CARE

COLLABORATION FOR APPLIED RESEARCH IN ECONOMICS

PROMOTING TAX FAIRNESS IN NEWFOUNDLAND AND LABRADOR THROUGH THE PERSONAL INCOME TAX SYSTEM

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Abstract

There have been emerging concerns in industrialized countries about increasing income inequalities. Economists have suggested that increases in income inequalities have reduced the long-term economic growth of the countries affected. Additionally, many academics and social groups believe that the increasing concentration of income and wealth in the hands of a few is unfair. Furthermore, governments have almost universally recognized the need for bounds on levels of inequality and have tried to inject an element of fairness through progressivity in their tax/transfer systems.

The Government of Newfoundland and Labrador asked the Collaborative Applied Research in Economics (CARE) initiative of the Department of Economics, Memorial University to review Newfoundland and Labrador's provincial personal income tax system with respect to fairness across income groups and propose various policy scenarios that would improve the progressivity of the personal income tax system while simultaneously reducing income inequalities within the Province. The idea is that the results of these scenarios would form a basis for public discussion within the province on tax progressivity and income inequality.

This paper examines the existing evidence on income inequality within the Province, measured both before and after taxes and transfers. In addition, this analysis assesses how income inequality has changed over time within Newfoundland and Labrador. To achieve this, this study describes and utilizes a number of indices that measure both vertical and horizontal tax equity. As well, to gain an understanding of its contribution to progressivity and equity, this research examines in detail the existing personal income tax system.

More specifically, this paper evaluates the impact of several revenue-neutral tax/transfer scenarios on equity and income inequality within the Newfoundland and Labrador context. One scenario of particular interest adapts the provincial government's own Newfoundland and Labrador Market Basket Measure (NLMBM) of the incidence and depth of low income amongst family types to develop transfers scenarios to better meet the income requirements of those most in need. The new transfer system would be funded by higher personal income tax rates imposed on higher income taxpayers. A second scenario involves enhancing the Newfoundland and Labrador HST (NLHST) credit and funding this enhanced credit by incorporating additional tax brackets and rates for those at the top end of the income distribution. The analysis provided below demonstrates that this measure does indeed promote a more equitable distribution of resources. To facilitate and promote discussion, these scenarios are then compared to other possible changes to Newfoundland and Labrador's tax/transfer system. The other scenarios include reducing tax rates on low-income taxpayers offset by higher tax rates on high income taxpayers, higher personal exemptions offset by higher tax rates on high income taxpayers and

an enhanced NLMBM credit offset by a personal income surtax on taxpayers in the highest income tax bracket.

Fairness and equity are understood by economists to involve subjective value judgments by members of a society.   The purpose of this paper, then, is to inform the public to promote discussion rather than proposing a specific change to our personal income tax system.

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Executive Summary

The Collaborative Applied Research in Economics (CARE) initiative had been asked by the Government of Newfoundland and Labrador to independently review the Province's personal income tax system to assess whether or not this system met the test of fairness across income groups. The purpose of this paper is to inform the general public and Newfoundland and Labrador decision-makers about the extent of income inequality already existing within the Province; to examine the degree to which the current personal income tax system reduces income inequality; to propose and analyze several tax-transfers scenarios that are designed to improve progressivity of the personal income tax system and reduce income inequality; and to assess their impact on income inequality through their effect on the disposable income within Newfoundland and Labrador for all nuclear families.[1] While nuclear families are the main thrust of this report, the analysis also evaluated the impact of each scenario on all family types – that is, all nuclear families, couple families (with and without children), lone parent families and non-family persons or single individuals. This additional information is available on the CARE website for interested readers.[2]

Growing income inequality is a significant concern for both economic and social reasons. Although growing income inequality is a real phenomenon in many parts of the industrialized world, the experiences of individual countries and provinces/states can and do differ. To date, it appears that Newfoundland and Labrador is an exception to the general trend of increasing income inequality. Specifically, income inequality in Newfoundland and Labrador has not noticeably increased over the past couple of decades, even though the general standard of living within the Province has improved, both before and after taxes.

This paper, utilizing various technical indices, analyzed both progressivity and fairness for the Newfoundland and Labrador personal income tax system. In particular, tax fairness was evaluated in terms of both horizontal and vertical equity. The conclusion from this analysis is that both taxes and transfers have made the Newfoundland and Labrador system more progressive. In terms of reducing income inequality associated with market incomes, government, transfers seemed to play a greater role than taxes. The analysis presented in this report demonstrated that the incidence of low income has diminished over time, but it still exists for many individuals and families. Consequently, it remains a concern. Moreover, the number of individuals and families who could be classified as being in the "poorest of the poor"

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[1] The analysis undertaken in this report utilizes Statistics Canada's The Social Policy Simulation Database and Model (SPSD/M) http://www.statcan.gc.ca/eng/microsimulation/spsdm/spsdm This model is capable of analyzing tax policy changes for a number of different perspectives, including households, economic families, census families, nuclear families and individuals or persons. While the analysis undertaken for this report considered a whole variety of family types, the main results are presented and discussed for nuclear families. According to the SPSD/M X-tab User's Guide, "a nuclear family in the SPSD/M is very similar to the census family, except that nuclear families are defined to exclude any never-married children aged 18 or older. Consistent with emerging practice in taxation that treats 18 year old individuals as adults, any such children in the household are deemed to constitute their own nuclear families." http://data.library.utoronto.ca/datapub/codebooks/cstdli/spsdm/v8_1/crosstabulatorusersguide.pdf

[2] The CARE website can be found at http://www.mun.ca/care/.

group seems to have been relatively constant. In other words, members of this group seem not to have benefitted from the improved prosperity to the same extent as other individuals and family units within Newfoundland and Labrador.

To meet the primary objective of this paper, five illustrative policy options were developed that would, if implemented, decrease income inequality through the provincial tax/transfer system. These options were developed under the constraint that any scenario considered had to be revenue neutral.[3] The analysis, undertaken for the representative year 2015, utilized economic forecasts provided by the Department of Finance, Government of Newfoundland and Labrador. These forecasts of economic indicators were inputs into Statistics Canada's Social Policy Simulation Database and Model (SPSD/M).

A basic premise of this research is that it is important for Newfoundland and Labrador to remain competitive with other provinces and not to produce major behavioural disincentives that might be manifested in terms of tax evasion, lower productivity, or out-migration to another jurisdiction in response to higher Newfoundland and Labrador taxes. Additionally, it is an operating assumption of or a value judgement implicit in this research that if funds are to be redistributed using the income tax system, then these funds should transferred to or targeted at low-income households that are most in need. Individuals and families in this low-income category, as demonstrated in the research presented in this report, could be identified through the use of the Market Basket Measure of low-income households for each community within Newfoundland and Labrador.[4]

The following five scenarios, which involved approximately the same amount of funds to be redistributed beyond the existing base case, were considered:

Scenario 1.   Introduces a new low-income credit which is based on the Newfoundland and Labrador Market-Basket Measure (NLMBM)[5] of low-income households to replace the current Newfoundland and Labrador Harmonized Sales Tax (NLHST) credit.[6] To ensure revenue neutrality, this new, low-income transfer is assumed to be funded through the combined effect of eliminating the NLHST and increasing the provincial tax rates applied

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[3] Revenue neural in this context means that the net balance to the provincial budget would be zero so that if enhanced transfers are considered, they would have to be funded by higher taxes on a subset of the taxpayers.

[4] Statistics Canada specified that the Market Basket Measure is a measure of low income based on the cost of a specific basket of goods and services representing a modest, basic standard of living. It includes the costs of food, clothing, footwear, transportation, shelter and other expenses for a reference family of two adults aged 25-49 and two children (aged 9 and 13).

[5] Under the NLMBM, a person in low income is someone whose available family income is less than the cost of the market basket in their community. For this indicator, a market basket is a selection of goods and services used to determine the cost of a "minimally accepted" standard of living. The income level at which this becomes operative depends on family size and the community in which the family lives. These points are explained in more detail in the main body of the report.

[6] The current Newfoundland and Labrador HST credit is a refundable tax credit for low-income residents of the Province. The credit amounts are: $40 per adult and $60 per child for taxpayers with net family income of $15,000 or less. The credit is reduced by 5% for every dollar of net family income in excess of $15,000. The credit is paid in October of each year and is included with the federal GST credit. The amount of the credit is based on net family income from the previous year. This credit is provided under Section 34 of the Income Tax Act. http://www.fin.gov.nl.ca/fin/tax_programs_incentives/personal/hstcredit.html

to additional income tax brackets that are introduced for Newfoundland and Labrador taxpayers at the upper end of the income distribution;[7]

Scenario 2.   Involves a higher basic personal exemption applied to Newfoundland and Labrador taxable income.[8] To ensure revenue neutrality, this change is funded by the higher tax rates and additional tax brackets at the upper end of the income distribution that were specified in Scenario 1;

Scenario 3.   Reduces tax rates for lower income individuals. To ensure revenue neutrality, this change is funded by the higher income tax rates and additional tax brackets at the upper end of the income distribution that were specified in Scenario 1. The tax brackets are identical to those assumed in Scenario 1, but the lower tax rates are assumed to change;[9]

Scenario 4.   Enhances the NLHST credits. To ensure revenue neutrality, this enhanced provincial HST credit is funded by higher tax rates and additional tax brackets at the upper end of the income distribution;[10] and

Scenario 5.   Analyzed the NLMBM credit when it was funded by both a surtax on the highest income tax bracket and the elimination of the existing NLHST credit.[11]

While all the scenarios increased the progressivity of the tax system, Scenario 4, an extension of the existing NLHST credit, seemed to dominate. Scenario 1 was second in terms of the contribution to reducing after-tax income inequality. Considering these two scenarios, an interesting trade-off emerged. Scenario 4 probably reduced income inequality more than Scenario 1 because it affected more people, whereas Scenario 1 affected fewer people, but was more precisely targeted those most in need.

This paper does not make any particular recommendation as to a specific policy to follow. Rather, the scenarios provided are examples or illustrations of different types of policy options to reduce income inequality in Newfoundland and Labrador, should that be deemed desirable.

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[7] The personal income tax rates in place prior to the 2015 budget were: 7.70% applied on the first $34,254 (or $35,008 in 2015 after adjusting for inflation); 12.5% applied to income between $34,255 and $68,508 (or $35,009 and $70,015, respectively, in 2015 after adjusting for inflation); and 13.3% applied to income over $68,509 (or $70,016 in 2015 after adjusting for inflation). In the revised scenario, the income tax rates will be identical for taxable income up to $100,000, but 13.8% will apply to taxable income between $100,001 and $160,000; income between $160,001 and $220,000 will be taxed at 14.3%, while taxable incomes in excess of $220,000 will be taxed at 17.6%.

[8] The basic personal exemption applied to Newfoundland and Labrador taxable income is increased from $8,578 to $11,312.

[9] The lowest three tax bracket had the rates lowered for the three lowest brackets as follows: 7.7% to 7.3% for taxable incomes below $35,008, 12.5% to 12.1% for taxable incomes between $35,009 and $70,016 and 13.3% to 13.0% for incomes between $70,016 and $100,000.

[10] The basic adult rate is assumed to increase from $40 to $500 and child rates are increased from $60 to $190 and the income threshold is increased from $15,000 to $20,000 before the claw back of the credit begins. The tax rates were identical to those considered in Scenario 1.

[11] The surtax is assumed to be 12.7% of taxes paid on taxable incomes above $70,015, which, before the 2015 budget, was the highest income tax bracket utilized for Newfoundland and Labrador personal income taxes.

The personal income tax increases analyzed were to some degree arbitrary. A more real world assessment of policy options may see decision-makers increasing these rates, decreasing them or dismissing the scenarios completely. As well, it is important to appreciate that scenarios could be combined for many reasons. The mandate of this study was not to make a recommendation, but to inform the public and the decision-makers and, by doing so, to promote informed discussion on income inequality and the progressivity of the income tax system in Newfoundland and Labrador. Hopefully, this study was successful, at least when measured against this metric of facilitating informed debate!

1. Introduction

While the public attention to income distribution has accelerated with the publication of Piketty (2014), there had been, and continues to be, a great deal of discussion about growing wealth and income inequality in industrialized countries and their implications for economic activity, social interactions and political stability.[12] For example, the International Monetary Fund suggested that "countries with more equal income distributions tend to have significantly longer growth spells."[13] Similarly, the Organization for Economic Cooperation and Development (OECD) Directorate for Employment, Labor and Social Affairs (2014) reported that "new OECD research shows that when income inequality rises, economic growth falls." And, in its just-released book, the OECD (2015, p. 26) states emphatically that: "...new research at the OECD…. finds consistent evidence that the long-term rise in inequality of disposable incomes observed in most OECD countries has indeed put a significant brake on long-term growth." Specifically, the OECD (2015, p. 15) reports that, between 1985 and 2005, income inequality "knocked 4.7 percentage points off cumulative growth between 1990 and 2010, on average across OECD countries." As well, of G7 countries, this growth in inequality has been most pronounced in the United States. Indeed, this issue has certainly caught the attention of the US Federal Reserve Chair, Janet Yellen, who, as quoted in a recent news article, noted that "she's 'greatly' concerned by the most sustained rise in U.S. wealth and income inequality since the 19th century…"[14] Finally, the World Bank, van der Weide and Milanovic (2014, p. 3), found that, during the period 1960 to 2010, high overall inequality in the United States only appeared to hurt income growth of the poor, while positively influencing the top end of the income distribution. That is, the type of growth observed in the United States not only further advanced inequality or growth in the top of the income distribution, but apparently held back growth at the bottom of the income distribution.

