278	$103,563,156	$131,074,261
2017	$71,918,703	$101,621,864	$129,268,614
2018	$69,853,655	$100,051,044	$127,249,670
2019	$67,270,415	$97,452,029	$124,044,276
2020	$64,438,034	$94,881,431	$120,483,934
2021	$61,682,862	$91,923,383	$116,603,448
2022	$59,478,453	$89,488,447	$113,229,829
2023	$57,055,860	$87,272,388	$110,084,856
2024	$55,663,192	$86,293,173	$108,863,151
2025	$52,571,119	$82,572,948	$103,895,463
2026	$49,861,649	$79,490,011	$99,848,752
2027	$47,415,475	$76,466,241	$95,858,892
2028	$44,721,258	$73,235,232	$91,489,531
2029	$43,050,297	$71,531,331	$89,289,927
2030	$41,793,117	$70,077,904	$87,421,899

Net Gain or Cost

Year	Lower 95%	Simulated Expected	95% Upper
2006	$227,197,213	$267,457,572	$305,167,152
2007	$224,491,782	$270,793,912	$314,482,354
2008	$229,385,694	$282,763,894	$333,208,807
2009	$231,404,622	$291,464,479	$347,723,733
2010	$235,949,680	$301,171,370	$363,590,452
2011	$237,904,087	$309,021,317	$375,740,146
2012	$241,817,654	$318,730,489	$391,061,118
2013	$242,593,580	$323,707,766	$399,896,984
2014	$237,861,255	$323,580,754	$404,469,355
2015	$241,898,441	$333,474,938	$419,995,121
2016	$249,792,343	$348,568,715	$441,410,625
2017	$246,175,180	$349,340,521	$445,878,187
2018	$249,062,567	$358,590,606	$457,967,523
2019	$248,540,628	$363,140,055	$465,117,581
2020	$244,173,473	$363,743,685	$465,736,878
2021	$234,762,890	$354,814,255	$454,711,389
2022	$239,756,745	$366,008,102	$468,520,014
2023	$229,703,120	$358,713,839	$459,283,542
2024	$233,538,022	$368,864,967	$472,543,420
2025	$231,823,822	$373,687,320	$479,515,083
2026	$228,917,195	$375,707,056	$482,637,843
2027	$227,403,063	$379,508,942	$488,384,190
2028	$220,148,288	$376,689,374	$485,712,134
2029	$214,019,915	$372,671,760	$481,664,512
2030	$208,351,739	$369,303,644	$479,331,260

The chart on the left shows the change in government taxation revenue that results from the number of persons with disabilities who resume work due to the new CPP-D policy. In all cases, there is an increase in taxation revenue in every year of the forecast period.

The chart in the centre shows the change in the total CPP-D payments the government will have to make every year under the new CPP-D policy. There is a cost saving in every year of the forecast period. The chart on the right shows the net gain or cost to the government under the new policy. This is the difference between the change in taxation revenue and CPP-D payment costs. Under the new policy, the government will make a net gain in every year. The expected gain varies from approximately $219 million in 2006 to $310 million in 2027.

Notice that, in every year of the forecast period, the net gain in this Upper Bound Scenario is greater than in the Expected Scenario Simulation. Since more persons with disabilities go back to work (at least part-time) in the Upper Bound Scenario, there will be a greater positive effect on the economy and thus government taxation revenue will increase more than in the Expected Scenario. Also, there is a greater CPP-D cost saving in the Upper Bound Scenario than in the Expected Scenario since more people resume work to some extent and will get partial CPP-D benefits (instead of full benefits).

Male Total Upper Scenario Simulation results

The following charts show the results of the Upper Bound Scenario Simulation for males only.

Exhibit 40: Upper: Estimated Change in Males with Disabilities Going Back to Work

Upper Back to Work Assumptions
Estimated Change in Males with a Disability Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Male 18-19 years	Male 20-24 years	Male 25-29 years	Male 30-34 years	Male 35-39 years	Male 40-44 years	Male 45-49 years	Male 50-54 years	Male 55-59 years	Male 60-64 years	Total
2006	8	18	183	545	1,160	2,351	3,909	4,209	6,453	8,454	27,290
2007	8	18	181	542	1,158	2,295	3,926	4,338	6,936	8,392	27,795
2008	8	19	187	555	1,175	2,332	4,047	4,621	7,284	8,682	28,910
2009	8	20	193	579	1,211	2,371	4,132	4,958	8,139	9,121	30,731
2010	8	20	198	591	1,229	2,381	4,172	5,013	8,754	10,603	32,969
2011	8	21	202	604	1,237	2,360	4,136	5,441	8,967	11,205	34,180
2012	9	21	206	614	1,244	2,357	4,120	5,549	9,163	13,609	36,893
2013	9	21	208	623	1,254	2,347	4,082	5,570	9,339	15,973	39,427
2014	9	23	210	627	1,271	2,352	4,083	5,627	9,551	17,151	40,904
2015	9	23	215	636	1,286	2,366	4,037	5,591	9,733	18,096	41,992
2016	9	24	217	644	1,308	2,374	3,989	5,474	9,856	18,954	42,850
2017	9	24	219	651	1,321	2,385	3,984	5,460	9,964	19,935	43,953
2018	9	25	220	656	1,335	2,396	3,944	5,348	10,086	20,592	44,612
2019	9	25	221	661	1,345	2,403	3,977	5,362	10,135	21,182	45,320
2020	9	26	222	665	1,356	2,411	3,992	5,229	10,183	21,491	45,585
2021	10	26	224	667	1,370	2,419	3,991	5,119	10,208	21,972	46,006
2022	10	26	226	675	1,381	2,436	3,996	5,094	10,242	22,282	46,369
2023	10	27	233	696	1,425	2,517	4,073	5,169	10,272	23,235	47,657
2024	10	28	239	718	1,479	2,595	4,166	5,316	10,410	23,912	48,873
2025	10	28	240	721	1,487	2,605	4,196	5,337	10,092	24,090	48,808
2026	10	28	246	739	1,529	2,668	4,331	5,480	10,322	22,989	48,343
2027	11	28	250	741	1,539	2,679	4,353	5,413	10,281	21,797	47,091
2028	11	29	250	745	1,543	2,694	4,356	5,497	10,408	20,114	45,645
2029	11	29	250	744	1,550	2,703	4,347	5,443	10,086	20,096	45,259
2030	11	28	250	746	1,555	2,707	4,361	5,507	10,383	19,735	45,285

This chart shows change in the total expected number of males with disabilities in each age group that resume work to some extent (part-time or full-time) under the new CPP-D policy (compared to the current CPP-D policy).

Exhibit 41: Upper: Estimated Change in Male Full-Time Equivalents Going Back to Work

Upper Back to Work Assumptions
Estimated Change in Males Full Time Equivalents Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Male 18-19 years	Male 20-24 years	Male 25-29 years	Male 30-34 years	Male 35-39 years	Male 40-44 years	Male 45-49 years	Male 50-54 years	Male 55-59 years	Male 60-64 years	Total Person
2006	2	4	37	109	232	470	782	842	1,291	1,691	5,459
2007	2	4	36	109	232	459	785	868	1,388	1,679	5,560
2008	2	4	37	111	235	466	810	924	1,457	1,737	5,783
2009	2	4	39	116	242	474	827	992	1,628	1,825	6,148
2010	2	4	40	118	246	476	835	1,003	1,751	2,121	6,596
2011	2	4	40	121	247	472	827	1,088	1,794	2,241	6,838
2012	2	4	41	123	249	472	824	1,110	1,833	2,722	7,380
2013	2	4	42	125	251	470	817	1,114	1,868	3,195	7,887
2014	2	5	42	125	254	470	817	1,126	1,911	3,431	8,183
2015	2	5	43	127	257	473	808	1,118	1,947	3,620	8,401
2016	2	5	43	129	262	475	798	1,095	1,972	3,792	8,572
2017	2	5	44	130	264	477	797	1,092	1,993	3,988	8,793
2018	2	5	44	131	267	479	789	1,070	2,018	4,120	8,925
2019	2	5	44	132	269	481	796	1,073	2,027	4,237	9,066
2020	2	5	44	133	271	482	799	1,046	2,037	4,299	9,119
2021	2	5	45	133	274	484	798	1,024	2,042	4,396	9,203
2022	2	5	45	135	276	487	799	1,019	2,049	4,457	9,276
2023	2	5	47	139	285	503	815	1,034	2,055	4,648	9,534
2024	2	6	48	144	296	519	833	1,063	2,083	4,784	9,777
2025	2	6	48	144	297	521	839	1,068	2,019	4,819	9,764
2026	2	6	49	148	306	534	866	1,096	2,065	4,599	9,671
2027	2	6	50	148	308	536	871	1,083	2,057	4,360	9,421
2028	2	6	50	149	309	539	871	1,100	2,082	4,024	9,131
2029	2	6	50	149	310	541	870	1,089	2,018	4,020	9,054
2030	2	6	50	149	311	542	872	1,102	2,077	3,948	9,059

This chart shows the number of full-time equivalent males in each age group that resume work under the new CPP-D policy. A full time equivalent male represents a number of males working part-time who, together, make up a full-time worker.

Exhibit 42: Upper: Yearly Change in Total Government Income Attributable to Male Back to Work Prevalence

Upper Back to Work Assumptions

Yearly Change in Total Government Income Attributable to Male Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Gain Side

Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper
2006	$98,270,836	$103,115,703	$107,960,569
2007	$98,233,236	$103,357,084	$108,480,933
2008	$103,259,617	$108,958,865	$114,658,113
2009	$106,707,624	$112,940,731	$119,173,838
2010	$111,800,944	$118,713,744	$125,626,544
2011	$115,244,866	$122,789,038	$130,333,210
2012	$121,122,939	$129,519,184	$137,915,429
2013	$123,978,616	$133,081,245	$142,183,874
2014	$122,195,940	$131,700,604	$141,205,268
2015	$126,364,560	$136,779,817	$147,195,075
2016	$135,854,425	$147,722,897	$159,591,369
2017	$135,789,044	$148,366,153	$160,943,262
2018	$140,552,328	$154,358,579	$168,164,830
2019	$142,482,839	$157,330,457	$172,178,076
2020	$142,088,807	$157,801,641	$173,514,474
2021	$137,345,195	$153,468,797	$169,592,400
2022	$143,135,378	$160,980,257	$178,825,136
2023	$139,148,080	$157,578,583	$176,009,085
2024	$144,128,366	$164,418,754	$184,709,142
2025	$147,120,331	$169,144,287	$191,168,243
2026	$146,968,816	$170,375,766	$193,782,715
2027	$146,918,594	$171,825,756	$196,732,919
2028	$142,030,440	$167,675,562	$193,320,684
2029	$138,416,371	$165,051,402	$191,686,433
2030	$134,975,333	$162,673,406	$190,371,479

Cost Side

Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved
2006	$39,643,824	$46,782,037	$53,174,957
2007	$38,396,426	$46,369,944	$53,677,463
2008	$38,399,779	$47,296,093	$55,539,101
2009	$38,265,678	$48,186,419	$57,256,294
2010	$39,670,090	$50,328,929	$60,532,817
2011	$38,980,822	$50,332,454	$60,789,295
2012	$40,328,979	$52,748,452	$64,266,076
2013	$40,950,288	$54,289,591	$66,648,355
2014	$40,699,741	$54,628,607	$67,641,051
2015	$39,597,768	$53,747,155	$66,997,062
2016	$38,009,442	$52,370,886	$65,663,296
2017	$37,074,566	$51,510,462	$64,865,005
2018	$36,108,397	$50,866,825	$63,891,646
2019	$34,194,845	$48,663,825	$61,161,877
2020	$32,891,132	$47,644,733	$59,604,716
2021	$31,237,595	$45,835,250	$57,364,003
2022	$30,029,783	$44,391,465	$55,412,086
2023	$28,854,163	$43,387,399	$53,779,667
2024	$28,121,297	$42,817,536	$53,099,005
2025	$26,926,421	$41,541,908	$51,356,221
2026	$25,019,091	$39,190,543	$48,377,128
2027	$23,558,613	$37,266,396	$45,929,549
2028	$21,596,008	$34,767,847	$42,689,822
2029	$20,716,625	$33,738,368	$41,375,133
2030	$19,861,983	$32,526,377	$39,850,038

Net Gain or Cost

Year	Lower 95%	Simulated Expected	95% Upper
2006	$127,244,542	$150,214,884	$171,005,576
2007	$124,152,075	$149,616,403	$173,123,825
2008	$126,692,522	$155,953,672	$183,225,889
2009	$128,115,389	$160,695,683	$190,677,159
2010	$133,156,388	$168,816,471	$203,063,665
2011	$134,083,091	$172,453,394	$208,016,385
2012	$138,981,857	$181,947,168	$222,020,331
2013	$141,310,996	$186,908,506	$229,404,138
2014	$138,210,582	$186,244,849	$231,360,806
2015	$139,991,612	$190,862,544	$238,757,041
2016	$145,023,009	$200,234,748	$251,673,487
2017	$143,361,608	$200,274,629	$253,294,982
2018	$144,336,414	$204,665,886	$258,560,686
2019	$143,219,966	$206,518,876	$262,040,228
2020	$139,536,985	$205,489,396	$260,244,968
2021	$133,539,176	$199,708,022	$253,490,728
2022	$136,434,389	$204,829,631	$259,204,667
2023	$130,674,031	$201,913,786	$255,435,163
2024	$133,444,049	$207,545,457	$262,394,752
2025	$132,762,545	$210,911,649	$267,106,295
2026	$130,023,008	$209,723,427	$265,704,412
2027	$127,360,405	$208,704,277	$265,069,336
2028	$120,600,453	$202,491,253	$257,496,602
2029	$116,323,083	$198,356,459	$252,867,719
2030	$112,293,554	$195,411,759	$250,625,415

The chart on the left shows the change in government taxation revenue that results from the number of males with disabilities who resume work due to the new CPP-D policy. The middle column shows the expected value of the changed taxation revenue (the most likely path), the left column the 95% shows lower confidence bounds, and the right column shows the upper 95% confidence bounds. There is an increase in taxation revenue each year of the forecast period (compared to the current policy).

The chart in the centre shows the change in the total CPP-D payments to males the government will have to make every year under the new CPP-D policy. There is a cost saving in ever year of the forecast period (compared to the current policy).

The chart on the right shows the net gain or cost to the government under the new policy. This is the difference between the change in taxation revenue and CPP-D payment costs. Under the new policy, the government will make a net gain in every year.

All amounts are in present valued dollars.

Female Total Upper Scenario Simulation results

The following charts show the results of the Upper Bound Scenario Simulation for females only.

Exhibit 43: Upper: Estimated Change in Females with Disabilities Going Back to Work

Upper Back to Work Assumptions
Estimated Change in Females with a Disability Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Female 18-19 years	Female 20-24 years	Female 25-29 years	Female 30-34 years	Female 35-39 years	Female 40-44 years	Female 45-49 years	Female 50-54 years	Female 55-59 years	Female 60-64 years	Total
2006	19	33	152	550	1,579	3,306	5,165	4,980	6,043	6,717	28,543
2007	19	34	157	574	1,626	3,325	5,268	5,255	6,424	7,482	30,163
2008	19	35	162	565	1,648	3,434	5,287	5,437	6,920	8,110	31,617
2009	20	37	167	583	1,690	3,528	5,292	5,738	7,479	8,737	33,271
2010	20	38	171	597	1,705	3,560	5,257	6,138	8,007	9,061	34,554
2011	20	37	174	604	1,728	3,609	5,171	6,511	8,355	9,596	35,805
2012	20	38	177	589	1,709	3,598	5,241	6,769	8,608	10,291	37,040
2013	20	38	180	603	1,734	3,617	5,300	6,960	8,936	10,943	38,331
2014	20	39	184	616	1,758	3,646	5,342	7,115	9,385	11,721	39,825
2015	21	39	187	619	1,783	3,697	5,469	7,241	9,918	12,418	41,393
2016	21	40	190	612	1,778	3,724	5,470	7,180	10,346	12,870	42,230
2017	21	39	192	618	1,807	3,762	5,539	7,108	10,710	13,540	43,336
2018	21	39	193	638	1,829	3,810	5,564	7,031	11,033	14,387	44,544
2019	20	38	194	635	1,841	3,872	5,648	6,961	11,319	15,306	45,832
2020	21	38	195	642	1,843	3,879	5,681	7,097	11,432	15,964	46,790
2021	21	38	195	635	1,856	3,873	5,714	7,207	11,481	16,510	47,530
2022	21	38	197	647	1,882	3,936	5,774	7,250	11,535	17,050	48,332
2023	21	37	198	659	1,888	3,976	5,880	7,413	11,506	17,457	49,036
2024	22	38	202	680	1,939	4,035	5,963	7,540	11,813	17,940	50,170
2025	21	37	200	659	1,910	3,995	5,872	7,499	11,757	17,779	49,727
2026	22	36	200	653	1,930	4,042	5,974	7,540	11,954	17,807	50,158
2027	22	36	203	669	1,948	4,058	6,005	7,645	12,212	17,696	50,495
2028	21	35	203	670	1,972	4,094	6,014	7,701	12,439	18,029	51,179
2029	22	35	203	670	1,961	4,104	6,032	7,759	12,542	18,292	51,620
2030	22	34	203	670	1,952	4,136	6,087	7,820	12,796	18,570	52,292

This chart shows change in the total expected number of females with disabilities in each age group that resume work to some extent (part-time or full-time) under the new CPP-D policy (compared to the current CPP-D policy).

Exhibit 44: Upper: Estimated Change in Female Full-Time Equivalents Going Back to Work

Upper Back to Work Assumptions
Estimated Change in Females Full Time Equivalents Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Female 18-19 years	Female 20-24 years	Female 25-29 years	Female 30-34 years	Female 35-39 years	Female 40-44 years	Female 45-49 years	Female 50-54 years	Female 55-59 years	Female 60-64 years	Total Person
2006	4	7	30	110	316	661	1,033	996	1,209	1,344	5,710
2007	4	7	31	115	325	665	1,054	1,051	1,285	1,497	6,034
2008	4	7	32	113	330	687	1,058	1,088	1,384	1,622	6,325
2009	4	7	33	117	338	706	1,059	1,148	1,496	1,748	6,656
2010	4	8	34	119	341	712	1,052	1,228	1,602	1,813	6,912
2011	4	7	35	121	346	722	1,034	1,303	1,671	1,920	7,163
2012	4	8	35	118	342	720	1,049	1,354	1,722	2,059	7,410
2013	4	8	36	121	347	724	1,060	1,392	1,788	2,189	7,668
2014	4	8	37	123	352	729	1,069	1,423	1,877	2,345	7,967
2015	4	8	37	124	357	740	1,094	1,449	1,984	2,484	8,281
2016	4	8	38	122	356	745	1,094	1,436	2,070	2,575	8,448
2017	4	8	38	124	361	753	1,108	1,422	2,143	2,709	8,669
2018	4	8	39	128	366	762	1,113	1,407	2,207	2,878	8,911
2019	4	8	39	127	368	775	1,130	1,393	2,264	3,062	9,169
2020	4	8	39	128	369	776	1,136	1,420	2,287	3,194	9,360
2021	4	8	39	127	371	775	1,143	1,442	2,297	3,303	9,508
2022	4	8	39	130	377	787	1,155	1,450	2,308	3,411	9,669
2023	4	7	40	132	378	795	1,176	1,483	2,302	3,492	9,810
2024	4	8	40	136	388	807	1,193	1,508	2,363	3,589	10,037
2025	4	7	40	132	382	799	1,175	1,500	2,352	3,557	9,948
2026	4	7	40	131	386	809	1,195	1,508	2,391	3,562	10,034
2027	4	7	41	134	390	812	1,201	1,529	2,443	3,540	10,101
2028	4	7	41	134	394	819	1,203	1,541	2,488	3,607	10,238
2029	4	7	41	134	392	821	1,207	1,552	2,509	3,659	10,327
2030	4	7	41	134	390	827	1,218	1,564	2,560	3,715	10,461

This chart shows the number of full-time equivalent females in each age group that resume work under the new CPP-D policy. A full time equivalent female represents a number of females working part-time who, together, make up a full-time worker.

