Fiscal Analysis of a Targeted Tax Credit for Taxpayers in the Second Bracket

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Executive Summary

Senator Larry Smith, Chair of the Standing Senate Committee on National Finance, requested that the Parliamentary Budget Officer (PBO) estimate the level of a benefit available to individuals whose taxable income falls within the second tax bracket, where the overall cost of these benefits is equivalent in size to the estimated level of revenues generated from introducing a 33.0 per cent tax rate on income over $200,000. Senator Smith also requested that PBO include the behavioural effect associated with the introduction of the new tax rate on income over $200,000 in determining the total revenues available for redistribution. PBO estimates this amount to be $1.8 billion in 2016.

This benefit would replace Bill C-2's proposal of a reduction of the second tax bracket's tax rate from 22.0 per cent to 20.5 percent.

The taxable income of individuals who fall in the second tax bracket ranges from $45,283 to $90,563. The amount that each individual within this tax bracket will receive from the redistribution of the $1.8 billion depends on the design of the new benefit. PBO examined four options (Summary Figure 1):

First, a redistribution of the benefit that increases, reaches a maximum, then decreases with the level of taxable income, would provide a maximum benefit of $486 to individuals with $67,923 of taxable income.[1] The behavioural impact is expected to be negligible.

Second, a redistribution that is linearaly progressive would provide $0 to taxpayers with $90,563 of taxable income, and the largest benefit of $399 to taxpayers with $45,283. The phase-out rate for this calculation is 0.9 per cent of taxable income over $45,283. This estimate does not account for the probable behavioural impact.

Third, an equal redistribution would provide the 7.2 million taxpayers in the second tax bracket each with a benefit of approximately $245. This estimate does not account for the probable behavioural impact.

Fourth, a redistribution that increasingly diminishes as taxable income increases (that is, the value of the benefit is reduced exponentially) would provide $317 for taxpayers with $45,283 of taxable income. The phase-out rate for this calculation is 15.5 per cent for every $1,000 greater than $45,283. This estimate does not account for the probable behavioural impact.

Summary Figure 1

Redistributing tax revenues across the estimated number of taxpayers in the second tax bracket determines the dollar value benefit for each taxpayer.

Individual Benefit ($)
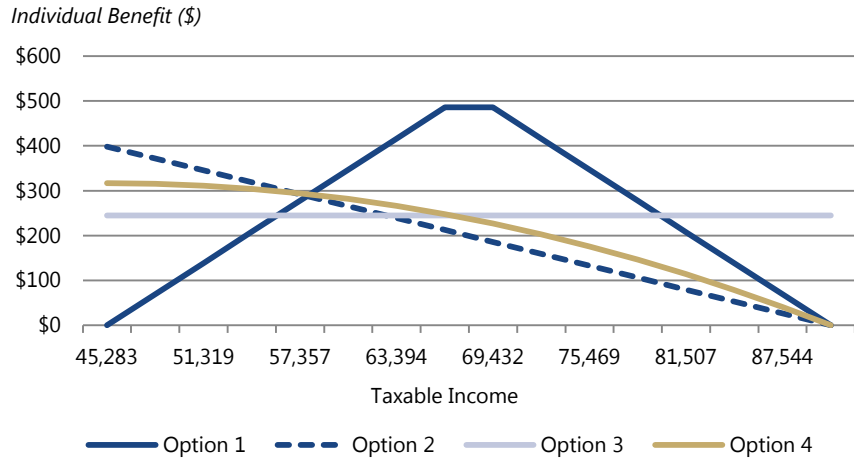
The number of taxpayers in the second tax bracket is not evenly distributed across taxable income. Rather, the number of taxpayers in the second tax bracket decreases with taxable income (Summary Figure 2).[2]