On the other hand, Cingano (2014, p. 12) surveyed the empirical literature, which addressed the relationship between inequality and growth and concluded that "there is no consensus on the sign and the strength of the relationship." However, Cingano (2014, p. 6), in reporting on his own econometric analysis, highlights that "income inequality has a negative and statistically significant impact on subsequent growth" and that "what matters most is the gap between low-income households and the rest of the population," but "no evidence is found that those with high incomes pulling away from the rest of the population harms growth."

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[12] For example, the Economist reported on October 13, 2012 that the "Growing inequality is one of the biggest social, economic and political challenges of our time." http://www.economist.com/node/21564414 . Likewise, in a 2015 report entitled the Top10 trends of 2015- Deepening Income Inequality", the World Economic Forum reported that "Inequality is one of the key challenges of our time" http://reports.weforum.org/outlook-global-agenda-2015/top-10-trends-of-2015/1-deepening-income-inequality/ Similarly, the International Monetary Fund, Bastagli et al. (2012, p. 4), noted that reductions in income inequality may be important for achieving greater equality of opportunities; for improving social cohesion; for improving economic growth and political stability.

[13] Berg and Ostry (2011, p. 16).

[14] As reported on Bloomberg news Nov 17, 2014. http://www.bloomberg.com/news/articles/2014-10-17/yellen-greatly-concerned-by-widening-u-s-inequality. Also, Kuziemko et al. (2015, p. 1478) reports that "The past several decades have seen a large increase in income concentration in the United States. While the top 1 percent of families captured 9.0 percent of total pretax income in 1970, that share rose to 22.4 percent by 2012."

As demonstrated by Figure 1,[15] growing income inequality has affected almost all wealthy countries, including Canada. This chart illustrates that income inequality in Canada increased between 1985 and 2008, as it did in most OECD countries.

Figure 2, using five-year averages, shows that disposable, or after-tax, income inequality has grown in all provinces except Prince Edward Island.[16]   Although the Gini coefficient in Newfoundland and Labrador has increased by 0.0158, Figure 3 illustrates that this increase in the Gini coefficient has been less than the increase in four of the other provinces and more than the increase in five of the other provinces. This increase in the Gini coefficient has caused Newfoundland and Labrador's rank, in terms of relative inequality, to improve from fourth to fifth, in terms of most unequal. In other words, given the increase in equality throughout the country, the relative position of Newfoundland and Labrador has improved one rank, even though absolute inequality, as measured by the Gini coefficient, has gotten slightly worse.

Figure 1: Inequality in OECD Countries 1985 to 2008
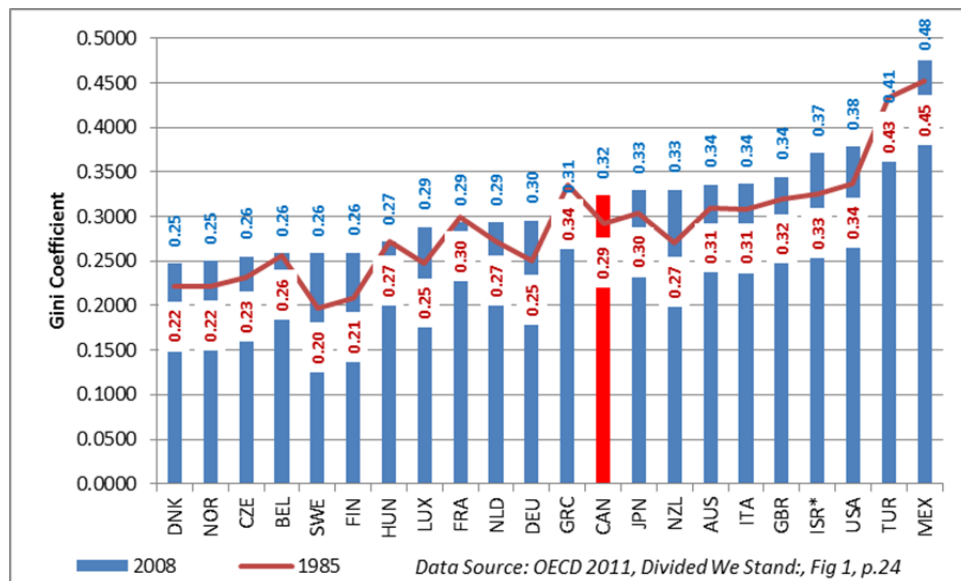
Figure 2: Income Inequality Change by Provinces in the Last 30 Years

Adjusted After-Tax Gini by Province and Select 5 Year Average and Change from 1977-81 to 2007-11

Data Souce: CANSIM Table 2020709
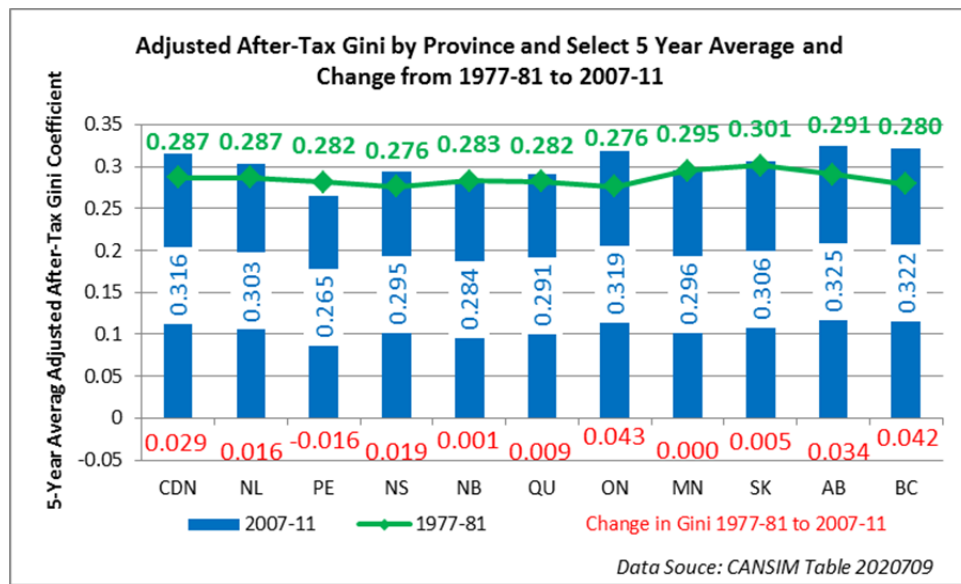
Figure 3: Change in Rank of Inequality by Province in the Last 30 Years

Rank from Least Equal Income Distribution to Most Equal Distribution

Data Source: CANSIM Table 2020709 and Authors calculations
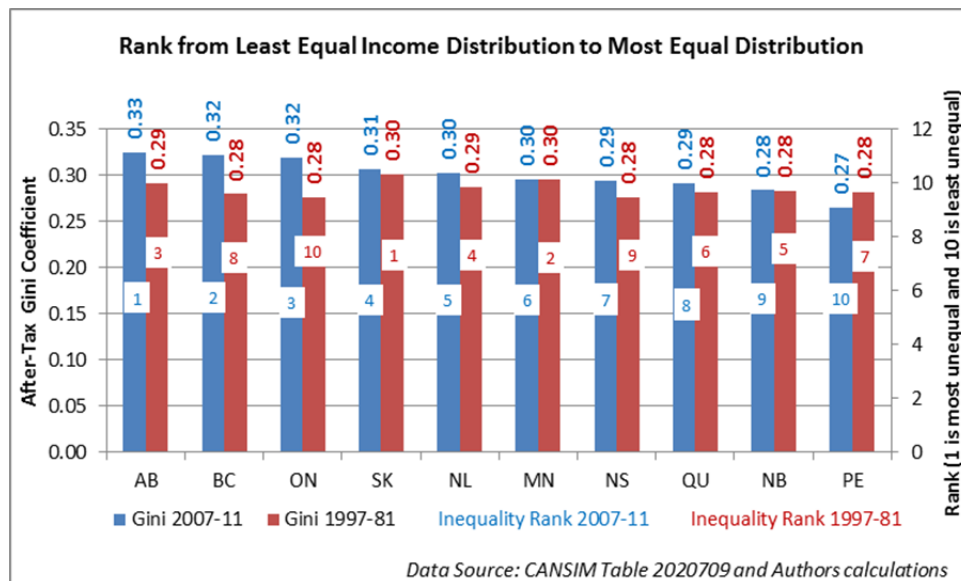
One obvious concern about income inequality is that democratic societies may consider that its resources are not fairly distributed.[17] Another concern is that growing inequality could slow economic growth and, correspondingly, reduce society's ability to improve collective living standards. Without exception, societies have already decided that the income distribution produced by pure market forces is not ideal.[18] This idea is exemplified by the fact that when

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[17] The perception of fairness is often in the eye of the beholder and, as such, there can often be legitimate disagreements about what constitutes an acceptable degree of income inequality versus ensuring that incentives to work, invest and save are not overly distorted.

[18] Thresh (2002, p. 15) highlights that: "A perfectly functioning market system can assure an efficient allocation of resources…But…a perfectly functioning market economy cannot guarantee that the distribution of goods and services will be socially optimal." Thresh

government funds publicly-provided goods and services, it is generally accepted that people with higher incomes should pay relatively larger shares of their earnings in taxes.[19] Correspondingly, it is understood that those with lower incomes should pay a smaller share (or no share) of their earnings in taxes. Furthermore, those that are most in need should receive some level of assistance through transfer programs.

If a larger portion of income is taken in the form of taxes when incomes increase, then the tax system is referred to as progressive.[20] While many types of taxes exist, this study examines how the personal income tax system in Newfoundland and Labrador can be made more progressive to make the after-tax income distribution more equitable, which is often equated with having a "fairer" tax system.[21]

Families and individuals at the lower end of the income distribution would not normally be taxed utilizing an ability-to-pay personal income tax. However, to alleviate the effects of their poverty, these people would normally receive income supports such as Old Age Security payments or Child Tax credits. Given that transfers are often utilized in conjunction with progressive income taxes to address issues pertaining to income inequality, this paper focuses on the design of income transfers that can be targeted at the "poorest of the poor" or those most in need within the province. Specifically, to target those most in need, this analysis utilizes the Government of Newfoundland and Labrador's Market Basket Measure (NLMBM) of low-income households for determining poverty levels, gaps, and severity and for designing a transfer system to more effectively deal with this group.[22] This transfer system represents a major enhancement to the existing Newfoundland and Labrador HST (NLHST) credit.

The purpose of this paper is multifaceted. This includes: (1) to inform the general public and the decision-makers about the extent of income inequality that currently prevails within Newfoundland and Labrador; (2) to examine the degree to which the current personal income tax system reduces income inequality; (3) to propose and analyze several tax-transfers scenarios; and (4) to assess the impact of these proposed scenarios on income inequality through their effect on the disposable income within Newfoundland and Labrador for all nuclear families.[23]

(2002, p. 9) also notes that: "The equity criterion is more difficult to define because neither economists nor anyone else have reached a consensus on what is equitable or fair in the realm of economic affairs."

[19] The disagreement is typically on how progressive the tax system should be or could be without destroying incentives that could result in lower overall well-being.

[20] If the average tax payable increases with income, or ability to pay, then the system is progressive. This can be achieved by having a marginal tax rate that increases for higher income levels. Alternatively, a regressive tax system would correspond to a situation where average taxes fall with increases in income and a neutral tax, in this context, would be one in which the average tax take does not change with changes in the taxpayer's income.

[21] Focusing on the personal income tax system is consistent with Wagstaff et al. (1999, p.75), which argues that policy-makers appear to accept that income redistribution is a proper policy goal of the personal income tax, whilst the same cannot be said of many other taxes.

[22] Under the NLMBM, a person in low income is someone whose available family income is less than the cost of the market basket in their community. For this indicator, a market basket is a selection of goods and services used to determine the cost of a "minimally accepted" standard of living.

[23] While nuclear families are the main thrust of this report, the analysis also evaluated the impact of each scenario on all family types – that is, all nuclear families, couple families (with and without children), lone parent families and non-family persons or single

Section 2 of this paper discusses the measurement of inequality and evaluates the current state of knowledge with respect to income inequality in Newfoundland and Labrador for the period 1976-2011.   The notions of tax fairness, equity, and progressivity are introduced in Section 3. This section also explains the metrics utilized in this study to measure equity and progressivity. As well, these concepts are then applied to data for the 2015 calendar year, which are based on the Newfoundland and Labrador tax system as of December 31, 2014 and the economic and demographic projections of the Department of Finance carried out around the same time period. Section 4 provides an assessment of individuals and families living below the Newfoundland and Labrador Market Basket Measure (NLMBM) of low income. In addition, this information is used to introduce a number of hypothetical revenue-neutral scenarios, which are designed to promote greater income equality in Newfoundland and Labrador. Specifically, changes to the personal income tax system and changes to the transfer system are inspired by HST credits for the 2015 calendar year. This section also evaluates the impact of these credits on the progressivity of the personal income tax system and the changes to the income inequality in Newfoundland and Labrador. Also discussed are the impacts on the incidence and severity of poverty within the province by family type. Section 5 outlines some general observations and considers potential directions for future research. Appendix A contains a discussion of how the Kakwani index can take values outside of the theoretical range (-2.0 to 1.0) when net taxes can take positive and negative values for different households, depending on where they sit in the income distribution. Finally, Appendix B expands the main discussion to various family types for Scenario 1 and Scenario 4.