Exhibit 45: Upper: Yearly Change in Total Government Income Attributable to Female Back to Work Prevalence

Upper Back to Work Assumptions

Yearly Change in Total Government Income Attributable to Female Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Gain Side			
Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper
2006	$65,498,148	$68,727,283	$71,956,417
2007	$68,271,525	$71,832,569	$75,393,613
2008	$72,701,418	$76,714,056	$80,726,694
2009	$74,591,385	$78,948,487	$83,305,590
2010	$76,096,632	$80,801,788	$85,506,943
2011	$79,118,577	$84,297,846	$89,477,115
2012	$79,922,284	$85,462,499	$91,002,713
2013	$79,807,296	$85,666,824	$91,526,352
2014	$79,247,960	$85,412,037	$91,576,114
2015	$83,462,874	$90,342,076	$97,221,278
2016	$89,868,836	$97,719,929	$105,571,022
2017	$90,224,763	$98,581,598	$106,938,433
2018	$95,300,224	$104,661,427	$114,022,629
2019	$97,984,020	$108,194,578	$118,405,137
2020	$99,501,107	$110,504,397	$121,507,686
2021	$97,507,978	$108,954,901	$120,401,824
2022	$103,253,969	$116,126,780	$128,999,591
2023	$99,812,554	$113,032,971	$126,253,387
2024	$103,657,448	$118,250,341	$132,843,234
2025	$105,574,771	$121,379,344	$137,183,918
2026	$108,066,297	$125,277,446	$142,488,596
2027	$112,529,890	$131,607,123	$150,684,356
2028	$114,735,985	$135,452,800	$156,169,615
2029	$114,199,539	$136,174,601	$158,149,663
2030	$113,384,820	$136,652,338	$159,919,857

Cost Side			
Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved
2006	$41,452,298	$48,576,734	$55,532,359
2007	$41,264,652	$50,018,086	$58,473,093
2008	$41,056,420	$50,934,811	$60,397,640
2009	$40,595,488	$51,463,004	$61,821,985
2010	$39,597,430	$51,148,459	$62,119,407
2011	$39,049,438	$51,366,314	$63,044,381
2012	$38,653,327	$51,649,752	$63,955,009
2013	$38,260,133	$51,822,898	$64,640,546
2014	$37,787,330	$51,967,836	$65,376,872
2015	$37,103,923	$51,718,986	$65,531,487
2016	$36,170,837	$51,192,270	$65,410,966
2017	$34,844,136	$50,111,402	$64,403,609
2018	$33,745,258	$49,184,219	$63,358,024
2019	$33,075,570	$48,788,204	$62,882,399
2020	$31,546,901	$47,236,699	$60,879,218
2021	$30,445,267	$46,088,132	$59,239,445
2022	$29,448,670	$45,096,982	$57,817,743
2023	$28,201,697	$43,884,989	$56,305,189
2024	$27,541,895	$43,475,637	$55,764,146
2025	$25,644,698	$41,031,040	$52,539,241
2026	$24,842,557	$40,299,468	$51,471,624
2027	$23,856,863	$39,199,845	$49,929,344
2028	$23,125,250	$38,467,385	$48,799,709
2029	$22,333,673	$37,792,964	$47,914,794
2030	$21,931,134	$37,551,528	$47,571,861

Net Gain or Cost			
Year	Lower 95%	Simulated Expected	95% Upper
2006	$99,952,671	$117,242,688	$134,161,576
2007	$100,339,708	$121,177,509	$141,358,529
2008	$102,693,172	$126,810,222	$149,982,918
2009	$103,289,233	$130,768,796	$157,046,573
2010	$102,793,291	$132,354,900	$160,526,787
2011	$103,820,995	$136,567,924	$167,723,761
2012	$102,835,797	$136,783,322	$169,040,788
2013	$101,282,583	$136,799,260	$170,492,847
2014	$99,650,673	$137,335,905	$173,108,550
2015	$101,906,828	$142,612,395	$181,238,079
2016	$104,769,333	$148,333,967	$189,737,138
2017	$102,813,572	$149,065,892	$192,583,205
2018	$104,726,153	$153,924,720	$199,406,837
2019	$105,320,662	$156,621,179	$203,077,353
2020	$104,636,488	$158,254,289	$205,491,910
2021	$101,223,714	$155,106,232	$201,220,662
2022	$103,322,356	$161,178,471	$209,315,348
2023	$99,029,089	$156,800,053	$203,848,379
2024	$100,093,974	$161,319,510	$210,148,668
2025	$99,061,277	$162,775,671	$212,408,788
2026	$98,894,187	$165,983,629	$216,933,431
2027	$100,042,658	$170,804,665	$223,314,854
2028	$99,547,836	$174,198,121	$228,215,533
2029	$97,696,832	$174,315,302	$228,796,793
2030	$96,058,185	$173,891,885	$228,705,845

The chart on the left shows the change in government taxation revenue that results from the number of females with disabilities who resume work due to the new CPP-D policy. The middle column shows the expected value of the changed taxation revenue (the most likely path), the left column the 95% shows lower confidence bounds, and the right column shows the upper 95% confidence bounds. There is an increase in taxation revenue each year of the forecast period (compared to the current policy).

The chart in the centre shows the change in the total CPP-D payments to females the government will have to make every year under the new CPP-D policy. There is a cost saving in ever year of the forecast period (compared to the current policy).

The chart on the right shows the net gain or cost to the government under the new policy. This is the difference between the change in taxation revenue and CPP-D payment costs. Under the new policy, the government will make a net gain in every year.

All amounts are in present valued dollars.

Appendix VI. Expected Scenario Simulation Results – Disease Contributions

The following charts refer to the Expected Scenario Simulation (conducted based on the expected assumptions of the percentage of CPP-D recipients who will go back to work when the CPP-D policy is changed – see Section 5.2.1).

Exhibit 46: Expected: Estimated Change in Disabled Totals Going Back to Work: Disease Contribution

Expected Back to Work Assumptions
Estimated Change in Disabled Totals Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Total		Cancer		Diseases of the Circulatory		Mental Disorders		Endocrine, Nutritional,		Diseases of the Respiratory	
	Disease Prevalence	Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006
2006	45,834	0%	12%	0%	20%	0%	58%	0%	6%	0%	4%	0%
2007	47,537	4%	12%	6%	20%	2%	58%	4%	7%	15%	4%	-4%
2008	49,616	8%	13%	11%	20%	4%	58%	8%	7%	31%	3%	-7%
2009	52,434	14%	13%	19%	19%	8%	57%	13%	8%	52%	3%	-9%
2010	55,291	21%	13%	28%	19%	14%	56%	18%	9%	76%	3%	-10%
2011	57,273	25%	13%	35%	19%	17%	56%	20%	9%	101%	3%	-11%
2012	60,480	32%	14%	46%	19%	26%	54%	24%	10%	132%	3%	-10%
2013	63,588	39%	14%	56%	19%	33%	53%	27%	11%	167%	2%	-10%
2014	65,988	44%	14%	64%	19%	37%	52%	30%	12%	197%	2%	-11%
2015	68,131	49%	14%	71%	19%	38%	52%	33%	13%	227%	2%	-13%
2016	69,498	52%	14%	76%	19%	39%	51%	35%	14%	252%	2%	-15%
2017	71,287	56%	14%	83%	18%	40%	51%	37%	14%	280%	2%	-17%
2018	72,789	59%	14%	87%	18%	40%	51%	39%	15%	305%	2%	-19%
2019	74,397	62%	15%	93%	18%	40%	50%	41%	16%	332%	2%	-20%
2020	75,375	64%	15%	98%	17%	38%	50%	43%	16%	355%	2%	-21%
2021	76,307	66%	15%	102%	17%	37%	50%	43%	17%	379%	2%	-22%
2022	77,249	69%	15%	106%	16%	36%	50%	44%	17%	398%	2%	-23%
2023	78,881	72%	15%	113%	16%	36%	49%	47%	18%	422%	2%	-22%
2024	80,797	76%	15%	121%	16%	36%	49%	50%	18%	446%	2%	-22%
2025	80,385	75%	15%	122%	15%	33%	49%	48%	19%	453%	2%	-23%
2026	80,360	75%	16%	124%	15%	29%	49%	49%	19%	457%	2%	-24%
2027	79,603	74%	16%	124%	14%	24%	49%	48%	19%	456%	2%	-25%
2028	78,959	72%	16%	123%	14%	18%	50%	48%	19%	455%	2%	-26%
2029	78,991	72%	16%	124%	14%	16%	50%	48%	19%	463%	2%	-27%
2030	79,547	74%	16%	127%	13%	14%	50%	49%	19%	472%	2%	-27%

The leftmost chart shows the change in the total expected number of persons with disabilities that resume work to some extent (part-time or full-time) under the new CPP-D policy (compared to the current CPP-D policy).

The other charts indicate what percentage of the total number of persons with disabilities that go back to work is accounted for by a particular disease. For example: the 2nd chart shows that in 2006, 12% of the 45,834 persons with disabilities that resume work will be disabled due to Cancer. That is, 5500 persons who are disabled due to Cancer will resume work under the new CPP-D policy.

Exhibit 47: Expected: Yearly Change in Total Government Income: Disease Contribution

Expected Back to Work Assumptions
Yearly Change in Total Government Income Attributable to Total Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Year	Total Disease Prevalence	Cancer Percent of Total Disease	Diseases of the Circulatory Percent of Total Disease	Mental Disorders Percent of Total Disease	Endocrine, Nutritional, Percent of Total Disease	Diseases of the Respiratory Percent of Total Disease
2006	$218,882,202	19%	37%	35%	4%	5%
2007	$223,147,562	19%	37%	35%	5%	5%
2008	$231,924,832	19%	37%	35%	5%	5%
2009	$238,627,674	19%	36%	35%	6%	5%
2010	$246,694,829	19%	37%	34%	6%	4%
2011	$253,125,131	19%	37%	33%	7%	4%
2012	$261,197,654	19%	37%	32%	8%	4%
2013	$265,231,099	19%	37%	32%	8%	4%
2014	$263,870,054	19%	37%	32%	9%	4%
2015	$271,760,367	19%	36%	31%	10%	3%
2016	$284,928,153	19%	36%	31%	10%	3%
2017	$285,147,708	20%	36%	30%	11%	3%
2018	$292,886,220	20%	36%	30%	11%	3%
2019	$296,967,727	20%	35%	30%	12%	3%
2020	$297,040,061	20%	35%	29%	12%	3%
2021	$289,363,533	20%	34%	29%	13%	3%
2022	$299,500,339	20%	34%	29%	13%	3%
2023	$293,152,667	21%	34%	29%	14%	3%
2024	$301,497,229	21%	34%	29%	14%	3%
2025	$305,426,692	21%	33%	28%	14%	3%
2026	$307,375,644	21%	33%	28%	15%	3%
2027	$310,449,747	22%	33%	28%	15%	3%
2028	$307,621,117	22%	32%	28%	15%	3%
2029	$303,968,928	22%	31%	28%	15%	3%
2030	$301,747,470	23%	31%	28%	16%	3%

The leftmost chart shows the net gain or cost to the government (the difference between the change in taxation revenue and CPP-D payment costs) under the new policy. There is a net gain in every year.

The other charts show how much a particular disease contributes to the change in net government income. For example, in 2006 Cancer accounted for 19% of the change in net income. That is, the economic activity and associated tax revenue generated by individuals with cancer who returned to work, and the decreased amount in CPP-D benefits that were paid to them, made up 19% (or $41,587,618) of the government's change in income.

All amounts are in present valued dollars.

Exhibit 48: Expected: Estimated Change in Males with Disabilities Going Back to Work: Disease Contribution

Expected Back to Work Assumptions
Estimated Change in Males with a Disability Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Total		Cancer		Diseases of the Circulatory		Mental Disorders		Endocrine, Nutritional,		Diseases of the Respiratory	
	Disease Prevalence	Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006
2006	22,716	0%	12%	0%	29%	0%	47%	0%	7%	0%	5%	0%
2007	23,129	2%	13%	5%	29%	1%	47%	1%	8%	11%	4%	-6%
2008	24,052	6%	13%	11%	28%	3%	47%	5%	8%	26%	4%	-11%
2009	25,556	13%	13%	20%	28%	8%	46%	11%	9%	45%	4%	-12%
2010	27,399	21%	13%	31%	28%	16%	45%	16%	10%	70%	3%	-11%
2011	28,393	25%	14%	40%	28%	20%	44%	18%	11%	91%	3%	-12%
2012	30,624	35%	14%	54%	28%	31%	43%	23%	12%	125%	3%	-10%
2013	32,706	44%	14%	67%	28%	41%	42%	27%	13%	161%	3%	-9%
2014	33,921	49%	15%	75%	28%	46%	41%	29%	14%	188%	3%	-10%
2015	34,816	53%	15%	83%	28%	47%	40%	32%	14%	214%	3%	-13%
2016	35,521	56%	15%	89%	27%	48%	40%	33%	15%	236%	2%	-16%
2017	36,429	60%	15%	96%	27%	49%	40%	35%	16%	262%	2%	-18%
2018	36,971	63%	15%	101%	27%	50%	39%	36%	16%	280%	2%	-20%
2019	37,555	65%	16%	108%	26%	50%	39%	37%	17%	298%	2%	-21%
2020	37,774	66%	16%	112%	26%	47%	39%	37%	18%	316%	2%	-24%
2021	38,120	68%	16%	117%	25%	46%	39%	37%	18%	333%	2%	-25%
2022	38,420	69%	16%	122%	25%	45%	38%	38%	19%	344%	2%	-26%
2023	39,487	74%	16%	131%	24%	46%	38%	41%	19%	368%	2%	-26%
2024	40,496	78%	17%	141%	24%	47%	38%	45%	19%	386%	2%	-25%
2025	40,444	78%	17%	143%	23%	43%	38%	45%	20%	392%	2%	-27%
2026	40,070	76%	17%	146%	23%	38%	39%	45%	19%	385%	2%	-28%
2027	39,043	72%	18%	143%	22%	32%	39%	42%	19%	371%	2%	-31%
2028	37,855	67%	18%	140%	22%	25%	40%	40%	19%	352%	2%	-32%
2029	37,538	65%	18%	141%	21%	22%	40%	39%	19%	350%	2%	-34%
2030	37,560	65%	18%	145%	21%	20%	40%	40%	19%	349%	2%	-34%

The leftmost chart shows the total expected number of males that will have one or more diseases (in the five disease categories under consideration) for each year from 2006 to 2033.

The other charts indicate what percentage of the total male disease prevalence is accounted for by each of the five disease categories.

Exhibit 49: Expected: Yearly Change in Total Government Income due to Males: Disease Contribution

Expected Back to Work Assumptions
Yearly Change in Total Government Income Attributable to Male Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Year	Total Disease Prevalence	Cancer Percent of Total Disease	Diseases of the Circulatory Percent of Total Disease	Mental Disorders Percent of Total Disease	Endocrine, Nutritional, Percent of Total Disease	Diseases of the Respiratory Percent of Total Disease
2006	$124,462,839	18%	47%	26%	4%	6%
2007	$124,529,390	18%	46%	25%	5%	5%
2008	$128,950,067	18%	47%	25%	5%	5%
2009	$133,595,994	18%	46%	25%	6%	5%
2010	$139,963,634	18%	47%	24%	6%	5%
2011	$143,382,804	19%	47%	24%	7%	4%
2012	$150,752,332	19%	47%	23%	7%	4%
2013	$154,893,054	18%	47%	22%	8%	4%
2014	$153,928,439	19%	47%	22%	9%	4%
2015	$157,707,985	19%	46%	22%	10%	4%
2016	$165,837,354	19%	47%	21%	10%	3%
2017	$165,488,293	19%	46%	21%	11%	3%
2018	$169,574,273	19%	46%	21%	11%	3%
2019	$171,008,132	19%	46%	20%	11%	3%
2020	$170,073,295	19%	45%	20%	12%	3%
2021	$165,105,750	20%	45%	20%	12%	3%
2022	$169,829,193	20%	44%	20%	13%	3%
2023	$166,974,112	20%	44%	20%	13%	3%
2024	$171,919,577	20%	43%	20%	13%	3%
2025	$174,489,657	21%	43%	20%	14%	3%
2026	$173,990,771	21%	43%	20%	13%	3%
2027	$173,133,228	22%	42%	20%	14%	3%
2028	$168,010,230	22%	42%	20%	14%	3%
2029	$164,480,934	22%	41%	20%	14%	3%
2030	$161,995,457	23%	41%	20%	14%	3%

The leftmost chart shows the net gain or cost to the government (the difference between the change in taxation revenue and CPP-D payment costs) when considering only the males who resume work under the new policy. There is a net gain in every year.

The other charts show how much a particular disease contributes to the change in net government income. For example, in 2006 Cancer accounted for 18% of the change in net income. That is, the economic activity and associated tax revenue generated by males with cancer who returned to work, and the decreased amount in CPP-D benefits that were paid to them, made up 18% (or $22,403,311) of the government's change in income.

All amounts are in present valued dollars.

Exhibit 50: Expected: Estimated Change in Males with Disabilities Going Back to Work: Disease Contribution

Expected Back to Work Assumptions
Estimated Change in Females with a Disability Going Back to Work from CPPD Scenario, 2006-2030: Allocated Across Age Groups

Year	Total		Cancer		Diseases of the Circulatory		Mental Disorders		Endocrine, Nutritional,		Diseases of the Respiratory	
	Disease Prevalence	Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006	Percent of Total Disease Prevalence	Disease Prevalence Percent Change From 2006
2006	23,118	0%	12%	0%	12%	0%	68%	0%	5%	0%	3%	0%
2007	24,408	6%	12%	6%	12%	4%	68%	5%	5%	19%	3%	-1%
2008	25,564	11%	12%	11%	11%	6%	68%	10%	6%	39%	3%	-2%
2009	26,878	16%	12%	18%	11%	8%	68%	15%	7%	62%	2%	-5%
2010	27,892	21%	12%	24%	11%	8%	67%	19%	7%	86%	2%	-8%
2011	28,880	25%	13%	31%	10%	10%	67%	22%	8%	114%	2%	-9%
2012	29,856	29%	13%	38%	10%	12%	66%	24%	9%	143%	2%	-10%
2013	30,881	34%	13%	46%	10%	13%	65%	27%	10%	174%	2%	-12%
2014	32,067	39%	13%	53%	10%	16%	64%	31%	11%	209%	2%	-12%
2015	33,315	44%	13%	59%	10%	18%	64%	35%	11%	245%	2%	-13%
2016	33,977	47%	13%	63%	9%	16%	63%	36%	12%	274%	2%	-14%
2017	34,858	51%	13%	69%	9%	16%	63%	39%	13%	307%	2%	-16%
2018	35,818	55%	13%	73%	9%	17%	62%	42%	14%	342%	2%	-17%
2019	36,842	59%	13%	79%	9%	17%	62%	44%	14%	380%	2%	-17%
2020	37,602	63%	14%	83%	8%	16%	61%	46%	15%	414%	2%	-18%
2021	38,187	65%	14%	87%	8%	15%	61%	47%	16%	445%	2%	-18%
2022	38,829	68%	14%	91%	8%	14%	60%	49%	16%	475%	2%	-17%
2023	39,394	70%	14%	95%	8%	13%	60%	50%	17%	499%	1%	-17%
2024	40,301	74%	14%	100%	8%	12%	60%	53%	17%	534%	1%	-16%
2025	39,941	73%	14%	100%	7%	9%	60%	51%	18%	541%	1%	-18%
2026	40,290	74%	14%	102%	7%	7%	59%	51%	18%	562%	1%	-18%
2027	40,560	75%	14%	103%	7%	4%	59%	52%	18%	580%	1%	-18%
2028	41,104	78%	14%	105%	7%	4%	59%	53%	19%	606%	1%	-16%
2029	41,453	79%	14%	108%	7%	3%	59%	54%	19%	628%	1%	-16%
2030	41,987	82%	14%	110%	7%	2%	58%	55%	20%	652%	1%	-16%

The leftmost chart shows the total expected number of females that will have one or more diseases (in the five disease categories under consideration) for each year from 2006 to 2033.

The other charts indicate what percentage of the total female disease prevalence is accounted for by each of the five disease categories.

