

**The Equity Effects of Tax Reform  
in New Brunswick**

by

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Working Paper Series 2009-04



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## THE EQUITY EFFECTS OF TAX REFORM IN NEW BRUNSWICK

### I. INTRODUCTION

In 2008 the New Brunswick government initiated a process leading to the introduction of a package of income tax reform in the 2009 provincial Budget. This process started with the publication in June 2008 of a Discussion Paper on New Brunswick's Tax System, which outlined various options for comprehensive and revenue-neutral tax reform. The Discussion Paper presented two options for reforming the personal income tax (PIT) system (a single rate and a dual rate option), four options for reducing the corporate income tax (CIT) general rate from 13% to 10%, 7% or 5%, an increase of two percentage points in the provincial portion of the Harmonized Sales Tax (HST), and the introduction of a carbon tax similar to the one introduced by British Columbia in 2008. The second step involved the creation of a legislative committee to travel across New Brunswick to increase public awareness of the proposed reform and to collect responses from individuals and organizations. The final stage was the government's final decision, which was announced in the March 2009 provincial Budget. This Budget introduced a selective version of tax reform which included only the income tax cuts. Specifically, the government opted for the two rate system for the PIT and the reduction in the CIT rate from 13% to 8%. This reform will be implemented gradually over the next four years.

Although in all the published documents the government emphasized the potential economic benefits of the income tax reform, neither the discussion paper nor the 2009 provincial Budget provide a detailed analysis of the channels through which these economic effects will be generated and the way in which the tax reductions will be distributed among different types of New Brunswick families and different income groups. This paper fills part of this analytical gap by developing estimates of the distributional effects of tax reform. Although this analysis is performed in a static framework, its results can also be used as a basis for understanding the dynamic implications of this tax reform over time.

This analysis is performed for three tax reform options. The first option is the income tax reduction introduced in the 2009 Budget. The New Brunswick Department of Finance estimated that this tax reform will lead to a reduction in provincial own-source revenue of \$380 million in fiscal year 2012-2013. To avoid increasing deficits, this loss of revenue must be offset by lower government spending or increases in other taxes. In our analysis, we followed the principle of revenue neutrality outlined in the June 2008 Discussion Paper, and analyzed the equity implications of the two revenue-neutral options presented in that paper: (1) an increase in the provincial component of the Harmonized Sales Tax (HST) or (2) the introduction of a carbon tax. In the first revenue neutral option, we raised the provincial HST rate by 2.39 percentage points from 8 to 10.39 percent in order to ensure that the full tax reform package is revenue-neutral. In the second option, we replaced the HST rate increase with a new carbon tax equivalent to \$19.50 per ton of carbon emissions.

This paper is organized as follows. Section II presents a summary of the reform options and their components. Section III presents a summary of the methodology employed in our analysis. Section IV presents the results of the distributional effect of the 2009 income tax reform when fully implemented. Chapter V provides a similar calculation for the first revenue-neutral tax reform option (2009 income tax reform plus a 2.39 percentage point increase in the HST rate), and Chapter VI presents results for the second revenue-neutral tax reform (2009 income tax cuts and a carbon tax based on \$19,50 per tonne of carbon emissions). The final chapter summarizes the results. The Appendix provides additional details on the methodology used in our analysis.

Our results show that the 2009 income tax reform will lower personal income taxes for most income levels, but will do so in a regressive manner. The reduction in effective tax rates increases in magnitude as family income rises. This reform will push the income tax system, which currently has a progressive structure of effective tax rates, towards proportionality. The first of the revenue-neutral options, offsetting the revenue loss from the income tax reform with an HST rate increase, would shift the burden of taxation from the high to low-income earners, thus increasing the regressivity of the overall tax system. The second revenue-neutral option, offsetting the revenue loss with a carbon tax, will also increase the regressivity of the tax, but not as much as the increase in the HST rate.

## II. ELEMENTS OF THE TAX REFORM OPTIONS

The 2008 tax reform proposal combined five main elements: (a) two options for personal income tax reductions, (b) various options for corporate income tax reductions, (c) an increase of the provincial component of the Harmonized Sales Tax, (d) the creation of a carbon tax based on the British Columbia model, and (e) adjustments to the property tax rates and assessment. Although the 2009 Budget included only the income tax reduction (plus an adjustment to the property tax assessment), we review also the main elements of the revenue-offsetting taxes since our analysis includes two revenue-neutral options.

*Personal Income Tax.* In the 2008 Discussion Paper, the New Brunswick government proposed two possible options. The first option is a single tax rate of 10% for all levels of income and an increase in the basic personal amount to \$12,000 for tax fillers with income below \$35,000. This amount would be progressively eliminated until taxable income reached \$75,000. There would also be an increase in the spousal amount to \$12,000 and the clawback rate for the income tax reduction (LITR) would be reduced from 5% to 3%. The second option includes a dual tax rate with a rate of 9% for income below \$35,000 and 12% afterwards. There would be no increase in the basic personal amount or spousal amount, but the clawback rate for the LITR would be lowered to 3%. Two other benefit programs would be introduced: a new non-refundable child tax credit and a universal child care benefit reducing tax payable by up to \$400 and \$600 respectively.

In the March 2009 Budget, the government introduced a modified version of the plan. It chose the two rate option with the first rate of 9% for income below \$35,000 and 12% for the rest. In addition to the lower rates, the government will increase the tuition rebate

program from \$2,000 to \$4,000, saving \$5 million to young graduates, and will raise the Low-Income Seniors' Benefit from \$200 to \$400 by 2010, saving approximately \$8.2 million for seniors. Table 1 shows a summary of the personal income tax reform introduced in the 2009 Budget.

**Table 1. Chronological Personal Income Tax Implementation Plan.**

|                                              | 2008              | 2009              | 2010              | 2011              | 2012         |
|----------------------------------------------|-------------------|-------------------|-------------------|-------------------|--------------|
| Taxable income, \$                           | 0 to 34,835       | 0 to 35,706       | 0 to 36,420       | 0 to 37,149       | 37,892       |
| <b>Tax rate (%)</b>                          | <b>10.12</b>      | <b>9.65</b>       | <b>9.30</b>       | <b>9.10</b>       | <b>9.00</b>  |
| Taxable income, \$                           | 34,836 to 69,672  | 35,707 to 71,414  | 36,421 to 72,842  | 37,150 to 74,300  | 37,893+      |
| <b>Tax rate (%)</b>                          | <b>15.48</b>      | <b>14.50</b>      | <b>12.50</b>      | <b>12.10</b>      | <b>12.00</b> |
| Taxable income, \$                           | 69,673 to 113,272 | 71,415 to 116,105 | 72,842 to 118,427 | 74,300 to 120,796 | 37,893+      |
| <b>Tax Rate (%)</b>                          | <b>16.80</b>      | <b>16.00</b>      | <b>13.30</b>      | <b>12.40</b>      | <b>12.00</b> |
| Taxable income, \$                           | 113,273+          | 116,106+          | 118,428+          | 120,797+          | 37,893+      |
| <b>Tax rate (%)</b>                          | <b>17.95</b>      | <b>17.00</b>      | <b>14.30</b>      | <b>12.70</b>      | <b>12.00</b> |
| Personal Amount, \$                          | 8,395             | 8,605             | 8,777             | 8,953             | 9,132        |
| Spousal Amount, \$                           | 7,129             | 7,307             | 7,453             | 7,602             | 7,754        |
| Expenses for dependent relative: maximum, \$ | 5,000             | 10,000            | 10,000            | 10,000            | 10,000       |
| Tuition amount: maximum                      |                   |                   |                   |                   |              |
| Annual, \$                                   | 2,000             | 4000              | 4000              | 4000              | 4000         |
| Lifetime, \$                                 | 10,000            | 20000             | 20,000            | 20,000            | 20,000       |
| Low-Income Seniors' Benefit, \$              | 200               | 300               | 400               | 400               | 400          |
| Low Income Tax Reduction Clawback, %         | 5                 | 4                 | 3                 | 3                 | 3            |

*Source: The Plan for Lower Taxes in New Brunswick 2009-2012, 2009, Page 18, Table A.1.*

*Corporate Income Tax.* The 2008 Discussion Paper proposed three options for reducing the corporate income tax (CIT) rate. The first option was a reduction of the CIT rate from 13% to 10% which would be in line with the 2012 federal government objective. The

second option would reduce the CIT rate to 7%, and the third option would lower this rate to 5%, which would be equal to the small business tax rate.

The Corporate Capital Tax will be completely eliminated by the end of 2009, thus no analysis will be performed. It was mentioned briefly in the 2008 Discussion Paper and was not re-mentioned afterwards since it was already implemented.

In the March 2009 Budget, the government introduced a revised reform plan. This plan has tax reductions for both large and small corporations. The components of this plan include:

- Cutting the CIT rate from 13% to 12% on July 1 2009 and thereafter lowering it to 8% by 2012;
- Increasing the income eligible for the Small Business tax rate to \$500,000;
- Introducing a Forestry Industry Investment Tax Credit;
- Extending the High Energy Use Tax Rebate;
- Introducing significant enhancements to the Small Business investor tax credit;
- Enhancing the Labour-Sponsored Venture Capital Tax Credit; and
- Introduction of incentives for the energy sector.

Two of the components, the introduction of a Forestry Industry Investment Tax Credit and the Extending the High Energy Use Tax Rebate will only benefit the forestry industry and bring a maximum of \$10 million in relief per year 2009. The increase in the income level eligible for the small business tax rate will save approximately \$1 million per year to small businesses. Another \$2 million in relief will be created by increasing the maximum annual investment amount and promote growth in this sector.

The revenue loss estimated by the provincial government for the 2009 personal and corporate income tax reform is shown in Table 2. The low income tax reduction (LITR) clawback rate implementation and the increase in the maximum expense for dependent relative are not mentioned in this table. The revenue loss for these two programs was estimated at \$13 million.

**Table 2. Estimated Changes to Provincial Government Revenues for the Complete Reform in Unadjusted 2008 \$.**

|                                                      | 2009-10 | 2010-11 | 2011-12 | 2012-13 |
|------------------------------------------------------|---------|---------|---------|---------|
| Personal Income Tax Rate Reductions                  | -1.18   | -232    | -288    | -323    |
| Enhanced Tuition Rebate                              | -2      | -2.5    | -3.5    | -5      |
| Enhanced Low-Income Seniors' Benefit                 | -3.5    | -7.4    | -7.8    | -8.2    |
| Tax Savings for Individuals                          | -123.5  | -241.9  | -299.3  | -336.2  |
| General Corporate Income Tax Rate Reduction          | -6      | -11     | -20     | -37     |
| Increase Small Business Limit                        | -1      | -1      | -1      | -1      |
| Enhanced Small Business Investor Tax Credit          | -2      | -3      | -4      | -5      |
| Enhanced Labour Sponsored Venture Capital Tax Credit | -1      | -1      | -1      | -1      |
| High Energy Use Tax Rebate                           | -5      | 0       | 0       | 0       |
| Forestry Industry Investment Tax Credit              | -5      | 0       | 0       | 0       |
| Tax Savings for Business                             | -20     | -16     | -26     | -44     |
| Total Tax Savings                                    | -143.5  | -257.9  | -325.3  | -380.2  |

*Source: The Plan for Lower Taxes in New Brunswick 2009-2012, 2009, Page 6, Table 1.*

*Harmonized Sales Tax.* The HST is a joint federal-provincial tax, with a common base and a combined rate, currently at 5 percent for the federal and 8 percent for the provincial part. The 2008 Discussion Paper proposed raising the provincial rate by two percentage points to 10 percent, thus picking up the tax room vacated by the federal rate reduction. The public consultations showed strong opposition to this proposed increase in the HST and this revenue-raising option was not included in the 2009 tax reform.

*Carbon Tax.* Since the revenue from the increase in the HST rate was not sufficient to offset the revenue loss from the proposed income tax reduction, the 2008 discussion paper incorporated the introduction of a new tax, specifically a carbon tax modeled on the recently introduced carbon tax in British Columbia. This tax would target all fuel types that produce CO<sub>2</sub> emissions when burned. Although no details were provided on the rates of this tax, the Discussion Paper estimated that this new tax would initially raise \$100 million per year. A summary of the carbon tax rates in British Columbia is presented in Table 3.