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2. Measuring Income Inequality Over Time in Newfoundland and Labrador

On one level, the idea of measuring income is fairly straightforward. Yet, measured income, even corrected for taxes and transfers, may not measure perfectly a household's economic well-being. In other words, income, however measured, may not precisely reflect a household's capacity to consume, which, arguably, is a better measure of household well-being.   For instance, if two households have the same measured income, but one owns its home outright and the other rents, then most people could accept that the homeowner is better off than the renter because the homeowner is getting an imputed income that is more-or-less equal to the value of the rent, while the renter household is expending a portion of measured income to pay for its housing needs. In effect, the homeowner is implicitly paying rent to itself, but this imputed rent will not normally show up as part of measured income. Or, owning a house is an asset that constitutes wealth for the household and for most households, a home is probably their most important asset. Furthermore, households also receive transfers-in-kind, such as primary and secondary education and access to publicly-provided medical services, that would not be included in measured income but would increase their household consumption and their well-being.

Although having household wealth and various in-kind transfers incorporated into a comprehensive income measure would better reflect inequality within Newfoundland and Labrador, data availability restricts the analysis undertaken in this paper to measured income. Moreover, the most easily accessed and comprehensive income data that are available in most countries and provinces, and in Newfoundland Labrador, in particular, are those data that are collected for the purposes of paying personal income taxes.

There are additional challenges in trying to measure income inequality. In particular, not all forms of income are taxable, even though these sources may affect both a household's capacity to consume and its well-being. By way of illustration, consider that neither capital gains on primary residences nor inheritances are taxable. In addition, even though certain sources of income are counted as taxable, in some instances, deductions from income are permitted. As well, allowances can be used to reduce gross income in determining taxable income. Further, calculated taxes, based on taxable income, may be further reduced by various refundable or nonrefundable tax credits. These include the federal and provincial basic personal exemption amounts and tuition fees, which are examples of nonrefundable tax credits.[24] As of December 31, 2014, the basic personal exemption effectively exempted the first $11,138 and $8,578 of income from federal and provincial income taxation, respectively. Effectively, the household's

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[24] A nonrefundable credit is one in which tax payable can be reduced to zero, but if the credit exceeds the amount of tax payable by the household, the excess of the credit value over taxes otherwise payable is lost to the taxpayer. A refundable credit is one in which tax payable can be reduced to zero and any credit in excess of taxes otherwise payable will be paid out to the household as a tax refund. An example of a refundable credit would be the HST credit.

income tax liability depends on its market income and on a number of other factors, including exemptions, allowances, deductions, credits, and, of course, tax rates.

Acknowledging that the focus of any study on inequality should be on consumption and that transfers-in-kind should be included in such an analysis, this current study focuses on disposable income because, in Canada, in-kind transfers and other direct transfers such as income support, the Canada Child Tax Benefit, and Old Age Security payments, are not normally included in measures of income.[25] This approach is consistent with Heisz (2014), who refers to disposable income as being "after-tax" and implicitly after-transfers.

Many social scientists studying income inequality compare the top decile (10%) of the income distribution, quintile (20%) of the income distribution, or 1% of taxpayers or wage earners to other corresponding income groups, or they use some other inter-decile ratio such as the Palma measure of inequality, which compares the top 10% to the bottom 40% of households.[26] However, this approach does not reflect the degree of inequality experienced within the entire population, as many people—such as young children—do not work and, as such, neither earn a wage nor pay any taxes. Given this concern and keeping with the normal practice followed by statistics agencies and academics, this study concentrates on household income, rather than earned income. Additionally, this analysis presented below considers after-tax household income on an *adult equivalent adjusted* basis.[27] This adjustment recognizes explicitly that all households are neither of the same size nor have the same composition. Specifically, and following the practice of the OECD, to recognize that households share resources, household income is divided by the square root of the household size.[28] Therefore, a household with four individuals would be deemed to be twice as expensive to run — the square root of four — as a household with one individual. Hence, any household income would only go half as far with a household of four than with a household of one.[29] Although we acknowledge that people can take issue with this particular methodology for converting household income into its adult equivalent basis,[30] the approach adopted in this study is the international standard utilized in studies of income inequality.[31]

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[25] Note that disposable income is calculated as market income and transfer income—that is, total income—minus income taxes levied by the federal and provincial government. Also note that Old Age Security payments appear in taxable income and disposable income and are subject to a high income claw back.

[26] See, OECD (2011), Heisz (2014), Heisz and Murphy (2014) and Cobham and Sumner (2013).

[27] Creedy et al. (2008, p. 13) suggest that "The use of household income per adult-equivalent person further recognizes that sharing economies may depend on household composition and size - where there are several adults and/or children within a household. For example, adding a second or third adult to a household, and the inclusion of children may provide differing opportunities to share income."

[28] No adjustment is made for the age of household members.

[29] To further illustrate, if a household had an annual after-tax disposable income of $100,000, then a single individual's adjusted income would be $100,000. Alternatively, a household comprised of two adults and two children would have the equivalent income of $50,000.

[30] Creedy et al. (2008, p. 13) highlight that "A number of adult equivalence scales are used in the literature, many of which can be captured by the simple form: $m = (n_a + \theta * n_c)^{\alpha}$, where m is the number of adult-equivalents, $0 \leq \theta \leq 1$ captures the weight attached to each additional child in the household, and $0 \leq \alpha \leq 1$ captures scale economies." They utilize the 'Jensen scale', which "approximately equates to $\theta = 0.7$; $\alpha = 0.6$." OECD Project on Income Distribution and Poverty (www.oecd.org/social/inequality.htm) notes that wide range of equivalence scales exist, but the most commonly used scales include: "OECD equivalence scale" or the "(old) OECD scale". This assigns a value of 1 to the first household member, of 0.7 to each additional adult and of 0.5 to each child; "OECD-modified scale" assigns a value of 1 to the household head, of 0.5 to each additional adult member and of 0.3 to each child

Having assigned each individual in the population an adjusted income, the next challenge is how to make comparisons over time and between various populations when populations and incomes may be changing. For this type of comparison, the concepts of the Lorenz curve and the Gini coefficient are very useful.

The Government of Canada's Standing Committee on Finance (2013) described the Lorenz curve as a curve that: "… is constructed by comparing cumulative shares of the population, ranked from the lowest to the highest income levels, to cumulative shares of income that this population receives." To more clearly illustrate the concept of the Lorenz curve, how it can be used to study changes in income inequality, and how it is utilized in the current study to analyze changes in the income distribution for the different scenarios considered, Figure 4 is provided.[32]

There are three Lorenz curves in Figure 4 — the "red" line, or the diagonal, is referred to as the "line of absolute equality" and reflects the relationship between the cumulative distribution of income and population[33] when income is distributed equally amongst all members of the population; the "blue" dashed line indicates the relationship between cumulative income and population for some hypothetical income distribution denoted as Y^1 in Figure 4; and the "black" dashed line corresponds to the relationship between cumulative income and population for some other hypothetical income distribution denoted as Y^2 in Figure 4 . The closer the Lorenz curve is to the "line of absolute equality," the lower the degree of income inequality associated with the particular income distribution being considered. Correspondingly, the further the Lorenz curve deviates from the diagonal, the more unequal is the associated distribution of income.

By visual inspection of the Lorenz curves, one can infer that the hypothetical income distribution Y^1 corresponds to some inequality (i.e., the Lorenz curve is not coincident with the "line of absolute equality"). However, the income distribution corresponding to Y^1 is more equal than the income distribution corresponding to the hypothetical income distribution Y^2 in that the Lorenz curve for Y^2 is further away from the diagonal than the Lorenz curve for Y^1. If Y^1 and Y^2 correspond to the income distribution for two different countries, country one and country two, respectively, then it is reasonable to conclude that the income distribution for country 2 is more unequal than the income distribution for country 1. Alternatively, if Y^1 and Y^2 represent the income distribution of a province, like Newfoundland and Labrador, but at different points in time, denoted T^1 and T^2, respectively, and where T^1 predates time period T^2, then one could conclude that the income distribution is more unequal in Newfoundland and Labrador in the

was used by the OECD in the 1990s; and "Square root scale" divides household income by the square root of household size and has been utilized in recent OCE publication. In its note, WHAT ARE EQUIVALENCE SCALES?, The OCED notes that "In general, there is no accepted method for determining equivalence scales, and no equivalence scale is recommended by the OECD for general use." http://www.oecd.org/eco/growth/OECD-Note-EquivalenceScales.pdf.

[31] Standing Committee on Finance, Government of Canada. (2013, p. 22), Solt (2014, p. 8), Statistics Canada, in developing its low-income methodology, also uses the square root equivalence scale scheme to adjust household income because "It is consistent with international practices and it is simple." http://www.statcan.gc.ca/pub/75f0002m/2010004/lim-mfr-eng.htm, and Frenette et al. (2014, p.7) utilize" an adjustment for adult equivalents using the square root of the number of family members."

[32] Figure 4 is derived from our own calculations and has not been specifically referenced to a particular source. This is also true for the other diagrams included in this report for which a source is not reported.

[33] The population is ranked from the lowest to the highest income in deriving the cumulative population and cumulative income percentage employed in constructing the Lorenz curve.

later time period (T^2) than in the earlier time period (T^1) or income inequality is growing between these two time periods.

Figure 4: Lorenz Curves and Gini Coefficients – An Illustration
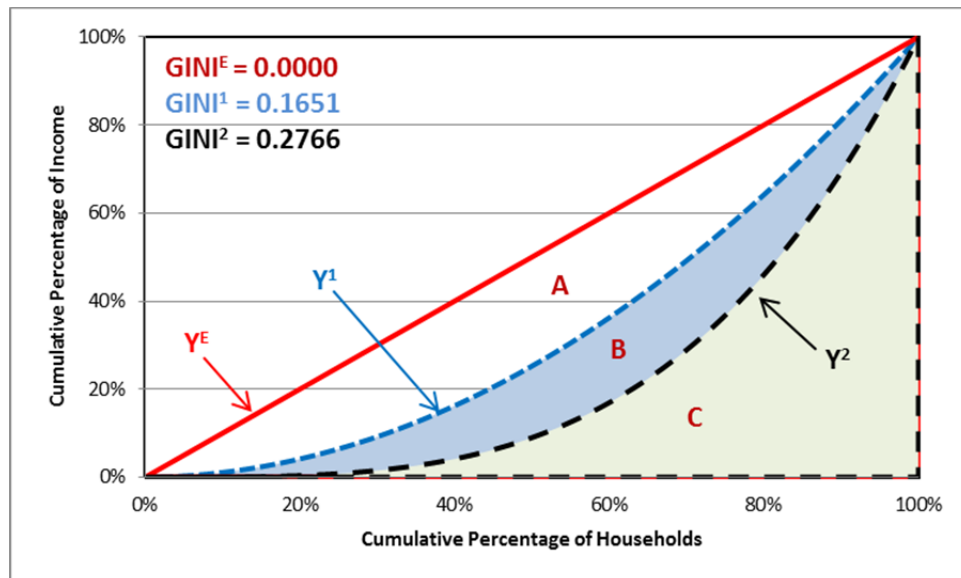
Alternatively, it is possible to indicate the degree of inequality embodied in the relative position of the Lorenz curves by calculating the corresponding Gini coefficients.[34] As noted by Standing Committee on Finance (2013), a Gini coefficient can be calculated as the ratio of the area between the Lorenz curve and the line of perfect equality and the total area under the line of equality. A Gini coefficient of 1 indicates maximum inequality, as a single person (household) in a society has all of the income and the remainder of the population has none and a Gini coefficient of 0 indicates maximum equality where everyone has exactly the same income. Referring to Figure 4 above, the Gini coefficient for income distribution Y^1 is calculated area A divided by area A+B+C, which, for the hypothetical income distribution depicted, has a value of 0.1651. Correspondingly, the Gini coefficient for the hypothetical income distribution Y^2 is area A+B divided by area A+B+C or 0.2766 for the specific income hypothetical distribution depicted in Figure 4.

It is also important to appreciate that the smaller is the Gini coefficient, the more equal is the associated income distribution. Obviously, Y^1, with a Gini coefficient of 0.1651, represents a more equal distribution than Y^2, with a Gini coefficient of 0.2766 because 0.1651 is a smaller

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[34] While the Gini coefficient is a common metric to utilize in studying income inequality, it is important to understand that the Gini coefficient, as noted by De Maio (2007), is "most sensitive to inequalities in the middle part of the income spectrum." This was also noted in Cobham and Sumner (2013, p. 5), where it was suggested that the "Gini is oversensitive to the middle of the distribution and consequentially less sensitive to changes at the extreme." OECD (2013, p. 171) also highlighted that the Gini coefficient may be too sensitive to changes in the middle of the income distribution because "the Gini coefficient reflects the ranking of the population, and ranking is most likely to change the densest part of the distribution, which is likely to be around the middle." It is also important to appreciate that Lorenz curves can intersect if the inequality is concentrated at different ranges of the income distribution. This subtlety would not be captured by the Gini coefficient.

value than 0.2766. Again, this is equivalent in this example to observing that the Lorenz curve for Y^1 is closer to the diagonal than the Lorenz curve for Y^2.

Gini coefficients are convenient to use because Statistic Canada publishes them for provinces and the country as a whole for particular years and across time.[35] This makes it relatively easy to compare differences in income distribution across provinces; how income distribution within each province changes over time; and how the income inequality in a particular province changes over time relative to other comparator provinces.