Exhibit 51: Expected: Yearly Change in Total Government Income due to Females: Disease Contribution

Expected Back to Work Assumptions
Yearly Change in Total Government Income Attributable to Female Back to Work Prevalence, Simulation Results, 2006-2030, Future Values

Year	Total Disease Prevalence	Cancer Percent of Total Disease	Diseases of the Circulatory Percent of Total Disease	Mental Disorders Percent of Total Disease	Endocrine, Nutritional, Percent of Total Disease	Diseases of the Respiratory Percent of Total Disease
2006	$94,419,362	20%	22%	50%	4%	5%
2007	$98,618,172	20%	21%	50%	4%	4%
2008	$102,974,764	20%	21%	50%	5%	4%
2009	$105,231,680	20%	21%	50%	5%	4%
2010	$106,731,195	20%	21%	50%	6%	4%
2011	$109,742,326	20%	20%	49%	7%	4%
2012	$110,445,322	20%	20%	48%	8%	4%
2013	$110,338,045	21%	20%	48%	8%	3%
2014	$109,941,615	21%	19%	48%	9%	3%
2015	$114,052,382	21%	19%	47%	10%	3%
2016	$119,090,799	21%	19%	47%	11%	3%
2017	$119,659,416	21%	18%	47%	11%	3%
2018	$123,311,947	21%	18%	46%	12%	3%
2019	$125,959,595	21%	18%	45%	13%	3%
2020	$126,966,766	21%	18%	45%	13%	3%
2021	$124,257,783	21%	17%	45%	14%	3%
2022	$129,671,146	21%	17%	44%	15%	3%
2023	$126,178,555	21%	17%	44%	15%	3%
2024	$129,577,652	22%	17%	43%	16%	3%
2025	$130,937,035	22%	17%	43%	16%	3%
2026	$133,384,873	22%	17%	42%	16%	3%
2027	$137,316,519	22%	16%	42%	17%	3%
2028	$139,610,886	22%	16%	41%	17%	3%
2029	$139,487,995	22%	16%	41%	18%	3%
2030	$139,752,013	22%	16%	41%	18%	3%

The leftmost chart shows the net gain or cost to the government (the difference between the change in taxation revenue and CPP-D payment costs) when considering only the females who resume work under the new policy. There is a net gain in every year.

The other charts show how much a particular disease contributes to the change in net government income. For example, in 2006 Cancer accounted for 20% of the change in net income. That is, the economic activity and associated tax revenue generated by females with cancer who returned to work, and the decreased amount in CPP-D benefits that were paid to them, made up 20% (or $18,883,872) of the government's change in income.

All amounts are in present valued dollars.

Appendix VII. Economic Simulation Results for Different Back to Work Assumptions

In addition to the Lower Bound, Expected, and Upper Bound Assumption Scenarios based on the results of a survey of stakeholders, five other scenarios were simulated. These scenarios assume that both genders and all age groups have the same back to work percentage. That is, among all CPP-D recipients, the same percentage will go back to work following a change in CPP-D policy.

The following chart shows the economic simulation results of a scenario in which 10% of recipients (both genders and all age groups) will take advantage of the new policy. This scenario can be considered to be a worst case scenario. That is, the scenario is analysed to understand the effects of a new CPP-D policy when CPP-D recipients are not very responsive to a change in policy.

Expected Back to Work Assumptions

Males	**10%**
Females	**10%**

Yearly Change in Total Government Income Attributable to Total Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

	Gain Side			Cost Side				Net Gain or Cost			
Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper	Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved	Year	Lower 95%	Simulated Expected	95% Upper
2006	$41,483,212	$43,528,382	$45,573,553	2006	$20,259,867	$23,767,183	$27,030,441	2006	$57,472,050	$67,295,565	$76,448,376
2007	$42,204,301	$44,405,678	$46,607,056	2007	$20,202,919	$24,395,700	$28,327,491	2007	$57,094,687	$68,801,378	$79,797,158
2008	$44,711,381	$47,179,154	$49,646,927	2008	$19,901,944	$24,553,856	$28,929,192	2008	$58,393,757	$71,733,010	$84,307,502
2009	$46,294,299	$48,998,485	$51,702,672	2009	$20,024,756	$25,259,529	$30,138,755	2009	$59,120,012	$74,258,014	$88,398,030
2010	$48,210,962	$51,191,910	$54,172,857	2010	$20,423,883	$26,102,986	$31,510,550	2010	$60,599,217	$77,294,896	$93,251,431
2011	$50,089,979	$53,368,974	$56,647,970	2011	$20,149,765	$26,219,095	$31,888,229	2011	$61,265,981	$79,588,070	$96,752,806
2012	$52,086,638	$55,697,285	$59,307,931	2012	$20,192,354	$26,650,419	$32,695,336	2012	$62,673,562	$82,347,703	$100,824,827
2013	$52,983,569	$56,873,673	$60,763,778	2013	$20,513,828	$27,435,888	$33,903,272	2013	$63,071,886	$84,309,562	$104,225,585
2014	$52,493,650	$56,576,719	$60,659,788	2014	$20,338,891	$27,587,940	$34,395,757	2014	$61,987,167	$84,164,660	$105,073,544
2015	$54,778,511	$59,293,482	$63,808,453	2015	$19,883,888	$27,303,673	$34,285,111	2015	$63,101,535	$86,597,155	$108,797,881
2016	$58,914,487	$64,061,357	$69,208,226	2016	$19,413,291	$27,063,441	$34,220,683	2016	$65,078,779	$91,124,798	$115,590,060
2017	$59,045,497	$64,514,433	$69,983,370	2017	$18,866,213	$26,612,860	$33,814,290	2017	$64,301,607	$91,127,293	$116,200,999
2018	$61,717,725	$67,780,167	$73,842,610	2018	$18,294,319	$26,166,077	$33,231,306	2018	$65,183,856	$93,946,245	$119,956,101
2019	$62,897,787	$69,452,136	$76,006,486	2019	$17,740,156	$25,654,206	$32,592,422	2019	$65,092,158	$95,106,342	$121,701,992
2020	$63,173,093	$70,159,064	$77,145,035	2020	$16,789,167	$24,697,066	$31,293,710	2020	$63,938,440	$94,856,130	$121,039,865
2021	$61,429,259	$68,640,731	$75,852,202	2021	$16,131,360	$24,003,580	$30,363,297	2021	$61,437,010	$92,644,311	$118,389,186
2022	$64,501,746	$72,543,266	$80,584,785	2022	$15,498,208	$23,288,060	$29,375,779	2022	$62,803,132	$95,831,326	$122,369,909
2023	$62,738,079	$71,047,891	$79,357,703	2023	$14,969,503	$22,865,623	$28,727,790	2023	$60,247,175	$93,913,514	$119,806,484
2024	$65,049,976	$74,207,711	$83,365,445	2024	$14,537,422	$22,501,409	$28,262,660	2024	$61,074,485	$96,709,119	$123,611,992
2025	$66,335,816	$76,266,307	$86,196,797	2025	$13,836,436	$21,702,197	$27,173,319	2025	$60,617,875	$97,968,503	$125,359,253
2026	$66,747,596	$77,378,134	$88,008,672	2026	$13,088,664	$20,841,024	$26,036,314	2026	$59,677,080	$98,219,158	$125,758,849
2027	$67,640,038	$79,107,078	$90,574,118	2027	$12,421,446	$20,002,589	$24,927,561	2027	$59,127,451	$99,109,667	$127,153,866
2028	$66,703,356	$78,747,363	$90,791,371	2028	$11,664,174	$19,082,835	$23,686,789	2028	$57,391,963	$97,830,198	$125,365,355
2029	$65,512,654	$78,119,050	$90,725,446	2029	$11,213,038	$18,613,987	$23,078,080	2029	$55,466,767	$96,733,037	$124,431,329
2030	$64,412,876	$77,630,940	$90,849,003	2030	$10,844,359	$18,157,026	$22,483,752	2030	$54,101,988	$95,787,966	$123,625,514

In each year, there is an increase in total taxation revenue (compared to the current CPP-D policy). In 2006, the expected change in total taxation revenue is approximately $43 million. In 2015, this will increase to approximately $59 million (an increase of 37% from 2006) and in 2025 the expected change in taxation revenue will be approximately $76 million (an increase of 77% from 2006). There is also a saving in CPP-D costs in each year from 2006 to 2030. In 2006 the expected cost saving is approximately $24 million, and it increases every year until 2015, when it is approximately $27 million. From 2016 onwards, the CPP-D cost saving is lower in each year until it reaches approximately $18 million in 2030.

The total gain the government can expect in each year varies from about $67 million in 2006 to $99 million in 2027 (in present valued dollars). In 2015, the expected total gain in government income is approximately $87 million (a 30% increase from 2006) and in 2025 the expected total gain is approximately $98 million (a 46% increase from 2006)

The following chart shows the economic simulation results of a scenario in which 20% of recipients (both genders and all age groups) will take advantage of the new policy.

Expected Back to Work Assumptions

Males	**20%**
Females	**20%**

Yearly Change in Total Government Income Attributable to Total Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Gain Side				Cost Side				Net Gain or Cost			
Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper	Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved	Year	Lower 95%	Simulated Expected	95% Upper
2006	$82,992,663	$87,084,298	$91,175,932	2006	$40,841,891	$47,912,250	$54,490,768	2006	$115,135,168	$134,996,548	$153,502,552
2007	$84,449,710	$88,854,609	$93,259,507	2007	$40,154,956	$48,487,300	$56,299,248	2007	$114,098,599	$137,341,908	$159,167,631
2008	$89,377,891	$94,310,959	$99,244,028	2008	$40,023,736	$49,379,184	$58,178,578	2008	$116,824,958	$143,690,144	$169,016,189
2009	$92,501,146	$97,904,411	$103,307,676	2009	$39,877,687	$50,301,792	$60,017,324	2009	$118,113,590	$148,206,203	$176,313,689
2010	$96,364,308	$102,322,640	$108,280,973	2010	$40,463,594	$51,716,042	$62,430,420	2010	$121,084,747	$154,038,682	$185,533,450
2011	$100,119,057	$106,673,062	$113,227,067	2011	$40,367,071	$52,523,021	$63,876,382	2011	$122,466,201	$159,196,083	$193,602,179
2012	$103,988,503	$111,196,989	$118,405,474	2012	$40,842,207	$53,900,713	$66,122,852	2012	$125,183,147	$165,097,702	$202,580,813
2013	$105,844,264	$113,615,451	$121,386,639	2013	$40,845,124	$54,629,944	$67,509,877	2013	$126,067,121	$168,245,395	$207,800,888
2014	$104,816,948	$112,969,836	$121,122,724	2014	$40,469,904	$54,900,158	$68,452,986	2014	$123,893,835	$167,869,994	$209,333,843
2015	$109,649,713	$118,687,294	$127,724,876	2015	$39,967,490	$54,883,869	$68,919,229	2015	$126,251,797	$173,571,163	$218,283,391
2016	$118,082,407	$128,398,286	$138,714,164	2016	$38,465,615	$53,628,254	$67,615,023	2016	$130,509,452	$182,026,540	$230,420,775
2017	$118,211,995	$129,161,076	$140,110,156	2017	$37,640,200	$53,105,530	$67,483,404	2017	$128,782,716	$182,266,606	$232,261,021
2018	$123,418,290	$135,541,489	$147,664,689	2018	$36,473,892	$52,164,576	$66,246,471	2018	$130,404,769	$187,706,066	$239,517,718
2019	$125,642,939	$138,735,733	$151,828,527	2019	$35,298,366	$51,040,534	$64,840,212	2019	$130,169,711	$189,776,267	$242,587,853
2020	$126,234,127	$140,193,677	$154,153,227	2020	$33,794,237	$49,707,950	$62,980,633	2020	$127,593,564	$189,901,627	$242,668,550
2021	$122,813,873	$137,231,574	$151,649,276	2021	$32,340,557	$48,130,352	$60,890,538	2021	$122,825,255	$185,361,927	$236,970,157
2022	$128,978,229	$145,058,117	$161,138,005	2022	$31,031,960	$46,620,438	$58,796,613	2022	$125,480,795	$191,678,555	$244,852,533
2023	$125,313,921	$141,912,056	$158,510,191	2023	$30,025,994	$45,869,975	$57,637,489	2023	$120,311,318	$187,782,031	$239,695,820
2024	$129,856,240	$148,137,398	$166,418,556	2024	$29,220,915	$45,230,427	$56,813,022	2024	$121,767,151	$193,367,825	$247,431,655
2025	$132,505,896	$152,342,067	$172,178,237	2025	$27,450,606	$43,055,084	$53,908,407	2025	$121,495,057	$195,397,151	$249,589,454
2026	$133,507,044	$154,770,008	$176,032,972	2026	$26,166,879	$41,669,181	$52,061,321	2026	$119,422,572	$196,439,189	$251,482,936
2027	$135,406,012	$158,361,442	$181,316,873	2027	$24,745,071	$39,850,466	$49,665,422	2027	$118,591,869	$198,211,908	$254,066,802
2028	$133,556,502	$157,671,564	$181,786,625	2028	$23,260,083	$38,051,890	$47,229,615	2028	$115,031,980	$195,723,453	$250,658,263
2029	$131,156,501	$156,394,538	$181,632,575	2029	$22,379,576	$37,145,640	$46,048,357	2029	$111,095,636	$193,540,178	$248,860,717
2030	$128,913,526	$155,367,666	$181,821,805	2030	$21,736,045	$36,396,062	$45,071,698	2030	$108,149,652	$191,763,727	$247,607,694

There is an economic benefit under the new CPP-D policy in each year of the forecast period. The total gain the government can expect in each year varies from about $135 million in 2006 to $198 million in 2027 (in present valued dollars).

The following chart shows the economic simulation results of a scenario in which 30% of recipients (both genders and all age groups) will take advantage of the new policy.

Expected Back to Work Assumptions

Males	**30%**
Females	**30%**

Yearly Change in Total Government Income Attributable to Total Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Gain Side				Cost Side				Net Gain or Cost			
Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper	Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved	Year	Lower 95%	Simulated Expected	95% Upper
2006	$124,524,521	$130,663,724	$136,802,928	2006	$61,773,555	$72,467,231	$82,418,002	2006	$173,005,976	$203,130,955	$231,204,018
2007	$126,795,480	$133,409,135	$140,022,790	2007	$60,413,208	$72,950,209	$84,705,676	2007	$171,347,576	$206,359,344	$239,240,916
2008	$134,180,686	$141,586,573	$148,992,459	2008	$60,072,972	$74,116,178	$87,325,646	2008	$175,365,745	$215,702,751	$253,731,785
2009	$138,862,685	$146,974,064	$155,085,443	2009	$60,315,244	$76,078,765	$90,767,521	2009	$177,333,477	$223,052,830	$265,744,247
2010	$144,646,871	$153,590,578	$162,534,285	2010	$60,985,667	$77,953,611	$94,109,808	2010	$181,819,953	$231,544,188	$279,065,192
2011	$150,041,124	$159,863,133	$169,685,141	2011	$60,128,579	$78,231,430	$95,137,671	2011	$183,518,180	$238,094,562	$289,212,840
2012	$156,043,904	$166,860,870	$177,677,837	2012	$60,913,873	$80,396,408	$98,632,720	2012	$187,858,539	$247,257,278	$303,042,619
2013	$158,903,940	$170,570,820	$182,237,700	2013	$61,261,178	$81,942,279	$101,267,310	2013	$189,254,157	$252,513,099	$311,843,336
2014	$157,587,211	$169,844,685	$182,102,158	2014	$60,946,881	$82,671,883	$103,074,932	2014	$186,069,551	$252,516,567	$315,163,860
2015	$164,482,536	$178,039,564	$191,596,593	2015	$60,349,600	$82,865,289	$104,050,418	2015	$189,267,997	$260,904,853	$328,592,318
2016	$176,632,263	$192,063,155	$207,494,048	2016	$58,306,641	$81,286,106	$102,785,613	2016	$195,145,911	$273,349,261	$346,808,366
2017	$177,104,247	$193,508,070	$209,911,893	2017	$56,413,143	$79,587,500	$101,131,901	2017	$193,010,592	$273,095,570	$347,953,834
2018	$185,262,009	$203,460,027	$221,658,045	2018	$54,470,523	$77,908,201	$98,944,444	2018	$195,873,437	$281,368,228	$358,680,328
2019	$188,709,196	$208,373,895	$228,038,594	2019	$53,061,812	$76,732,963	$97,485,299	2019	$195,398,909	$285,106,859	$364,596,826
2020	$189,586,876	$210,552,265	$231,517,653	2020	$50,522,883	$74,306,490	$94,138,369	2020	$191,643,095	$284,858,754	$363,768,207
2021	$184,503,472	$206,163,208	$227,822,943	2021	$48,073,386	$71,543,182	$90,509,062	2021	$184,851,912	$277,706,389	$354,330,159
2022	$193,523,070	$217,649,850	$241,776,630	2022	$46,768,184	$70,265,470	$88,624,022	2022	$188,037,364	$287,915,320	$368,150,626
2023	$188,088,907	$213,001,742	$237,914,577	2023	$44,897,380	$68,580,748	$86,164,251	2023	$180,672,284	$281,582,490	$359,195,164
2024	$194,868,740	$222,302,357	$249,735,973	2024	$43,596,237	$67,489,940	$84,782,630	2024	$183,125,831	$289,792,297	$370,354,571
2025	$198,727,185	$228,476,702	$258,226,218	2025	$41,606,139	$65,261,784	$81,718,407	2025	$181,514,477	$293,738,485	$376,049,786
2026	$200,143,602	$232,019,419	$263,895,237	2026	$39,475,347	$62,863,374	$78,542,855	2026	$178,619,454	$294,882,793	$377,980,431
2027	$203,162,583	$237,604,810	$272,047,036	2027	$37,290,758	$60,053,528	$74,843,262	2027	$177,525,391	$297,658,338	$381,929,486
2028	$200,350,095	$236,525,457	$272,700,819	2028	$35,345,209	$57,821,423	$71,766,188	2028	$171,400,415	$294,346,879	$378,046,516
2029	$196,923,321	$234,816,663	$272,710,005	2029	$33,560,990	$55,706,974	$69,060,981	2029	$166,821,522	$290,523,637	$373,535,887
2030	$193,611,572	$233,342,295	$273,073,017	2030	$32,753,696	$54,842,057	$67,912,153	2030	$161,928,828	$288,184,351	$372,502,585

There is an economic benefit under the new CPP-D policy in each year of the forecast period. The total gain the government can expect in each year varies from about $203 million in 2006 to $298 million in 2027 (in present valued dollars).

The following chart shows the economic simulation results of a scenario in which 40% of recipients (both genders and all age groups) will take advantage of the new policy.

Expected Back to Work Assumptions

Males	**40%**
Females	**40%**

Yearly Change in Total Government Income Attributable to Total Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Gain Side				Cost Side				Net Gain or Cost			
Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper	Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved	Year	Lower 95%	Simulated Expected	95% Upper
2006	$165,961,357	$174,143,444	$182,325,532	2006	$81,784,231	$95,940,933	$109,117,873	2006	$230,347,981	$270,084,377	$307,126,847
2007	$168,623,824	$177,629,679	$186,435,534	2007	$80,613,820	$97,345,217	$113,037,140	2007	$228,323,222	$274,974,896	$318,801,015
2008	$178,706,762	$188,570,194	$198,433,626	2008	$80,173,605	$98,916,273	$116,546,600	2008	$233,681,473	$287,486,467	$338,214,375
2009	$185,132,861	$195,947,018	$206,761,174	2009	$80,426,634	$101,452,810	$121,052,444	2009	$236,546,593	$297,399,827	$354,248,776
2010	$192,834,043	$204,757,227	$216,680,410	2010	$80,854,058	$103,337,406	$124,745,700	2010	$242,236,271	$308,094,633	$371,037,116
2011	$200,194,812	$213,299,987	$226,405,162	2011	$80,168,916	$104,315,840	$126,870,287	2011	$244,882,363	$317,615,827	$385,753,776
2012	$208,253,695	$222,689,846	$237,125,997	2012	$81,539,006	$107,614,597	$132,021,344	2012	$250,619,635	$330,304,443	$405,139,435
2013	$211,846,379	$227,400,344	$242,954,308	2013	$81,860,705	$109,484,713	$135,294,588	2013	$252,233,837	$336,885,057	$416,269,515
2014	$209,702,515	$226,013,629	$242,324,743	2014	$80,848,147	$109,671,111	$136,740,800	2014	$247,824,565	$335,684,741	$418,522,637
2015	$219,341,911	$237,420,576	$255,499,240	2015	$79,312,647	$108,904,314	$136,747,369	2015	$252,607,580	$346,324,889	$434,875,279
2016	$236,282,439	$256,924,472	$277,566,505	2016	$77,540,340	$108,105,406	$136,703,226	2016	$260,901,000	$366,029,878	$462,845,966
2017	$236,682,956	$258,605,103	$280,527,250	2017	$75,264,760	$106,183,485	$134,927,555	2017	$257,749,914	$364,788,588	$464,841,250
2018	$246,683,544	$270,914,910	$295,146,277	2018	$73,032,881	$104,449,511	$132,644,500	2018	$260,634,794	$375,364,421	$479,101,499
2019	$251,146,676	$277,317,758	$303,488,840	2019	$71,182,895	$102,942,327	$130,786,904	2019	$259,896,591	$380,260,085	$486,920,454
2020	$252,750,487	$280,700,798	$308,651,109	2020	$67,177,727	$98,808,204	$125,187,175	2020	$255,700,312	$379,509,003	$484,337,029
2021	$245,882,434	$274,747,737	$303,613,040	2021	$64,180,138	$95,506,197	$120,816,701	2021	$246,242,803	$370,253,934	$472,572,584
2022	$257,948,810	$290,107,633	$322,266,457	2022	$61,849,941	$92,939,523	$117,236,732	2022	$251,349,934	$383,047,157	$488,869,967
2023	$250,386,642	$283,550,964	$316,715,286	2023	$59,845,650	$91,423,762	$114,876,413	2023	$240,702,189	$374,974,726	$478,283,053
2024	$259,967,571	$296,565,799	$333,164,027	2024	$58,299,235	$90,235,539	$113,337,532	2024	$243,898,413	$386,801,338	$494,682,227
2025	$265,119,874	$304,808,395	$344,496,917	2025	$55,481,336	$87,021,875	$108,960,598	2025	$242,083,806	$391,830,271	$501,644,570
2026	$266,897,211	$309,404,524	$351,911,837	2026	$51,974,468	$82,768,568	$103,413,715	2026	$239,496,436	$392,173,092	$501,297,185
2027	$270,709,225	$316,602,658	$362,496,092	2027	$49,566,561	$79,824,785	$99,486,067	2027	$236,951,323	$396,427,443	$508,301,148
2028	$266,784,310	$314,955,083	$363,125,856	2028	$46,668,170	$76,340,199	$94,745,246	2028	$229,389,369	$391,295,282	$501,496,036
2029	$262,124,537	$312,564,346	$363,004,154	2029	$44,836,012	$74,429,159	$92,279,109	2029	$221,959,478	$386,993,505	$497,767,582
2030	$257,791,018	$310,691,901	$363,592,785	2030	$43,272,398	$72,456,037	$89,725,564	2030	$216,834,427	$383,147,938	$494,223,684

There is an economic benefit under the new CPP-D policy in each year of the forecast period. The total gain the government can expect in each year varies from about $270 million in 2006 to $396 million in 2027 (in present valued dollars).