**Table 3. British Columbia's Tax Rates Schedule.**

| Fuel                   | Units for Tax Rates   | Tax Rates |       |
|------------------------|-----------------------|-----------|-------|
|                        |                       | 2008      | 2012  |
| Gasoline               | cents per litre       | 2.34      | 7.02  |
| Diesel and Heating Oil | cents per litre       | 2.69      | 8.07  |
| Heavy Fuel Oil         | cents per litre       | 3.15      | 9.45  |
| Natural Gas            | cents per cubic meter | 1.9       | 5.7   |
| Propane                | cents per litre       | 1.54      | 4.62  |
| Low Heat Value Coal    | \$ per tonne          | 17.77     | 53.31 |
| High Heat Value Coal   | \$ per tonne          | 20.77     | 62.31 |
| Peat                   | \$ per tonne          | 10.22     | 30.66 |
| Tires                  | \$ per tonne          | 20.8      | 62.4  |

Source: British Columbia Ministry of Small Business and Revenue: [www.sbrgb.bc.ca/individuals/Consumer\\_Taxes/Carbon\\_Tax/carbon\\_tax.htm](http://www.sbrgb.bc.ca/individuals/Consumer_Taxes/Carbon_Tax/carbon_tax.htm)

As this tax would impose a disproportionate burden on low income families, the Discussion Paper proposed to introduce a New Brunswick Climate Change Tax Credit for low income earners. This credit would also be in synchronization with the GST credit and could replace the Home Energy Assistance Program (HEAP).

The public response to this new tax was negative, therefore, the provincial government decided not to implement this proposal, thus introducing in 2009 only the tax reduction components of the 2008 revenue-neutral tax reform package. This means that either the tax increases were postponed or the revenue loss will be offset by spending reductions, unless the provincial government plans on running budget deficits of increasing amounts indefinitely.

*Property Tax.* The final component of the 2008 Discussion Paper and the March 2009 reform was the property tax adjustment. In the first report, four options were presented. The first option would eliminate the difference between resident and non-resident rates.

In addition, the local service district (LSD) rate would be raised to \$1.50. The second option would eliminate the provincial residential rate, reduce the provincial non-residential rate and extend the 65 cents LSD rate. The third option would average the evaluation period for three years. This would avoid excessive increases in the property tax burden. In the 2009 Budget, the government chose instead the accountability mechanism. This method works by calculating an adjustment factor that is then multiplied by the present property tax rate. The adjustment factor was implemented to curb large increases in assessment values.

The analysis of the property tax change is outside the scope of this paper for the simple reason that it would become much harder to maintain the budget neutrality assumption because of intra-jurisdiction issues. Also, the property tax adjustment was created so that the burden could be shifted from the provincial to the municipal level.

### **III. ELEMENTS OF THE METHODOLOGY**

Since the provincial government decided to implement only the deficit financed portion of the package of tax reform originally presented in the 2008 Discussion Paper, we are left with two options for the distributional analysis. We can perform the analysis only on the income tax cuts or we can select some budget measures, spending cuts or increases in other taxes that would lead to a fiscally-neutral fiscal reform. We chose the latter because running large budget deficits of increasing magnitude may not be fiscally sustainable over the long run. For this approach we used the two options for revenue loss offset identified in the Discussion Paper, specifically, an increase in the HST rate or, alternatively, the introduction of a carbon tax modeled on the one introduced by British Columbia.

The methodology used in our study is divided into two parts. The first part discusses the general assumptions and definitions used in the analysis. The second part identifies the steps needed to measure the incidence of the three scenarios chosen. More details on the tax shifting assumptions used in our analysis are found in the appendix.

#### **General Assumptions**

To measure the incidence of these three tax reform scenarios, we calculated the tax payable for the average taxpayer for 80 selected income groups (16) and family types (5) under the tax structure of 2008 and then compared it with the 2012 structure (when the reform will be fully implemented). For these calculations, we used the data incorporated in Statistics Canada's Social Policy Simulation Database and Model (SPSD/M). For the personal income tax, the SPSP/M data was compared with the information in the Taxation Statistics for Individuals published by the Canada Revenue Agency.

For the selection of family types, we used the concept of Census Family. A census family is defined as "a head, their spouse (if there is one), and their children under the age of 25 (including their guardian children), living together in the same dwelling. A head is defined as the male if the census family contains a married or common-law couple, the

female lone parent if the census family includes children but not a couple, or the unattached individual.” We divided New Brunswick’s census families into the following five major categories: singles (under the age of 65 without a child and young adults not living with their parents), single parents (singles, separated or divorced, 25 of age or older, with children), one-earner couples (with or without children and with a single income source), two-earner couples (with or without children and with two or more income sources when a child younger than 25 of age living with his family also generates income), and seniors (singles or couples).

For the income concept, we chose total income, defined by the SPSPD/M as “all income received by individuals: the sum of all market income and transfer income.” Each family type was divided into 16 groups based on a family’s total income, with a closed range up to \$300 thousand and an open range for income above this level.

The SPSPD/M program only has actual data up to 2006 and projections for the subsequent years. We performed the analysis with the 2006 data instead of relying on projections. While choosing the 2006 data has benefits, it has also some shortfalls. First, our analysis is based on the distribution of income and family types for this year. If there were large shifts in the income distribution from the selected groups from year to year the results that would materialize in fiscal year 2012-13 could be different than the results in this paper. In the case of the HST, the SPSPD/M data underestimates the amount recorded in the provincial Budget, because it includes only revenues from individual consumers. A portion of the HST is paid by institutions and non-profit organizations (commercial firms receive offsetting tax credits). We reconciled this difference by increasing proportionally the HST collected from individuals to match the NB government figures. This means that the revenue collected from institutions, such as universities and hospitals, was treated for distributional purposes as the revenue from individuals, an assumption commonly used in the measurement of the incidence of broad based consumption taxes.

### **The Components of Tax Reform**

To determine whether each one of the tax reform options evaluated in this report are progressive or regressive, we analyzed the pattern of effective tax rates (ETR) for each component of the reform package and for the entire package. The ETR was calculated as the ratio of the tax payable by each family type and income group to the corresponding total income. If the ETR increases (decreases) as income rises, a tax is said to be progressive (regressive).

The incidence of the new and reformed fiscal instruments was measured in four steps. First, we determined who bears the burden of a tax based on tax incidence theory and practice. Second, we identified the selected groups of taxpayers according to their family and income characteristics. Third, we calculated the actual tax liability and the effective tax rate for the current and the new system. Each of these values is representative of the average taxpayer in his/her specific income group. Finally, whether a tax reform package would be regressive or progressive was determined by comparing the difference between the current and the new effective tax rate for each specific tax instrument. A deficit

generating tax reform that reduces the ETR for taxpayers is said to be progressive (regressive) when the change in the ETR decreases (increases) as family income rises. A revenue-neutral tax reform is said to be progressive (regressive) when the ETR decreases (increases) for low income earners and increases (decreases) for high income earners. Details of how this approach was applied to each tax are discussed below.

### **Personal Income Tax Reform**

The reform of the personal income tax contains four elements: (a) the change in statutory rates, (b) the change in the Low Income Tax Reduction, (c) the enhancement of the tuition rebate and the subsidy for expenses for relatives, and (d) the increase in the Low Income Senior Benefit. Before discussing these four elements, it is necessary to address some general methodological issues.

**General Issues.** First, it must be decided whether to perform the distributional analysis for each of the four years or only for the final year, when the reform is completely implemented. Since the 2009 tax reform will be implemented over a four year period, little information would be gained by annual estimates because what matters ultimately is the incidence of each reform option under full implementation. For that reason, we performed the analysis for the final year only.

Second, we must determine whether the full tax reform is applied to the income distribution of the current year or of the final year so that the changes in the tax burden borne by different families can be compared in a consistent manner. If the calculations are based on the 2012 year data, a consistent comparison imposes two requirements. We need to have accurate projections of the number of families by major characteristic and by income group. Also, we must adjust the results for inflation in order to make the comparisons in real terms and make them relevant to the current situation. These inflation adjustments are not needed if we apply the full reform to the current year 2006 according to the latest SPSD/M data. Under this second option, however, the results do not incorporate the effects of changes in the distribution of families, the distribution of income, and the increase in real income.

On balance, the second option seems to require fewer assumptions and to provide more consistent comparisons, as one may reasonably expect only small changes in the distribution of families and income within a four year period. Therefore, we chose this option. Our results address the following question for each component of a tax reform package: if tax reform were fully implemented in 2006, how would the relative tax burden borne by different family and income groups be affected?

The problem of adjusting for inflation is automatically solved by this approach because we would obtain the same conclusions by using the results for the current year or the results for future years discounted to the present by the projected rate of inflation. An example of this correspondence in the case of the personal income tax is shown in Table 4.

**Table 4. Tax Payable Under the Current and New Personal Income Tax Structure: an Illustrative Example.**

|                           | 2008    |         | 2012    |
|---------------------------|---------|---------|---------|
|                           | Current | New     | New     |
| Total Income, \$          | 34,000  | 34,000  | 36,985  |
| Taxable Income, \$        | 34,000  | 34,000  | 36,985  |
| Tax Rate (%)              | 10.12   | 9.0     | 9.0     |
| Gross Tax                 | 3,440.8 | 3,060.0 | 3,328.7 |
| Basic Personal Amount, \$ | 8,395   | 8,395   | 9,132   |
| Basic Personal Credit, \$ | 849.6   | 755.6   | 821.9   |
| Net Tax, \$               | 2,591.2 | 2,304.4 | 2,506.8 |
| New Tax in 2008 Dollars   | 2,591.2 | 2,304.4 | 2,304.4 |
| Effective Tax Rate (%)    | 7.62    | 6.78    | 6.78    |

**The Change in Statutory Rates.** Changing the tax rate structure from four to two statutory rates is by far the largest change in this reform. We measured the incidence of the personal income tax reform in four steps. First, we allocated the burden of this tax to those who are liable for its payment, based on the commonly used assumption in tax incidence studies that the burden of the personal income tax is borne by those who claim the relevant components of income. Since in this case there is no tax shifting, the second step was directed at identifying the relevant groups of taxpayers, based on their demographic characteristics and their total income, and calculate their tax liability. For each group, we estimated the tax payable and average income, and then calculated the average tax. The tax payable was calculated by using the SPSPD/M program, which includes all the present tax credits and tax reductions for the 2008 year. We performed these calculations for 80 distinct groups (16 income groups and five family types). Finally, we calculated the effective tax rate for both the current and new personal income tax schedules.

**Low-Income Tax Reduction (LITR).** This program works by reducing the tax payable for low income individuals and families. For taxpayers with income lower than the threshold, the program completely eliminates the tax payable. When this threshold is exceeded, the benefit is reduced by a clawback mechanism. For an individual in 2008, the threshold is \$14,011 and this translates into a maximum rebate of \$569 of tax payable. The clawback mechanism works by taking the excess income above the threshold and applying the clawback rate. This amount is then subtracted from the maximum allowed reduction to give the tax filer his total tax reduction. Therefore, as income increases above \$14,011, the net benefit is reduced until it completely vanishes when income reaches \$25,391. The reform does not change the income levels, but changes the rate at which the benefit is reduced from 5% to 4% in 2009 and to 3% in 2010.

Table 5 shows the effect of reducing the LITR rate from 5% to 3% on the net tax payable adjusted on a base of 2008 dollars. This illustrative individual is not subject to any CPP and EI contribution, only the base personal amount is used to discount the taxable income. In addition, the rate of inflation is assumed to be equal to the rate of indexation. This exercise leads to four observations.

First, taxpayers with income below or equal to \$14,011 will not gain from this lower clawback rate. Moreover, the value of the claimable LITR deduction will be reduced for these individuals due to the reduction in the personal income tax rate (from 10.12% to 9%) that will lower the tax they have to pay. In addition, as the net burden for these low income earners is zero due to the LITR, no benefits will be gained from the lower PIT rate. Simply put, a single taxpayer working at minimum wage will gain nothing from this 2009 reform.

Second, the benefit received from the LITR would be lower with the new system for a single taxpayer with taxable income between the range of \$14,011 and \$17,230. The reduction of the PIT rate will reduce the tax payable at the lower threshold to \$505, reducing the total benefit of the LITR by \$64 compared to the older system. An additional \$3,217 in taxable income is needed to eliminate this difference created from the reduction of the clawback rate and PIT reduction. For this specific group of taxpayers, the benefit received from the lower personal income tax rate would be offset by lower benefits received from the LITR program.