Switching from hypothetical to actual income distributions, Table 1 compares the ratio of the incomes of those households at the 99th percentile of the income distribution to those households in the middle of the income distribution (that is, at the 50th percentile of the income distribution) for each Canadian province in 2011. The second column of Table 1 and the cell associated with Newfoundland and Labrador indicates that total income,[36] utilizing Statistics Canada's Longitudinal Administrative Database (LAD), for the 99th percentile (or the top 1% of households) is 6.4 times that of the 50th percentile or the mid-point of the income distribution. In other words, for every dollar that an individual in the middle of the income distribution in Newfoundland and Labrador earned, the person at the 99th percentile earned $6.40 or 6.4 times as much. Also, given the progressivity of the current tax system, this ratio fell to 5.1 after taxes. Moving across on the same row, this ratio was the 4th highest in Canada (that is, Newfoundland and Labrador was ranked 7 out of 10 for total and after-tax income) and higher than all of the other Atlantic Provinces, both in terms of total income and after-tax/disposable income. As one might expect, Alberta led the country in terms of this inequality.

Has this ratio been constant over time? Figure 5 illustrates that this ratio was relatively constant for the top 10% compared to the median over the whole period. However, comparing the top 1% of households to the median household, one observes that the ratio was relatively constant up to 1994 when it bumped up and started to increase until 2007 when the increase was more pronounced. In 2012, the top 1% had slightly over 6% of all after-tax income and women were about 18% of the top 1% of the taxfilers.

As can be seen from Figure 6, Brent crude oil prices continued their sharp increase around 2005 to 2006. Given that one would expect a lag between higher oil price and wages increases, it may not be a coincidence that income inequality increased around that period.

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[35] Cingano (2014, p. 13) emphasizes that while the Gini coefficient is commonly used to analyze income inequality, the link between "inequality and growth might be rather associated with inequality in different parts of the income distribution...a single inequality statistics may end up capturing a relatively unimportant average effect of inequality on growth and more complex indicators of inequality should be used (for example, ratios of income percentiles on either side of the median or decile share ratios)."

[36] Total income includes both market income and transfer income. In addition, Cobham and Sumner (2013, p. 31) finds that "found the Palma and the Gini to have a near perfect fit – suggesting that much of the same information is captured by the two measures. Indeed, the components of the Palma ratio alone are able to 'explain' between 99% and 100% of Gini variation" and have argued that the Palma ...is a more policy-relevant measure of inequality."
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Piketty (2014) makes a point in his discussions of income inequality of focusing on the top 1%. Although this concern seems justified in the Newfoundland and Labrador context, rising income inequality may owe more to labour income trends than capital income inequality as Piketty (2014) suggests. Moreover, it is not clear whether this inequality will inevitably rise even with a declining population. The next few years will prove instructive in light of a decline in oil prices, a shrinking population, and an aging population.

As well, Piketty (2014) concentrated on before-tax income of the top 1% since an issue in his analysis is the division between labour earnings and the income from capital and the manner in which this division has evolved over time. Piketty's data relates to families, whereas Canadian data on this issue relates to individual taxfilers. Figure 7, taken from Veall (2012), compares Canadian incomes, defined as market incomes, excluding capital gains,[37] for those in the top 1% to the corresponding US data. As one can observe, there was an upward movement in income shares, starting in the late 1980s before stalling during the recession of the early 1990s and resuming in the mid-90s. The most recent data (2012) for Canada indicates that the share of market income of the top 1% has continued to decline from the 2006 peak and stands at 11.7%. The corresponding peak for Newfoundland and Labrador (10.5%) occurred in 2001 and has declined to 8.9% in 2012.

Table 1: Inequality Measures by Province, 2011

| | Ratio of income threshold for top 1% to that for top 50% | | Gini coefficient of income | | Provincial rankings: 1 most equal, 10 least equal | | | |
| | | | | | Ratio of income threshold for top 1% to that for top 50% | | Gini coefficient of income | |
	Total	After-tax	Total	After-tax	Total	After-tax	Total	After-tax
Canada	7.1	5.5	0.355	0.313	-	-	-	-
NL	6.4	5.1	0.351	0.308	7	7	8	7
PE	5.2	4.2	0.313	0.279	1	1	1	1
NS	5.7	4.6	0.320	0.282	5	4	2	2
NB	5.6	4.7	0.320	0.283	2	5	2	3
QC	6.2	4.8	0.340	0.283	6	6	6	4
ON	7.4	5.7	0.354	0.311	9	9	9	8
MB	5.7	4.5	0.334	0.294	3	2	4	5
SK	5.7	4.6	0.338	0.298	4	3	5	6
AB	7.9	6.3	0.378	0.337	10	10	10	10
BC	6.9	5.5	0.349	0.314	8	8	7	9

Source: Statistic Canada, CANSIM Tables 204-002 and 202-0709

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[37] Data from Table A3 of Saez http://elsa.berkeley.edu/~saez/TabFig2012prel.xls shows that the capital gains income share in the U.S. for the top 1% is 19.86% and increases to 22.46% by 2012.

Figure 5: Ratio of After-Tax Income Thresholds for the top 1% and 10% of Earners to Median Income in Newfoundland and Labrador 1982-2012

Data Source: CANSIM Table 2040002
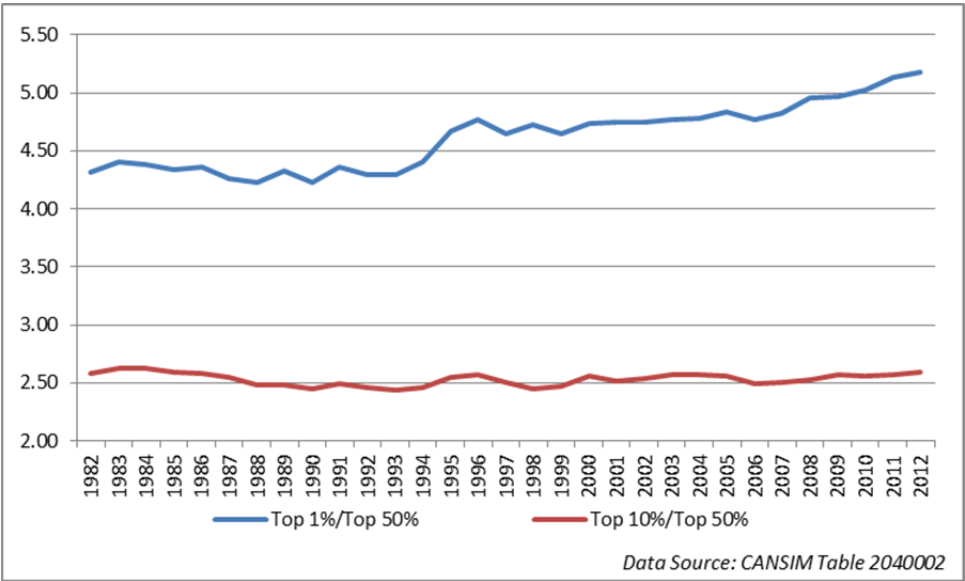
Figure 6: Annual Brent Crude Prices

Data Source: Federal Reserve Bank of St. Louis: FRED Data
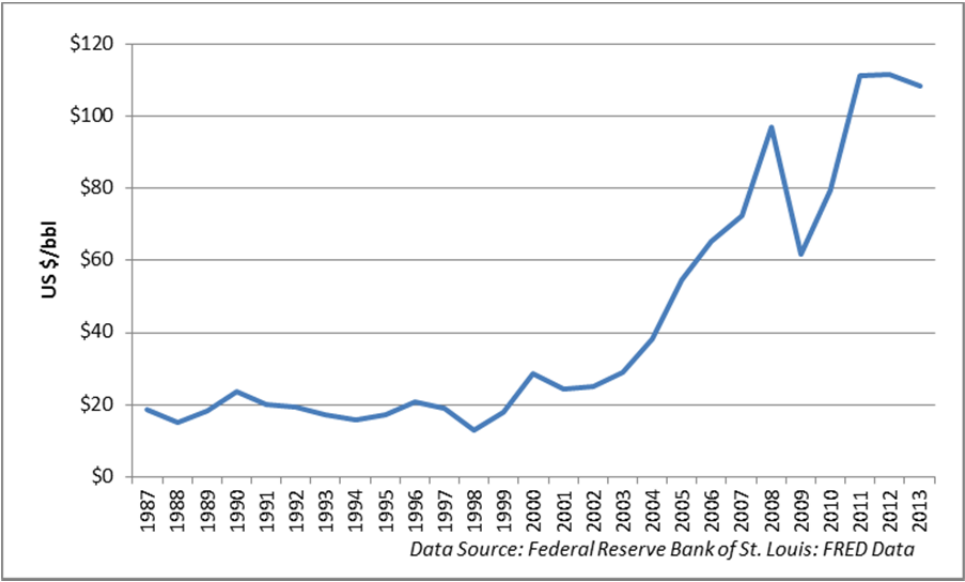
Income share of the top 1%, 0.1%, and 0.01%, Canada, 1920 - 2009; United States, 1920- 2010

Source: Veall (2012)
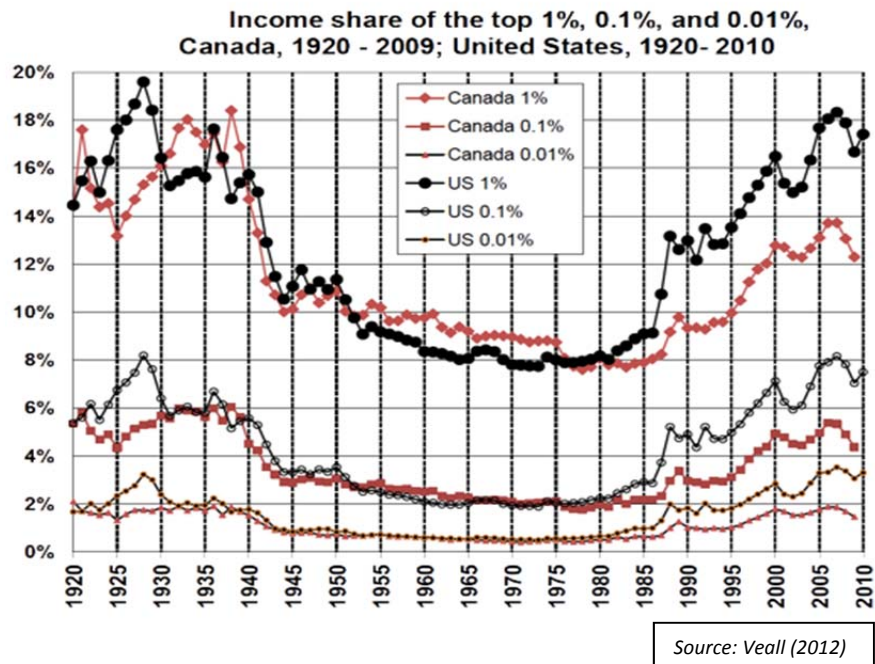
Note: Canadian results are by taxfiler. United States results are by family. Source: Canada: Author's calculations based on special order results provided to him by Statistics Canada using the Longitudinal Administrative Database; United States: Piketty and Saez (2003), as updated to 2010 at the website of Emmanuel Saez, http://elsa.berkeley.edu/~saez/TabFig2010.xls, March 2012, as accessed August 2, 2012.

It is interesting to ask: how does Newfoundland and Labrador fit into this picture? Figures 8, 9 and 10 below illustrate that the Canadian profile is dominated by Alberta, British Columbia and Ontario. While income shares of taxfilers in the top 1% in Newfoundland and Labrador have grown, this growth is much more modest than that observed in Alberta, British Columbia and Ontario and, certainly, much more modest than that observed in the United States.

While examining market incomes is instructive when trying to understand the initial source of income distributions and inequalities, it is important to recognize that it is after-tax incomes that determine household living standards. Figure 11 shows the after-tax income shares of the various quintiles. The top quintile (20% of the population) had almost 40% of all the after-tax income of Newfoundlanders and Labradorians. The bottom 20% had about 7.5% of the after-tax income. Interestingly, these shares remained virtually constant over 35 years.

When one examines the upper income limits for all individuals in the province, using adjusted family income (in which children are also assigned an income), Figure 12 demonstrates that, although the shares remain relatively constant, real (inflation-adjusted) incomes have risen for all quintiles.   This rise in the standard of living seems to occur at the same time that oil production began. In other words, the evidence presented so far shows that although living

standards began to increase in the late 1990s, income inequality did not. It is really not until around 2008 that one observes the top 1% taxfilers begin to pull away.