The following chart shows the economic simulation results of a scenario in which 50% of recipients (both genders and all age groups) will take advantage of the new policy.

Expected Back to Work Assumptions

Males	**50%**
Females	**50%**

Yearly Change in Total Government Income Attributable to Total Back to Work Prevalence, Simulation Results, 2006-2030, 2005 Present Values

Gain Side				Cost Side				Net Gain or Cost			
Year	Total Taxation Change 95% Lower	Total Taxation Change Simulated Expected	Total Taxation Change 95% Upper	Year	CPPD 95% Lower Cost Saved	CPPD Simulated Expected Cost Saved	CPPD 95% Upper Cost Saved	Year	Lower 95%	Simulated Expected	95% Upper
2006	$207,425,550	$217,651,870	$227,878,191	2006	$102,408,204	$120,135,379	$136,633,894	2006	$287,986,437	$337,787,249	$384,204,813
2007	$211,016,362	$222,022,980	$233,029,599	2007	$100,145,995	$120,927,814	$140,413,285	2007	$285,069,062	$342,950,795	$397,306,834
2008	$223,550,691	$235,889,211	$248,227,731	2008	$99,964,741	$123,329,239	$145,303,580	2008	$292,094,493	$359,218,449	$422,490,748
2009	$231,460,876	$244,981,188	$258,501,501	2009	$100,157,337	$126,335,854	$150,731,863	2009	$295,524,935	$371,317,043	$442,097,912
2010	$240,831,002	$255,721,901	$270,612,800	2010	$101,919,327	$130,260,593	$157,246,696	2010	$302,779,099	$385,982,495	$465,501,896
2011	$250,303,122	$266,688,493	$283,073,863	2011	$100,657,042	$130,970,779	$159,283,882	2011	$306,163,162	$397,659,272	$483,369,543
2012	$260,442,937	$278,496,847	$296,550,757	2012	$101,484,201	$133,938,139	$164,315,023	2012	$313,370,762	$412,434,986	$505,468,362
2013	$264,886,894	$284,335,144	$303,783,394	2013	$102,887,394	$137,613,664	$170,061,071	2013	$315,384,417	$421,948,808	$521,888,778
2014	$262,294,527	$282,696,361	$303,098,195	2014	$101,389,900	$137,537,286	$171,486,024	2014	$309,888,966	$420,233,646	$524,271,763
2015	$274,160,889	$296,757,859	$319,354,830	2015	$99,745,230	$136,953,301	$171,962,049	2015	$315,592,673	$433,711,160	$545,315,573
2016	$295,074,269	$320,852,455	$346,630,641	2016	$96,353,208	$134,342,838	$169,889,435	2016	$326,163,292	$455,195,293	$576,412,317
2017	$295,827,492	$323,227,748	$350,628,005	2017	$94,108,300	$132,761,961	$168,696,351	2017	$322,126,856	$455,989,709	$581,113,761
2018	$308,448,322	$338,746,753	$369,045,183	2018	$90,576,349	$129,554,542	$164,540,611	2018	$326,355,741	$468,301,295	$596,667,126
2019	$314,380,314	$347,140,743	$379,901,172	2019	$87,999,211	$127,265,759	$161,693,340	2019	$325,916,885	$474,406,502	$605,995,458
2020	$315,977,565	$350,919,816	$385,862,068	2020	$84,136,831	$123,758,087	$156,804,555	2020	$319,552,528	$474,677,904	$606,035,467
2021	$307,404,914	$343,492,632	$379,580,350	2021	$80,450,127	$119,737,534	$151,491,736	2021	$307,782,639	$463,230,167	$591,534,390
2022	$322,655,866	$362,881,805	$403,107,744	2022	$77,390,172	$116,288,357	$146,686,865	2022	$314,238,903	$479,170,162	$611,692,958
2023	$313,349,303	$354,853,183	$396,357,063	2023	$75,021,018	$114,618,518	$144,036,808	2023	$300,965,817	$469,471,701	$599,158,533
2024	$324,582,076	$370,276,732	$415,971,388	2024	$72,657,279	$112,469,137	$141,275,580	2024	$304,998,765	$482,745,869	$616,965,478
2025	$330,972,776	$380,519,495	$430,066,215	2025	$69,438,873	$108,915,485	$136,375,417	2025	$302,158,072	$489,434,981	$626,781,632
2026	$333,245,211	$386,319,421	$439,393,630	2026	$65,282,525	$103,956,942	$129,881,455	2026	$298,436,026	$490,276,362	$627,381,153
2027	$338,138,294	$395,463,002	$452,787,711	2027	$62,302,336	$100,343,469	$125,067,752	2027	$295,314,906	$495,806,471	$636,482,664
2028	$333,666,622	$393,913,715	$454,160,808	2028	$58,474,339	$95,668,656	$118,754,251	2028	$286,728,437	$489,582,371	$627,717,665
2029	$327,768,234	$390,839,655	$453,911,076	2029	$56,259,345	$93,388,864	$115,782,058	2029	$276,910,870	$484,228,519	$623,368,457
2030	$322,055,480	$388,143,972	$454,232,464	2030	$54,635,292	$91,474,381	$113,269,316	2030	$269,270,524	$479,618,353	$620,083,496

There is an economic benefit under the new CPP-D policy in each year of the forecast period. The total gain the government can expect in each year varies from about $338 million in 2006 to $496 million in 2027 (in present valued dollars).

Appendix VIII. Opinion Survey Details

Percentage of CPP-D Recipients Going Back to Work (Policy Take Up Rate between 0-100%)

The survey had required each disability specialist to complete two tables which reflected their opinion of the percentage of CPP-D recipients that will return to work when a policy is implemented. The tables were prepared to be completed reflecting:

- Table 1: Males: CPP-D Disability Scenarios: Percentage of CPP-D Recipients Going Back to Work (Policy Take Up Rate between 0-100%). For the age groups 18-34 years, 35-50 years, 50-64 years, The disability specialist's Low Estimate, Expected Estimate, and Upper Estimate of the CPP-D recipients that will return to work when a policy is implemented;
- Table 2: Females: CPP-D Disability Scenarios: Percentage of CPP-D Recipients Going Back to Work (Policy Take Up Rate between 0-100%). For the age groups 18-34 years, 35-50 years, 50-64 years, The disability specialist's Low Estimate, Expected Estimate, and Upper Estimate of the CPP-D recipients that will return to work when a policy is implemented;

The data collected as a result of the survey represented a series of ranges for each age group (18-34 years, 35-50 years, 50-64 years), and gender. A value of 1 is assigned to 100% of CPP-D recipients that will return to work when a policy is implemented, and a value of 0 is assigned to 0% of CPP-D recipients that will return to work when a policy is implemented. For each response i, the ranges were assumed to correspond to a triangular probability distribution $T_i(\mu, b, w)$ (highest probability at the expected survey point μ and negligible at the best b and worst w edges). The results are then combined, resulting in a sampling distribution:

$$D = \frac{\sum_i f_i T_i(\mu, b, w)}{\sum_i T_i(\mu, b, w)}$$

Here the functions f_i represent the weight functions to each individual response. These are assumed for each disability specialist working with patients disabled from the effects of a particular disease as:

$$f_i = \frac{CPPD_d(t)}{\sum_d CPPD_d(t)}$$

Where:

$$\sum_i f_i = 1$$

The resulting sampling distribution D is normalized (the probabilities of all events have a combined unit value).

A simple Monte Carlo (MC) algorithm has then been used to randomly sample from within the distribution D. In essence, the MC algorithm will simulate a large number of (artificial) responses based on the constraints resulting from the specialist responses. Given a sufficient number of such simulated responses (for cancer, circulatory disease, chronic obstructive pulmonary disease, HIV/AIDS, mental illness), the results must converge (approximately) to a normal distribution[14].

[14] As required by the central limit theorem.

Results:

Males: 18-34 years

Simulation Summary

Measure	*Total Expected 18 to 34yr*
Observations	10,000
Mean	0.45368
Standard Deviation	0.02633
Posterior STD	0.00026
Variance	0.00069
Minimum	0.38066
5th Percentile	0.4093
Median	0.45395
95th Percentile	0.49739
Maximum	0.53166

Males: 35-50 years

Simulation Summary

Measure	*Total Expected 35 to 50yr*
Observations	10,000
Mean	0.40568
Standard Deviation	0.02475
Posterior STD	0.00025
Variance	0.00061
Minimum	0.33747
5th Percentile	0.36401
Median	0.4059
95th Percentile	0.44666
Maximum	0.47438

Males: 50-64 years

Simulation Summary

Measure	*Total Expected 51 to 64yr*
Observations	10,000
Mean	0.28279
Standard Deviation	0.01815
Posterior STD	0.00018
Variance	0.00033
Minimum	0.23218
5th Percentile	0.25453
Median	0.28165
95th Percentile	0.31426
Maximum	0.34276

Females: 18-34 years

Simulation Summary

Measure	Total Expected 18 to 34yr
Observations	10,000
Mean	0.46831
Standard Deviation	0.02789
Posterior STD	0.00028
Variance	0.00078
Minimum	0.39393
5th Percentile	0.42111
Median	0.46849
95th Percentile	0.51459
Maximum	0.54747

Females: 35-50 years

Simulation Summary

Measure	Total Expected 35 to 50yr
Observations	10,000
Mean	0.4296
Standard Deviation	0.03071
Posterior STD	0.00031
Variance	0.00094
Minimum	0.35266
5th Percentile	0.37796
Median	0.42955
95th Percentile	0.48052
Maximum	0.51005

Females: 50-64 years

Simulation Summary

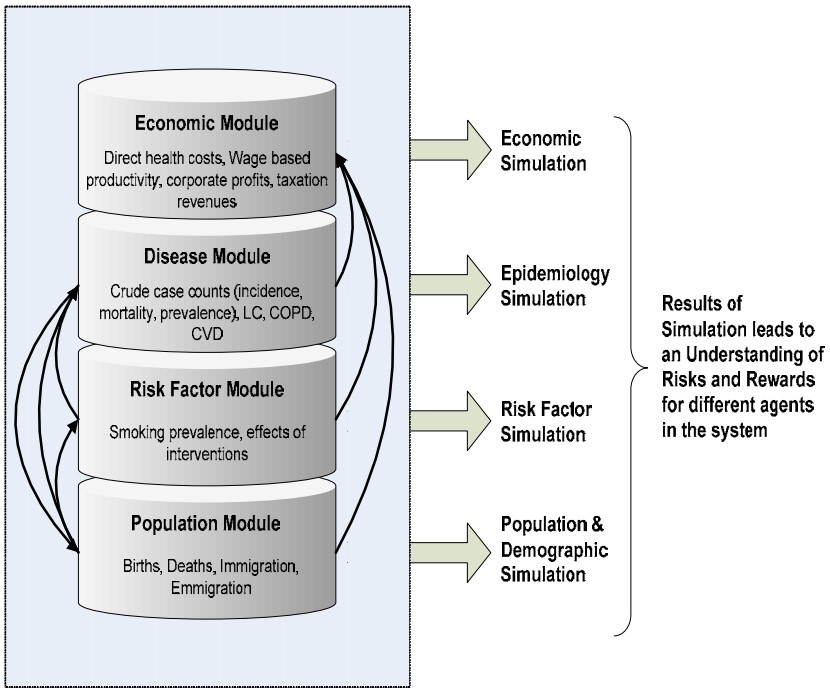
Measure	Total Expected 51 to 64yr
Observations	10,000
Mean	0.31029
Standard Deviation	0.02592
Posterior STD	0.00026
Variance	0.00067
Minimum	0.24747
5th Percentile	0.27153
Median	0.30744
95th Percentile	0.35691
Maximum	0.38916

Appendix IX. Simulation Engine

The simulation engine consists of four modules which together simulate the population and labour force, possible disease prevalence, and the associated economic value. The simulation within each module is carried out using a Monte Carlo algorithm based on a random number generator. Each step in the simulation is then chosen randomly for an appropriate distribution of all possible next steps (Distributions which are tested using a standard Kolmogorov-Smirnov procedure). This is the Metropolis-Hastings algorithm which, at each time t, generates a random walk using a proposed density and a method for rejecting proposed moves. That is, given an initial value at time t the algorithm allows us to choose and accept or reject the next value. When the value is rejected, we repeat the process again. The process is repeated many times resulting in a Markov chain in which the last value is independent of the initial (in theory, given sufficiently many trials). The appropriate statistics are computed (central tendency and spread). As the number N of individual trials increases, the solution will converge at a rate which is proportional to $1/\sqrt{N}$. Such slow convergence is typical of the Monte Carlo scheme and as a result requires increasingly powerful computational resources.

The four modules that make up the simulation engine are: a population module, a risk factor module, a disease module and an economic module. The modules are connected with one another through inputs but otherwise act as independent functions. For the purposes of assessing the economic costs or benefits of a change in CPP-D policy, the risk factor module is not relevant and was not used in the quantitative analysis.

Exhibit 52: Overview of Simulation Model Structure



The four modules within the model along with their interactions.

In this study, the model focuses on 5 diseases and their associated disability levels. They are Cancer, Circulatory disease (CD), Chronic Obstructive Pulmonary disease (COPD), HIV/AIDS, and Mental illnesses. Given the initial disease prevalence conditions, the model simulates all of the possible future disease prevalence trajectories for each disease. The subsequent steps in the simulation are chosen from all possible next steps. These are

chosen randomly with a probability given by an appropriate distribution function (tested from historical data using the standard Kolmogorov-Smirnov procedure).

1.1. Population Simulations

The future population is simulated as a boundary within which the actual (measured) future population is expected to lie. The model differentiates between 100 age groups and 2 genders (any two people in a single group are of the same age and gender). All age groups will also depend on the immigration and emigration rates given by $\mathrm{Im}_a(t)$ and $Em_a(t)$ respectively. At each point in time the population is subject to mortality $M_a(t)$, subject to life $L_a(t)$, as well as subject to immigration and emigration. These are randomly chosen from their respective transition probability distributions under the completeness condition (the combined probability of all of these events must be unity). We compute the population at time t for each of these (random walk) trials as:

$$P_a(t) = \left[P_{a-1}(t-1) + (Em_a(t) - \mathrm{Im}_a(t))\right] \cdot (1 - M_a(t))$$

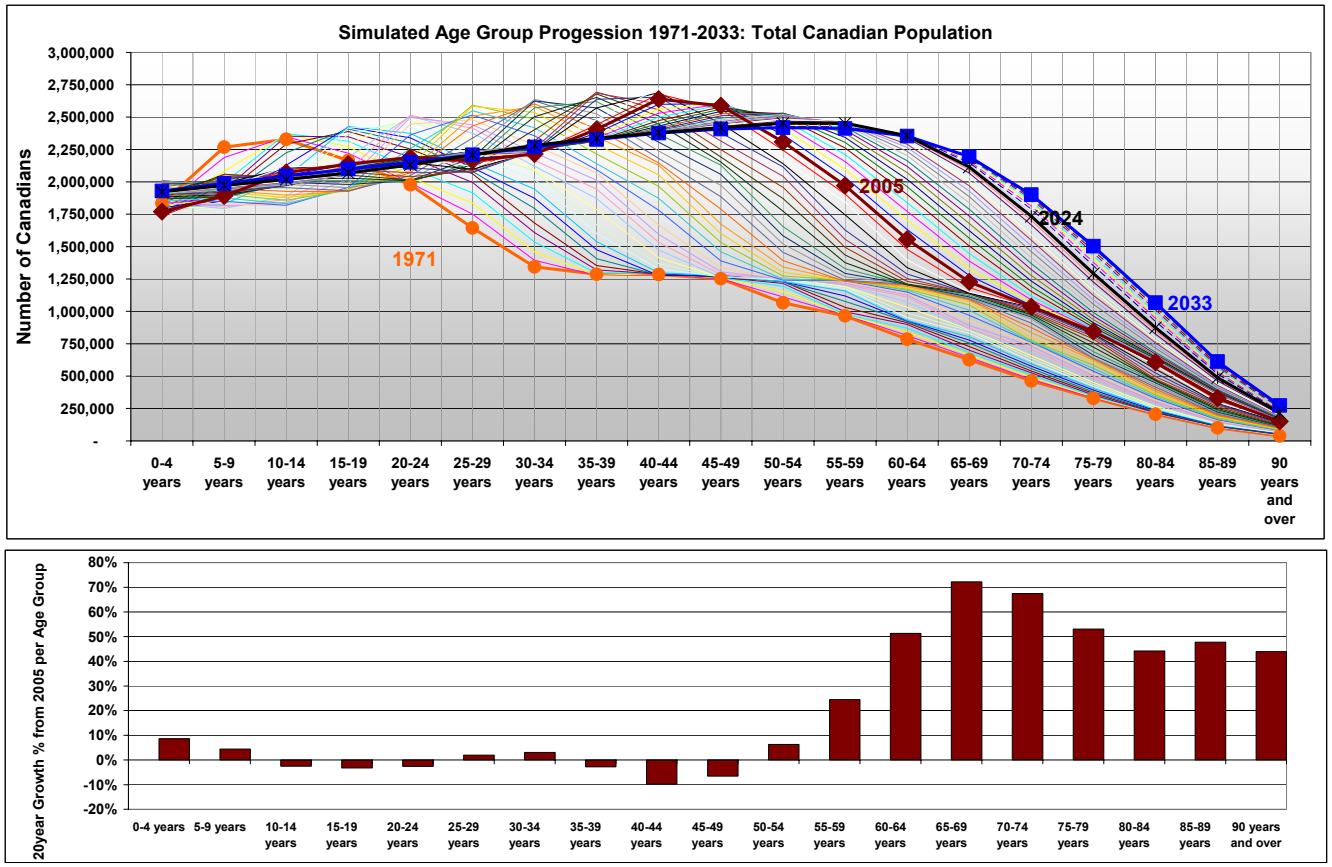
For all age groups expect for the first year (age 0). In the first year we must take into account the birth rate $Br_a(t)$ based on females aged 16 to 50. We have:

$$P_0(t) = \left[\sum_a P_{a-1}(t-1) \cdot Br_{a-1}(t-1) + (Em_0(t) - \mathrm{Im}_0(t))\right] \cdot (1 - M_0(t))$$

At each time t the random walk Monte Carlo required about 10000 trials in order to reach an appropriate accuracy (slightly different for the various age groups). Exhibit 2 illustrates the simulated population as a function of age. The exhibit is a contour plot in which each line indicates a different year. A very clear increase in the higher age (older) population occurs as one moves from 1971 (orange dots) to 2003 (brown diamonds) and eventually simulates the results until 2033 (blue squares).