Third, the maximum taxable income which gives rights to the LITR program will be increased to \$30,844 for single taxfilers, \$5,153 higher than in 2008.

Finally, there are some clear winners from this lower clawback rate. Taxfilers with taxable income between \$17,230 and \$30,844 will receive higher LITR benefits compared to the old system

**Table 5. Low-Income Tax Reduction (LITR) Under the Current Formula and the New Formula: Single Taxpayer, 2008 Dollars.**

| Gross<br>Income | Gross Tax \$    | LITR \$ | Net Tax \$ | Gross Tax \$ | LITR \$ | Net Tax \$ |
|-----------------|-----------------|---------|------------|--------------|---------|------------|
|                 | Current Formula |         |            | New Formula  |         |            |
| 8,398           | 0               | 0       |            | 0            | 0       | 0          |
| 10,000          | 162             | 162     | 0          | 144          | 144     | 0          |
| 12,000          | 365             | 365     | 0          | 324          | 324     | 0          |
| 14,011          | 569             | 569     | 0          | 505          | 505     | 0          |
| 15,000          | 668             | 520     | 148        | 594          | 480     | 114        |
| 17,230          | 894             | 408     | 486        | 795          | 472     | 323        |
| 20,000          | 1,174           | 270     | 904        | 1,044        | 389     | 655        |
| 30,844          | 2,241           | 0       | 2,241      | 1,993        | 0       | 1,993      |

*Note: The source of income is not subject to CPP and EI contributions.*

The change in the LITR clawback rate from 5 to 3 percent was taken into account by using the SPSPD/M program and changing the LITR rate.

**Enriched Tuition Rebate and Enhanced Expense for Relatives.** Measuring the distributional effects of these two programs would require some arbitrary assumptions that would make the results unreliable. Therefore, we excluded these two items from my analysis.

Increase in Low-Income Senior Benefit. This program is a transfer payment to New Brunswickers based on age and income level. Therefore, it is a component of provincial government spending and not of the tax system. Accordingly, we excluded it from our analysis.

### *Corporate Income Tax Reform*

Measuring the incidence of the CIT reform demanded a different approach than the analysis performed for the personal income tax.

First, corporations are legal entities that pay CIT, but do not bear the burden of this tax. This tax may be shifted to consumers through higher prices, workers through lower wages, or investors through lower rates of return. As explained in the Appendix, we assumed that all three groups of economic agents – consumers, workers, and investors – bear the burden of this tax. For consumers, the allocation was based on data for total consumption from the SPSPD/M. For workers and investors, we used total investment and employment income data also from the SPSPD/M. Total investment income is defined as the sum of all investment income such as dividend, capital gains and interest and other investment income. Employment income is the sum of all employment and self-employment income. Next, we allocated the tax savings in proportion to each of the separate 80 family groups based on the incidence assumption discussed in the Appendix, specifically, 50 percent to consumption and 50 percent to the combination of investment and employment income.

### *The Harmonized Sales Tax (HST)*

We measured the incidence of the HST in three steps. First, we determined who bears the burden of this tax. The HST is a value added sales tax and is levied on all goods and services apart from basic groceries and rent. In addition, businesses receive an input tax credit equal to the amount they pay on their purchases so that the tax is only paid by the final consumer. Although there is the possibility of tax shifting in the short-run, depending on demand and supply elasticities, studies of tax incidence generally assume that this tax is ultimately borne by final consumers. We used the same assumption in our calculations.

Second, we used the SPSPD/M data series for the provincial component of the HST. The series is composed of 48 distinct goods and services categories. This series was then divided into the same income and family categories as the previous reform components. When we compared the data with the provincial government budget, there was a divergence in the amounts collected for the year. The SPSPD/M data underestimated total collection by \$187.9 million. This was caused by the fact that the net HST paid by institutions, such as universities, hospitals, and non-profit organisations is not included in the SPSPD/M data. Two options were possible to solve this issue. First, we could take the SPSPD/M values as given and correct for the underestimate by raising the revenue-neutral increase in the HST rate. Alternatively, we could readjust the values from the SPSPD/M model with the ones from the finance department by allocating the revenue from the

finance department in the same proportions that the retail sales tax was distributed in the SPSPD/M. We chose the second option and distributed the total HST revenue in the same proportions as the retail sales distribution in the SPSPD/M series.

The next step, after deciding which data series and adjustment to use, was to calculate the actual incidence of the HST and to make it comparable with the reform proposed in the discussion paper. Using the retail sales tax data and performing the appropriate proportional increase would create the table we needed. This table would represent the complete revenue received by the provincial government for each of the selected family and income groups. In 2006, the federal government decreased its component of the HST by 1%. This brought the rate down from 15% to 14%. Although this changed the actual rate charged, it did not change the rate the provincial government charged which stands at 8%. The adjusted data represents this 8%. We then calculated that the revenue-neutral increase in the HST rate would amount to 2.39 percentage points. We recognize that the HST rate can be raised in increments of 1 percentage point at a time. We used the 2.39 percentage point's increase to ensure revenue-neutrality.

The final step consisted of finding the effective tax rate for the current and new provincial component. With the tax payable calculated in the last step and the total income for the selected group, dividing them by each other would result in the effective tax rates. Taking the difference in the two effective tax rates would generate the actual change in the effective tax rate created by the increase of 2.39 percentage point in the HST.

### *The Carbon Tax*

A distributional analysis of introducing a carbon tax modeled on the British Columbia system was recently performed by Ruggeri and Bourgeois [2009]. In this report, we started from the results of that study, which were derived on the basis of the same family demographic and income characteristics as discussed above, and simply made a proportional adjustment based on the ratio of the revenue for neutralizing the income tax reform to the revenue collected from the carbon tax in the Ruggeri and Bourgeois study. A summary of the main methodological steps in these calculations is presented below.

Table 6 shows the details of the carbon tax rates that the government of British Columbia has applied to various fuel types and the rates that were applied in this analysis. To generate revenue equal to \$257 million in 2006, the New Brunswick government would need to introduce a carbon tax equal to \$19.50 per ton of CO<sub>2</sub> emissions in 2006 dollars. Applying the same inflation factor used to reconcile current and future losses from income tax reform would yield tax rates based on a tax of 27.10\$ per ton of CO<sub>2</sub> emissions in 2012 dollars.

**Table 6. Carbon Tax Rates by Fuel Type According to the British Columbia System.**

| Fuel                 | Units for Tax Rates | Tax Rates*                 |                            |                              |
|----------------------|---------------------|----------------------------|----------------------------|------------------------------|
|                      |                     | BC July 1 2008<br>10\$/Co2 | BC July 1 2012<br>\$30/Co2 | NB July 1 2012<br>19.5\$/Co2 |
| A. Liquid Fuels      |                     |                            |                            | (2006 dollars)               |
| Gasoline             | c/litre             | 2.34                       | 7.02                       | 4.56                         |
| Diesel               | c/litre             | 2.69                       | 8.07                       | 5.25                         |
| Heating Oil          | c/litre             | 2.69                       | 8.07                       | 5.25                         |
| Locomotive Fuel      | c/litre             | 2.69                       | 8.07                       | 5.25                         |
| Heavy Fuel Oil       | c/litre             | 3.15                       | 9.45                       | 6.14                         |
| Aviation Fuel        | c/litre             | 2.46                       | 7.38                       | 4.80                         |
| Jet Fuel             | c/litre             | 2.61                       | 7.83                       | 5.09                         |
| Kerosene             | c/litre             | 2.54                       | 7.62                       | 4.95                         |
| Naphta               | c/litre             | 2.55                       | 7.65                       | 4.97                         |
| Methanol             | c/litre             | 1.09                       | 3.27                       | 2.13                         |
| B. Gaseous Fuel      |                     |                            |                            |                              |
| Natural Gas          | c/Gigajoule (GJ)    | 49.66                      | 148.98                     | 96.84                        |
| Propane              | c/litre             | 1.54                       | 4.62                       | 3.00                         |
| Butane               | c/litre             | 1.76                       | 5.28                       | 3.43                         |
| Ethane               | c/litre             | 0.98                       | 2.94                       | 1.91                         |
| Refinery Gas         | c/cubic metre       | 1.76                       | 5.28                       | 3.43                         |
| Coke Oven Gas        | c/cubic metre       | 1.61                       | 4.83                       | 3.14                         |
| C. Solid Fuels       |                     |                            |                            |                              |
| Low Heat Value Coal  | \$/tonne            | 17.77                      | 53.31                      | 34.65                        |
| High Heat Value Coal | \$/tonne            | 20.77                      | 62.31                      | 40.50                        |
| Coke                 | \$/tonne            | 24.87                      | 74.61                      | 48.50                        |
| Petroleum Coke       | c/litre             | 3.57                       | 11.01                      | 7.16                         |
| D. Combustibles      |                     |                            |                            |                              |
| Tires-Shredded       | \$/tonne            | 23.91                      | 71.73                      | 46.62                        |
| Tires-Whole          | \$/tonne            | 20.80                      | 62.40                      | 40.56                        |
| Peat                 | \$/tonne            | 10.22                      | 30.66                      | 19.93                        |

*Source: Ministry of small business and revenue [2008], Carbon tax rates by fuel type, Government of British Columbia, Victoria.*

*\*These tax rates are based on a tax of \$10 per tonne of carbon emission in 2008 and \$30 per tonne in 2012.*

The items to which this tax would be applied are both final goods which consumers consume and inputs which are used for the production of goods and services. Therefore, it is necessary to differentiate the direct effects (the tax on the final consumer) from the indirect effects (the tax on inputs). This difference is important in the analysis of the distributional effects of the carbon tax.

For the purpose of measuring the incidence of a carbon tax, it is useful to distinguish four major sectors: (a) public administration, (b) electricity generation, (c) business sector, and (d) residential sector (final consumers). For the public administration sector, it was assumed that the carbon tax would have no distributional impact as the tax potentially paid by this sector would equal the tax collected from this sector. For electricity generation it was assumed that the tax paid would be fully shifted forward to the

purchasers of electricity. For the business sector it was assumed that 50% of the burden would be borne by consumers and the other 50% by the combination of employment and investment income. The residential sector would bear the burden of the carbon in three ways: (a) the consumption of the taxed fuels, (b) the consumption of electricity, whose price incorporates the carbon tax, and (c) the consumption of goods and services whose prices are raised because of the higher production and distribution costs created by the carbon tax.

The next step involved the allocation of the tax burden of the tax among individuals and families of different income groups. This analysis was previously performed by Ruggeri and Bourgeois [2009]. The method used consisted of estimating one direct and two indirect components.

The direct component consisted of estimating the revenue from the carbon tax paid by the residential sector and allocating it among the different family groups according to their share of spending on specific energy sources. The first indirect component was the carbon tax collected from businesses. Half was allocated according to the distribution of total consumer spending and the other half according to the distribution of labour income and investment income combined. The second portion was assigned to the consumers on the basis of their total consumption expenditures by family type and income group, using the available information contained in the SPSPD/M series. The second indirect component was the carbon tax paid on the inputs to electricity generation and shifted to the residential sector through higher electricity rates.

The carbon tax would also increase the HST revenue since it would be subject to HST, for both the provincial and federal components. This additional HST was allocated to the residential sector as the business sector can claim input tax credits. Only the provincial portion was allocated in order to maintain a balance in the provincial tax reform. It should be remembered, however, that in this case, revenue neutrality for the provincial government is associated with a net increase in the tax burden borne by New Brunswickers in the amount of the extra HST paid to the federal government.

The analysis of the carbon tax was conducted for the same 80 groups as the other tax reform components listed above. The same data was used as in Ruggeri and Bourgeois [2009], and the use of the SPSPD/M model was employed to find total income, total employment income, investment income, total consumption, net electricity expense and net motor fuels and lubricant expenses. Additional data were found in Electric Power Generation, Transmission and Distribution (57-202-X) and the Report on Energy Supply and Demand (57-003-X) from Statistics Canada. All these tables are for the year 2006. Each table was defined by family types and income level.

#### IV. RESULTS OF THE DISTRIBUTIONAL EFFECT OF THE 2009 INCOME TAX REFORM

This section presents detailed results on the distributional effects of the personal and corporate income tax reform. Although we show the change in tax payable by the selected family types and income levels, our main indicator of the equity effects of this tax reform is the change in effective tax rates, measured as the ratio of the change in tax payable to the income level. The results are presented in three steps. First, we determine the revenue loss from the income tax reductions; then we present the results by income group; and finally, we show the results by family type.