Figure 8: Top 1% Income Share by Province, 1982-2012 – Newfoundland and Labrador Compared to the Atlantic Provinces

Source: CANSIM Table 2040002
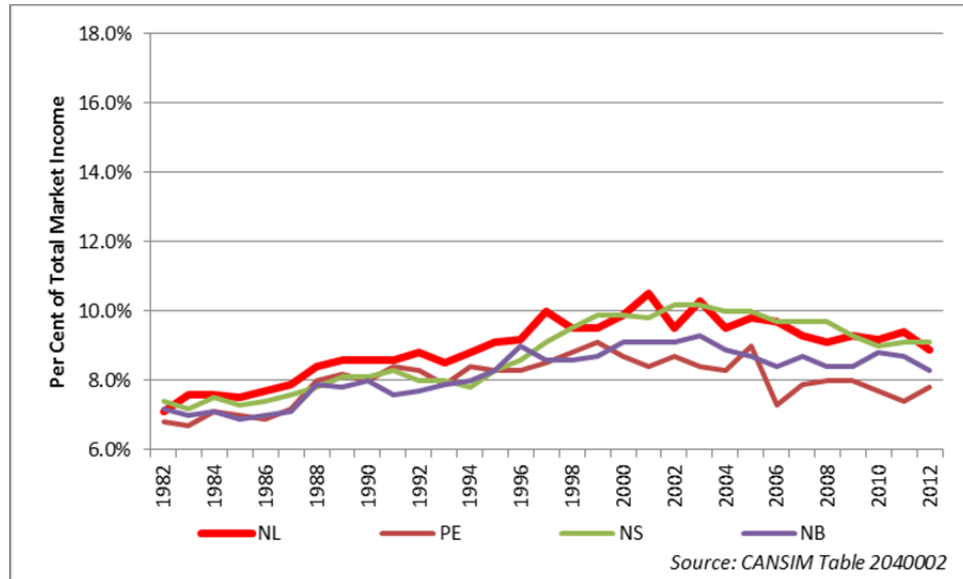
Figure 9: Top 1% Income Share by Province, 1982-2012 – Newfoundland and Labrador Compared to Quebec and Ontario

Source: CANSIM Table 2040002
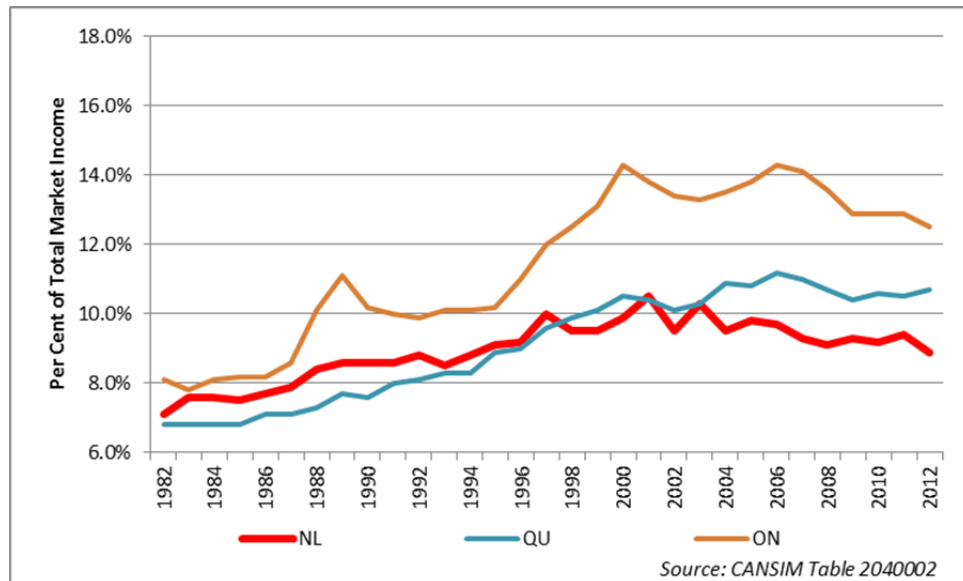
Figure 10: Top 1% Income Share by Province, 1982-2012 – Newfoundland and Labrador Compared to the Western Provinces

Source: CANSIM Table 2040002
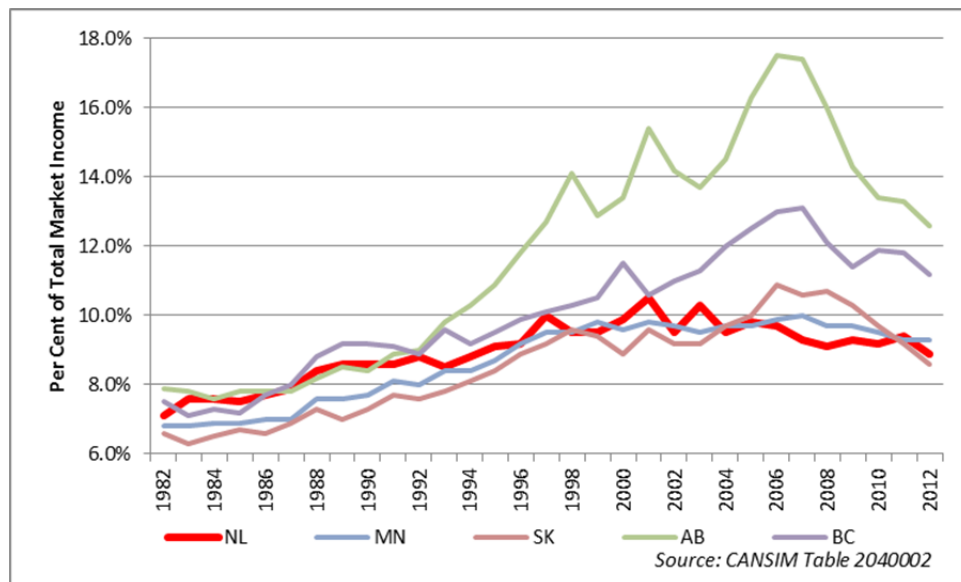
Figure 11: Adjusted After-Tax Income Shares in NL by Income Quintiles for All Family Units, $2011

Data Source CANSIM Table 2020706
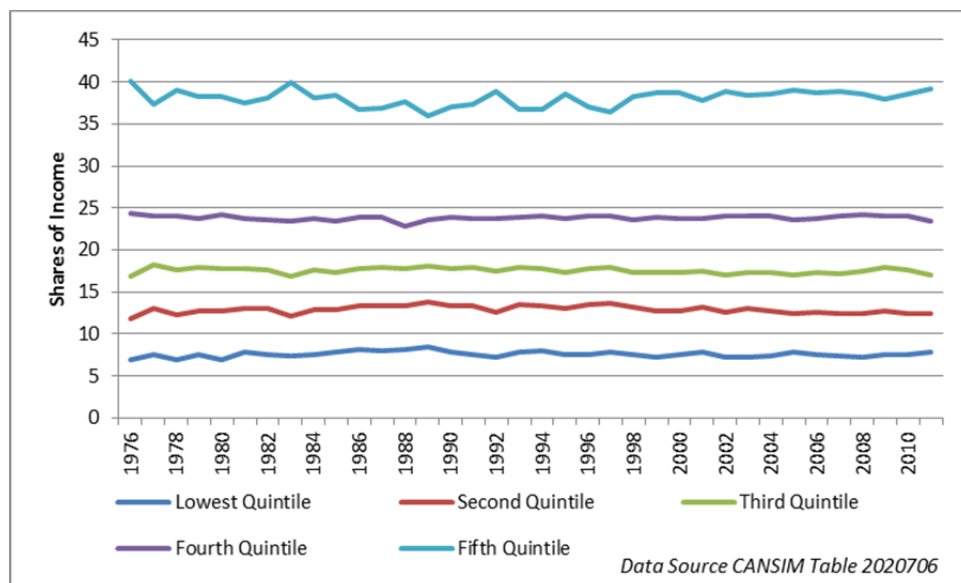
Figure 12: Upper Income Limits of After-Tax Income Quintiles, NL, $2011

Data Source: CANSIM Table 2020604
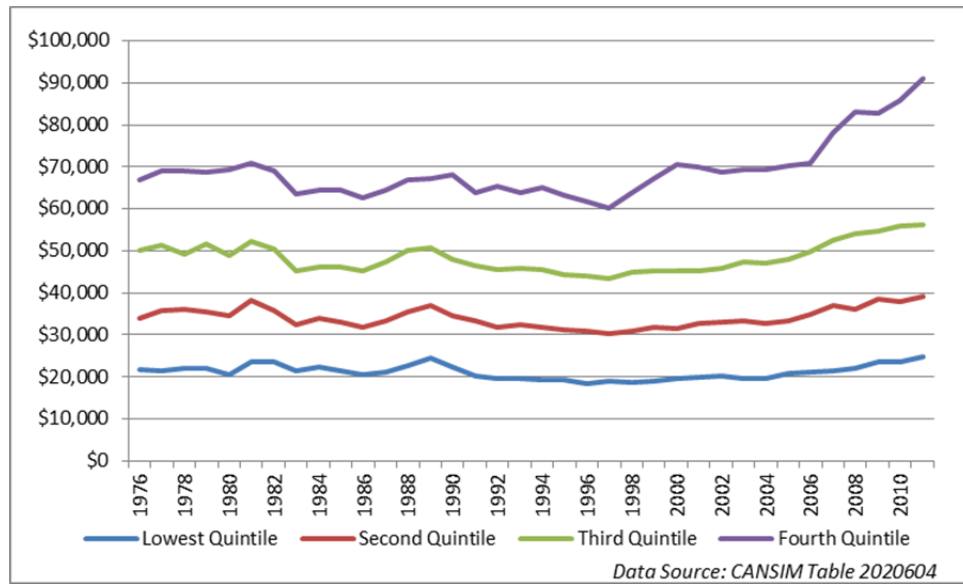
Figure 14 moves from adjusted market incomes, noted in Figure 13, to adjusted average after-tax (and transfers) disposable income. Note that a different picture emerges. Real incomes in the bottom quintile (20%) do begin to increase after 2004. This trend was not observed in Figure 13. It appears that changes in taxes and transfers are best explained by increases in the purchasing power of the bottom quintile. It is also noteworthy that the average adjusted after-tax or disposable incomes of those in the top 20% is about five times the average for those in the bottom 20%. Recall with market incomes, which unlike after-tax income does not account for taxes and transfers, the ratio was 21. It appears that the tax/transfer system does greatly reduce income inequality in the province.

Figure 13: Average Market Incomes, Adjusted and Unadjusted by Quintile, All Family Units, NL, $2011

Data Source: CANSIM Table 2020706

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Data Source: CANSIM Table 2020706
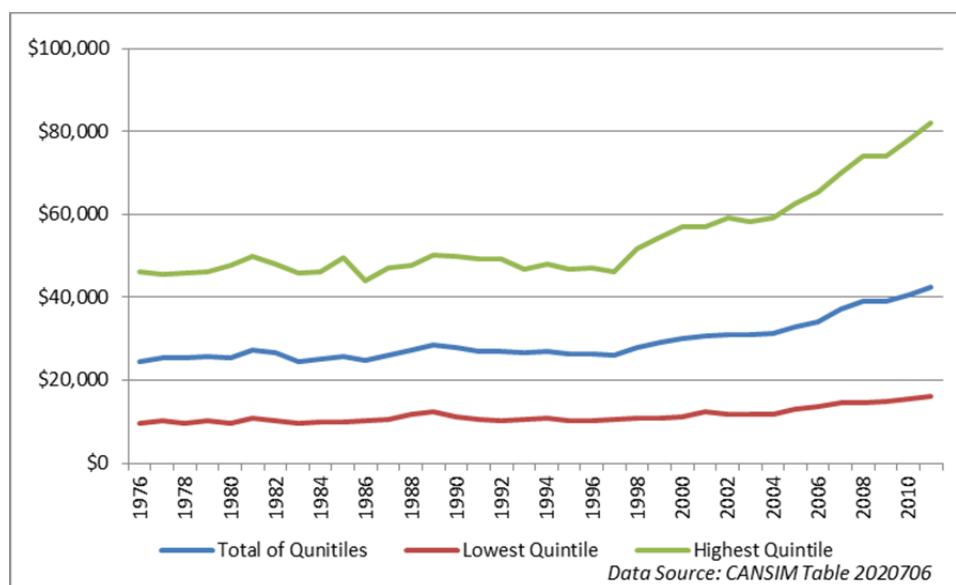
In the discussion above, income inequality was evaluated utilizing quintiles and deciles, rather than utilizing an index of inequality such as the Gini coefficient. Table 1, in columns 4 and 5, presents the before-tax and after-tax Gini coefficients calculated, using the Survey of Labour and Income Dynamics (SLID) data.[38] In 2011, the after-tax Gini coefficient was 0.308, which is not high relative to international standards. This after-tax Gini coefficient places Newfoundland and Labrador as the Canadian province with the 4th most drastic income inequality.

Figure 15, which displays Gini coefficients before and after taxes and transfers, has two features that are worthy of note. First, the displayed data for adjusted after-tax or disposable income does not demonstrate that inequality has been increasing. By way of illustration, the Gini coefficient for after tax income or disposable income was 0.308 in 1976 and it was 0.308 in 2011. In fact, since the late 1990s, the Gini coefficient related to adjusted disposable income seems to be consistently around 0.300. Although there has been a slight increase since the late 1990s, this occurred after a period of decline in the mid-1980s. The slight increase might be attributable to the impact of the top 1%.

Somewhat surprisingly, the Gini coefficients associated with adjusted market incomes are characterized by recent declines. This appears to be counterintuitive, given what seems to be happening at the very top; especially since the top 1% of households appears to have an increasing share of income. This apparent anomaly reinforces the need to examine the entire

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[38] The longitudinal Survey of Labour and Income Dynamics (SLID) was discontinued in 2011. A new cross-sectional survey has been developed and has tax-filer data for 2012, but the data are not comparable to earlier years. This lack of comparability is the primary reason for our use of SLID data.

distribution to more precisely understand what is happening to income inequality in Newfoundland and Labrador.