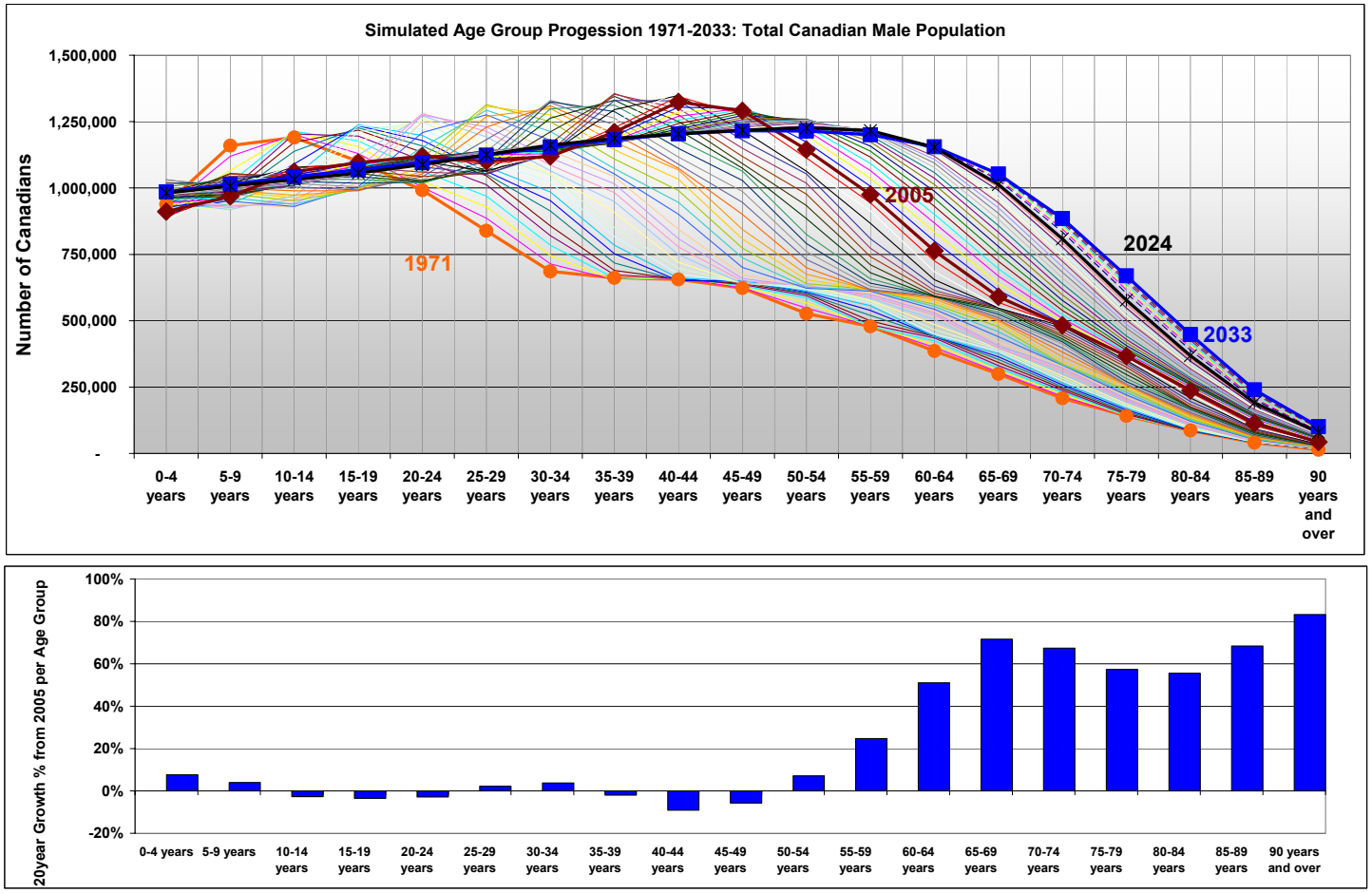
Exhibits 3 and 4 illustrate the results of the population simulation for the male and female population respectively (again as a function of age and time). It is clear that the shift towards an older population is not a phenomenon unique to just males or females.

Exhibit 53: Canadian Population Age Group Simulations 1971-2033



RiskAnalytica Life at Risk (2005)
Smetanin, Paul., Kobak, Paul. (2005) Population-Based Risk Analysis of Canadian Tobacco Control Simulations and Implications for the Research Landscape. Sponsored by The Canadian Tobacco Control Research Initiative.

Exhibit 54: Canadian Male Population Age Group Simulations 1971-2033



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Smetanin, Paul., Kobak, Paul. (2005) Population-Based Risk Analysis of Canadian Tobacco Control Simulations and Implications for the Research Landscape. Sponsored by The Canadian Tobacco Control Research Initiative.

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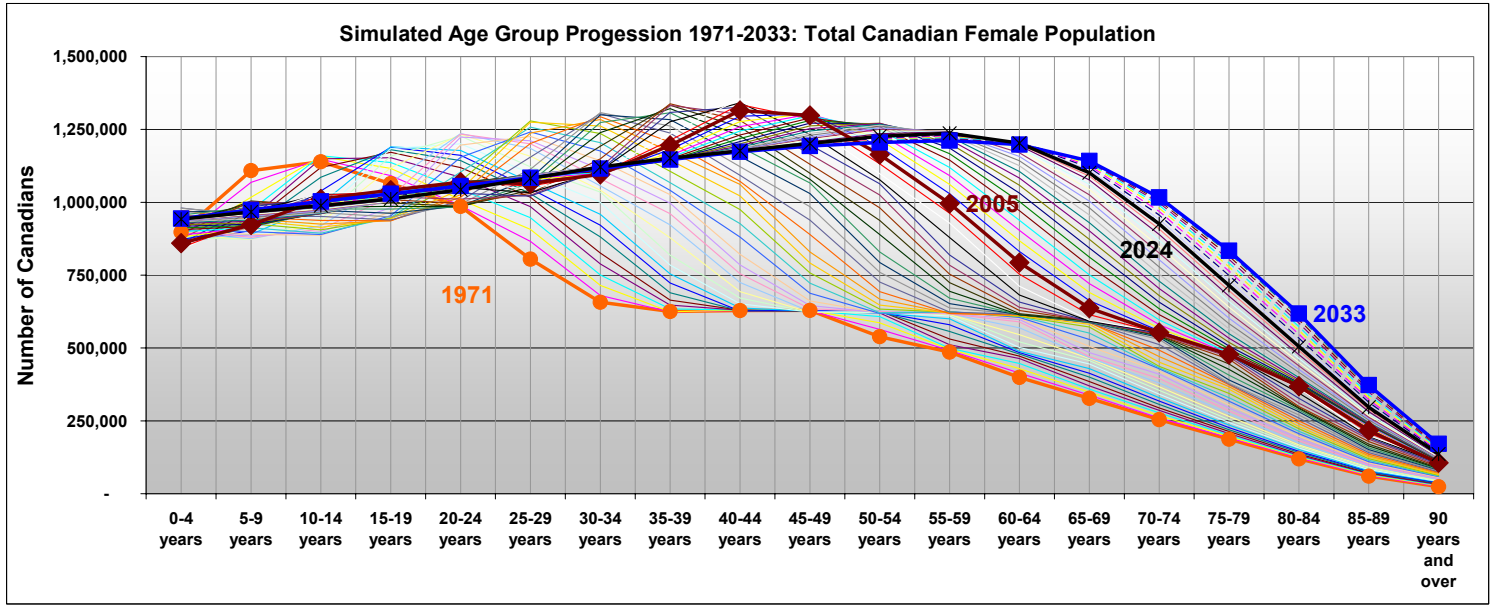
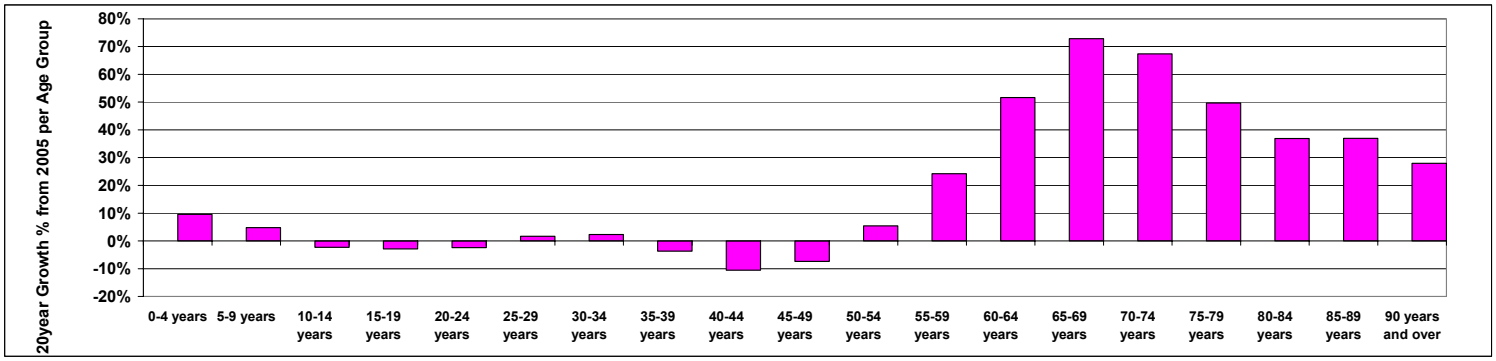
Exhibit 55: Canadian Female Population Age Group Simulations 1971-2033





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Smetanin, Paul., Kobak, Paul. (2005) Population-Based Risk Analysis of Canadian Tobacco Control Simulations and Implications for the Research Landscape. Sponsored by The Canadian Tobacco Control Research Initiative.

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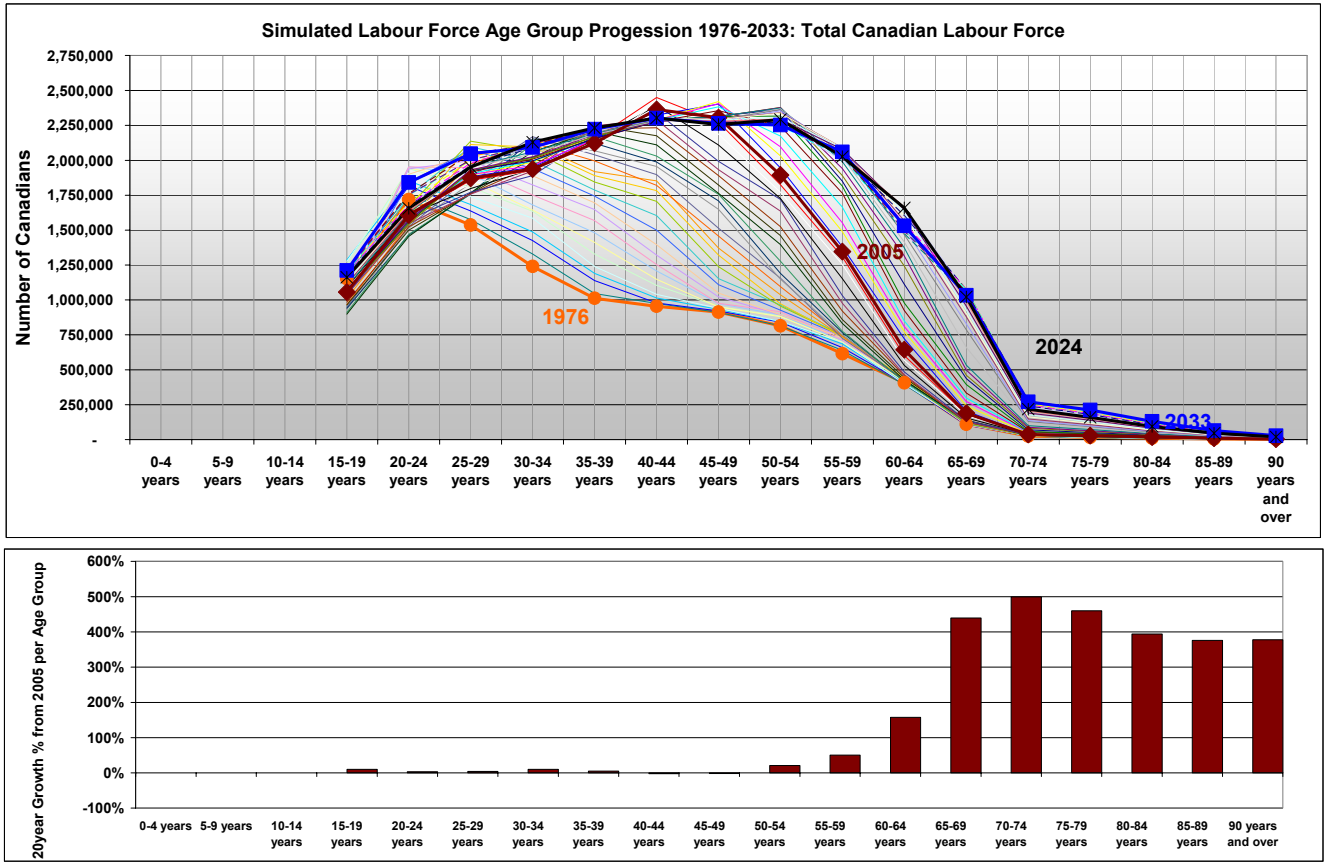
1.2. Labour Force Models

The future labour force is simulated as a boundary within which the actual (measured) future labour force numbers are expected to be found. The model differentiates between 75 age groups and 2 genders (any two people in a single group are of the same age and gender). At each time t the random walk Monte Carlo required about 10000 trials in order to reach an appropriate accuracy (slightly different for the various age groups). Exhibit 5 illustrates the simulated labour force as a function of age. The exhibit is a contour plot in which each line indicates a different year. A very clear increase in the higher age (older) population occurs as one moves from 1976 (orange dots) to 2003 (brown diamonds) and eventually simulates the results until 2033 (blue squares).

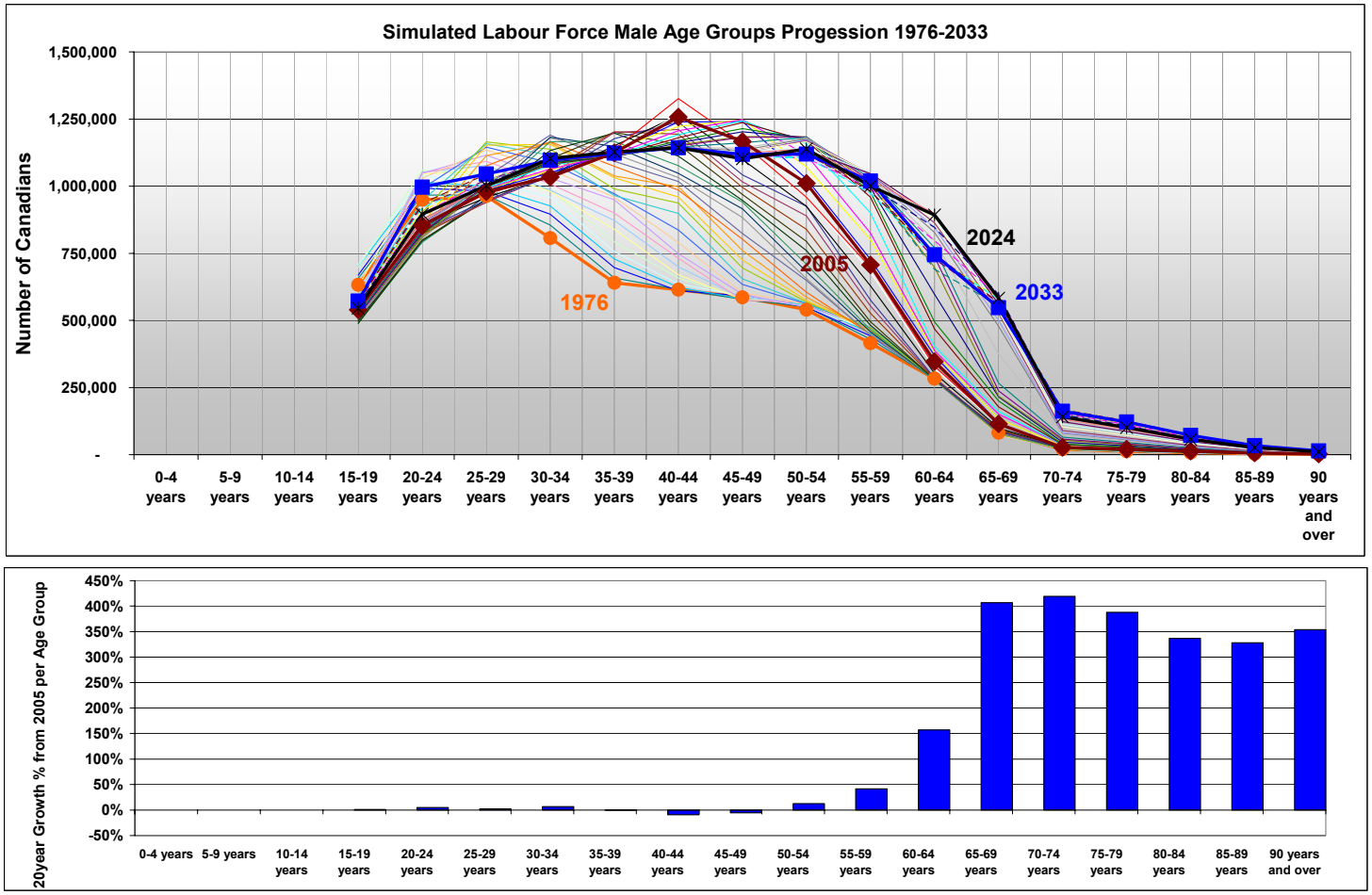
Exhibits 6 and 7 illustrate the results of the labour force simulation for males and females respectively.

Exhibit 56: Canadian Labour Force Total Age Group Simulations 1976-2033



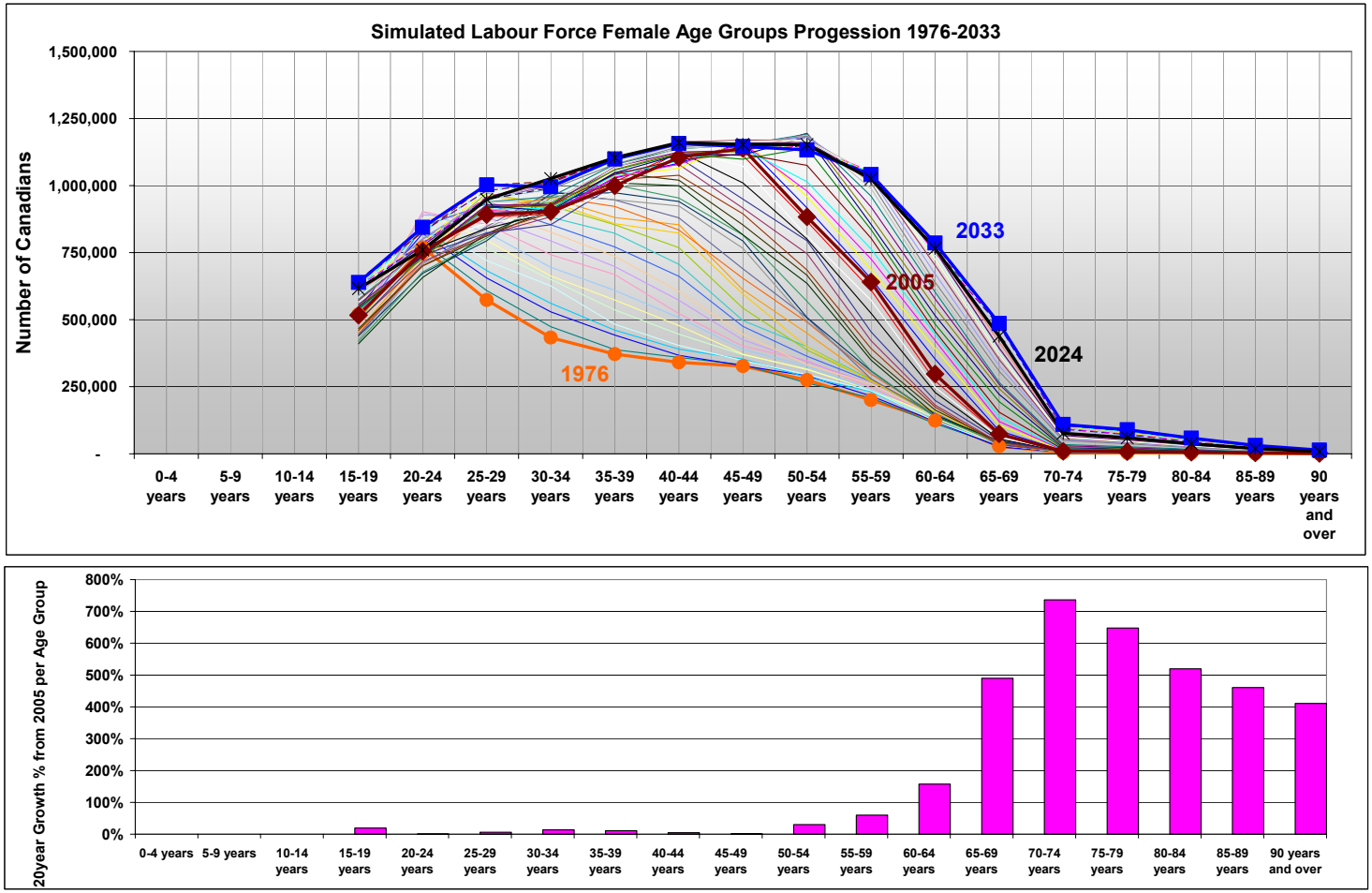
RiskAnalytica Life at Risk (2005)
Smetanin, Paul., Kobak, Paul. (2005) Population-Based Risk Analysis of Canadian Tobacco Control Simulations and Implications for the Research Landscape. Sponsored by The Canadian Tobacco Control Research Initiative.