Summary Figure 2

Distribution of taxpayers in the second tax bracket, across taxable income

Number of Taxpayers ('000)
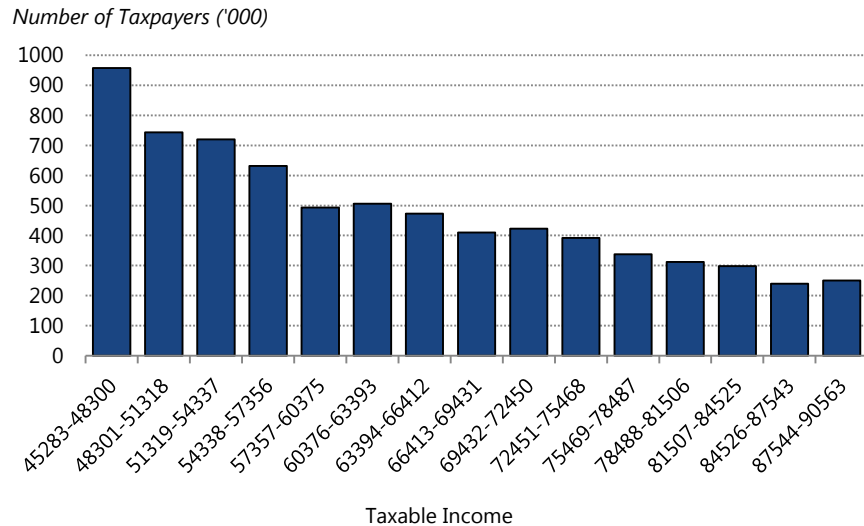
1. Introduction

In January 2016, PBO estimated the additional revenue that would be generated from a new tax rate of 33 per cent on income over $200,000 to taxpayers in the second tax bracket will be $1.8 billion in 2016.[3] This estimate accounts for a shift in behaviour, whereby individuals may engage in tax avoidance and reduced labour market participation.

Subsequent to this, Senator Larry Smith, Chair of the Standing Senate Committee on National Finance, requested that the PBO prepare a fiscal analysis of providing a targeted tax credit to taxpayers in the second bracket. In effect, this would reduce the tax payable for only those taxpayers reporting annual taxable income in the second bracket (that is, reporting taxable income of between $45,283 and $90,563 in 2016). To this end, PBO prepared four complementary fiscal analyses:

1. Option 1: Symmetric linear function

   Taxpayers with income below $67,923 will receive an amount that increases with each dollar of taxable income greater than $45,283, after which the amount is reduced for each dollar of taxable income greater than $67,923.

2. Option 2: Decreasing linear function

   Each taxpayer will receive an amount that is reduced for each dollar of taxable income greater than $45,283.

3. Option 3: Static function

   Each taxpayer receives the same amount, regardless of taxable income.

4. Option 4: Concave quadratic function

   Each taxpayer receives an amount that is reduced exponentially for each dollar of taxable income greater than $45,283.

2. Re-distribution of Tax Revenues

The result of re-distributing income tax revenues originating from taxpayers with taxable income over $200,000 to taxpayers with taxable income in the second tax bracket is presented below using three methods.

Each approach requires an annual estimate of:

- Tax revenues, accounting for behavioural effects, generated from the introduction of the new high-income tax bracket.[4]

- The number of taxpayers in the second tax-bracket for the same year.[5]

It is important to note that the timing of this redistribution is assumed to be simultaneous. That is, PBO assumes the estimated tax revenues generated from high-income taxpayers in 2016 will be re-distributed to eligible taxpayers in the second tax bracket in 2016.

Equally important is the assumption that the anticpation of this re-distribution will not create a behavioural response. The literature suggests that the income elasticity of labour supply for a phase-in, phase-out benefit is small at moderate to high levels of income. Therefore, PBO assumes potential recipients (and non-recipients) would not engage in behaviour that would alter their taxable income, with the objective of maximizing (or obtaining) the benefit.[6]

2.1. Symmetric linear function

The calculation of the symmetric linear function resembles the existing Working Income Tax Benefit (WITB). With both a phase-in and phase-out rate, the WITB encourages individuals to increase their employment income in order to receive a larger WITB payment. The benefit caps-out at a particular level of income, after which the benefit phases-out. The increasing-decreasing aspect of WITB smooths individuals' marginal effective tax rates and assists welfare recipients get past the 'welfare wall'.