The second point to note in Figure 15 is that there is a large drop in the Gini coefficient when the analysis moves from adjusted market incomes (Gini coefficient average 0.4741 between 1976 to 2011) to adjusted total incomes (Gini coefficient average 0.3290 between 1976 to 2011). Since adjusted total incomes include market incomes plus transfers, government transfers appear to be relatively important. Government transfers have accounted for 78.8% of the drop in the Gini coefficient in going from market income to disposable income. The remaining 21.2% drop in the Gini coefficient was due to the effect of taxes. Clearly, the impacts of transfers deserve greater examination. The change to adjusted after-tax income, which would subtract taxes from total income, also moves Newfoundland and Labrador toward greater equality —the average value of the Gini coefficient drops from 0.4741 to 0.3290 when total income is considered instead of market income and then to 0.2899 when disposable income is considered instead of total income. In other words, the tax effect seems to be less pronounced than the effect of government transfers.[39]

Figure 15: Gini Coefficients of Adjusted Market, Total and After-Tax Income of All Family Units, NL
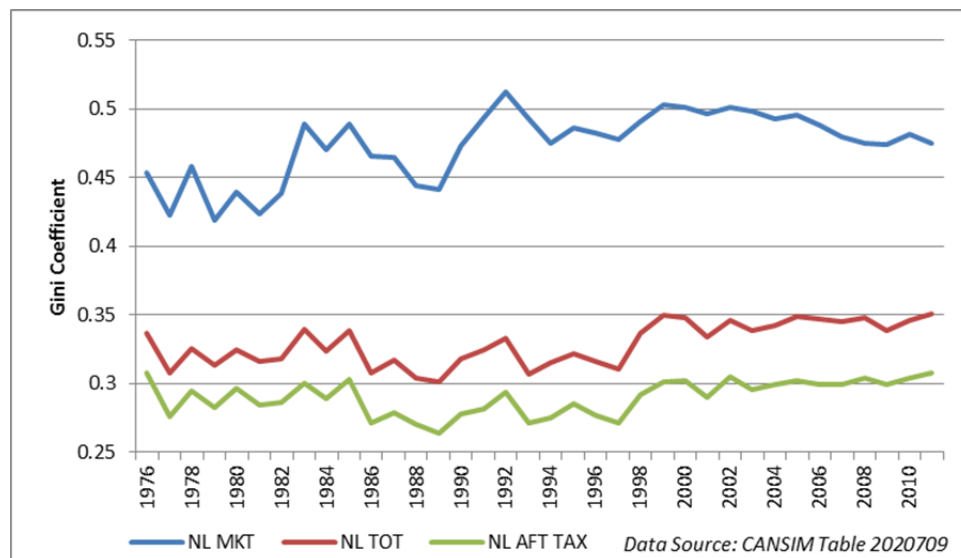
To summarize, there has been a growing concern in industrialized countries about the dramatic increase in income inequality. This concern has recently been on the top 1% of households.[40]

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[39] The larger impact of transfers relative to taxes on improving the equality of the after-tax income distribution was found in other studies. See, for example, IMF (2014, p. 15), which finds that transfers account for two-thirds of the decrease in the Gini coefficient and an OCED study, Joumard et al. (2012), found that transfers reduced income dispersion more than taxes. As well, Huesca, and Araar (2014, p. 17) estimated that "total benefits are more progressive than total taxes in Mexico," which Huesca and Araar (2012, p. 20) explained by "the efficient targeting of poor and the higher sensitivity of progressivity indices to the income changes in the bottom part of the distribution." Sharpe and Capeluck (2012, p. 2) had similar findings for their Canada-wide study. However, the Sharpe and Capeluck (2012) study use CANSIM Table 202-0705 whereas our study utilizes CANSIM Table 202-0709, as does Statistics Canada (Brian Murphy) when discussing income inequalities. The latter table adjusts for household size (equivalizes). This eliminates the possibility that Gini coefficients may change over time due to changes in household size.
[40] See, for example, Piketty (2014).

This concern has been accompanied by the growing belief that this group has not been paying its fair share in taxes. It has been argued that growing income inequality can act as a barrier to economic growth, which will inhibit rising living standards.

With respect to Newfoundland and Labrador, there is evidence that the general standard of living, as measured by adjusted real, after-tax income, has risen since the latter part of the 1990s. While the distribution of after-tax income by quintile has remained remarkably constant for well over three decades, there is evidence that the incomes shares of the top 1% have risen, both before and after-tax, but modestly. The picture here of rising inequality is not the same one described nationally or that which is discussed in the international media. Furthermore, there is evidence to support the notion that both the tax and transfer system have served to reduce the inequality of after-tax (disposable) incomes.

The past is not always a good predictor of the future, especially in periods of adjustment such as the one that Newfoundland and Labrador is currently experiencing. The trends to be watched are: (1) what is happening to incomes of the top 1% of households and (2) what is occurring at the bottom of the income distribution, especially to those who are living in poverty.

The socially desirable distribution of disposable income is a matter of tax policy. Section 3 examines Newfoundland and Labrador's Personal Income Tax system, with a view to determining its progressivity.

3. Tax Fairness, Equity and Progressivity: Economic Concepts and their Application to Newfoundland and Labrador's Personal Income Tax System

3.1. Concepts of Tax Fairness

Citizens widely expect fairness, albeit loosely defined, from their personal income tax system. What exactly makes a tax system fair is a subjective assessment and it involves having to a value judgement and, as such, the interpretation of a fair tax system is subject to differences of opinion, even for economists that work in this area. In general, however, public finance economists would be in general agreement that the tax system should be both vertically and horizontally equitable.[41]

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[41] Thresh (2002, p. 9) indicates that: "About all one can point to are some notions of equity that commonly appear in the economic literature." These include process equity, which is "a judgment about the rules of the economic game" and end-results equity, which is "a judgment about the outcome of the game." The focus on end-results equity leads some economists to focus on horizontal and vertical equity that are analyzed in this paper.

As an economic concept, vertical equity refers to the degree to which individuals or households who are unequal with respect to economic status should be treated unequally by the tax system. More specifically, a tax system is vertically equitable if those households with higher incomes and greater abilities to pay contribute more in taxes, both absolutely and relatively, than individual and households that comprise the relatively lower income groups in a society. In fact, society deems it to be socially desirable that those with a greater ability to pay actually contribute a higher share of their income in terms of taxes. Alternatively, one could interpret vertical equity as operationalizing the concept of distributive justice for society. In particular, the view that a relatively larger tax burden should be borne by those individuals or households with higher income arises from a belief that a dollar transferred to the government by a wealthy individual or household does not result in the same loss of well-being as to someone who is poor. In other words, a dollar is scarcer and is worth relatively more to a poor person than to a rich household so that the appropriate implementation vertical equity can be welfare enhancing for society.

 A tax system under which people or households pay higher proportions of their incomes in taxes as their incomes rises is referred to as being progressive. The opposite case, in which the relative tax burden falls as income rises, is denoted as a regressive tax system. The third possibility is that households' relative tax burdens are constant shares of their incomes. This is referred to as a proportional tax system. While vertical equity implies that some type of progressive taxation is acceptable and desirable, it does not imply the extent of progressivity that would be appropriate. In fact, the extent of progressivity that is appropriate is where the value judgments and disagreements come into play. Although most people can agree that "some" progressivity is important and desirable, there may not be a lot of agreement of where "some" ends and "too much" begins.

Another equity concept commonly utilized by public finance economists is horizontal equity, which implies that individuals or households with similar levels of income, or a similar ability to pay, should be treated equally before and after considering the effects of the tax system. Essentially, if individuals or households have the same level of economic well-being before government taxes and transfers — the same relative ranking with respect to one another, then they should have the same ranking or level of well-being after the government taxes and transfers if the tax system is horizontally equitable. That is, equals should be treated equally.

3.2. Measuring Progressivity

The progressivity of a personal income tax system is determined by many factors. Probably the most important factor is the increasing marginal tax rates applied to higher income categories. In most systems, tax rates on marginal income rise with a taxpayer's income. In 2014, for example, Newfoundland and Labrador's provincial income tax system featured three tax

brackets, with higher marginal tax rates associated with higher incomes —7.7% for taxable incomes up to $34,254, 12.5% for taxable income between $34,555 and $68,508 and 13.3% for incomes above $68,509. Table 2 and Figures 16, 17 and 18 illustrate how Newfoundland and Labrador compared to the other Canadian provinces in 2014.[42] As well, the changes introduced in the Government of Newfoundland and Labrador's Budget 2015 are also depicted in Figures 16, 17 and 18 to indicate how the new tax brackets and tax rates impact upon Newfoundland and Labrador's relative position.[43]

Table 2: Statutory Federal and Provincial Marginal Income Rates, 2014

Tax Rate[44]	Tax Bracket	Tax Rate	Tax Bracket
Newfoundland and Labrador		**Ontario[45]**	
7.70%	Up to $34,254	5.05%	Up to $40,120
12.50%	$34,255 to $68,508	9.15%	$40,120 to $80,242
13.30%	$68,509 and over	11.16% (13.39%)	$80,243 to $150,000
		12.16% (19.00%)	$150,001 to $220,000
		13.16% (20.05%)	$220,001 and over
		20.00% (surtax)	*Threshold $4,331*
		36.00% (surtax)	*Threshold $5,543*
Prince Edward Island[46]		**Manitoba**	
9.80%	Up to $31,984	10.80%	Up to $31,000
13.80%	31,985 to $63,969	12.75%	$31,001 to $67,000
16.70%	$63,970 and over	17.40%	$67,001 and over
16.70% (18.37%)	$98,145 and over		
10.00% (surtax)	*$12,500*		
Nova Scotia		**Saskatchewan**	
8.79%	Up to $29,590	11.00%	Up to $43,292
14.95%	$29,591 to $59,180	13.00%	$42,293 to $123,692
16.67%	$59,181 to $93,000	15.00%	$123,693 and over
17.50%	$93,001 to $150,000		
21.00%	$150,001 and over		
New Brunswick[47]		**Alberta**	

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[42] The tax rates include Table 2 incorporate the reduction in rate due to the federal tax abatement of 16.5% of federal tax. See, for example, http://www.taxtips.ca/taxrates/qc.htm.

[43] In Budget 2015, the Government of Newfoundland and Labrador introduced two new tax rates and two new tax brackets to apply to higher income categories - a fourth rate of 14.3% for taxable income of $125,001 to $175,000 and a fifth rate of 15.3% for taxable income over $175,000, effective July 1, 2015. http://www.budget.gov.nl.ca/budget2015/highlights/highlights_2015.pdf

[44] Data taken from KPMG (2014): Federal and Provincial Income Tax Rates and Brackets for 2014 http://www.kpmg.com/Ca/en/IssuesAndInsights/ArticlesPublications/PersonalTaxRates/Federal-and-Provincial-Income-Tax-Rates-and-Brackets-and-Surtaxes-in-2014.pdf

[45] The tax rates in the parentheses have adjusted the statutory rates for the Ontario surtaxes, assuming that the first surtax becomes effective at a taxable income of $70,651 and the second surtax becomes effective at $83,237 as per information provided at http://www.taxtips.ca/taxrates/on.htm.

[46] The tax rates in the parentheses have adjusted the statutory rates for the Prince Edward Island surtax, assuming that the surtax becomes effective at a taxable income of $98,145 as per information provided at http://www.taxtips.ca/taxrates/pe.htm.

[47] In the 2015 budget, New Brunswick introduced two addition tax brackets and higher tax rates. Specifically, those with a taxable income between $150,000 and $250,000 saw their tax rate increase from 17.84% to 21.00% and those with a taxable income over $250,000 will see their tax rate increase from 17.84% to 25.75%. http://www2.gnb.ca/content/dam/gnb/Departments/fin/pdf/Budget/2015-2016/BudgetSpeech2015-2016.pdf

Tax Rate[44]	Tax Bracket	Tax Rate	Tax Bracket
9.68%	Up to $39,305	10.00%	All Income[48]
14.82%	$39,306 to $78,609		
16.52%	$78,610 to $127,802		
17.84%	$127,803 and over		
Quebec[49]		**British Columbia**	
16.00% (13.36%)	Up to $41,495	5.06%	Up to $37,606
20.00% (16.70%)	$41,496 to $82,985	7.70%	$37,607 to $75,213
24.00% (20.04%)	$82,986 to $100,970	10.50%	$75,214 to $86,354
25.75% (21.50%)	$100,971 and over	12.29%	$86,355 to $104,858
		14.70%	$104,859 to $150,000
		16.80%	$150,001 and over
Federal			
15.00%	Up to $43,953		
22.00%	$43,954 to $87,907		
26.00%	$87,908 to $136,270		
29.00%	$136,271 and over		

For higher income tax brackets, Newfoundland and Labrador had one of the lowest income tax rates as of December 31, 2014. Alberta had a 10% flat tax, which, in the most recent Alberta budget, was proposed to be increased to 11.5% for incomes above $100,000 and to 12.0% for incomes above $250,000 with the 2015 budget.[50] Ontario has a slightly lower statutory rate (13.16%) on incomes over $220,000, but Ontario also has two surtaxes in place. When the surtaxes are taken into account, the highest marginal rate in Ontario is 20.05%.[51] In addition, the Government of Alberta, in its Budget 2015, proposed to fund health care through the introduction of a progressive health levy to come into effect on July 1, 2015.[52] As well, Ontario residents pay an Ontario Health Premium.[53] In contrast, health care expenditures are funded out of general tax revenues in Newfoundland and Labrador.

Although fine tuning would be required for each family's circumstances to determine exactly which province has the lowest tax burden from them specifically, it is the case that the income tax rates on higher income taxpayers are lower in Newfoundland and Labrador than almost all other provinces, with Alberta being the exception. It also appears that with the most recent

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[48] In their 2015 budget, the Government of Alberta introduced two new tax brackets; starting January 1, 2016 — (1) taxable income over $100,000 will be taxed at an 11.5% provincial rate and will be phased in over a three year period. This is estimated to impact 11% (330,000) of Albertan taxpayers; and (2) taxable income over $250,000 will be subject to an additional, but temporary, 0.5% tax rate. This is meant to be a temporary three-year measure until the budget is balanced in 2019 and is estimated to impact 1.5% (44,000) of Albertan taxpayers. Tax Plan Annex: Budget 2015, Government of Alberta (p. 88). http://finance.alberta.ca/publications/budget/budget2015/fiscal-plan-tax-plan.pdf#pit

[49] The tax rates in the parentheses have adjusted the Quebec statutory rates for the 16.5% federal rebate or the effective tax rate in Quebec is 83.5% of the statutory rate. For a discussion of how the rebate work, please refer to the Canada revenue agency website at http://www.cra-arc.gc.ca/tx/ndvdls/tpcs/ncm-tx/rtrn/cmpltng/ddctns/lns409-485/440-eng.html)

[50] With defeat of the conservative government in Alberta and the newly elected NDP government not planning to bring down a budget until the fall 2015, it remains to be seen at which level income tax rates in Alberta will be established.