Exhibit 57: Canadian Labour Force Male Age Group Simulations 1976-2033



RiskAnalytica Life at Risk (2005)
Smetanin, Paul., Kobak, Paul. (2005) Population-Based Risk Analysis of Canadian Tobacco Control Simulations and Implications for the Research Landscape. Sponsored by The Canadian Tobacco Control Research Initiative.

Exhibit 58: Canadian Labour Force Female Age Group Simulations 1976-2033



RiskAnalytica Life at Risk (2005)
Smetanin, Paul., Kobak, Paul. (2005) Population-Based Risk Analysis of Canadian Tobacco Control Simulations and Implications for the Research Landscape. Sponsored by The Canadian Tobacco Control Research Initiative.

1.3. Disease Scenario Results

The disease module simulates the incidence, mortality and the associated prevalence of Cancer, Circulatory disease (CD), Chronic Obstructive Pulmonary disease (COPD), HIV/AIDS, and Mental illnesses. The population is divided into those who have a particular disease and those who are healthy (have no disease). For each disease, the module then simulates the possible number of future incidence and mortality from a randomly selected series of life tables. At each point in time, t, individuals are transitioned to become either sick, healthy or to die (both as a result of a causal connection to the disease as well as from causes not related to the disease) randomly from a transition probability distribution function.

For each disease, the Monte Carlo process randomly chooses the incidence rate *IR* with the normalized probability $\hat{\pi}_a(t)$. This results in an incidence of: $Id_a(t) = IR_a(t)(1 - M_a(t))$

The distributions representing the Lung Cancer (related) rates were computed using historical Canadian smoking data obtained from the Statistics Canada. The distributions were tested using the Kolmogorov-Smirnov test in order to ensure that a proper type of distribution was being used. Unfortunately no reliable and self-consistent data exist in Canada for the CD and COPD.

The incidence rates for COPD and CD were estimated by Helen Johansen[15] using data which was "washed out" to find incident or first hospitalizations. For each year, she took every patient who had a visit with COPD or CVD as the first diagnosis (the index visit) and then looked at all the previous years of data to see if they had a prior admittance with COPD or CVD as any diagnosis. The number of years between the index visits and the closest prior admittance was recorded. The cut-off for the minimum number of years since the last admittance for the index visit to be considered incident was chosen after looking at the trends across several years. A 5 year washout was chosen for CD and a 4 year for COPD. The trends are quite short due to the fact that for a washout of *x* years we need that many years of data prior to the first year. We have linkable data from all jurisdictions starting in the fiscal year 1994/95 so for CD with a 5 year washout the first possible year is 1999/2000 and for COPD with a 4 year washout it is 1998/99. We used these estimates to indicate the possible future incidence rates at the expense of large error (due primarily to the small number of sample points). The result of this is a large systematic error in the simulation due to the *IR* variable. This additional error is not present in the Cancer case where historical incidence was available and the procedure was not used as a result).

Mortality is ideally computed using the survival function $Su(t - t_0)$ for those who were diagnosed with the chronic disease $(t - t_0)$ years ago. With the simulated incidence and mortality estimates we compute the prevalence as:

$$\Pr_a(t) = (\Pr_a(t-1) - Md_a(t))(1 - M_a(t)) + Id_a(t).$$

[15] Johansen Helen, Statistics Canada: To be published. Data used prior to publication with the permission of the author.

1.4. Economic Impacts

The final component within the model is the economic module. This module translates the mortality and prevalence trajectory for each disease (each Monte Carlo trajectory for mortality and prevalence) into an economic coordinate. The model considers the lost tax revenue due to mortality and disability as well as CPP-D costs due to disability as the total economic impact. The lost tax revenue is a combination of a direct and an indirect effect on both the income and corporate taxes. The total tax revenue which is lost in a particular year and which is (causally) attributed to the effects of the disease can be further attributed to the following causes:

1. Tax revenue lost immediately due to disease mortality denoted by $TM(t)$
2. Tax revenue lost due to staged disability denoted by $TD(t)$
3. Tax revenue lost due to dependant care giving denoted by $TC(t)$

We write the tax revenue lost (due to a disease) term in equation (1) as:

$$TL(t) = TM(t) + TD(t) + TC(t)$$

1.5. Income and Corporate Tax Loss Due to Mortality (TM)

We attribute this part of the lost tax revenue to mortality which can be linked (causally) to disease. It is a function of two independent effects:

1. Direct: The income tax lost due to the death (caused by the disease) or the complete inability of an employed patient disabled by the disease to earn wages, and an unemployed person replacing a patient with the disease
2. Indirect: The income tax lost due to the follow on effects of the direct loss of wages attributable to the death or the complete inability of an employed patient (disabled by the disease) to earn wages

Both the direct and the indirect tax which is lost due to disease attributable causes are further split into that portion which is due to income tax and corporate tax given by:

$$TM(t) = \{TM_{D,I}(t) + TM_{I,I}(t)\} + \{TM_{I,C}(t) + TM_{I,C}(t)\}$$

Here, the direct income tax lost is given by:

$$\begin{aligned} TM_{D,I}(t) = {} & \tau(t)\sum_a Md_a(t)\{R_a(t) - W_a(t)\} \\ & + \tau(t)\sum_a Md_a(t)\{R_a(t) - W_a(t)\}(CRF(t) - 1)\left(\frac{1}{\beta(t)}\right)^{0.2} \\ & - \tau(t)\sum_a Md_a(t)\{W_a(t)\}R_a \\ & + \tau(t)\sum_a Md_a(t)\{W_a(t)\}R_{a,}(1 - CRF(t))\left(\frac{1}{\beta(t)}\right)^{0.2} \end{aligned}$$

the indirect income tax lost is given by:

$$TM_{I,I}(t) = \left\{ TM_{D,I}(t) + \tau(t) \sum_a Md_a(t) \{W_a(t)\} R_a \right\} (\lambda - 1)$$

the direct corporate tax lost is given by:

$$\begin{aligned} TM_{D,C}(t) = {} & \tau_C(t) \sum_a Md_a(t) \{R_a(t) - W_a(t)\} (CRF(t) - 1) \\ & + \tau_C(t) \sum_a Md_a(t) \{R_a(t) - W_a(t)\} (CRF(t) - 1)^2 \left(\frac{1}{\beta(t)} \right)^{0.2} \\ & + \tau_C(t) \sum_a Md_a(t) \{R_a(t) - W_a(t)\} R_a (1 - CRF(t)) \\ & + \tau_C(t) \sum_a Md_a(t) \{W_a(t)\} R_{a,} (1 - CRF(t))^2 \left(\frac{1}{\beta(t)} \right)^{0.2} \end{aligned}$$

and finally the indirect corporate tax lost is given by:

$$TM_{I,C}(t) = TM_{D,C}(t)(\lambda - 1) \tag{8}$$

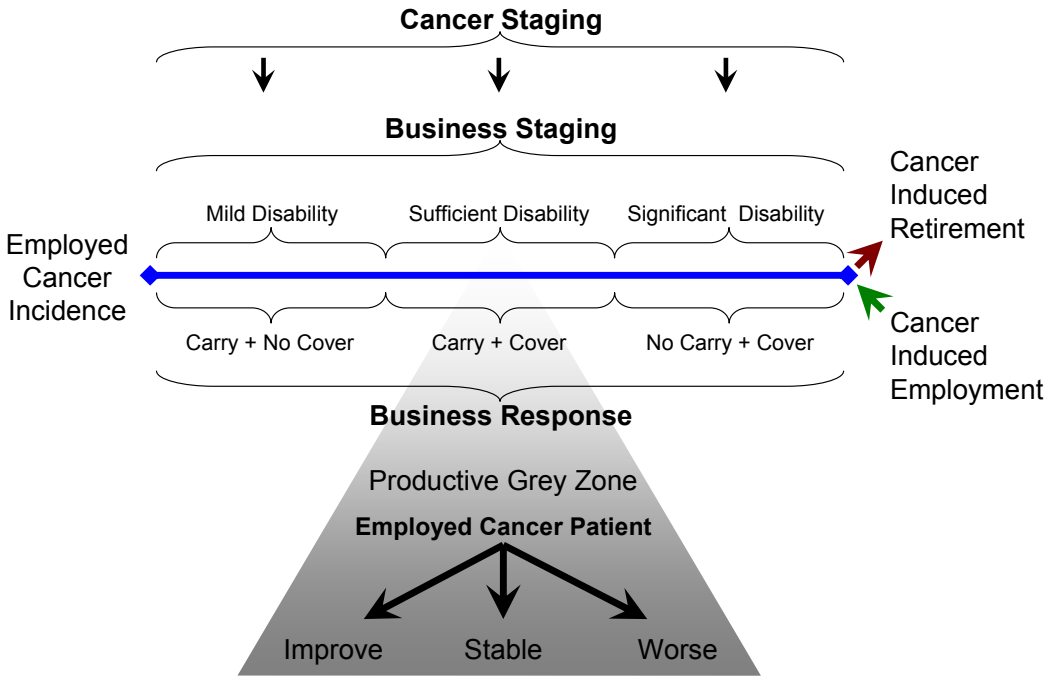
1.6. Staged Disability Tax Loss Model (ID)

We attribute this part of the lost tax revenue to the disability associated with a disease within a particular tax year. It is a function of the direct as well as indirect effects based on an economic disability staging system which captures the disease cycle from initial diagnosis through to death. This calculation applies to those disease patients that are staged, rather than those that are diagnosed and pass away in the same year. We define the stage coefficient E as the ability of the patient to continue to work.

Using Lung Cancer as an example, the following describes how the disease staging is conducted. We define four separate stages here based on the patient's ability to work. These stages are characterized by two indexes: Carry and Cover (Exhibit 65) as a function of the disease staging system (in the current study the staging system applies only to Lung Cancer[16]). Carry occurs when the employer continues to pay the cancer patient despite the cancer stage having reduced the patient's ability to do work. No Carry occurs when the employer does not continue to pay the cancer patient for the lost production capacity due to the impact of the cancer stage. The patient continues to be paid for the work done. Cover occurs when the employer decides that the reduction in productive ability from a cancer stage is required to be covered by a new employed resource. No Cover occurs when the employer decides that the reduction in productive ability from a cancer stage has not incapacitated the employed patient sufficient to warrant a new employed resource.

[16] Mountain, CF (1997). Revisions in the international system for staging lung cancer. *Chest* **111**,1710-1717

Exhibit 59: Economic response to disability.



Within this disease staging system we define four economic stages:

Stage 1 $0.8 \le E \le 1$

In this stage no support staff is necessary: There is no effect on income tax, but the disability has an effect on reduced profitability equal to:

(Corporate Revenue Multiplier-1) x (1- Stage Coefficient)

which will affect subsequent wages levels. The direct income and corporate effect on tax revenue here are given by:

$$TD_{D,I}(t)\Big|_1 = \tau_I(t)\sum_a \Pr_a(t)(S-1)\{W_a(t)\}CRF(t)\left(\frac{1}{\beta(t)}\right)^{0.2} \qquad (9)$$

and:

$$TD_{D,C}(t)\Big|_1 = \tau_C(t)\sum_a \Pr_a(t)(S-1)\{W_{a,s}(t)\}(CRF(t)-1))^2\left(\frac{1}{\beta(t)}\right)^{0.2} + \tau_C(t)\sum_a \Pr_a(t)(S-1)\{W_{a,s}(t)\}(CRF(t)-1)) \qquad (10)$$

Stage 2: $0.433 \le E \le 0.963$

In this stage support staff is necessary while the staged disability patient is continued to be paid 100%. While this amounts to an increase in income tax revenue for the current year given a partial double up of wage expenses, it reduces the corporate profit by the support

staff cost in the current year which reduces the wages to be paid in the current year and years that follow, which is the impact of negative productivity induced by cancer staging effects. A Corporate Profit Wage Beta is used to capture the follow on effect of reduced profits on wage levels. A five year cycle is assumed in the calculation of the Corporate Profit Wage Beta. The direct income and corporate effect on tax revenue here are given by:

$$\begin{aligned} TD_{D,I}(t)\big|_2 &= \tau_I(t)\sum_a \Pr_a(t)(1-S)\{R_a(t)\}\left(\frac{1}{\beta(t)}\right)^{0.2} \\ &+ \tau_I(t)\sum_a \Pr_a(t)(S-1)\{W_a(t)\}(CRF(t))\left(\frac{1}{\beta(t)}\right)^{0.2} \\ &+ \tau_I(t)\sum_a \Pr_a(t)(S-1)\{W_a(t)-R_a(t)\}(CRF(t)-1)\left(\frac{1}{\beta(t)}\right)^{0.2} \end{aligned} \tag{11}$$

and:

$$\begin{aligned} TD_{D,C}(t)\big|_2 &= \tau_C(t)\sum_a \Pr_a(t)(S-1)\{W_a(t)\}(CRF(t)-1)(CRF(t))\left(\frac{1}{\beta(t)}\right)^{0.2} \\ &+ \tau_C(t)\sum_a \Pr_a(t)(S-1)\{W_a(t)\}(CRF(t)) \\ &+ \tau_C(t)\sum_a \Pr_a(t)(S-1)\{W_a(t)-R_a(t)\}(CRF(t)-1) \\ &+ \tau_C(t)\sum_a \Pr_a(t)(S-1)\{W_a(t)-R_a(t)\}(CRF(t)-1)^2\left(\frac{1}{\beta(t)}\right)^{0.2} \end{aligned} \tag{13}$$

Stage 3: $0.233 \le E \le 0.766$

In this stage replacement is found to the extent of (1- Stage Coefficient), and the staged patient is treated as retired by disease to the extent of the Stage Coefficient. The direct income and corporate effect on tax revenue here are given by:

$$\begin{aligned} TD_{D,I}(t)\big|_3 &= \tau_I(t)\sum_a \Pr_a(t)(1-S)\{R_a(t)-W_a(t)\}\left(\frac{1}{\beta(t)}\right)^{0.2} \\ &+ \tau_I(t)\sum_a \Pr_a(t)(S-1)\{R_a(t)-W_a(t)\}(1-CRF(t))\left(\frac{1}{\beta(t)}\right)^{0.2} \end{aligned} \tag{14}$$

and:

$$\begin{aligned} TD_{D,C}(t)\big|_3 &= \tau_C(t)\sum_a \Pr_a(t)(1-S)\{R_a(t)-W_a(t)\}(CRF(t)-1) \\ &+ \tau_C(t)\sum_a \Pr_a(t)(S-1)\{R_a(t)-W_a(t)\}(1-CRF(t))^2\left(\frac{1}{\beta(t)}\right)^{0.2} \end{aligned} \tag{15}$$

Stage 4: $0 < E \le 0.465$

In this stage replacement is found to the extent of (1- Stage Coefficient), and staged patient is treated as retired by disease to the extent of the Stage Coefficient. The direct income and corporate effect on tax revenue here are given by:

$$TD_{D,I}(t)\big|_4 = \tau_I(t)\sum_a \Pr_a(t)(1-S)\{R_{a,s}(t)-W_{a,s}(t)\}$$
$$+\tau_I(t)\sum_a \Pr_a(t)(1-S)\{R_{a,s}(t)-W_{a,s}(t)\}(CRF(t)-1)\left(\frac{1}{\beta(t)}\right)^{0.2} \quad (16)$$
$$+\tau_I(t)\sum_a \Pr_a(t)(1-S)\{W_{a,s}(t)\}\mathrm{Re}_{a,s}(1-CRF(t))\left(\frac{1}{\beta(t)}\right)^{0.2}$$

and:

$$TD_{D,C}(t)\big|_4 = \tau_C(t)\sum_a \Pr_a(t)(1-S)\{R_{a,s}(t)-W_{a,s}(t)\}(CRF(t)-1)$$
$$=\tau_C(t)\sum_a \Pr_a(t)(1-S)\{R_{a,s}(t)-W_{a,s}(t)\}(CRF(t)-1)^2\left(\frac{1}{\beta(t)}\right)^{0.2} \quad (17)$$
$$+\tau_C(t)\sum_a \Pr_a(t)(1-S)\{W_{a,s}(t)\}\mathrm{Re}_{a,s}(1-CRF(t))$$
$$+\tau_C(t)\sum_a \Pr_a(t)(1-S)\{W_{a,s}(t)\}\mathrm{Re}_{a,s}(1-CRF(t))^2\left(\frac{1}{\beta(t)}\right)^{0.2}$$

And all of the indirect effects are given by:

$$TM_{I,C}(t)\,|_\beta = TM_{D,C}(t)\,|_\beta\ (\lambda-1),\ \beta\in\{1,2,3\},$$

with the exception of:

$$TD_{I,I}(t)\,|_4 = \left\{TD_{D,I}(t)\,|_4 + \tau(t)\sum_a \Pr_a(t)\{W_{a,s}(t)\}\mathrm{Re}_{a,s}\right\}(\lambda-1).$$

We now define the total revenue lost due to disability as:

$$TD_{D,I}(t) = \alpha_1 TD_{D,I}(t)\big|_1 + \alpha_2 TD_{D,I}(t)\big|_2 + \alpha_3 TD_{D,I}(t)\big|_3 + \alpha_4 TD_{D,I}(t)\big|_4$$

and:

$$TD_{D,C}(t) = \alpha_1 TD_{D,C}(t)\big|_1 + \alpha_2 TD_{D,C}(t)\big|_2 + \alpha_3 TD_{D,C}(t)\big|_3 + \alpha_4 TD_{D,C}(t)\big|_4$$

where:

$$\alpha_i = \frac{\int_{E_i}^{E_{i-1}} \exp\left\{-\frac{(x-\mu_{a,s})^2}{2\sigma_{a,s}^{\ 2}}\right\}dx}{\int_0^1 \exp\left\{-\frac{(x-\mu_{a,s})^2}{2\sigma_{a,s}^{\ 2}}\right\}dx}$$

Here we define disability stages by the elements $S_{i,a,s}=\{1,2,3,4\}$ (where the indices i,a,s correspond to a disease type, age and sex respectively. We define a stochastic function η such that:
$\eta(S_{i,a,s}) = (\mu_{i,a,s},\sigma_{i,a,s})$

where $\mu_{i,a,s} \in E = [0,1]$. That is, we define a vector function which maps the disability stages into economic stages $S \to E$.

1.7. Connected Person Impact Models (TC)

The last part of TL considers the effects of disease on the lost tax revenue of people who are not part of the labor force but who are connected to an employed person. We consider the effect due to the disease mortality and disease disability of a connected person (someone who is unemployed) on the psychological state of a healthy employee. We will denote those as TCM (revenue lost due to connected mortality) and TCD (Revenue lost due to connected disability) respectively:

$$\begin{aligned} TC(t) &= TCM(t) + TCD(t) \\ &= \left\{TCM_{D,I}(t) + TCM_{I,I}(t)\right\} + \left\{TCD_{D,C}(t) + TCD_{I,C}(t)\right\} \end{aligned}$$

In the last equation we have further broken down TCM and TCD into factors due to direct and indirect effects based on income and corporate tax.