##### *Revenue*

The New Brunswick government has estimated that the complete income tax reform would reduce the tax burden by \$380.2 millions in fiscal year 2012-13. We estimated that the reduction in the tax burden from the PIT and CIT reform would lead to revenue loss of \$257.8 million in adjusted 2006 dollars. When this value is adjusted for inflation and productivity growth, it becomes \$371.6 million in 2012-13, which is very close to the amount estimated by the Department of Finance.

**Table 7. Comparison of Revenue Loss from Personal and Corporate Income Tax Reform.**

|                                   | NB Government Results |        | Distributional |        |
|-----------------------------------|-----------------------|--------|----------------|--------|
|                                   | Dollar Base           |        | Analysis       |        |
|                                   | 2006                  | 2012   | 2006           | 2012   |
| Personal Income Tax               |                       | -323   | -228           |        |
| Tuition Rebate                    |                       | -5     |                | -5     |
| Low-Income Senior's Benefit       |                       | -8.2   |                | -8.2   |
| Business Tax Savings              |                       | -44    | -30            |        |
| Total                             | 0                     | -380.2 | -258           | -13.2  |
| Adjustment Factor for 2006 Income |                       |        | 1.39025        |        |
| Total Reduction in 2012 Dollars   |                       | -380.2 |                | -371.6 |

##### *Distribution by Income Class*

Table 8 shows the share for each selected income group of the population, number of families, income, and the reduction in the burden of income taxation due to the tax reform. This table shows that families making less than \$80 thousand will receive a share of the benefits of tax reform which is smaller than their share of income. Specifically, families which comprise 59 percent in the total income in New Brunswick will receive 40 percent of the total share of the tax benefit. These same families constitute 80 percent of all the families and 76 percent of the population in New Brunswick. Income tax reform will provide minimal benefits to families with income up to \$20,000. This group represents 15 percent of the population, 25 percent of families (including unattached individuals), and 6.6 percent of income, but will receive only 1.2 percent of the benefits from tax reform.

The main beneficiaries of income tax reform are high income families. Families with income above \$100,000, which account for 13 percent of the population, 8.6 percent of families and 27 percent of income, will receive 45 percent of the benefits of income tax reform. The gains are even larger for the top income groups, families with income in excess of \$300,000. This group represents less than half a percentage point of the population and one-third of a percentage point of families. Though it accounts for 3.9 percent of income, it gains 11.2 percent of the benefits of the income tax reduction.

**Table 8. The Distribution of the Revenue Reduction: Select Income class (percent).**

| <b>Family Income<br/>(\$ Thousands)</b> | <b>Population</b> | <b>Families</b> | <b>Income</b> | <b>Reform Change</b> |
|-----------------------------------------|-------------------|-----------------|---------------|----------------------|
| MIN-10k                                 | 3.65              | 6.93            | 0.79          | 0.07                 |
| 10k-15k                                 | 4.40              | 6.89            | 1.83          | 0.23                 |
| 15k-20k                                 | 7.02              | 11.22           | 3.98          | 0.94                 |
| 20k-25k                                 | 5.68              | 7.91            | 3.66          | 2.18                 |
| 25k-30k                                 | 6.50              | 7.98            | 4.51          | 2.27                 |
| 30k-40k                                 | 12.74             | 13.52           | 9.65          | 6.98                 |
| 40k-50k                                 | 11.50             | 10.44           | 9.63          | 6.99                 |
| 50k-60k                                 | 8.46              | 6.86            | 7.77          | 5.59                 |
| 60k-70k                                 | 8.32              | 6.18            | 8.27          | 6.76                 |
| 70k-80k                                 | 7.48              | 5.60            | 8.65          | 8.20                 |
| 80k-90k                                 | 5.80              | 4.16            | 7.26          | 7.51                 |
| 90k-100k                                | 5.38              | 3.72            | 7.23          | 7.74                 |
| 100k-150k                               | 9.65              | 6.48            | 15.70         | 19.70                |
| 150k-200k                               | 1.83              | 1.14            | 3.99          | 6.65                 |
| 200k-300k                               | 1.05              | 0.63            | 3.18          | 7.00                 |
| 300k-MAX                                | 0.55              | 0.34            | 3.88          | 11.20                |

The relationship between the income share and the share of the tax reform benefit is shown in Figure 1.

**Figure 1. Income and Total Reform Benefit Received Share: Select Income Groups.**

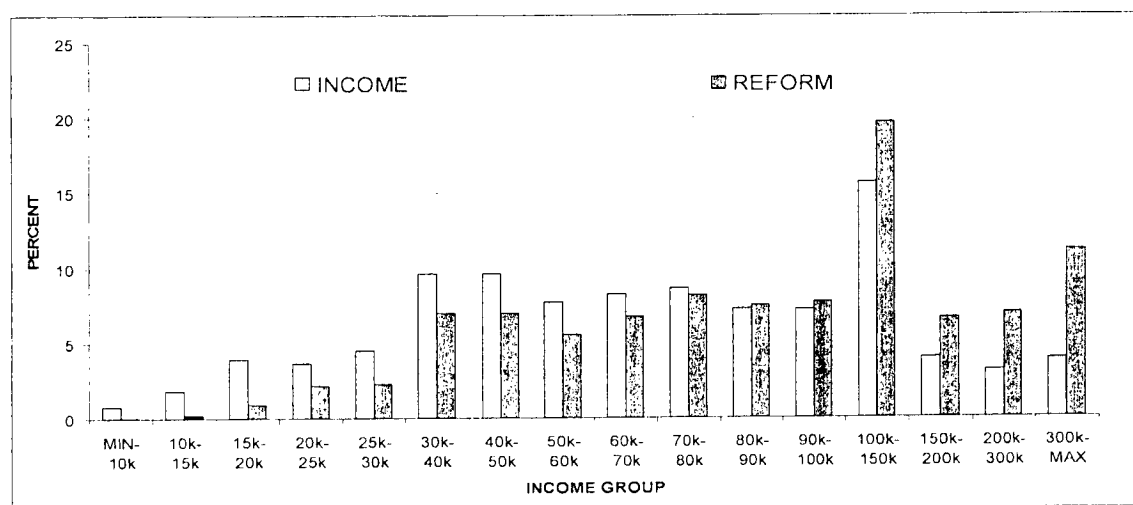


Figure 2 shows the share of the benefits from tax reform divided by the share of income for each income group. This figure gives an indication of how regressive income reform is as the above ratio increases as income rises. This ratio is less than 100 percent (the share of benefit is less than the share of income) for families with income below \$80,000. It is equal or close to one (the tax reform is proportional) for families with income in the \$80,000-\$100,000 range. It can be easily seen that for a family to be receiving an equal share of the benefit, their income must be above \$80 thousand. When family income becomes greater than \$100,000 the benefit increases dramatically for each of the selected high income groups. For the lower income groups, families making less than \$25 thousand receive less than 1/4 of the benefit compared to their income.

**Figure 2. Share of Income Divided by Tax Cut Share: Selected Income Groups.**

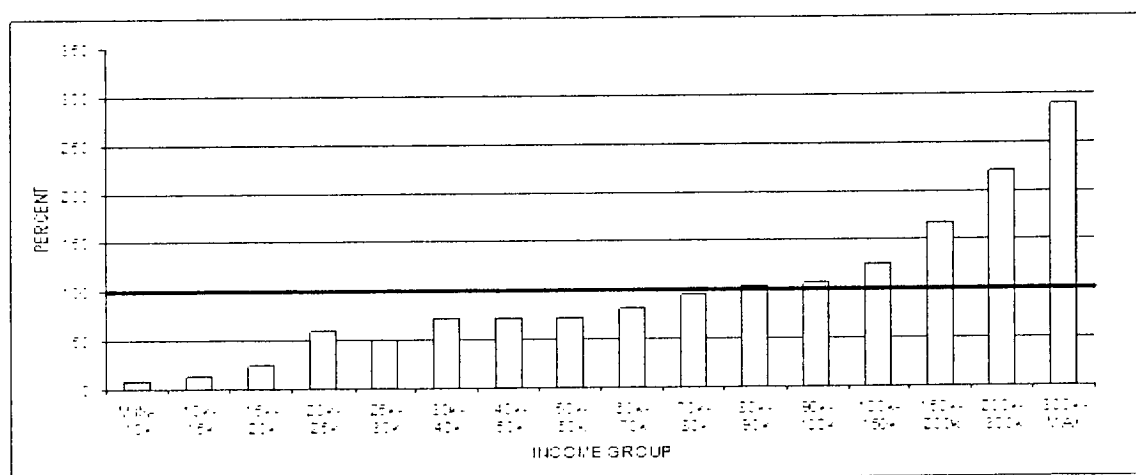


Table 9 shows the benefit received by the average family in its respective income class. It also shows the effective tax rate (ETR) under the pre-reform system and the post-reform

system. The last column is the difference in the ETR from those two systems. The income tax reform provides \$722 in tax savings for the average family in constant 2006 dollars, but there are wide differences in the tax benefit among families in different income classes. At the low end of the income scale, families with an average income of \$12,914 will receive a tax reduction of \$24, which is 1/30 of the average tax reduction. At the other end, families with income above \$300,000, with an average family income of \$559,000, will receive a tax reduction of \$24,029, which is 33 times the average. Families making income above \$60 thousand will receive a tax break above the average reduction.

To determine whether income tax reform is progressive or regressive we need to relate the changes in tax payable to a family's income, as is done in the last three columns of this table. The last column provides an indication of the extent to which income tax reform is moving the income tax system in New Brunswick towards proportionality. A review of the information contained in these three columns leads to the following conclusions.

First, the reduction in effective tax rates increases as family income rises. The average reduction in the effective tax rate is 1.5 percentage points. Families with income up to \$20,000 will get an effective tax rate reduction of about 15 percent of the average. Families with income above \$300,000 will gain an effective rate reduction of 4.3 percentage points or nearly three times the provincial average.

Second, this unequal reduction in the effective tax rate reduces the overall progressivity of the income tax system. For the selected income classes, the effective tax rate for the current system ranges between nearly 1 percent for the low income groups (income up to \$10,000) and 14 percent for families making more than \$300 thousand. The new system will have a very small effect on the effective tax rate of the lowest income group, but will reduce the effective tax rate of the top income group by 4.1 percentage points, lowering it to 9.6 percent. Under the new income tax system, the combination of the personal and income tax structure becomes roughly proportional after income reaches \$150,000.

**Table 9. Change in Tax Payable and in Effective Tax Rates by Income Class for the Complete Tax Reform: Select Income Class.**

| Family Income<br>(\$ Thousands) | Tax Reduction (\$) | Effective Tax Rate (%) |               | Difference (%) |
|---------------------------------|--------------------|------------------------|---------------|----------------|
|                                 |                    | Current<br>System      | New<br>System |                |
| MIN-10k                         | 7                  | 0.86                   | 0.73          | -0.13          |
| 10k-15k                         | 24                 | 1.03                   | 0.85          | -0.18          |
| 15k-20k                         | 60                 | 1.43                   | 1.08          | -0.35          |
| 20k-25k                         | 199                | 3.51                   | 2.63          | -0.89          |
| 25k-30k                         | 205                | 3.85                   | 3.10          | -0.75          |
| 30k-40k                         | 373                | 5.19                   | 4.12          | -1.07          |
| 40k-50k                         | 484                | 6.45                   | 5.37          | -1.08          |
| 50k-60k                         | 589                | 7.21                   | 6.14          | -1.07          |
| 60k-70k                         | 791                | 7.83                   | 6.62          | -1.21          |
| 70k-80k                         | 1,058              | 8.72                   | 7.31          | -1.41          |
| 80k-90k                         | 1,305              | 9.06                   | 7.53          | -1.54          |
| 90k-100k                        | 1,506              | 9.27                   | 7.67          | -1.59          |
| 100k-150k                       | 2,196              | 10.11                  | 8.25          | -1.87          |
| 150k-200k                       | 4,215              | 11.58                  | 9.10          | -2.48          |
| 200k-300k                       | 8,021              | 12.58                  | 9.31          | -3.27          |
| 300k-MAX                        | 24,029             | 13.97                  | 9.68          | -4.30          |
| Average                         | 723                | 7.79                   | 6.30          | -1.49          |

*Distribution by Family Type*

Table 10 shows the shares of the population, families, income and the benefit from the reform for the five selected family types. We can identify two groups. The first group - singles, single parents, and seniors - identifies the family types that receive a share of the tax reduction lower than their respective shares of either population or families. The second group, comprised of couples with one or two earners, is defined by a share of the tax reduction larger than their share of the population, families or income.