Phased-in for earners with taxable income of at least $45,283, the benefit examined in this report would smooth the increase in after-tax income such that the incentive for non-eligible individuals to increase their taxable income is greatly diminished (Figure 2-1). With the phase-out rate, the same would be true for non-eligbile individuals whose taxable income is slightly above the top end of the second tax bracket (that is, $90,563).

Determining each taxpayer's net benefit using this method can be done using the formula:

$$a = min[0.0230 * (taxable\ income - 45283), 0.0230 * (67923 - 45283)]$$

$$- max[0.0230 * (taxable\ income - 67923), 0]$$

The distribution of taxpayers declines as taxable income increases, however at a declining rate. Figure 2-1 shows that there are a greater number of lower-income second-bracket taxpayers receiving a small benefit than there are higher-income second-bracket taxpayers.

Figure 2-1

This graph shows the average benefit for each income group within the second tax bracket, as well as the number of recipients using a symmetric linear function.
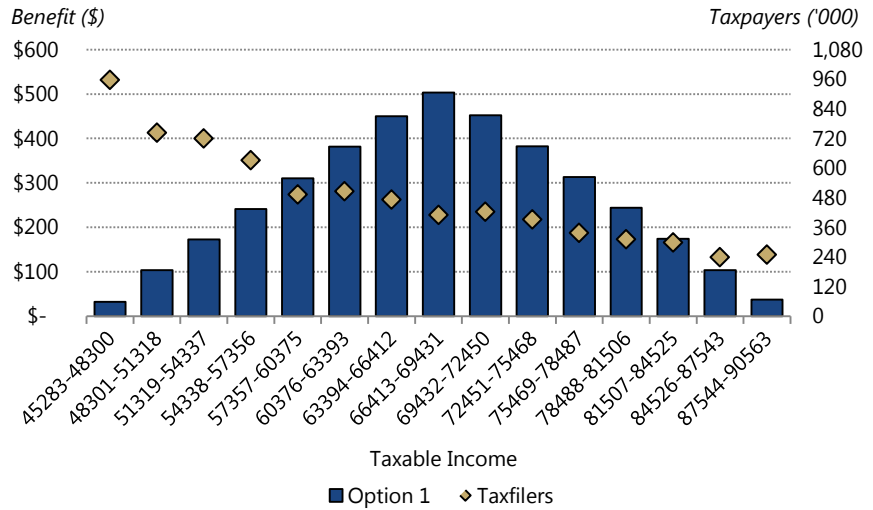
The distribution is an important factor in determining the level of the benefit. A flat or increasing distribution would have increased the deduction, and as a result increased the base benefit. However, fewer taxpayers would be in receipt of the higher benefit.

2.2.   Decreasing linear function

Of the other three methods examined in this report, the decreasing linear function is the most consistent with other benefits and tax credits in Canada's personal income tax system. It is progressive, that is, it is reduced as income increases. It is also simple for taxpayers to calculate.

A simple equation for calculating the benefit using a decreasing linear function is to assume a base dollar benefit that is greater than zero for individuals with the minimum eligible taxable income ($45,283 in this case), and reducing that benefit by a proportion of taxable income (often referred to as a phase-out rate) that is greater than the minimum eligible income.

Assuming that taxpayers with $90,563 taxable income would receive $0 in benefits, PBO calculated the phase-out rate to be 0.9 per cent and the base benefit to be $399. Details on the calculation can be found in Appendix A.

Determining each taxpayer's net benefit using this method can be done using the formula:

$$a = 399 - 0.009 * (taxable\ income - 45283)$$

The distribution of taxpayers declines as taxable income increases, however at a declining rate. Figure 2-1 shows that there are a greater number of taxpayers receiving a higher benefit than there are receiving a smaller benefit.