[51] The surtax will make the marginal tax rate on the higher income brackets higher than the corresponding rate in place in Newfoundland and Labrador as of December 31, 2014.

[52] It remains to be seen if the newly elected government continues this initiative in the budget that it is expected to release in the fall of 2015.

[53] With the change of government in Alberta, it remains to be seen how health care expenditures will be funded in that province. This will be revealed with the budget expected in the fall of 2015.

budgetary changes, Saskatchewan personal income tax rate on higher incomes is now lower than that proposed for Newfoundland and Labrador.

Figure 16: A Comparison of Provincial Income Tax Rates by Income Tax Brackets – Newfoundland and Labrador and the Maritime Provinces
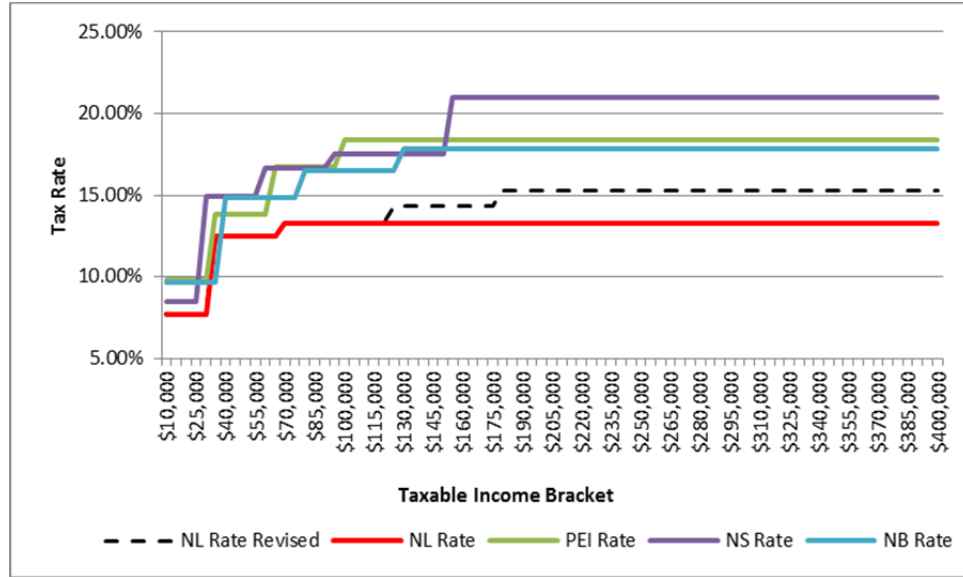
Figure 17: A Comparison of Provincial Income Tax Rates by Income Tax Brackets – Newfoundland and Labrador, Quebec and Ontario
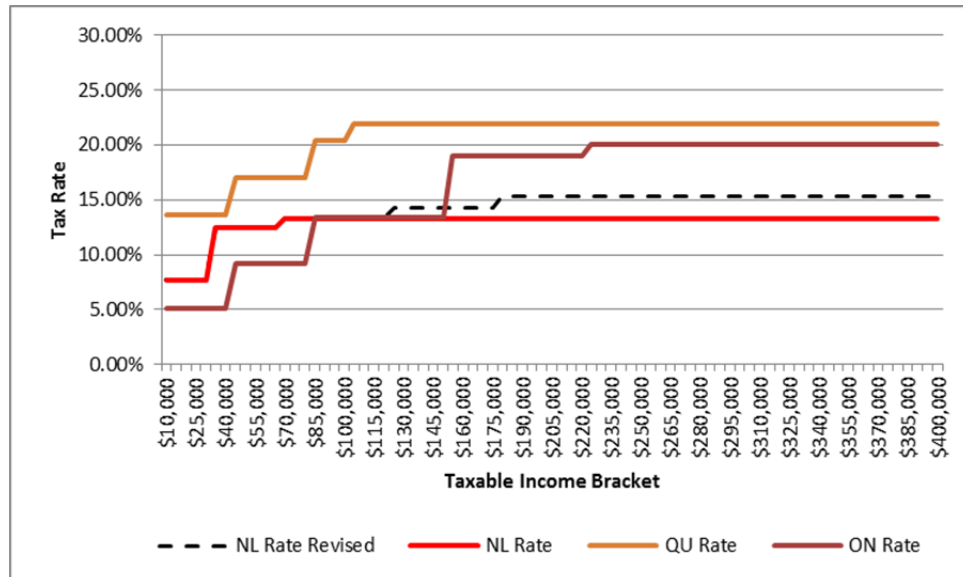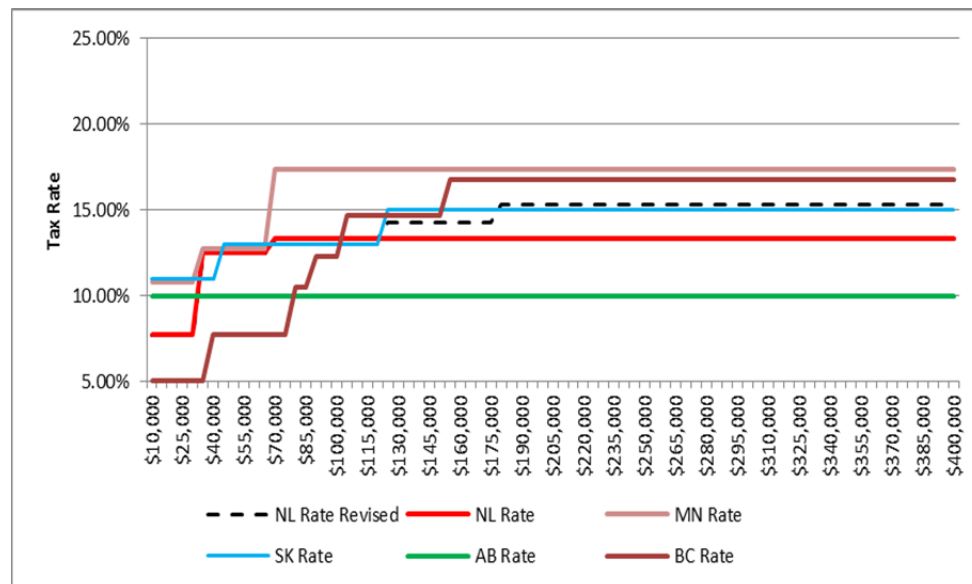
Another complicating factor in comparing the relative progressivity of income tax systems across provinces is that there are no commonly accepted rates, brackets, or number of rates amongst the provincial income tax systems. Although it is common practice for the brackets to change from one year to the next to reflect changes in the prices of goods and services or other economic circumstances, the rate of change may also vary from province to province.

Additional complications associated with analyzing the personal income tax system are associated with variations in the income items included as taxable income. For instance, only one-half of the capital gains on assets are taxable; or, one-half of these gains are tax-exempt. Inheritances are generally tax-exempt. In addition, there are deductions from taxable income such as annual union dues, childcare expenses or contributions to a Registered Retirement Savings Program up to a certain limit. Furthermore, the Income Tax Act will have certain "amounts" that can be converted to tax credits. Consequently, once the tax owing is calculated on taxable income, then any tax credits can be deducted from the amount of tax owed. In the case of refundable tax credits, if the tax credit is greater than the tax owing, then the government will refund the difference to the taxpayer. In other words, there are a complex number of factors such as exemptions, credits, allowances, limits, and deductions in addition to rates and brackets that influence the progressivity and horizontal equity of the personal income tax system.

Finally, as Table 2 illustrates, the Newfoundland and Labrador personal income tax system is partially integrated with the federal personal income tax system. As such, the income tax base is, for the most part, the same. However, provincial tax brackets, provincial tax rates and provincial tax credits can and do vary. The implication of this integration is that while changes

to each provincial personal income tax system can be implemented to improve tax fairness and reduce income inequality, there are limits or constraints as to how much change is possible.

3.3. Indicators of Progressivity and Inequality

This review of the Newfoundland and Labrador personal income tax system follows the methodology outlined in Verbist (2014) and the work of Creedy et al. *(*2008).

3.3.a Indicators of Progressivity and Inequality – Redistributive Effect

One can analyze the change in the pre-tax and post-tax income distributions or the redistributive effect of the tax (RE) to determine the extent of the progressivity of the tax being analyzed.[54] Specifically, the RE index can be evaluated by comparing the Lorenz curves pre-tax (the black-dashed line) and post-tax (the green line) as is shown in Figure 19 below or by comparing the corresponding Gini coefficients as reflected in Equation (1) below:

$$RE = GINI^{PRETAX} - GINI^{POSTTAX} \qquad eqn.(1)$$

If the tax is progressive, then the RE index will have a positive value and the Lorenz curve post-tax will lie closer to the diagonal than the Lorenz curve pre-tax, indicating that the tax has made the post-tax income distribution more equal than the pre-tax income distribution. From Figure 19, 0.2433 is the post-tax Gini coefficient calculated as the difference between the hypothetical income distribution and the illustrative progressive tax structure. The post-tax Gini coefficient is smaller than 0.2766, which is the pre-tax Gini coefficient calculated for the hypothetical income distribution in the absence of any taxes. Consequently, the RE index of 0.0333 (that is, 0.2766 minus 0.2433) indicates that the after-tax income distribution is more equal than the pre-tax income distribution or the inequality of the income distribution has been reduced. Alternatively, the RE index is simply the area in Figure 19 between the green line (the post-tax Lorenz curve) and the black-dashed line (the pre-tax Lorenz curve) divided by the whole area underneath the diagonal. This is equivalent to twice the area between the green and dash-black lines[55] and is indicated as area "I" in Figure 19.

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[54] Verbist and Figari (2013, p. 3) highlights that in measuring the redistributive effect of taxes is equivalent to comparing "the existing tax system with a proportional tax that yields the same revenue."

[55] Since the post-tax Gini coefficient is calculated as the area H/(H+I+J), the pre-tax Gini coefficient is calculated as the AREA (H+I)/(H+I+J) and the area is H+I+J is the area under the diagonal which has a value of ½ with the axis interpreted as numbers and not percentages, then the RE = I/(1/2) or 2*I (that is, twice the area between the two lines). Lustig and Higgins (2012, p. 19) note that "Concentration curves are constructed similarly to Lorenz curves but the difference is that the vertical axis measures the proportion of the tax (transfer) under analysis paid (received) by each quantile....Concentration coefficients are calculated in the same manner as is the Gini; for cases in which the concentration coefficient is above the diagonal, the difference between the

If the only impact of the tax was to move the post-tax Lorenz curve closer or further away from the origin, which is equivalent to reducing or increasing value of the post-tax Gini coefficient relative to the value of the pre-tax Gini coefficient, then no other indicators would be necessary. However, real world taxes also change the relative position or rank of taxpayers in the post-tax income distribution relative to their relative position in the pre-tax income distribution. This change in relative position or rank of some of the households has been referred to as the re-ranking effect of the tax. This issue is addressed in detail below.

Figure 19: Improvement in the Income Distribution Associated with the Introduction of a Hypothetical Progressive Income Tax
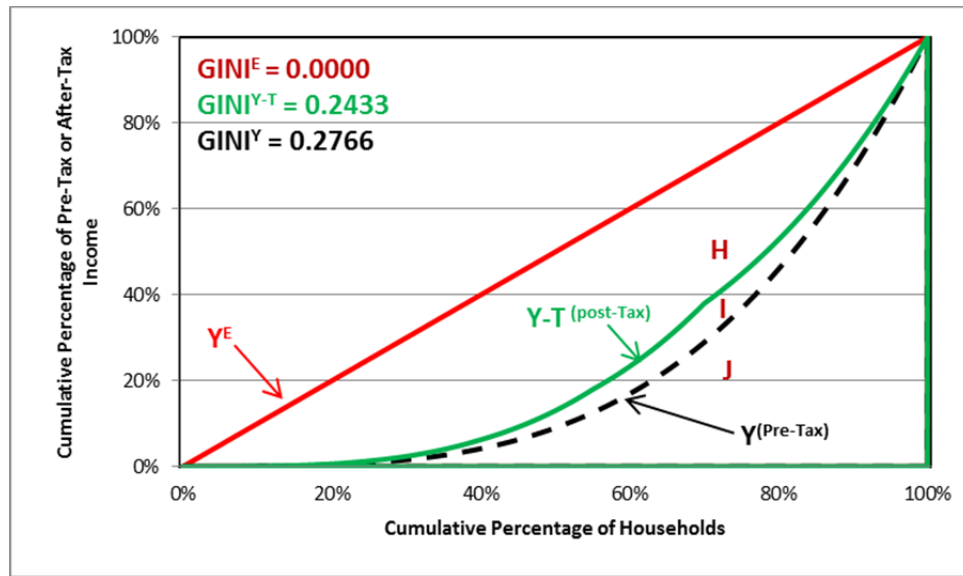
3.3.b   Indicators of Progressivity and Inequality – Reynolds-Smolensky Index

A standard measure of the redistributive effect of an income tax is the Reynolds-Smolensky index (RS index).[56] The RS index is simply the difference of the pre-policy Gini coefficient and the concentration coefficient for post-policy (or post-tax) income or the area between the pre-tax Lorenz curve and the concentration curve for the post-tax income distribution.[57] Note, if there is no re-ranking (RR) associated with the taxes and transfers being considered, then the concentration coefficient for post-policy (or post-tax) is identical to the post-policy (or post tax) Gini coefficient[58] and the RS index is identical to the RE index. In other words, as noted in Verbist and Figari (2013, p. 4), the RS index measures the total reduction in inequality that would occur

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triangle of perfect equality and the area under the curve is negative, which cannot occur with the Gini for the income distribution by definition."
[56] Reynolds-Smolensky (1977).
[57] Urban (2009, p.4).
[58] Diaz de Sarralde (2010, p. 87).

if there were no re-ranking associated with the tax/transfer policy. That is, the re-ranking effect reflects how much of the equalizing effect is 'undone' by the re-ranking effect.