**Table 10. The Distribution of the Revenue: Select Family Type (percent).**

| Family Type        | Population | Families | Income | Tax Reduction |
|--------------------|------------|----------|--------|---------------|
| Singles            | 12.58      | 26.03    | 13.39  | 11.89         |
| Single Parents     | 7.61       | 6.11     | 4.00   | 2.29          |
| One-Earner Couples | 9.96       | 9.01     | 8.24   | 8.96          |
| Two-Earner Couples | 53.84      | 35.30    | 58.26  | 66.12         |
| Seniors            | 16.00      | 23.56    | 16.12  | 10.74         |

The final table in this section (Table 11) shows the amount of tax that each different average family would be saving after the reform. The average tax savings per family is \$723 in constant 2006 dollars. Couples with one or two earners are the only families receiving close or above the average saving. The other three family types receive below average benefits.

It also shows, in the last three columns, the effective tax rate borne by each average family type under the current and new system. The average reduction in effective tax rates for all families is estimated at 1.5 percentage points. One-earner and two-earner families are the only family groups with above-average reductions in effective tax rates (about 9 percent higher in both cases). Single parents and seniors are the two family groups with the lowest reduction in effective tax rates, with a reduction of 43 percent and 34 percent below the average, respectively.

**Table 11. Change in Tax Payable and in Effective Tax Rates: Select Family Type.**

| Family Type        | Tax<br>Reduction (\$) | Effective Tax Rate (%) |            | Difference<br>(%) |
|--------------------|-----------------------|------------------------|------------|-------------------|
|                    |                       | Current System         | New System |                   |
| Singles            | 330                   | 7.38                   | 6.06       | -1.32             |
| Single Parents     | 271                   | 4.40                   | 3.55       | -0.85             |
| One-Earner Couples | 719                   | 7.26                   | 5.65       | -1.62             |
| Two-Earner Couples | 1,354                 | 8.87                   | 7.19       | -1.69             |
| Seniors            | 330                   | 5.32                   | 4.33       | -0.99             |
| Average            | 723                   | 7.79                   | 6.30       | -1.49             |

## V. RESULTS OF THE INCOME TAX REFORM WITH AN OFFSETTING INCREASE IN THE HST RATE

This section evaluates the distributional effects of a revenue neutral tax reform where the revenue loss from income tax reductions is fully offset by an increase in the HST rate. It follows three steps. First, it estimates the increase in the HST rate needed to ensure revenue-neutrality. Second, it evaluates the change in tax liability and effective tax rates by income group. Finally, it performs the calculation for the selected family types.

### *Revenue*

One of the options presented by the New Brunswick government in the 2008 Discussion Paper was a two percentage point increase in the provincial component of the HST. Dividing the revenue loss from the income tax reductions (applied to 2006 data) by the revenue yield of one percentage point of provincial HST yielded a revenue-neutral increase of 2.39 percentage points in the HST rate. Although we recognize that in practice the HST rate can be raised by discrete amounts only, we performed the analysis with the full 2.39 percentage point increase in order to measure the distributional effects of a revenue-neutral package of tax reform.

### *Distribution by Income Class*

Table 12 shows the change in the tax burden for the average family in each income class from the revenue-neutral tax reform with an HST rate increase. The last column shows the change in the effective tax rate (ETR) for each of these family income classes. In this case, the ETR is calculated as income taxes plus HST payment divided by income for each income group.

With a revenue-neutral tax reform we can identify clearly winners and losers. As shown in the first column, the partial shift from income taxes to consumption taxes would create a transfer of the tax burden from families with income above \$80,000 to families with income below that level. The amount of the tax break is greatest for the families in the top income class (income above \$300,000), which would gain on average nearly \$20,000. The largest loss per family would go to families in the income range \$50,000-60,000, who would pay an additional \$395.

Each component of the revenue-neutral tax reform package has a regressive distribution of benefits and burdens. The reduction in the rates of the personal and corporate income taxes provide relatively greater benefits as family income increases, while the increase in the HST rate would impose declining relative burdens as income increases. Raising HST rates to offset the revenue loss from income tax reform would compound the regressivity of the tax reform introduced in 2009. The degree of regressivity of the entire tax reform package is shown in the last column of table 12. The partial shift from income taxes to consumption taxes would raise the effective tax rate on families with income up to \$80,000 and reduce that rate for families with higher income. At the two ends of the income distribution, families with income up to \$10,000 would be faced with a 27 percent increase in their effective tax rate (3.2 percentage points) while families with income above \$300,000 would enjoy a 22 percent reduction in their effective tax rate (3.6 percentage points). With this revenue-neutral tax reform package, a family making \$500,000 would end up with an effective tax rate lower than a family making \$50,000.

The regressivity of this package of tax reform will have a major impact on the pattern of incidence of the PIT, CIT and HST combined, which account for most of the own-source revenue of the New Brunswick government. Under the current system, the effective tax rates from the \$10,000-\$15,000 income class onwards increase steadily from 6.0 percent to 16.4 percent at the \$300,000-plus level (a range of 10.4 percentage points). Roughly half of this increase occurs in the income range from \$10,000 to \$50,000. Under this revenue-neutral reform package, progressivity occurs for income groups between \$10,000 and \$60,000. For income between \$80,000 and \$200,000, the combination of these three taxes is roughly proportional. For higher income levels, these taxes would become regressive as the effective tax rate falls as income rises. The range of effective tax rates for income from \$10,000 to \$565,000 (the average of the top income class) is reduced to 5.5 percentage points, which is roughly half of the range under the existing system.

**Table 12. Change in the Tax Burden and in Effective Tax Rates: Select Income Class.**

| Family Income (\$ Thousands) | Change (\$) | Effective Tax Rate (%) |            | Difference (%) |
|------------------------------|-------------|------------------------|------------|----------------|
|                              |             | Current System         | New System |                |
| MIN-10k                      | 178         | 11.98                  | 15.17      | 3.19           |
| 10k-15k                      | 167         | 5.98                   | 7.28       | 1.30           |
| 15k-20k                      | 221         | 6.90                   | 8.18       | 1.28           |
| 20k-25k                      | 161         | 8.87                   | 9.59       | 0.72           |
| 25k-30k                      | 295         | 9.96                   | 11.03      | 1.07           |
| 30k-40k                      | 209         | 10.81                  | 11.41      | 0.60           |
| 40k-50k                      | 324         | 12.48                  | 13.20      | 0.72           |
| 50k-60k                      | 395         | 13.19                  | 13.90      | 0.72           |
| 60k-70k                      | 242         | 13.14                  | 13.51      | 0.37           |
| 70k-80k                      | 104         | 13.90                  | 14.04      | 0.14           |
| 80k-90k                      | -110        | 13.78                  | 13.65      | -0.13          |
| 90k-100k                     | -300        | 13.54                  | 13.22      | -0.32          |
| 100k-150k                    | -763        | 14.19                  | 13.54      | -0.65          |
| 150k-200k                    | -2,300      | 15.35                  | 14.00      | -1.35          |
| 200k-300k                    | -5,733      | 15.71                  | 13.37      | -2.34          |
| 300k-MAX                     | -19,984     | 16.39                  | 12.82      | -3.57          |
| Average                      | 0           | 12.77                  | 12.77      | 0.00           |

Figure 3 shows clearly that high income families will be the net beneficiaries of this reform at the cost of the lower income groups. It can be observed that few will be receiving large benefits: a total of 58,763 higher income families will be subsidized by 298,017 families making less than \$80,000 a year.

**Figure 3. Change from Gain or Loss of the Reform: Selected Income Groups.**

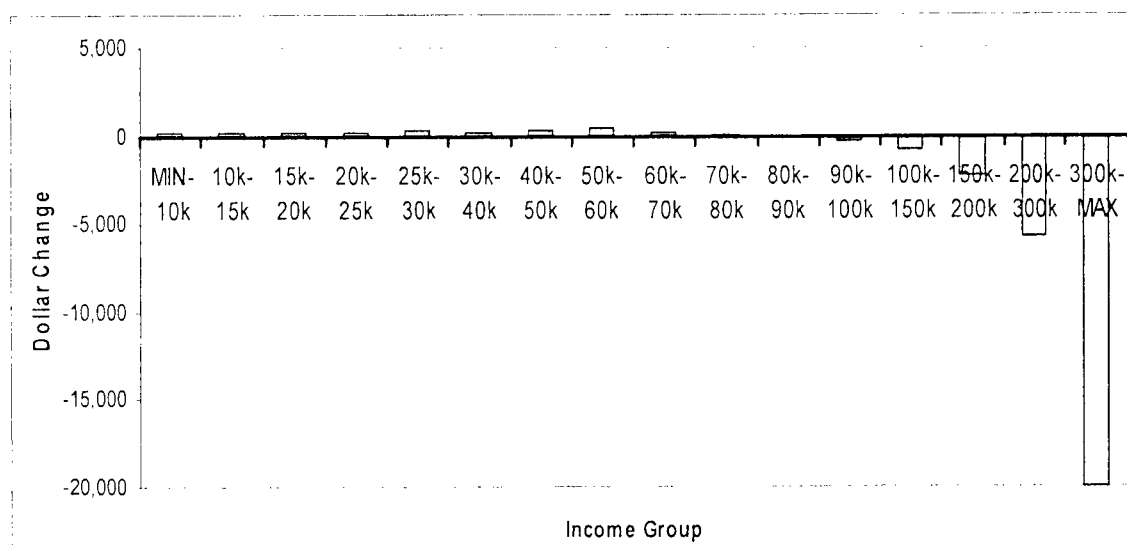
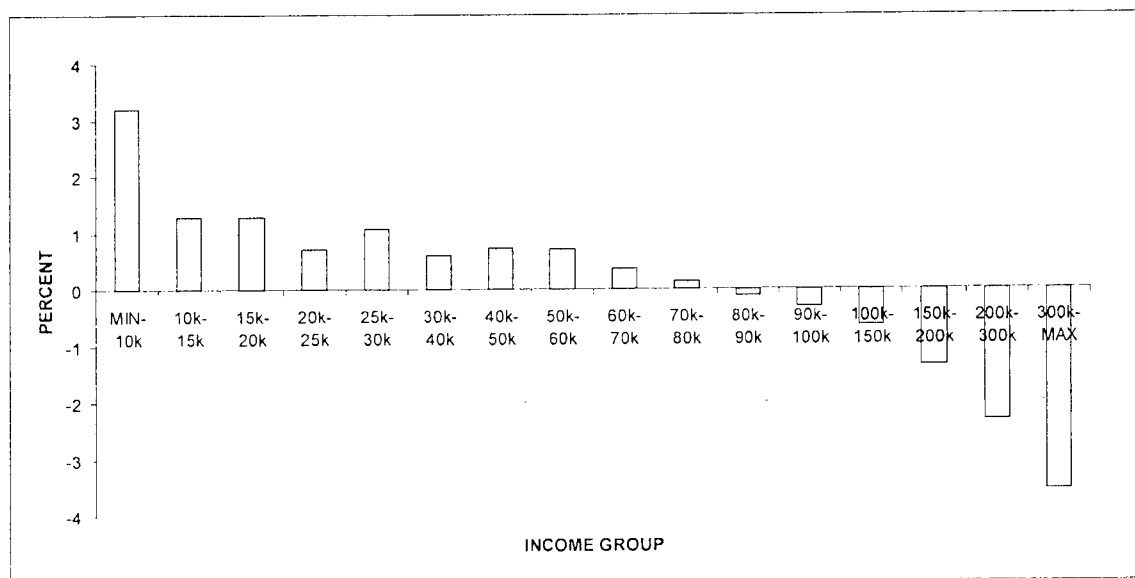


Figure 4 shows the change in the effective tax rate found in Table 12. It clearly shows a switch in tax burdens from high to low income families. The pivot stands at families with \$80,000 of income. The most heavily burdened group is that with less than \$10,000 of income. This group shows a 3.19 percentage point increase in its effective tax rate, while families with income greater than \$300,000 show a 3.57 percentage point decrease in their effective tax rate.

**Figure 4. Change in the Effective Tax Rate. Select Family Income Groups.**



#### *Distribution by Family Type*

This sub-section identifies, for the revenue-neutral tax reform package, the winners and losers among the selected five family types. We found that this revenue-neutral package of tax reform involves a shift of \$29.6 millions to two-earner families from the rest of the families. Nearly two-thirds of New Brunswick families will pay higher taxes in order to reduce the tax burden for one-third of families.