Figure 2-2

This graph shows the average benefit for each income group within the second tax bracket, as well as the number of recipients using a decreasing linear function.

Benefit ($) ... Taxpayers ('000)

Taxable Income

☐ Option 2   ◆ Taxfilers

6
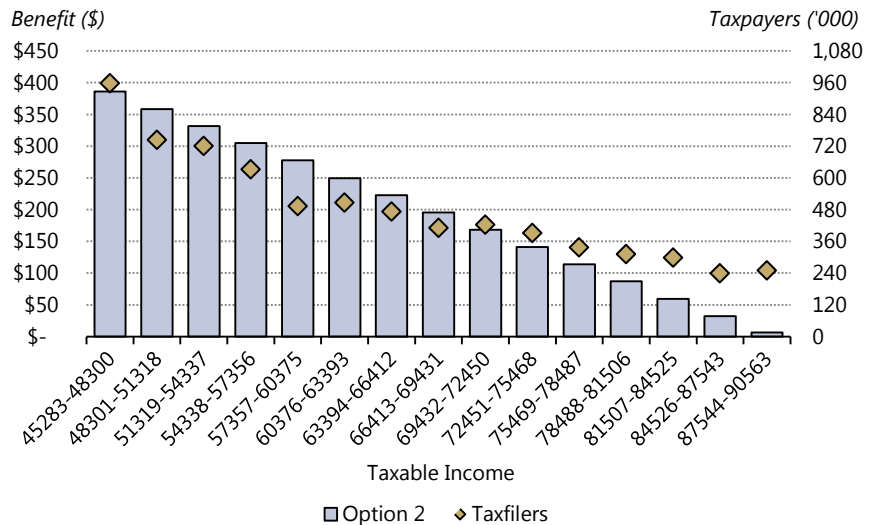
2.3. Static function

A static tax credit would provide the same benefit to all eligible taxpayers. Analagous examples include the basic personal allowance, the age credit, and the employment tax credit. The static equation presented in this report does not assume any deduction or claw-back and so is unique compared to existing benefits and tax credits.

Determining each taxpayer's net benefit using this method can be done using the formula:

$$a = \$1.8 \text{ billion} / 7.2 \text{ million taxfilers}$$

Figure 2-3

This graph shows the average benefit for each income group within the second tax bracket, as well as the number of recipients using a static function.
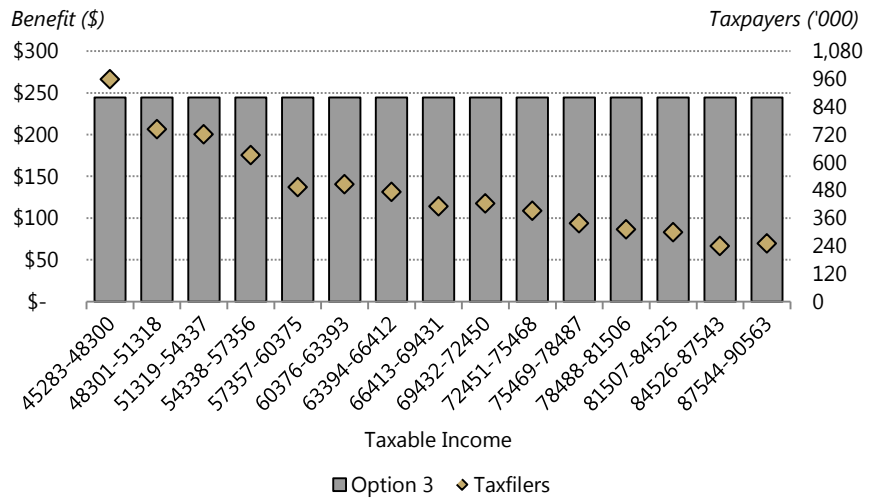
2.4. Concave quadratic function

PBO also included a concave quadratic function solution to present an alternative that would provide a greater dollar benefit to a greater number of higher-income individuals within the tax bracket at a cost to lower-income individuals, compared to the decreasing linear function.