We assume that the effects on an employed person due to the disability of a disabled person are a result of two factors: First: the sacrifice in the wage due to providing care, characterized by the caregiver work coefficient δ_i. Second: the effect of depression on the connected person, characterized by the depression work coefficient ε_i. We used Dutch and Australian data used to generate these expected values and standard deviations[17,18] under the assumptions that conditions (due to depression and care giving) are similar to those found in Canada. The number of dependents, care givers or interested family members (collectively called connected persons) per age group is defined as:

$$P_{a,s}(t) - L_{a,s}(t)$$

where P is the population and L is the labour force. When a connected person has a disease they affect that part of the labour force that is required to respond to the disability of the connected, thereby reducing wage based productivity in two ways:

1 – A member of the labour force has to partially care for a non labour force disease patient.
2 – A member of the labour force will be subject to a partial depression disability for the care for a non labour force disease patient.

We define the connected caregiver wage sacrifice $CW_{a,s}(t)$ for age group a and sex s as:

$$CW_{i,a,s}(t) = \delta_i W_{a,s}(t)(1 - L_{a,s}(t))$$

[17] Family caregiver burden: results of a longitudinal study of breast cancer patients and their principal caregivers Eva Grunfeld, Doug Coyle, Timothy Whelan, Jennifer Clinch, Leonard Reyno, Craig C. Earle, Andrew Willan, Raymond Viola, Marjorie Coristine, Teresa Janz, Robert Glossop CMAJ • JUNE 8, 2004; 170 (12).

[18] Family caregiver burden: results of a longitudinal study of breast cancer patients and their principal caregivers Eva Grunfeld, Doug Coyle, Timothy Whelan, Jennifer Clinch, Leonard Reyno, Craig C. Earle, Andrew Willan, Raymond Viola, Marjorie Coristine, Teresa Janz, Robert Glossop CMAJ • JUNE 8, 2004; 170 (12)

where δ_i is the caregiver work coefficient[19]. We also define the connected depression wage sacrifice $C\widetilde{W}_{a,s}(t)$ for age group a and sex s as:

$$C\widetilde{W}_{i,a,s}(t) = \varepsilon_i W_{a,s}(t)(1 - F_{a,s}(t))$$

where ε_i is the depression work coefficient. We write the lost income tax revenue due to the care giving effect as:

$$TCD_{D,I}(t) = \tau_I(t)\sum_a \Pr_a(t) CW_a(t) + \tau_I(t)\sum_a \Pr_a(t) CW_a(t)(CRF - 1)\left(\frac{1}{\beta(t)}\right)^{0.2}$$

We write the lost corporate tax revenue due to the care giving effect as:

$$TCD_{D,C}(t) = \tau_C(t)\sum_a \Pr_a(t) CW_a(t)(CRF(t) - 1) + \tau_C(t)\sum_a \Pr_a(t) CW_a(t)(CRF - 1)^2\left(\frac{1}{\beta(t)}\right)^{0.2}$$

We write the lost income tax revenue due to the connected mortality effect as:

$$TCM_{D,I}(t) = \tau_I(t)\sum_a \Pr_a(t) C\widetilde{W}_a(t) + \tau_I(t)\sum_a \Pr_a(t) C\widetilde{W}_a(t)(CRF - 1)\left(\frac{1}{\beta(t)}\right)^{0.2}$$

We write the lost corporate tax revenue due to the connected mortality effect as:

$$TCM_{D,C}(t) = \tau_C(t)\sum_a \Pr_a(t) C\widetilde{W}_a(t)(CRF(t) - 1) + \tau_C(t)\sum_a \Pr_a(t) C\widetilde{W}_a(t)(CRF - 1)^2\left(\frac{1}{\beta(t)}\right)^{0.2}$$

As before the indirect effects are given by:

$$TCM_{I,\gamma}(t) = TCM_{D,\gamma}(t)(\lambda - 1) \qquad \text{and} \qquad TCD_{I,\gamma}(t) = TCD_{D,\gamma}(t)(\lambda - 1)$$

where $\gamma = \{I, C\}$.

[19] For example, if the 50 to 54 year labour force has 20,000 connected persons with a cancer stage 3, then the wage sacrifice by a member of the labour force is: Connected Wage Sacrifice = 2.4% x Percent at That Stage x Average Labour Force Wage of the 50 to 54 year labour force x 20,000

1.8. Simulation of Total Wage

The future wage is simulated as a boundary within which the actual (measured) future total wage is expected to lie. The model differentiates between 16 age groups and 2 genders (from the wage perspective, those who are under the age of 15 and those who are over the age of 65are considered not relevant). The wages at a specific time and person of age a are randomly chosen from their respective transition probability distributions under the completeness condition (the combined probability of all of these events must be unity).

1.9. Disposable Income Calculations

We calculate the effect of each policy option upon the disposable income private sector and public sector perspectives as:

$$I(R,E) = R(t,x_1,x_2,...) + E(t,x_1,x_2,...)$$

Here, I represents the measured disposable income while R and E represents the measured revenues the measured expenses as a function of time t and other independent variables $x_1, x_2, ...$ In general we can write the change in disposable income as the total derivative:

$$DI = J\left\{\frac{\partial(R,E)}{\partial(t,x_1,x_2,...)}\right\}\cdot\nabla I(R,E)$$

which is a vector product of the gradient and a Jacobian J given by:

$$J\left\{\frac{\partial(R,E)}{\partial(t,x_1,x_2,...)}\right\} = \begin{pmatrix} \frac{\partial R}{\partial t} & \frac{\partial R}{\partial x_1} & \Lambda & \Lambda & \frac{\partial R}{\partial x_n} \\ \frac{\partial E}{\partial t} & \frac{\partial E}{\partial x_1} & \Lambda & \Lambda & \frac{\partial E}{\partial x_n} \end{pmatrix}$$

In the present case we consider two types of disposable incomes; the public and the private given respectively by:

$$\begin{aligned} I_{Pu} &= G + T + T_T - CPPD(D,t) \\ &= R - E \end{aligned}$$

and:

$$\begin{aligned} I_{\Pr} &= W_a(D_a,t) + Pf(D,t) - Tx_a(W,D_a,Tr,t) \\ &= R(D_a,P,t) - E(D_a,P,Tr,t) \end{aligned}$$

In the first equation (public), G is the sales tax, Tx is the total taxation (income and corporate) revenue, $CPPD$ is the cost of CPP-D payments. In the second equation (private), W represent the wages, *D* represent the disability states within the population, Tr is the tax rate and finally, Pf represents the profit. The change in the public and private disposable income is then given by the total derivative.

$$DI_{\Pr} = J\left\{\frac{\partial(R,E)}{\partial(t,D_a,P,Tr)}\right\}\cdot\nabla I(R,E)$$

The model of the change in private sector value is based on the concept of Net National Product (NNP). NNP is a useful measure for several reasons. First, an aggregate index of economic activity, to help summarize macroeconomic activity, is necessary. Second, we need a quantitative measure of well-being for making welfare comparisons and to evaluate alternative economic policies.[20] Dasgupta and Maler (2005) conduct a study on NNP and find that it can be used as a gauge for evaluating policy. Our model is derived from Net National Product:

NNP = *Personal Disposable Income* + *Income Taxes* + *Retained Earnings* + *Corporate Taxes* + *Indirect Taxes* – *Interest on Public Debt* – *Government Transfer Payments*

So a change in NNP can be written as:

Δ *NNP* = Δ *Personal Disposable Income* + Δ *Retained Earnings* + Δ *All Taxes* – Δ *Interest on Public Debt* – Δ *Government Transfer Payments*

Now letting:

Δ *Personal Disposable Income* = Δ *Wages* – Δ *Personal Income Tax*

Δ *Retained Earnings* = Δ *Corporate Profit* – Δ *Corporate Taxes*

and

Δ *Government Balance* = Δ *All Taxes* – Δ *Interest on Public Debt* – Δ *Government Transfer Payments*

we arrive at the measure:

Δ (*Wages* – *Personal Income Tax*) + Δ (*Corporate Profit* – *Corporate Taxes*) + Δ (*Government Balance*)

However, since we are primarily concerned with the value of the private sector, we can disregard the measure of government wealth. We then arrive at our measure:

NetEffect = (*Wages* – *Personal Income Tax*) + (*Corporate Profit* – *Corporate Taxes*)

This essentially evaluates the change in the disposable income available to the private sector as a whole. In a similar vein, Macklem (1994) develops a measure of aggregate private sector wealth in Canada which includes human, physical and financial wealth. Human wealth is measured as the expected present value of aggregate labour income net of government expenditures. Financial and physical wealth are measured by consolidating the assets and liabilities of the various sectors of the economy "so as to measure the net worth of the ultimate owners of the private sector – households."[21] In our case, where we are considering *changes* to the value of private sector wealth, changes in financial and physical assets are taken into account in the changes in corporate profits.

1.10. Glossary

[20] Partha Dasgupta and Karl-Goran Maler, *Environment and Development Economics*, 5 (2000): 69-93

[21] Tiff Macklem, "Wealth, Disposable Income and Consumption: Some Evidence for Canada." Bank of Canada Technical Report No.71 (November 1994)

Base Possibility Space (The Status Quo Scenario) – the possible set of states that will occur in the future, estimated under the assumption that the current CPP-D policy will not be changed. The base possibility space represents the region of future outcomes that may occur if no changes are made to the status quo. The effects (success or failure) of any new intervention will be measured with respect to this *status quo scenario*.

The base possibility space is simulated based on the constraints afforded by historical data.

Upper Boundary (of Base Possibility Space) – The upper boundary represents the maximum possible values that can be expected assuming that no changes to CPP-D policy will be implemented.

Lower Boundary (of Base Possibility Space) – The upper boundary represents the minimum possible values that can be expected assuming that no changes to CPP-D policy will be implemented.

Gauge Expectation – the most likely path of future outcomes that lies within the base possibility space. For example, in a base possibility space that represents the future possible prevalence rate of a disease in Canada over the next 20 years: the *gauge expectation* will describe the single value of the prevalence that we expect to occur in each of the next 20 years.

Reward region – the area between the gauge expectation and the lower boundary (in a base possibility space). Every point in this area represents a future prevalence rate that is lower than the most likely value.

Risk region – the area between the gauge expectation and the upper boundary (in a base possibility space). Every point in this area represents a future prevalence rate that is higher than the most likely value.

Confidence Interval – an estimated range of values which is likely to include an unknown parameter, calculated from a given set of sample data. For example: If independent samples are taken repeatedly from the same population, and a 95% confidence interval is calculated for each sample, then 95% of the intervals will include the unknown population parameter. A confidence interval has both an upper bound and a lower bound.

Data resolution – the amount of detail of the data. For example, data which measures disease prevalence for people in 20 different age groups and for both genders has a *higher resolution* than data which measures prevalence for 5 different ages groups and does not differentiate between genders.

Gauge – an instrument for or a means of measuring or testing. In the current analysis, the status quo scenario is used as a *gauge* (ruler) when evaluating alternative intervention scenarios.

Present value – compares the value of a dollar today to the value of that same dollar in the future, taking inflation and returns into account.

Scenario Analysis – the process of analysing possible future events by considering the alternative outcomes (scenarios) that are possible. The analysis is designed to allow improved decision-making by allowing more complete consideration of outcomes and their implications.

Standard Error – the estimated standard deviation of a statistic. All estimated parameters have an associated standard error. Together, the estimate of the parameter and the associated error represent a range within which the true value of the parameter is expected to lie, with a certain probability.

Reward – any point in the reward region. Every point in the reward region represents and outcome that is *better* than the most likely future outcome. That is, rewards are outcomes in which the burden of disease is lower than in the most likely future outcome.

Risk – any point in the risk region. Every point in the risk region represents and outcome that is *worse* than the most likely future outcome. That is, risks are outcomes in which the burden of disease is lower than in the most likely future outcome.

1.11. Sampling Theory

In this section, we provide a brief account of sampling theory and direct the reader to literature for further analysis[22,2,3,4]. We begin by defining a sample of size *N* which is drawn from a normal population with a mean μ. For each sample we compute the *t* statistics given by:

$$t = \frac{\overline{X} - \mu}{s / \sqrt{N-1}} \qquad \text{(D1)}$$

where $\overline{X}$ is the sample mean and where *s* is the sample standard deviation. If we consistently choose small samples (*N*<30) randomly from the population we will find that a sample with a mean $\overline{X}$ will be selected with a distribution[23]:

$$P(t) = \frac{P_0}{\left(1 + \left(\frac{t^2}{N-1}\right)\right)^{N/2}} \qquad \text{(D2)}$$

where P_0 is a constant such that:

$$\int_{-\infty}^{\infty} P(t)dt = 1 \qquad \text{(D3)}$$

That is, the probability of selecting a random sample with t statistic between t_0 and t_1 is given by:

[22] Kalton, Graham, and D. W. Anderson, "Sampling Rare Populations", 149 *Journal of the Royal Statistical Society, Series A* 65 (1986)
[2] Kalton, Graham, *Compensating for Missing Survey Data*, (University of Michigan Institute for Social Research, 1983).
[3] Yamane, Taro, Elementary Sampling Theory, (Prentice-Hall, 1967).
[4] Tryfos, Peter, Sampling Methods for Applied Research: Text and Cases, (Wiley, 1996).
[5] The distribution was first discovered by W.S. Gossett in the early part of the 20th century.

$$P = \int_{t_0}^{t_1} \frac{P_0}{\left(1+\left(\frac{t^2}{N-1}\right)\right)^{N/2}} dt \qquad \text{(D4)}$$

As the size of the sample, *N*, increases we find that equation D2 converges to an exponential function. That is, as $N \to \infty$ we find that:

$$\frac{P_0}{\left(1+\left(\frac{t^2}{N-1}\right)\right)^{N/2}} \to P_0 e^{t^2/2} \qquad \text{(D5)}$$

In fact it can be shown (Figures D1 and D2) that already, for $N \leq 30$ the sequence is within:

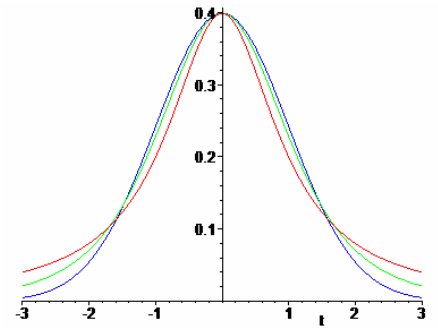


Figure D1: The normalized t-distributions for *N*=2 (red) and *N*=5 (green) plotted against the normal distribution (blue).

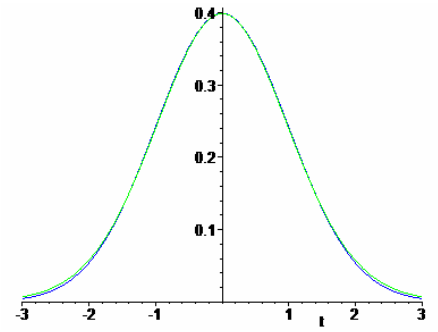


Figure D2: The normalized t-distribution at *N*=30 (green) against the normal distribution (blue). We can see that within the 95% confidence interval the functions are almost identical.

We therefore say that for large number of sampling values (*N*>30) we recover the standard normal distribution given by:

$$P(t) = \frac{1}{\sqrt{2\pi}} e^{(1/2)t^2} \qquad \text{(D6)}$$

A process by which a representative sample may be obtained is random sampling. Using this method each member of the population has an equal chance of being included in the sample. We used a random number generator to select each sample. The basic requirement of such sampling is that all possible samples must have an equal chance of being selected from the population. Mathematical simulation methods such as Monte Carlo[24] use random numbers in order to create realistic conditions. In most cases such a simulation is preferable to other sampling methods when they are too dangerous, costly or time consuming. A typical Monte Carlo simulation is set up as follows:

- Define all of the possible outcomes
- Determine the probability of each outcome
- Set up the correspondence between a random number and each outcome of the simulation
- Compute random numbers from a number generator
- Repeat the experiment for a large *N*
- Compute the statistic of interest

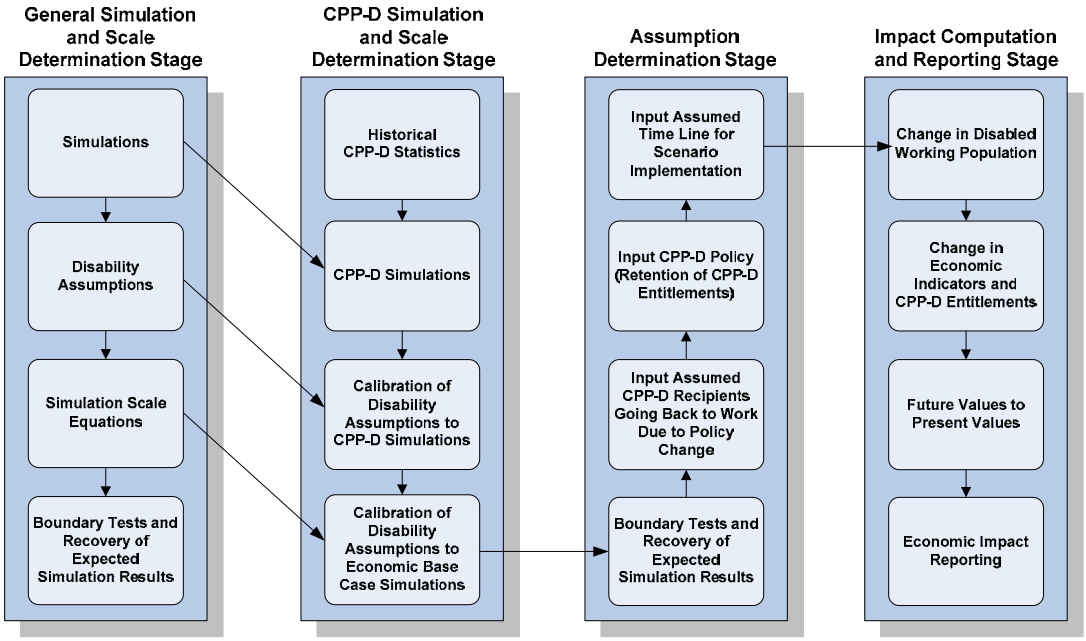
In our case we used a Monte Carlo simulation for each response, randomly selecting 1000 samples within the region $R = (S_{\min}, S_{\max})$ (given in the response) and computed the sample mean $\overline{X}$ and the sample standard deviation *s*. A *t* statistic was then computed for each sample mean using equation (D2) and solved for the population mean μ and the standard deviations.

[6] Som, R. K., *Practical Sampling Techniques*, 2nd edition, (M. Dekker, 1996).
[7] Johnson, P. O., and M. S. Rao, *Modern Sampling Methods*, (University of Minnesota Press, 1959).

Appendix X. Scale Methodology

Simulation, Impact and Reporting Process

The following flowchart is a stepwise representation of the modeling process undertaken to perform the CPP-D policy impact analysis:



The way in which general economic relations are simulated is described in the previous section. This section explains how the simulation results of the previous section are manipulated to allow for a dynamic assessment of different CPP-D assumptions and policies.

The solution for different CPP-D policies is approximated within a Taylor series. The approximation has been taken independently for a large number of close disability (economic)[25] states, allowing for a good approximation even at a first order (linear approximation). The alternative, running a complete economic simulation for each different combination of CPP-D assumptions and policies, would have quickly become prohibitively expensive in terms of both human as well as computer resources. In addition to a significant reduction in resource allocation, the method provides a platform for a fast responsive model with dynamic CPP-D assumptions and policies (that are user defined).

The simulation results provide a set of N economic factors that are identified with the vector:

$$\vec{F}(t) = (F_1(t), F_2(t), ..., F_N(t))$$

The components are given as follows:

F_1 = Direct Average Wages (DAW)

F_2 = Direct Average Corporate Profit (DACP)

F_3 = Direct Average Spending (DASP)

F_4 = Indirect Average Wages (DAW)

[25] Disability is defined as an inability to work. For example: A person who is 100% disabled can not work at all. A person who is 75% disabled can work 25% of the time. A person who is 0% disabled can work all the time.

F_5 = Indirect Average Corporate Profit (DACP)

F_6 = Indirect Average Spending (DASP)

F_7 = Direct Federal Income Tax (FiTD)

F_8 = Indirect Federal Income Tax (FiTI)

F_9 = Direct Provincial Income Tax (PiTD)

F_{10} = Indirect Provincial Income Tax (PiTI)

F_{11} = Direct Federal Goods and Services Tax (FGSTD)

F_{12} = Indirect Federal Goods and Services Tax (FGSTI)

F_{13} = Direct Provincial Goods and Services Tax (PGSTD)

F_{14} = Indirect Provincial Goods and Services Tax (PGSTI)

F_{15} = Direct Federal Corporate Income Tax (FCITD)

F_{16} = Indirect Federal Corporate Income Tax (FCITI)

F_{17} = Direct Provincial Corporate Income Tax (PCITD)

F_{18} = Indirect Provincial Corporate Income Tax (PCITI)

$F_{19} - F_{24}$ concern the federal and provincial income, goods and service as well as corporate taxes which are associated with the direct care taking effect.