Table 13 shows the gain or loss per family from this revenue-neutral package of tax reform and the corresponding change in effective tax rates. Only one family type gains from this tax reform: two-earner families. The average couples with two earners would enjoy \$235 in tax savings. Although singles and one earner couples will not bear a large increase in their respective tax burden, single parents and senior families will see their tax burden increase substantially by \$279 and \$208 respectively.

The last three columns show the current and new effective tax rate calculated as income taxes and the HST payment for each family type. Only one family type will see its effective tax rate decrease at the cost of the other family types. The large difference in the change in effective tax rate for single parents is due to the fact that these families have

lower income and consume most of their income, therefore, the partial shift from income to consumption tax bases will generate a net burden to them.

**Table 13. Change in the distribution from Option 2 and in Effective Tax Rates:  
Select Family Type.**

| Family Type        | Tax Change<br>(S) | Effective Tax Rate (%) |            | Difference<br>(%) |
|--------------------|-------------------|------------------------|------------|-------------------|
|                    |                   | Current System         | New System |                   |
| Singles            | 59                | 12.59                  | 12.83      | 0.24              |
| Single Parents     | 279               | 10.19                  | 11.07      | 0.88              |
| One-Earner Couples | 16                | 12.80                  | 12.83      | 0.04              |
| Two-Earner Couples | -235              | 13.54                  | 13.25      | -0.29             |
| Seniors            | 208               | 10.73                  | 11.36      | 0.63              |
| Average            | 0                 | 12.77                  | 12.77      | 0.00              |

The total change in tax payable can also be viewed in Figure 5, which reaffirms the conclusions previously stated that the average two earner families will be the only gainers from this reform at the cost of the other family types, particularly single parents and seniors. These latter groups will be heavily burdened by the increase in the HST rate and will not see this burden reduced by an increase in the GST credit because this is a federal program.

**Figure 5. Change from Gain or Loss of the Reform. Selected Family Class**

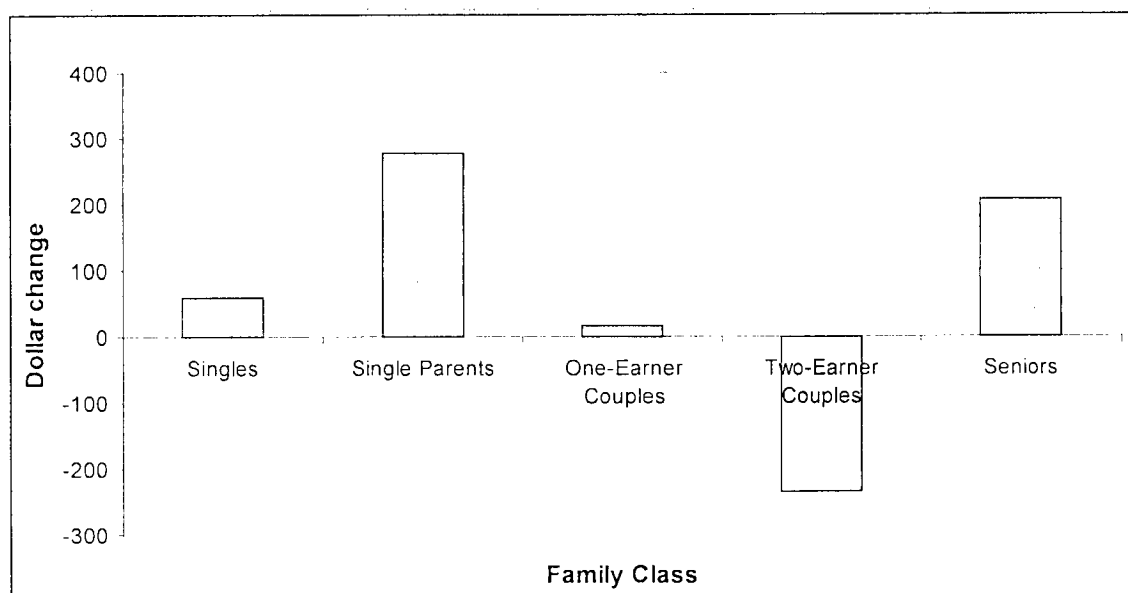
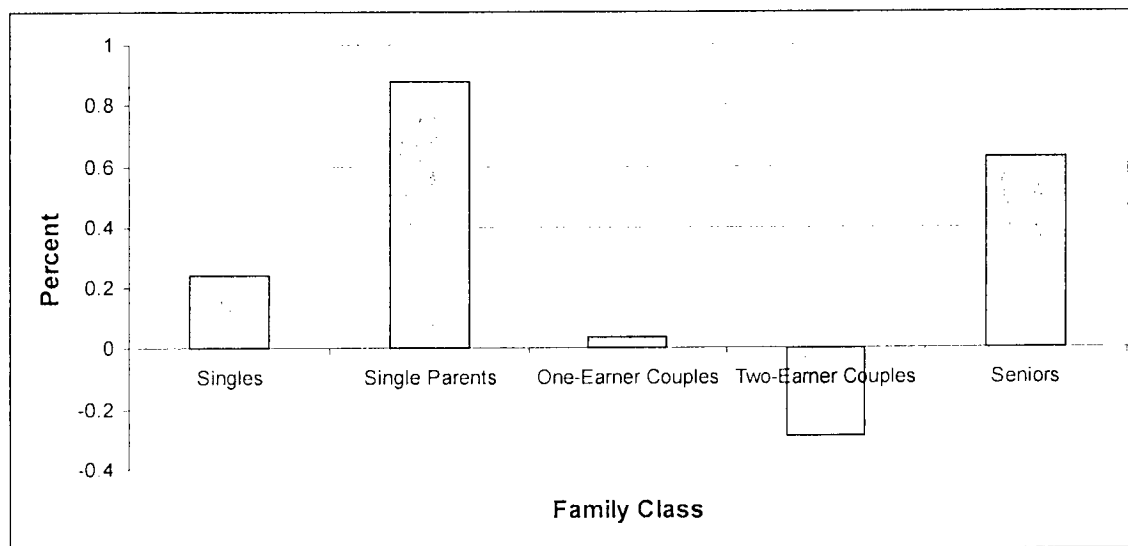


Figure 6 shows the change in the effective tax rate which reaffirms the results shown in Figure 5.

**Figure 6. Change In the Effective Tax Rate. Select Family Class.**



## VI. RESULTS FROM THE INCOME TAX REFORM WHILE OFFSETTING REVENUE LOSS WITH A CARBON TAX

This section evaluates the distributional effects of an alternative revenue-neutral tax reform where the revenue lost from the income tax cuts is offset by the revenue from the introduction of a new carbon tax.

### *Provincial Government Revenue*

The New Brunswick government proposed in its 2008 Discussion Paper the introduction of a carbon tax similar to the one in British Columbia. Ruggeri and Bourgeois [2009], estimated that full implementation of British Columbia's carbon tax rate, based on \$30 per tonne of carbon, would yield \$410.7 million in New Brunswick in 2006. Since the revenue loss from the income tax reform is only \$257.6 million, a carbon tax with rates equivalent to \$19.50 per tonne of carbon would generate revenue-neutrality.

### *Distribution by Income Class*

Table 14 shows the change in the tax payable for the average family in the selected income groups created from the change in the income tax reform and the introduction of a carbon tax. Notice that families with income lower than \$80,000 will pay higher taxes in order to finance a tax reduction for families with income above that level. The largest increase in tax burden per family would be borne by families with income between \$15 and \$20 thousand with an average increase of \$240 per family. Families with income above \$300,000 (average income of \$560,000) would enjoy a tax reduction of \$18,318. This tax reduction is greater than the earnings of a worker being paid minimum wage.

The pattern of incidence of this revenue-neutral tax reform is shown in the last column, which identifies a clear trend in the change in effective tax rates. Starting with an increase in the burden of taxation equal to 3 percent of income for the lowest income class, we see that the effective tax rate declines steadily up to income of \$80,000 and turns negative, indicating a gain from the tax reform. The reduction in the effective tax rate also increases steadily. A family with income of \$560,000 (the average income of the top income class), would gain a reduction in its effective tax rate slightly larger than the increase in the rate for the bottom income class.

Since this reform package shifts part of the burden from the high income to the low income families, it would reduce the degree of progressivity of the tax system. For the combination of the current PIT and CIT, the range of effective tax rates is 13.1 percentage points. With the reduction of income tax rates and the addition of a carbon tax, this range would be reduced to 6.9 percentage points. Moreover, nearly three quarters of this range would be found in the income classes up to \$80,000. For income above this level, the combination of the reformed PIT and CIT and the new carbon tax would impose a tax burden roughly proportional to income.

**Table 14. Change in the Tax Burden and in Effective Tax Rates: Select Income Class.**

| Family Income<br>(\$ Thousands) | Tax Change<br>(\$) | Effective Tax Rate (%) |       | Difference |
|---------------------------------|--------------------|------------------------|-------|------------|
|                                 |                    | Current                | New   |            |
| MIN-10k                         | 165                | 0.86                   | 3.81  | 2.96       |
| 10k-15k                         | 234                | 1.03                   | 2.84  | 1.81       |
| 15k-20k                         | 240                | 1.43                   | 2.83  | 1.39       |
| 20k-25k                         | 181                | 3.51                   | 4.31  | 0.80       |
| 25k-30k                         | 228                | 3.85                   | 4.68  | 0.83       |
| 30k-40k                         | 171                | 5.19                   | 5.69  | 0.49       |
| 40k-50k                         | 211                | 6.45                   | 6.92  | 0.47       |
| 50k-60k                         | 238                | 7.21                   | 7.64  | 0.43       |
| 60k-70k                         | 193                | 7.83                   | 8.13  | 0.30       |
| 70k-80k                         | 98                 | 8.72                   | 8.85  | 0.13       |
| 80k-90k                         | -51                | 9.06                   | 9.00  | -0.06      |
| 90k-100k                        | -161               | 9.27                   | 9.09  | -0.17      |
| 100k-150k                       | -621               | 10.11                  | 9.58  | -0.53      |
| 150k-200k                       | -2,070             | 11.58                  | 10.36 | -1.22      |
| 200k-300k                       | -5,126             | 12.58                  | 10.49 | -2.09      |
| 300-MAX                         | -18,318            | 13.97                  | 10.70 | -3.28      |
| Average                         | 0                  | 7.79                   | 7.79  | 0.00       |

The relationship described in Table 7 is shown in Figure 7, which offers a clear picture of the winners and losers. In terms of actual families, 298,017 families will have to pay higher taxes so that 58,763 families gain from this reform. Although these results are similar to the ones using the HST as the rebalancing instrument, the carbon tax would generate less redistribution of the tax burden from rich to poor.