Assuming that taxpayers with $90,563 taxable income would receive $0 in benefits, PBO calculated the phase-out rate to be 0.0000155% and the base benefit to be $317. Details on the calculation can be found in Appendix A.

Determining each taxpayer's net benefit using this method can be done using the formula:

$$a = 317 - 0.155 * [\{(\text{taxable income}/1000) - 45.283\}^2]$$

Similar to the decreasing linear function, a greater number of taxpayers would receive a larger benefit than those receiving a smaller benefit. However compared to Figure 2-1, the average dollar value has decreased for lower-income taxpayers, and increased for higher-income taxpayers.

Figure 2-4

This graph shows the average benefit for each income group within the second tax bracket, as well as the number of recipients using a concave quadratic function.

Benefit ($)   *Taxpayers ('000)*

Taxable Income

■ Option 4   ◇ Taxfilers
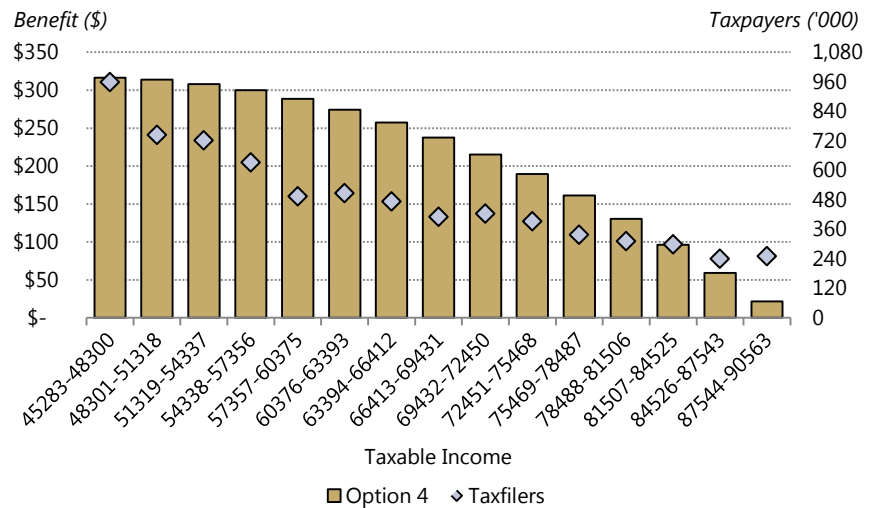
# 3. Conclusion

PBO presented four methods in this report, however there are an infinite number of ways to re-allocate the estimated tax revenues generated from the proposed new income tax bracket.

A convex quadratic function (see Figure 3-1) would provide a larger benefit to a greater number of low-income individuals, at the expense of higher-income individuals. A mirrored s-curve would provide a larger benefit to lower-income invidiuals at the expense of medium-to-higher income earners, whereas the s-curve would provide the reverse.

Figure 3-1

There are an infinite number of ways to distribute benefits to individuals.
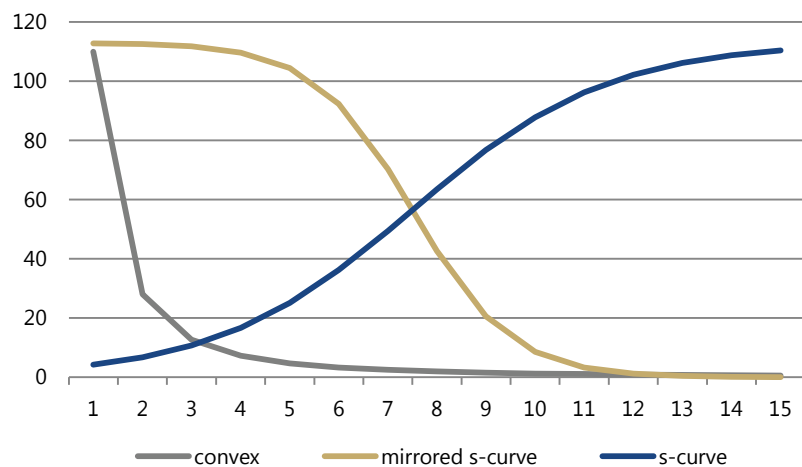
Parliamentarians would need to decide how to implement any type of benefit into the Canadian tax system.