$F_{25} - F_{30}$ concern the federal and provincial income, goods and service as well as corporate taxes which are associated with the indirect care taking effect.

$F_{31} - F_{36}$ concern the federal and provincial income, goods and service as well as corporate taxes which are associated with the direct depression effect.

$F_{37} - F_{43}$ concern the federal and provincial income, goods and service as well as corporate taxes which are associated with the indirect depression effect.

We identify each factor with an additional set of higher rank tensors $F_{N,a,g,s,d}$ by identifying weights ω_i such that:

$$F_{N,a,g,s,d} = \Omega_{agsd} F_N = \omega_d \omega_s \omega_g \omega_a F_N$$

Where, N represents number of economic factors, a represents age groups, g represents gender differentiation, s represents disability staging, and d represents disability level.

Here each weight $\omega_i = (\omega_a, \omega_g, \omega_s, \omega_d)$ must satisfy the completeness relation:

$$\sum_i \omega_i = 1$$

We define the prevalence for a disease as $P_{a,g,s}(t)$ for each group of age a, gender g and disease stage s. From an economic perspective, we are interested in that part of the prevalent population who are a part of the employed labour force defined as:

$$PE_{a,g,s}(t) = P_{a,g,s}(t) \cdot \left\{ LF_{a,g}(t) \cdot E_{a,g}(t) \right\}$$

where $LF_{a,g}(t)$ and $E_{a,g}(t)$ are the labour force and employed percentages respectively as derived from demographic simulations taking into account population and economic activity dynamics.

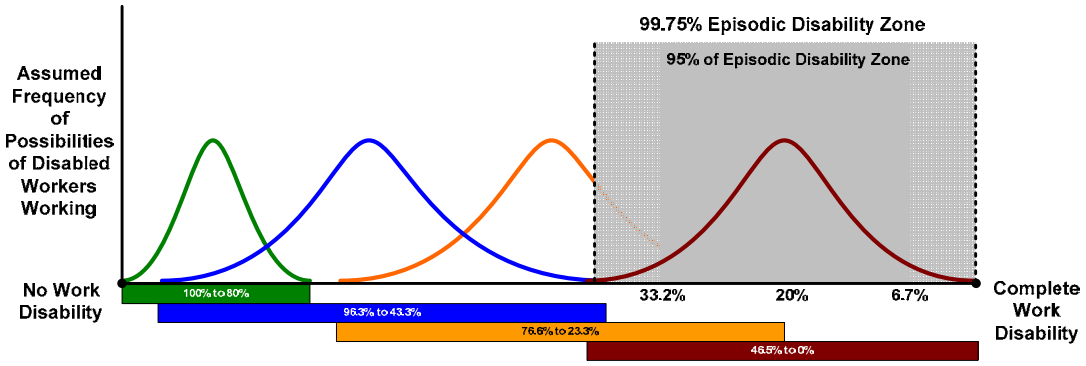
The employed prevalent population (the part of the population which is currently living with the disease and which is employed) is then further decomposed into the economic disability ranges between 0 (totally disabled) and 1 (healthy). We identify 4 separate economic disability stages and assign specific disability ranges to them. Each stage is characterized by a normal distribution:

$$DS_i = (\mu_i, \sigma_i)$$

Each economic stage represents the range and probability of expected disability given by:

$$DS_1 = (90\%, 3.3\%)$$
$$DS_2 = (70\%, 8.77\%)$$
$$DS_3 = (50\%, 8.77\%)$$
$$DS_4 = (20\%, 8.77\%)$$

We identify the 4th economic stage with the Episodic Disability Zone. That is, this stage represents all people who are disabled enough to collect a full disability pension.



Potential Work Ability Outcomes per Disease/ Age Group/ Gender

The disability spectrum is then divided into 30 sub-stages d, each with a range of 3.3 % such that:

$$d = 1 \in [0, 3.3)\ \%$$
$$d = 2 \in [3.3, 6.6)\ \%$$
$$\vdots$$
$$d = 30 \in [96.7, 100)\ \%$$

In order to determine the proper economic disability scales, a simulation has been conducted to determine all of the vector components of the economic factors. The simulation has been conducted under the constraint of equal disease prevalence within each economic stage. We then determine the prevalence of employed people within a disability stage d as:

$$PE_{a,g,s,d}(t) = \frac{PE_{a,g,s}(t)}{4} \cdot \int_d \frac{e^{-(x-\mu_1)^2/2\sigma_1^2}}{\sqrt{2\pi}} dx + \frac{PE_{a,g,s}(t)}{4} \cdot \int_d \frac{e^{-(x-\mu_2)^2/2\sigma_2^2}}{\sqrt{2\pi}} dx$$
$$= \frac{PE_{a,g,s}(t)}{4} \cdot \int_d \frac{e^{-(x-\mu_3)^2/2\sigma_3^2}}{\sqrt{2\pi}} dx + \frac{PE_{a,g,s}(t)}{4} \cdot \int_d \frac{e^{-(x-\mu_4)^2/2\sigma_4^2}}{\sqrt{2\pi}} dx$$

Here, the employed prevalent population for an interval d is sampled over each economic disability stage (which includes the 4th economic stage). The relationship is written as:

$$PE_{a,g,s,d}(t) = \frac{PE_{a,g,s}(t)}{4} \cdot \sum_{i=1}^{4} \int_d \frac{e^{-(x-\mu_i)^2/2\sigma_i^2}}{\sqrt{2\pi}} dx$$

For each age group a, gender g, and disease prevalence stage d, the Nth economic factor is given by:

$$F_{N,a,g,s,d} = \omega_d F_{N,a,g,s}$$

where:

$$\omega_d = \frac{WE_{a,g,d,d}(t) \cdot PE_{a,g,s,d}(t)}{\sum_d WE_{a,g,d,d}(t) \cdot PE_{a,g,s,d}(t)}$$

The above relationship requires that:

$$F_N = \sum_{a,g.s.d} F_{N,a,g,s,d}$$

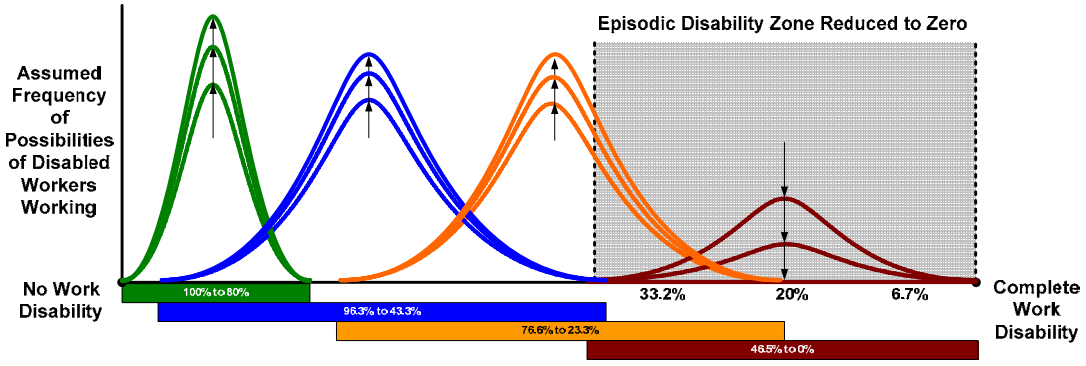
The episodic disability zone is then renormalized with respect to real data (historical CPP-D recipients). That is, the number of employed people who are in stage 4 is rescaled to fit the real data $\eta(t)$. The process will change the number of employed people within each of the economic stages such that $PE_{a,g,s}(t) = \eta_{a,g,s}(t)$ in the 4th stage. The prevalence of employed people within a disability stage d is then renormalized as:

$$PE_{a,g,s,d}(t) = \frac{PE_{a,g,s}(t) - \eta_{a,g,s}(t)}{3} \cdot \sum_{i=1}^{3} \int_d \frac{e^{-(x-\mu_i)^2/2\sigma_i^2}}{\sqrt{2\pi}} dx + \eta_{a,g,s}(t) \cdot \int_d \frac{e^{-(x-\mu_4)^2/2\sigma_4^2}}{\sqrt{2\pi}} dx$$

Finally, the 4th stage prevalence distribution is set to zero, thereby imposing the condition of completeness:

$$\sum_d PE_{a,g,s,d}(t) = PE_{a,g,s}(t)$$

on the sum of all disability stages d contained within the first three economic stages (the contribution from the remaining disability groups which are contained within the 4th economic stage are negligible since the distribution there is trivial). This initial condition requires that no disabled people within stage 4 are employed. This condition unites the requirement that CPP-D recipients are not working with the way in which the model recognizes disabled employees.



Potential Work Ability Outcomes per Disease/ Age Group/ Gender

Within the employed population pool only the 1st, 2nd, and 3rd economic stages remain. In order to ensure that this configuration of disabled employees conforms to real economic historical results, the scales for these economic stages are renormalized for the final time as:

$$PE_{a,g,s,d}(t) = PE_{a,g,s}(t) \cdot \sum_{i=1}^{3} \Phi_i \int_d \frac{e^{-(x-\mu_i)^2/2\sigma_i^2}}{\sqrt{2\pi}} dx$$

to ensure that, when the number of 1st, 2nd, and 3rd economic stage employees are multiplied by each economic scale, the base case simulation results are recovered (based on the renormalization $\Phi_i \in [0,1]$).

The task now is to determine the rate of change of the economic factor $F_i(t)$ as a function of the changing (increasing) employed population of age a, gender g and disease stage d within the 4th economic stage. We compute the total derivative:

$$dF_i(t) = \frac{\partial F_i}{\partial (PE)} \frac{\partial (PE)}{\partial a} da + \frac{\partial F_i}{\partial (PE)} \frac{\partial (PE)}{\partial g} dg + \frac{\partial F_i}{\partial (PE)} \frac{\partial (PE)}{\partial s} ds$$

The solution to this differential equation gives the manner (function) in which the total economic factor $F_i(t)$ changes as the number of employed people of age a, gender g and disease stage d increases (the status of people who were previously considered unemployed are continuously changed to employed). Given the initial condition $F_i(PE_{a,g,s,d}(t))$, we compute the economic factor for $F_i\left(PE_{a,g,s,d}(t) + \Delta PE_{a,g,s,d}(t)\right)$ using a Taylor expansion:

$$F_i\left(PE_{a,g,s,d}(t) + \Delta PE_{a,g,s,d}(t)\right) \approx F_i\left(PE_{a,g,s,d}(t)\right) + \frac{\partial}{\partial d} F_i\left(PE_{a,g,s,d}(t)\right) + \Lambda$$

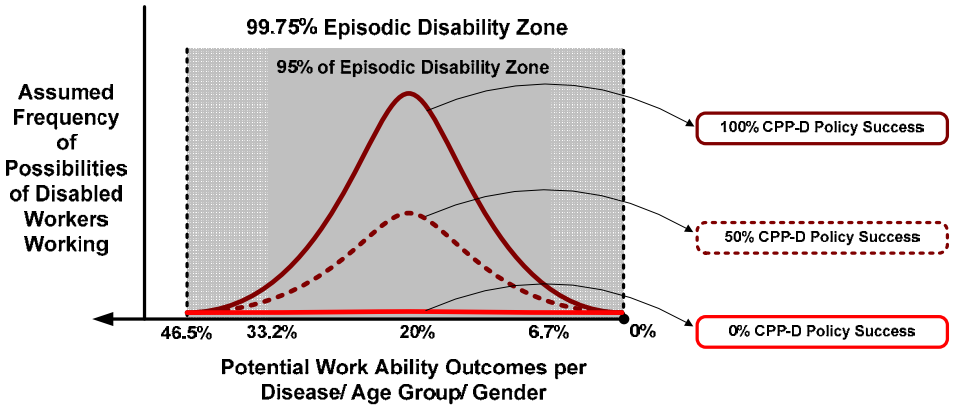
or (using the above analysis):

$$F_i\left(PE_{a,g,s,d}(t) + \Delta PE_{a,g,s,d}(t)\right) \approx F_i\left(PE_{a,g,s,d}(t)\right) + F_i\left(\omega_d PE_{a,g,s}(t)\right)$$

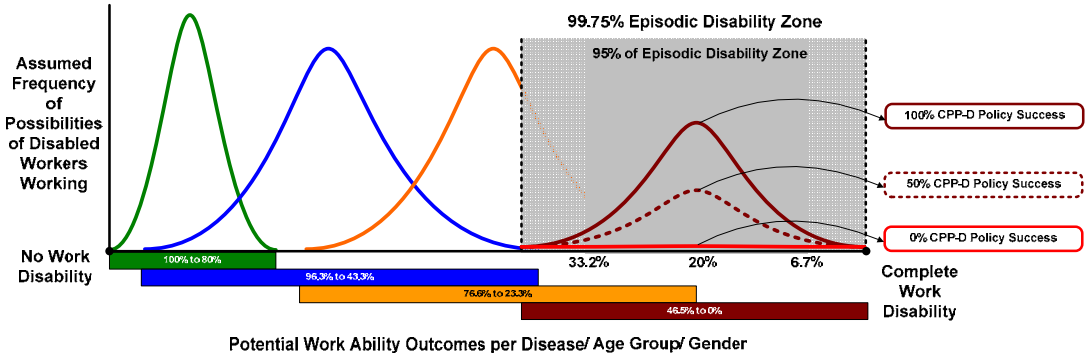
where ω_d is a scaling factor for $\Delta PE_{a,g,s,d}(t) = PE_{a,g,s}(t)$ new employed people who are put into stage 4. $F_i\left(PE_{a,g,s,d}(t) + \Delta PE_{a,g,s,d}(t)\right)$ indicates the new value of the economic factor i when an $\Delta PE_{a,g,s,d}(t)$ people (formally unemployed in economic stage 4) become employed.

The CPP-D policy impact analysis model is now calibrated against age group, gender, disease prevalence, labour force, and CPP-D recipient historical data. In combination with simulations of future possible states of the world for disease prevalence, labour force, and

CPP-D recipients for age groups and gender, the stage 4 disability normal distribution can now be changed to indicate the level of success of a change in CPP-D policy as follows:



Changes from the CPP-D base zero employment assumption will now generate economic results across all of the economic scales as computed from the Taylor series expansion. The following diagram illustrates this:



Appendix XI. Data Requirements

A fundamental concern with respect to the quality of the final results is embedded within the data availability and its quality. While the availability and consistency of existing historical economic data was satisfactory the same could not in general be said about the health data. In most cases the data which was required was simply unavailable while in other cases its quality suffered from inadequate resolution and poorly defined causal relations. In other cases an ambiguity in the data definition persisted (such as the ICD code consistency). In particular, while mortality and incidence data was available for Lung Cancer dating back to the early 50's, the same could not be said of COPD and the circulatory diseases (particularly CVD). We were not able to locate a self-consistent incidence data for either the COPD or CVD. In large part due to the limitations created by the incidence data, we have found that no reliable long term (historical) estimates of prevalence exist for any of the diseases considered.

In order to obtain estimates for the incidence rates we consulted subject matter experts at Statistics Canada. We used data which was "washed out" to find incident or first hospitalizations. For each year, they took every patient who had a visit with COPD or CD as the first diagnosis (the index visit) and then looked at all the previous years of data to see if they had a prior admittance with COPD or CD as any diagnosis. The number of years between the index visits and the closest prior admittance was recorded. The cut-off for the minimum number of years since the last admittance for the index visit to be considered an incident was chosen after looking at the trends across several years. A 5 year washout was chosen for CD and a 4 year for COPD. The trends are quite short due to the fact that for a washout of x years we need that many years of data prior the first year. We have linkable data from all jurisdictions starting in the fiscal year 1994/95 so for CD with a 5 year washout the first possible year is 1999/2000 and for COPD with a 4 year washout 1998/99. We used these estimates to indicate the possible future incidence rates at the expense of large error (due primarily to the small number of sample points).

For HIV/AIDS and mental illness, estimates of incidence, mortality and prevalence estimates were obtained as follows.

The data for HIV and AIDS was available from HIV and AIDS in Canada: Surveillance Report to December 31 2004 by the Public Health agency of Canada. The report provided incidence and mortality statistics for HIV and AIDS respectively. The report gave:

- Incidence of HIV positive tests by sex and 10 year age groups between 1985 and 2004 (for each year except from 1985-1989).
- Incidence of AIDS (number of reported cases) by sex and 5 year age groups between 1995 and 2004 (annual) and 1979 to 1994 (one group).
- Mortality due to HIV (deaths attributed to the HIV infection) by sex between 1985 and 2004 (for each year except from 1985-1989).
- Mortality due to AIDS by sex between 1985 and 2004 (for each year except for 1985-1989).

The report also provided the 2003 AIDS and HIV prevalence estimates for each age group and sex. Since estimates for 1 year age groups were not found, they have been estimated from population data using a cubic spline approximation (where applicable).

The mental illness data was available from Statistics Canada. A paper by Lasser et al. (2000)[26] outlines what constitutes a mental disease and we have followed their convention.[27]

[26] Lasser K., Boyd J.W., Woolhandler S., Himmelstein D., McCormik D., Bor D. (2000), Smoking and Mental Illness: A population-based Prevalence Study. *JAMA.* 284:2606-2610.

For incidence and mortality, the data from Statistics Canada is available from 1990 consistently for both sexes (but not consistently in 5 year age groups). Again the 1 year age group estimates were determined with population data using a cubic spline approximation (where applicable). The prevalence estimates for 5 year age groups were obtained from the general (males and females) estimates for 2003 (available from Statistics Canada). Here the 1 year age group estimates were determined with population data as well as the US data (as a relative proxy for each age group) using a cubic spline approximation (where applicable).

In order to determine the economic cost or benefit of the change in CPP-D policy we consider the cost of paying CPP-D benefits and the change in tax revenue. This is the tax revenue which is lost due to disability and mortality (causally linked to the disease). Here we consider two effects: direct and indirect. The direct deals with the income tax lost due to the death or the complete inability of an employed patient to earn wages, and an unemployed person replacing the cancer patient. The indirect effect deals with the income tax lost due to the follow on effects of the direct loss of wages attributable to the death or the inability of completely disabled person to earn wages. We attribute this part of the lost tax revenue to disease disability within a particular tax year. It is a function of the direct as well as indirect effects based on an economic disability staging system which captures that part of the disease cycle from initial diagnosis through to death. This calculation applies to those patients that are staged, rather than those that are diagnosed and pass away in the same year.

In addition we also consider the depression and care taking effects which consider the effects of the disability on the lost tax revenue of people who are not part of the labour force but who are connected to an employed person. We consider the effect due to the disease mortality and cancer disability of a connected person (someone who is unemployed) on the psychological state of a healthy employee. The effect is further broken down into direct and indirect based on income and corporate tax. We assume that the effects on an employed person due to the disability of a person with a disability are a result of two factors. First: the sacrifice in the wage due to providing a care characterized by the caregiver work coefficient δ_i. Second: the effect of depression on the connected person characterized by the depression work coefficient ε_i. We used Dutch and Australian data used to generate these expected values and standard deviations[28,29]. When a connected person has cancer they affect that part of the labour force that is required to respond to the disability of the connected, thereby reducing wage based productivity in two ways: 1. A member of the labour force has to partially care for a non labour force cancer patient. 2. A member of the labour force will be subject to a partial depression disability for the care for a non labour force cancer patient.

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[27] The categories of mental illnesses are: Social phobia; Agoraphobia; Panic disorder; Major depression; Dysthymia; Panic attacks; Simple phobia, Nonaffective psychosis; Alcohol abuse or dependence; Antisocial personality, antisocial behaviour, or conduct disorder; Posttraumatic stress disorder; Generalized anxiety disorder; Drug abuse or dependence; and Bipolar disorder.

[28] Family caregiver burden: results of a longitudinal study of breast cancer patients and their principal caregivers Eva Grunfeld, Doug Coyle, Timothy Whelan, Jennifer Clinch, Leonard Reyno, Craig C. Earle, Andrew Willan, Raymond Viola, Marjorie Coristine, Teresa Janz, Robert Glossop CMAJ • JUNE 8, 2004; 170 (12).

[29] Family caregiver burden: results of a longitudinal study of breast cancer patients and their principal caregivers Eva Grunfeld, Doug Coyle, Timothy Whelan, Jennifer Clinch, Leonard Reyno, Craig C. Earle, Andrew Willan, Raymond Viola, Marjorie Coristine, Teresa Janz, Robert Glossop CMAJ • JUNE 8, 2004; 170 (12)

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