**Figure 7. Change from Gain or Loss of the Reform. Selected Income Groups.**

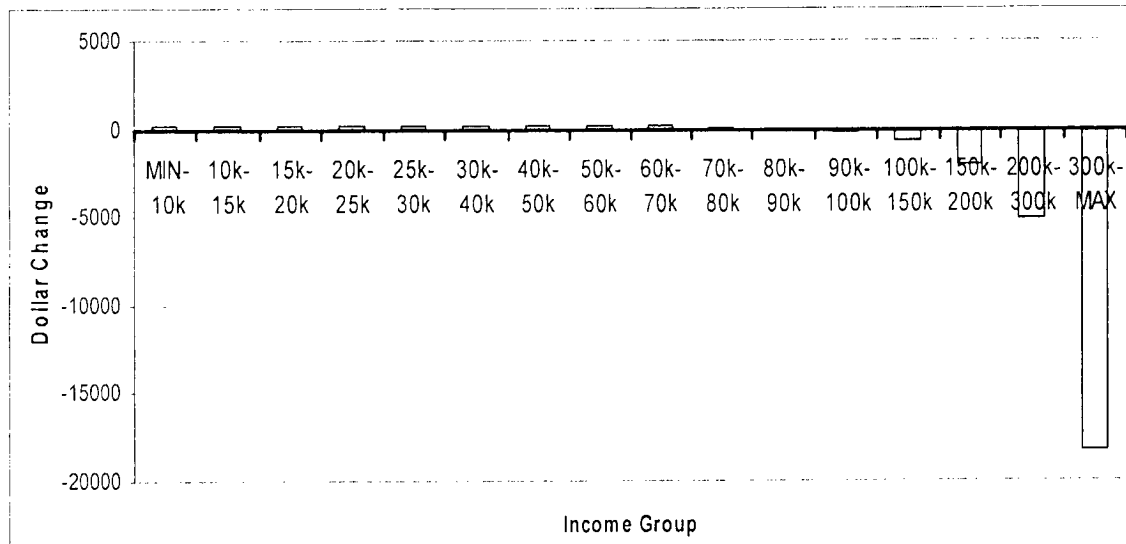
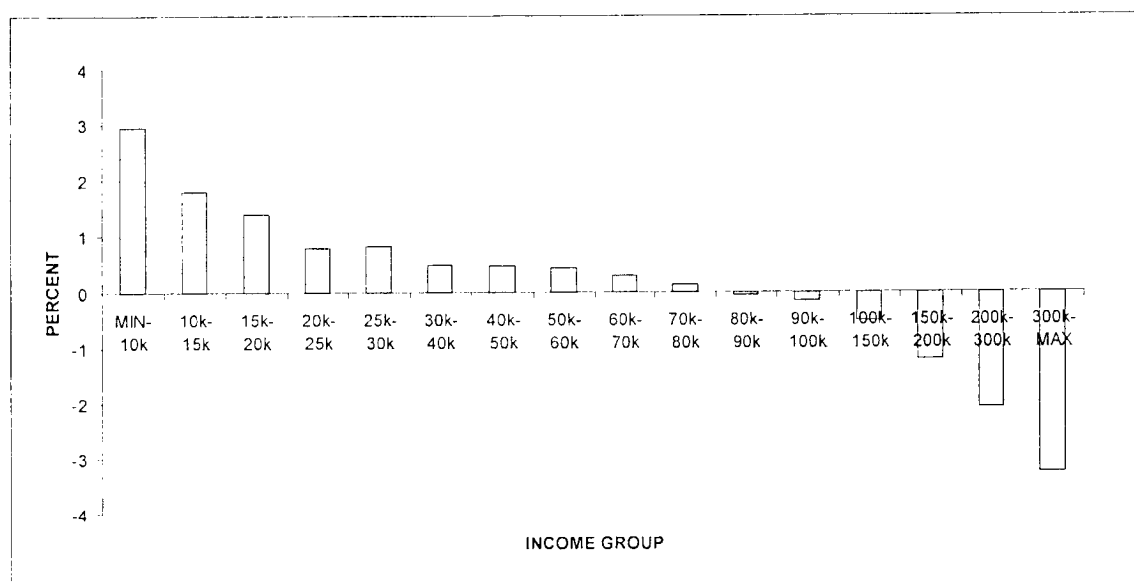


Figure 8 shows the change in the effective tax rate from the 2009 reform complimented by the carbon tax. A complete reallocation of the taxation burden can be observed. The income group that will be the most heavily affected will be families with income lower than \$10,000 receiving an increase of 2.96 percentage points of their effective tax rate. Afterwards, income groups see their effective tax rate increase at a decreasing rate until average income reaches \$80,000. When it reaches this level, the change in effective tax rate turns negative as high income families receive a reduction in their effective tax rates. This reduction in effective tax rates expands at an increasing rate until it reaches a maximum of 3.28 percentage point for the highest income family.

**Figure 8. Change In the Effective Tax Rate. Select Family Income Groups.**



### *Distribution by Family Type*

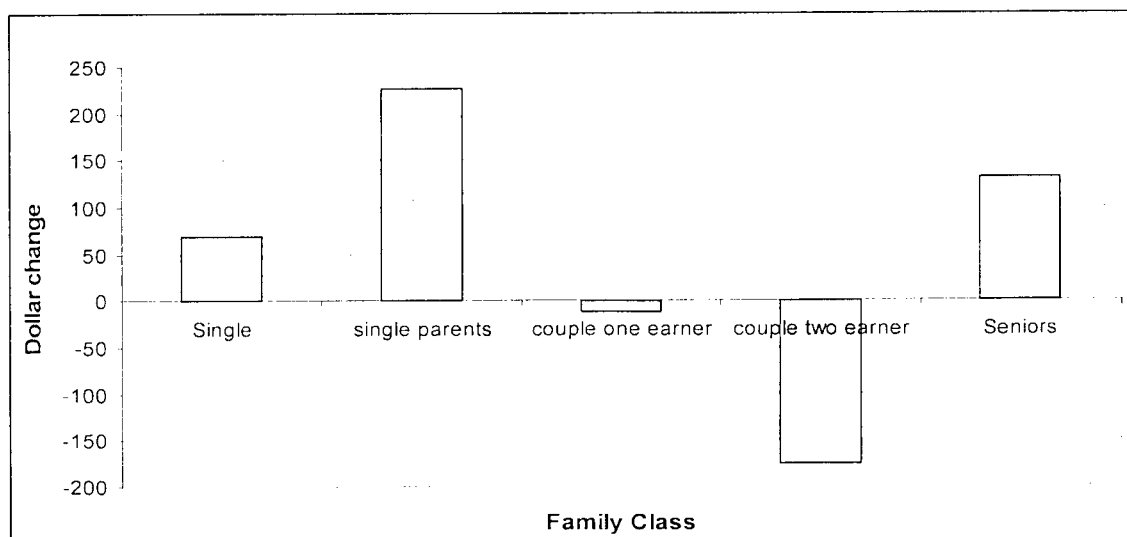
This sub-section presents the results of our distributional analysis for the selected five family types. The change in the tax burden per family is shown in Table 15. The main winners in this tax reform are two-income families with an average gain of \$176. Small gains are also received by one-earner families. The biggest losers would be single parent families with an average loss of \$227, followed by seniors with a loss of \$132 per family. The last three columns show the change in the effective tax rate of these selected families. The general conclusion is the same as above. In general, the changes in effective tax rates are fairly small, except for the single parent families, which would experience a 16 percent increase in their effective tax rate.

**Table 15. Change in Tax Payable and in Effective Tax Rate: Select Family Type.**

| Family Type        | Tax Change<br>(S) | Effective Tax Rate (%) |      | Difference<br>(%) |
|--------------------|-------------------|------------------------|------|-------------------|
|                    |                   | Current                | New  |                   |
| Single             | 70                | 7.38                   | 7.66 | 0.28              |
| Single Parents     | 227               | 4.40                   | 5.11 | 0.71              |
| Couple One Earner  | -12               | 7.26                   | 7.24 | -0.03             |
| Couple Two Earners | -176              | 8.87                   | 8.65 | -0.22             |
| Seniors            | 132               | 5.32                   | 5.72 | 0.40              |
| Average            | 0                 | 7.79                   | 7.79 | 0.00              |

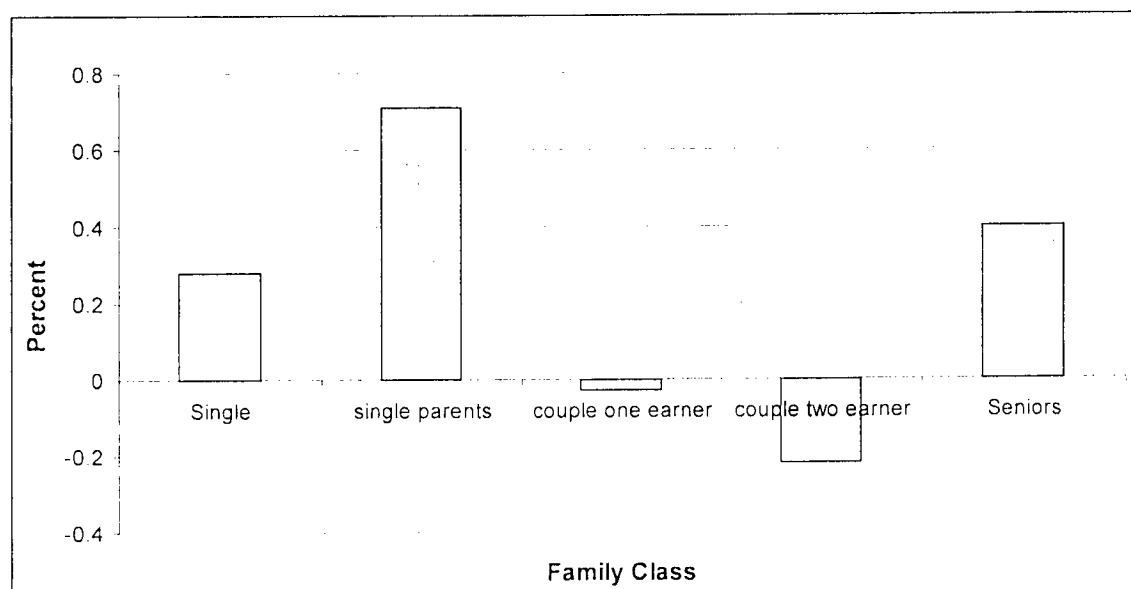
Figure 9 shows the change in tax payable for the selected family types shown in Table 15. We identify three separate groups. The first –one earner couples - will be hardly affected. The second – singles, single parents and seniors - are the families most heavily affected by the reform, paying an additional \$6.5 million in taxes, \$5 million and \$11.3 million, respectively. Finally, two earner couples, are the family type receiving most of the benefits, gaining \$22 million.

**Figure 9. Change from Gain or Loss of the Reform. Selected Family Class.**



The same conclusions are shown in Figure 10 in terms of the changes in effective tax rates. One earner families would see minimum changes in their ETRs. Two earner families would be the only net gainers with a decrease of 0.22 percentage points in their ETRs. Singles, single parents and senior families would end with an increase in their tax burden as their would rise by 0.28, 0.71 and 0.40 percentage points,

**Figure 10. Change in the Effective Tax Rate. Select Family Class.**



## VII. CONCLUSIONS

This report provides a detailed analysis of the distributional effects of the fully implemented tax reform introduced in the 2009 New Brunswick Budget, and of two revenue-neutral reform packages suggested in "A Discussion Paper on New Brunswick's Tax System". The first revenue-neutral option offsets the revenue lost from income tax reform by raising the provincial component of the HST rate by 2.39 percentage points. In the second option the revenue loss is offset by the introduction of a new carbon tax, separate from the existing fuel taxes, at rates equivalent to \$19.50 per tonne of carbon. The results for each of these three cases are summarized separately below.

### *2009 Income Tax Reform*

The tax reform introduced in 2009 includes (a) a compression from a four to a two rate structure of the personal income tax, (b) a reduction in the general corporate income tax rates and (c) the creation and enhancement of multiple programs and tax relief. The results of our analysis indicate that this tax reform is a step towards regressivity because it reduces the effective tax rate by increasing amounts as income rises. Families in the highest income class (average income of \$560 thousand) will receive 3,432 times the tax

reduction of families with income smaller than \$10 thousand and 33 times the average tax reduction received by the average family. The top income class gains 11.2 percent of the total “tax savings” from tax reform, although it accounts for 0.55 of the population, 0.34 percent of families and 3.88 of income.

The regressivity of the income tax reform is evident from the pattern on the change in effective tax rates. The reduction in the effective tax rate for families in the top income class is 33 times higher than the reduction for the bottom income class. This regressive tax reform reduces the progressivity of the PIT and CIT combined as the range of effective tax rates is reduced from 13.1 to 9.0 percentage points. The main beneficiaries of the 2009 income tax reform are two-earner families whose effective tax rate falls by 13 percent more than the provincial average of 1.5 percentage points.

#### *Revenue-Neutral Tax Reform: 2009 Reform + HST*

The results for this revenue-neutral tax reform package show that the shift of the tax burden from an income to a general consumption base would be even more regressive than the income tax reform alone. It would shift \$69.5 million from families earning up to \$80,000 to families earning more than that amount. The top income groups would gain a tax reduction of \$24.0 million while the lower three income groups (income up to \$20,000) would pay \$17.4 million in additional taxes. The average family in the top income class would end up with a tax saving of nearly \$20,000 while the lower three income classes would pay on average close to \$200 in extra taxes.

The reform would increase the effective tax rate of the lowest income groups, but by declining amounts as income increases up to \$80 thousand where the change in the effective tax rate turns negative and increases as income rises. The change in the effective tax rate in these two parts of the income distribution is almost symmetric, with the pattern of higher effective tax rates in the lower part of the income distribution being paralleled by a pattern of lower effective tax rates for the higher part.