Appendix A: Methodology

PBO used two formulae and substitution to solve for the base benefit amount and the phase-out rate for the decreasing linear function, as well as for the concave quadratic function. This section provides the details on the calculations.

The symmetric linear function looks like this:

Dollar benefit for taxpayer i = min[(taxable income of individual i – 45283) * phase-out rate, (67923 – 45283) * phase-in rate]
- max[0, (taxable income of individual i – 67923) * phase-out rate]

Or: $a_i = min[r*(y_i - 45283), r*(67923 – 45283)] – max [0, r*((y_i - 67923)]$

For simplicity, income greater than $45,283 and $67,923 multiplied by the phase-in and phase-out rate, respectively, can be thought of as deductions. These amounts are reducing the amount of the benefit.

PBO assumes that the dollar benefit would be $0 for individuals with $90,563 and $45,283, or taxable income and would be maximized for individuals with taxable income in the middle of the second tax bracket (that is, $67,923).

$$a_i = r * (90563 - 45283)$$

$$a_i = 22640r \qquad (1)$$

Since the total benefits for every eligible individual is determined to be $1.8 billion dollars, we can use a second equation to help solve these unknowns:

Total number of second-bracket taxpayers * Dollar benefit for each taxpayer = $1.8 billion

Or: $N_{low} * r * (y_i - 45283) + N_{high} * \{a_i – (y_i - 67923) * r \}= 1.8 billion$

Where: N_{low} is number of taxpayers with $45,283 <= income <= $67,923;
N_{high} is number of taxpayers with $67,923 <= income <= $90,563;

We can re-arrange this equation so that we are only solving for one unknown. We do this by substituting equation (1) into equation (2):

$r = 1.8 billion / [\{(N_{low} * (y_i - 45283)\} + N_{high} * \{22640 – (y_i - 67923)\}]$ (2)

PBO estimates that roughly 2.4 million taxpayers in the second tax bracket have income above $67,923 and 4.7 million have income below $67,923. The difference between their income and $45,283 and $67,923, respectively, is $24.6 billion and $45.6 billion.

We can now find out what the phase-out rate should be, given the number of taxpayers eligible and their taxable income:

$$r = 1{,}757{,}000{,}000 / (45{,}600{,}000{,}000 + (2{,}400{,}000 * 22640) + 24{,}600{,}000{,}000)$$
$$r = 0.0230$$

Using equation (1), we can now solve for a_i:

$$a_i = \quad 22640*0.0230 \quad = \$586$$

Determining each taxpayer's net benefit using this method can be done using the formula:

$$a = min[0.0230* (taxable\ income - 45283),\ 0.0230 * (67923 - 45283)]$$
$$- max[0.0230 * (taxable\ income - 67923),\ 0]$$

The decreasing linear function looks like this:

Dollar benefit for taxpayer i = Base amount – phase-out rate*(taxable income of individual i - \$45,283)

Or: $\quad a_i = A - r * (y_i - 45283)$

For simplicity, taxable income less the \$45,283 multiplied by the phase-out rate can be thought of as a deduction, since it is being subtracted from a base benefit. In this equation, both the dollar benefit and the phase-out rate are unknown.

PBO assumed that the dollar benefit would be \$0 for individuals with \$90,563 of taxable income. The first equation is as follows:

$$a_i - r * (90563 - 45283) = 0$$

$$a_i = 45280r \qquad (1)$$

Since the total benefits for every eligible individual is determined to be \$1.8 billion dollars, we can use a second equation to help solve these unknowns:

Total number of second-bracket taxpayers * Dollar benefit for each taxpayer – total sum of deductions = \$1.8 billion

Or: $\quad N* a_i - r * \sum(y_i - 45283) = 1.8\ billion$

We can re-arrange this equation so that we are only solving for one unknown. We do this by substituting equation (1) into equation (2):

$$r = 1.8\ billion\ / [(N*45280) - \sum(y_i - 45283)] \qquad (2)$$

PBO estimates that roughly 7.2 million taxpayers are in the second tax bracket, and that the sum of their deductions is roughly \$1.3 billion.

We can now find out what the phase-out rate should be, given the number of taxpayers eligible and their taxable income:

$$r = 1{,}757{,}000{,}000/ (7{,}200{,}000*45280) - 126{,}000{,}000{,}000 = 0.009$$

Using equation (1), we can now solve for a_i:

$$a_i = 45280*0.009 \ =\$399$$

The concave quadratic function is solved in the same way. This function looks like this:

$$a_i = A - r * [(y_i - 45283)^2]$$

As with the linear function, PBO assumed that the dollar benefit would be $0 for individuals with $90,563 of taxable income. The first equation of the concave quadratic function is as follows[7]:

$$a_i - r * [\{(90563/1000) - (45283/1000)\}^2] =0$$

$$a_i = 2050r \qquad (1)$$

The second equation to help solve these unknowns looks like this:

$$N* a_i - r * \sum[\{(yi/1000)-(45283/1000)\}^2] = 1.8 \text{ billion}$$

We can re-arrange this equation so that we are only solving for one unknown. We do this by substituting equation (1) into equation (2):

$$r = 1.8 \text{ billion} / [(N*2050) - \sum[\{(yi/1000)-(45283/1000)\}^2] \qquad (2)$$

PBO estimates the sum of the squared deductions is $3.4 billion. We can now find out what the phase-out rate should be, given the number of taxpayers eligible and their taxable income:

$$r = 1{,}757{,}000{,}000/ (7{,}200{,}000*2050) - 3{,}400{,}000{,}000$$

$$r = 0.155$$

Using equation (1), we can now solve for a_i:

$$a_i = 2050*0.155 \ \ =\$317$$

Notes

1. PBO used the unweighted average of the second tax bracket taxable income thresholds ($67,923) as the value eligible to receive the maximum benefit. A weighted average would reflect an asymmetric concave parabola, and result in a lower level of taxable income ($62,780) as the value eligible for the maximum benefit.

2. PBO did not account for commodity taxes when determining the number of taxpayers in the second tax bracket.

3. PBO, "The Fiscal and Distributional Impact of Changes to the Federal Personal Income Tax Regime", 2016 presented fiscal year estimates.

4. Estimating tax revenues for the current or future year is akin to estimating the tax base or taxable income. PBO derived this estimate in preparation for a previous report, using Statistics Cananda's SPSDM, version 22.0.

5. Estimating the number of taxpayers for the current or future year is akin to estimating the tax base or taxable income. PBO derived this estimate using Statistics Canda's SPSDM, version 22.1.

6. The literature suggests the behavioural effect of WITB, as measured by the income elasticity of labour supply, is applicable to a small sub-population. Source: See references to income elasticities of labour in Blundell R, MaCurdy T, "Labour Supply", *Handbook of Labor Economics*, 1999, Vol 3A. This literature has focused on benefits for persons with little income, where the marginal increase in income is large enough to offset employment disincentives. Furthermore, Annabi et. al find this elasticity is small for medium to high income individuals and families. Source: Nabil A, Boudribila Y, Harvey S, "Labour supply and incocme distribution effects of the working income tax benefit: a general equilibrium microsimulation analysis", *IZA Journal of Labor Policy*, 2013, Vol. 2, Issue 19. Since the benefit examined in this report would target persons in the second tax bracket, PBO expects the behavioural effect to be negligible. The remaining three functions PBO used for analysis in this report is likely to have a significant behavioural effect, however PBO did not estimate it.

7. PBO divided taxable income and the $45,283 by 1,000 to scale the numbers down.