With respect to family types, couples with two earners will be the only family type that receives tax relief, while seniors will be receiving the largest share of the tax burden.

#### *Revenue-Neutral Tax Reform: 2009 Reform + Carbon Tax*

The results for the second revenue neutral tax reform package shows that the shift of the tax burden from income taxes to a specific consumption tax would increase the regressivity by more than the income reform alone. It would shift \$59.2 million from families making less than \$80,000 to families earning more than this amount. Compared to the previous package (using the HST to offset the revenue loss), the reform package with a carbon tax would be less regressive. This difference can be explained by the fact that low income families, who do not receive a large portion of the income tax benefit, will not receive a large burden of the carbon tax, because their expenses on fuel and electricity are much less than other families of different income (i.e. smaller house, lack of vehicle would decrease the tax paid substantially). Higher income families will receive

a smaller reduction in the total tax burden because they spend considerably more on electricity use in larger homes, burn more fuel in SUV's and other direct and indirect fuel intensive activities.

The effective tax rate under this tax-reform package will increase for families making less than \$80,000 and decrease for the ones above this income level. As income increases from the lowest income families, the effective tax rate will decrease until it reaches \$80,000 and turn negative creating a discount that will increase with income. Although similar to the HST package, the carbon tax will create less change in the effective tax rate.

With respect to family types, couples with one or two earners will be the soles families that receive a tax reduction, while singles, single parents and seniors will see their tax burden increase. Seniors, will also bear a disproportional share of the tax reform burden, while couples with two earners will receive almost all of the tax reduction.

### *Comments*

The New Brunswick government has emphasized that the main purpose of the 2009 income tax reform is to provide an incentive for in-migration of workers and for expansion of the corporate base. How effective tax reform will be in achieving these goals is not known, especially since the provincial government has not provided any analysis of the relationship between tax cuts and economic development. Whatever success this policy may have in stimulating job creation and economic growth, it should be understood that it will not impact the provincial budget. Higher economic growth would expand the provincial tax base, but the increase in provincial own-source revenues would be offset by lower equalization payments, leaving total revenues roughly unchanged. This means that the revenue loss from income tax reform must be offset by other tax increases or spending reductions if we want to avoid permanent deficits. We have shown in this paper that the two offsetting tax increases suggested in the government's Discussion Paper would be regressive and would involve a shift of the tax burden from high income to low income families. Whether the same effects would be generated by spending reductions is not known and depends on whose benefits the lower spending would curtail. It is clear from our analysis, however, that unless the reduction in provincial government spending was directed at the benefits received by high income families, the 2009 tax reform would ultimately lead to an increase in income inequality in New Brunswick.

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## **APPENDIX: INCIDENCE ASSUMPTIONS**

This Appendix discusses the incidence assumptions for each of the four taxes used in our analysis of the equity effects of tax reform in New Brunswick.

### *The Personal Income Tax*

Personal income taxes are levied on the income of individuals. It has been standard practice in tax incidence studies to assume that the person who pays the tax also bears its burden. The assumption that the personal income tax is not subject to shifting has been more recently challenged in a number of studies. Bingley and Lanot [2002] provided some empirical evidence of tax-induced migration. Lockwood and Manning [1993] found that there was evidence of tax shifting due to bargaining based on after-tax wages. Montmarquette [1974] found tax shifting evidence with respect to human capital acquisition based on after tax wages.

In this paper we used the traditional assumption of no shifting because the focus of our analysis is on the short-run distributional impact of tax reform. We acknowledge that the tax reform options presented in the Discussion Paper and those implemented in the 2009 Budget were directed at attracting workers in light of the looming labour shortages and not at distributional considerations. The non-shifting approach to the incidence of the personal income tax implicitly assumes that the labour supply is fixed, at least in the short run. To the extent that lower income tax rates encourage in-migration, over the long-term the labour supply would have some elasticity with respect to changes in real wages. In this case, income tax reform would be equivalent to a wage subsidy to employers, which would not have to raise wages in order to attract workers from other regions of the country. The distributional effects of the income tax cuts would then become a combination of lower taxes on businesses as well as on workers and recipients of passive income (pensions and investment income).

Evaluating the long-term effects of tax reform in New Brunswick is a major task that requires a separate research project which would have to address a variety of issues. First, the tax reform introduced in 2009 will be financed by borrowing until the offsetting adjustments on the spending side are made. Because of the manner in which the Equalization program works by offsetting any provincial revenue from tax base expansion, this tax reform will affect the entire fiscal structure and not just the tax system. Therefore, it is not meaningful to speak about tax-induced migration. At best, we have to talk about fiscally-induced migration. The tax burden is only one of the numerous factors one must keep in mind when relocating. Social programs, family, schools, quality of life and job opportunities are some examples of the many factor that affect reallocation. In order to evaluate properly the effects of tax reform on labour migration, we need to analyze the changes in the entire fiscal system, including both the spending and tax sides (Ruggeri, 2008). Second, even if the labour supply were sensitive to changes in after-tax wages and tax reform provided a strong incentive for the high income workers that it would benefit most to relocate to New Brunswick, this potential tax-induced migration would not materialize if there was no demand for this type of high paid worker.

### *The Corporate Income Tax*

Corporations pay taxes as legal entities, but do not bear the burden of those taxes. In the end the burden falls on three groups, exclusively or in combination: consumers through higher prices of goods and services, workers through lower real wages, and investors through lower rates of return, and not all these agents reside in N.B. There is no consensus in the literature on the exact pattern of shifting of the corporate income tax, but there is agreement that the incidence of this tax differs depending on whether we are dealing with a closed economy or with a small open economy. Harberger [1962] showed that in a closed economy the tax burden is completely absorbed by the owners of capital. In an open economy, the corporate income tax burden incidence is complicated by tax exporting. This happens when capital moves to a more prosperous location. Therefore, the burden is also borne by the local labour (Gravelle and Smitters, 2006). For the component of the provincial economy that deals with goods and services produced and consumed locally (non-tradable goods), there is the opportunity to shift forward the tax burden, although this depends on the price elasticity of demand.

Since New Brunswick is a small open economy operating within a small open economy, with substantial movement of goods, people and capital both nationally and internationally, it is not clear how the benefits of a corporate tax cut would be distributed. The issue is further complicated by the fact that in New Brunswick the corporate income tax is paid mostly by large corporations with national and international operations and that the tax cut introduced by the tax reform is a miniscule proportion of the total profits of these large corporations.

In our calculations, we used a simplified approach by shifting the tax to all three groups. Specifically, 50 percent was assigned to consumption and 50 percent to the combination of labour and investment income. This is a less progressive variant than either the allocation to investment income (strict closed economy case) or the allocation to labour income (strict small open economy case). This means that our results will tend to underestimate the regressivity of the income tax reform. However, since the estimated revenue loss from the corporate income tax cuts is very small relative to the total revenue lost, the effect of our assumptions on the overall regressivity of the tax reform is negligible.

### *The Harmonized Sales Tax*

The HST is a value-added tax which is collected at the time of purchase. This tax covers all goods and services, with the major exception of basic groceries, and is ultimately paid by final consumers because firms receive tax credits on the tax paid on their inputs. In the case of a general sales tax such as the HST, the standard incidence assumption is based on the “uses” side of the household budget. This means that the burden of this tax is fully borne by the household in proportion of their consumption. The use of this standard assumption has been challenged by Browning [1978], who argued that the incidence of the tax falls on the “source” side of household budget because transfer payments are indexed for inflation, thus providing an automatic compensation for the tax-induced

increases in the price index. Browning's arguments were later refuted by Ruggeri [1993], who showed that all sources of income tend to respond to increases in the price index, thus eliminating the difference between transfer payments and earned income.

In this paper, we used the standard assumption and allocated the burden of the harmonized sale tax in proportion of family consumption as is done also in the calculation of the HST revenue through the SPSP/M program.

### *The Carbon Tax*

The carbon tax structure, used in the second revenue-neutral tax reform option is essentially the same one recently introduced by British Columbia. This tax will affect all fuel types that produce CO<sub>2</sub> emissions. This carbon tax is an excise tax imposed on the purchaser of a specific type of commodities. In addition, this tax would not replace the existing fuel taxes in New Brunswick, but it would simply be added onto the existing ones. Because no tax credits would be offered for the excise tax paid by business, there is the potential for shifting the burden of this tax. This tax can generate distributional effects through three channels, two indirect ones and a direct one.

The direct component is the tax paid by final consumers on their purchases of CO<sub>2</sub> producing fuels. The indirect component can be divided into two parts: (a) the tax paid by the electricity generating sector, and (b) the tax paid by other businesses on their purchases of CO<sub>2</sub> generating inputs. In their analysis of the distributional effects of a carbon tax in New Brunswick, Ruggeri and Bourgeois [2009] identified four main economic sectors: (a) public administration, (b) electricity generation, (c) other businesses, and (d) the residential sector. The same approach was used in this paper. We started with the analysis contained in Ruggeri and Bourgeois [2009] and adjusted the results to match the revenue needed to ensure revenue-neutrality.

**Public Administration.** At the provincial level, this tax on the public sector would have a zero revenue effect. The tax paid by various departments would equal the tax collected by the Department of Finance. The federal government would be exempt from paying this tax, unless it willingly decided to pay it. The tax paid by local governments would have to be offset by increased grants or higher property taxes, if services are to be maintained at the same level. Therefore, as in Ruggeri and Bourgeois [2009], the public administration sector was excluded from the analysis.

**Electricity Generation.** This sector must be treated somewhat differently than the public administration sector. As Ruggeri and Bourgeois [2009] point out, the province of New Brunswick electricity generating sector is dominated by a public utility called the New Brunswick Power Corporation. Since the potential of shifting the burden of the carbon tax depends on economic and institutional factors, the fact that New Brunswick is fully responsible for its electricity generating capacities, and that it also sells power to other provinces and to the upper-eastern states, will affect its carbon tax incidence.

Part of the electricity exported will not bear a portion of the carbon tax. This is due to the fact that under the assumption of New Brunswick as a small open economy, the public utility would be a price taker. It would be incapable of shifting the extra cost created by the carbon tax to its U.S. customers. With respect to the Canadian customers, (e.g. P.E.I.), shifting would be assumed as the province does not have sufficient electricity generating power.

The New Brunswick Power Commission has the capacity to shift the burden of the carbon tax on electricity generation to residential and business customers, definitely in the short-run because of the low price elasticity of demand for electricity. To the extent that producers of goods and services have the capacity to shift this cost increase onto higher prices, the demand for electricity would remain inelastic even in the long-run. Therefore, as in the first case evaluated by Ruggeri and Bourgeois [2009] we assumed full forward shifting of the carbon tax.

**Business Sector.** The carbon tax will affect this sector in two ways. The first will be through a direct channel. Firms will have to pay a higher price for the purchase of carbon based fuels because of the carbon tax. The second channel will be through higher electricity rates from the electricity generating sector. Firms, however, may have the capacity to shift this burden forward through higher prices and backward to the owners of factor inputs (workers and investors). How this shifting will take place depends on the demand and supply elasticities of the different goods and services produced, market structure and the possibility of input substitution with non carbon based inputs.

Following Ruggeri and Bourgeois [2009], the incidence of the carbon tax for business was allocated in two portions. The first part was allocated to consumers who are assumed to bear 50 percent of the burden and the other 50 percent was allocated to the combination of investment income and employment income.

**Residential Sector.** Similar to the other sectors, the residential sector can be divided into two parts. The direct part has one component, and the indirect part has two components. The direct part is the tax that is paid by consumers on their purchases of carbon based fuels like gasoline for transportation. Economic theory shows that the burden of similar commodity taxes is fully borne by the final consumer. This assumption was also used by Ruggeri and Bourgeois [2009] in their carbon tax analysis. Therefore, the direct component of the tax was allocated in proportion to the consumption expenses that families spend on the specific taxed goods and services. This portion of the carbon tax revenue was therefore distributed to the total fuel purchases by households based on the 48 retail sales categories specified by the SPSD/M.

The indirect component can be divided into two parts. The first part is the additional cost from one's own electricity bill. The residential sector would not pay an additional tax but be charged more for electricity, because the public utility company would have higher input cost due to the carbon tax. This extra burden borne by the residential sector is a direct consequence of the electricity generating sector assumptions above. The second indirect cost is the increase in the price for goods and services. This additional cost is a

direct consequence from the business sector assumptions above. Therefore, 50 percent of the carbon tax borne by businesses will be shifted to the residential sector.