Letting $GINI^{PRETAX}$ represent the Gini coefficient pre-tax or pre-policy and $CONC_{POSTTAX}^{PROGRESSIVE}$ represent the concentration coefficient for the post-tax income distribution, the RS Index is illustrated in Figure 20 and is calculated in Equation (2) as follows:

$$RS = GINI^{PRETAX} - CONC_{POSTTAX}^{PROGRESSIVE} \qquad eqn.(2)$$

Figure 20 Re-Ranking Effect and the Reynolds-Smolensky Index – An Illustration
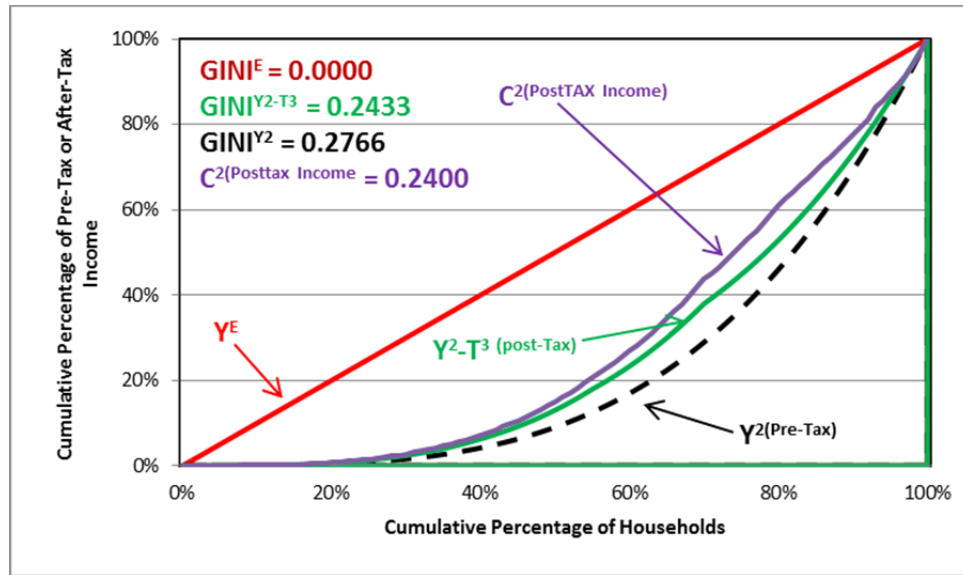
This RS index is the change in inequality due to the tax or fiscal policy being assessed. The RS index should be positive (greater than zero) and the more positive it is, the more equal is the post-tax or post-policy income distribution. By way of illustration, starting with perfect inequality (that is, one person in the population having all the income), where, for the income distribution depicted with income value which are greater than or equal to zero,[59] the Gini coefficient would have a value of 1 and then moving to the case where everyone had identical incomes post-tax or post-policy (that is, perfect equality), where the Gini coefficient was 0, implies that a maximum value for the RS index is 1 (that is, one minus zero equals one). Verbist and Figari (2014), amongst others, note that the redistributive effect of an income tax or a tax change depends on the average tax rate and the degree of progressivity. This issue is addressed below when the Kakwani index is described and discussed.

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[59] See Appendix A, for example, for an illustration of what happens to the plausible range for the Gini coefficient when market incomes can take negative values. In these circumstances, the Gini coefficient could exceed one. This is not normally a problem in this type of analysis since negative incomes are normally dropped before the Gini coefficient is calculated. This is how the Progres subroutine in STATA handles negative value for income. Other studies that have raised the concern with negative income and the Gini coefficient taking a value in excess of one are: Chen et al. (1982, p.473), OECD (2013, p. 171), Litchfield (1999, fn. 6), and Scott and Litchfield (1994).

It is important to appreciate the difference between the post-fiscal (or post-tax) Gini coefficient and post-fiscal (or post-tax) concentration coefficient.[60] The post-fiscal (or post-tax) Gini coefficient is obtained from the Lorenz curve for post-fiscal (or post-tax) income when households are sorted in ascending order utilizing post-fiscal (or post-tax) income (the green line in Figure 20). However, the post-fiscal (or post-tax) concentration curve is similar to the post-tax Lorenz curve, but with the households sorted in ascending order according to pre-fiscal (or pre-tax) income (the purple line in Figure 20). As noted in Urban (2009, p. 4), Lambert (2001) proved that the concentration curve (the purple line in Figure 20) never lies below the corresponding post-fiscal (or post-tax) Lorenz curve (the green line) or the concentration coefficient ($C_{posttax}^{progressive}$ = 0.2400) can never exceed the post-fiscal (or post-tax) Gini coefficient ($GINI^{Y-T}$ =0.2433).

If there is no re-ranking effect associated with the fiscal policy, then the post-policy Gini and the post-fiscal (or post-tax) concentration coefficient are identical. This implies that the RE index and the RS index are identical as shown in Equations (3), (4) and (5). The RR effect is calculated by Equation (3) as follows:

$$ RR \ = \ GINI^{POSTTAX} \ - \ CONC_{POSTTAX}^{PROGRESSIVE} \qquad eqn.(3) $$

If the imposition of the tax does not cause any re-ordering or re-ranking of the taxpayers from the pre-tax ordering, then the value of the concentration coefficient, ranked on post-tax income, is identical to the post-tax GINI coefficient or:

$$ CONC_{POSTTAX}^{PROGRESSIVE} \ = \ GINI^{POSTTAX} \qquad eqn.(4) $$

Substituting Equation (3) and Equation (4) into Equation (2) yields:

$$ RS = \ GINI^{PRETAX} \ - \ CONC_{POSTTAX}^{PROGRESSIVE} \ = \ GINI^{PRETAX} \ - \ GINI^{POSTTAX} \ = \ RE \qquad eqn.(5) $$

That is, in the absence of re-ranking, the RS index is identical to the redistributive effect of the fiscal policy or the tax (RE). Alternatively, in the presence of the re-ranking effect, the relation between the redistribution effect and the RS index is given by Equation (6).

$$ RE \ = \ RS - \ RR \qquad eqn \ (6) $$

As well, since the RS index is an indicator of the vertical equity (VE) associated with the fiscal policy (tax change) and the RR effect measures how much of the equalizing effect is undone by the re-ranking, the following relation also holds:[61]

$$ RE \ = \ VE - \ RR \qquad eqn \ (7) $$

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[60] Urban (2009, p. 54).
[61] Urban (2009, p. 2).

In other words, the redistribution effect of a tax change consists of two effects: the progressivity effect and the re-ranking effect.[62]

3.3.c Indicators of Progressivity and Inequality – Re-Ranking and the Atkinson-Plotnick Index

Given the pre-tax Gini coefficient of 0.2766, the post-tax Gini coefficient of 0.2433 and the post-tax income concentration coefficient of 0.2400 illustrated in Figure 20, the RS index would have an implied value of 0.0366, the RE would have an implied value of 0.0333, and the RR would be 0.0033, calculated by subtracting the concentration coefficient of post-tax income from the Gini index of post-tax income.[63]

The re-ranking effect provides a measure of the relative position of taxpayers from before the tax is imposed to after the tax is imposed. The further the index deviates from zero, the more a tax changes the ordering of the population by after-tax income. This is also related to the Atkinson-Plotnick (AP).

The Atkinson-Plotnick index can be determined as the area between the concentration curve constructed by ordering the population according to initial rank by income and then plotting their cumulative share of final income and the Lorenz curve for after-tax income. This area is then divided by the relevant Gini coefficient to give the Atkinson-Plotnick index. Alternatively, the Atkinson-Plotnick index is equal to one half of the re-ranking effect divided by the Gini coefficient of post-tax income.[64] This is illustrated in Figure 20 by the area between the green line (the post-tax Lorenz curve) and the purple line (the post-tax income concentration curve), which shows a sizable re-ranking effect. For the hypothetical example depicted in Figure 18, the re-ranking effect is 0.0033 (0.2433-0.2400).

Figure 20 illustrates how one could utilize the RS index to analyze the extent of redistribution made possible by a proposed tax change for a hypothetical distribution. Specifically, utilizing the hypothetical income distribution (Y^2) depicted in Figure 4 to illustrate the concept of the Lorenz curve and the Gini coefficient and applying a progressive tax structure (T^2) to the income distribution.[65] The black-dashed line is the pre-tax Lorenz curve presented previously, the green-solid line is the corresponding Lorenz curve that one would derive if the hypothetical tax rate were applied to the income distribution to calculate after tax or disposable income, and the purple line is the post-tax income concentration curve. Since the post-tax concentration curve (the purple line) is closer to the diagonal (the red line or line of perfect equality) than the pre-tax Lorenz curve (the black line), then it is appropriate to conclude that the after-tax income

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[62] Urban (2009, p. 2).
[63] Urban (2009, p. 2).
[64] Lambert and Ramos (1997, p. 7).
[65] The hypothetical progressive tax structure is constructed so that tax rate increases from 10% to 15% to 20% to 30% to 50% for progressively higher income brackets.

distribution is more equal than the pre-tax income distribution or the hypothetical progressive tax caused the income distribution to be more equal.

3.3.d   Indicators of Progressivity and Inequality – Kakwani Index

Another common measure of progressivity currently used[66] is the Kakwani index (denoted as "K").[67] This index is the difference between a concentration index of personal income tax payments ($CONC^{PROGRESSIVE}$) and the Gini coefficient of pre-tax incomes. That is, the "K" Index is calculated in Equation (8) as follows:

$$K \;=\; CONC^{PROGRESSIVE} \;-\; GINI^{PRETAX} \qquad eqn\,(8)$$

Figure 21 illustrates the concentration curve for the hypothetical income distribution utilized in this report for explanatory purposes only. There are two concentration curves included in this diagram. The "black" concentration curve is based on applying a proportional tax (such as 42.7%) and the second "purple" concentration curve is derived by applying a hypothetical progressive tax structure.[68] Associated with each of these tax concentration curves is a concentration coefficient[69] — the proportional concentration coefficient is 0.2766 and the concentration coefficient for the progressive tax is 0.3214. The further the concentration curve is from the diagonal, the higher will be the value of the concentration coefficient. Note that the concentration curve and the concentration coefficient for the proportional tax are necessarily identical to the pre-tax Lorenz curve and the pre-tax Gini coefficient.[70] The degree of progressivity of a proposed income tax is determined by comparing the concentration curve (or coefficient) for the progressive tax structure to the corresponding concentration curve (or coefficient) for the proportional tax, which is identical to comparing the concentration curve (or concentration coefficient) for the progressive tax to the pre-tax Lorenz curve (or the pre-tax Gini coefficient). If the concentration coefficient (or concentration curve) for the proposed tax is higher than (or lies further away from the diagonal) than the pre-tax Gini coefficient (or the pre-tax Lorenz curve), then the proposed tax is progressive. Moreover, the larger is the concentration coefficient relative to the pre-tax Gini coefficient, the more progressive is the tax being analyzed.

In the illustration provided in Figure 21, the concentration coefficient for the hypothetical progressive tax is 0.3214, which is larger in value than the pre-tax Gini coefficient (0.2766) or the

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[66] See Creedy et al. (2008) and Verbist and Figari (2014).
[67] Kakwani (1977a).
[68] Note, the 42.7% is chosen for illustrative purposes and to ensure that the same tax revenue is collected with each tax.
[69] The concentration coefficient is calculated in an identical manner to Gini coefficient, except that the vertical axis is different. Specifically, in Figure 19, the concentration coefficient for the proportional tax is determined by area D divided by areas D+E+F to give 0.2766, while the concentration curve for the progressive tax is determined by area D+E divided by areas D+E+F to give 0.3214.
[70] For example, for the hypothetic pre-tax income distribution ($Y_1...Y_N$) implies a total income of $\sum Y_i$ and with a proportion tax "t", a distribution of taxes as ($t*Y_1...t*Y^N$) implies a total income of $\sum t*Y_i$ or pre-tax income share and post-tax income share are identical as follows: $Y_i/\sum Y_i = t*Y_i/\sum t*Y_i$.

Kakwani index has a value of 0.0448. A positive value for the Kakwani index is evidence that the hypothetical progressive income tax being considered is more progressive than a proportional tax. Furthermore, anytime the concentration curve (or coefficient) lies outside of (is larger in value than) the pre-tax Lorenz curve (the pre-tax Gini coefficient), then the post-tax Gini coefficient will have a lower value than the pre-tax Gini coefficient and the post-tax Lorenz curve will lie inside of the pre-tax Lorenz curve or the post-tax Lorenz curve will be closer to the line of perfect equality.

Figure 21: Hypothetical Concentration Curves – An Illustration for Proportional and the Hypothetical Progressive Income Taxes
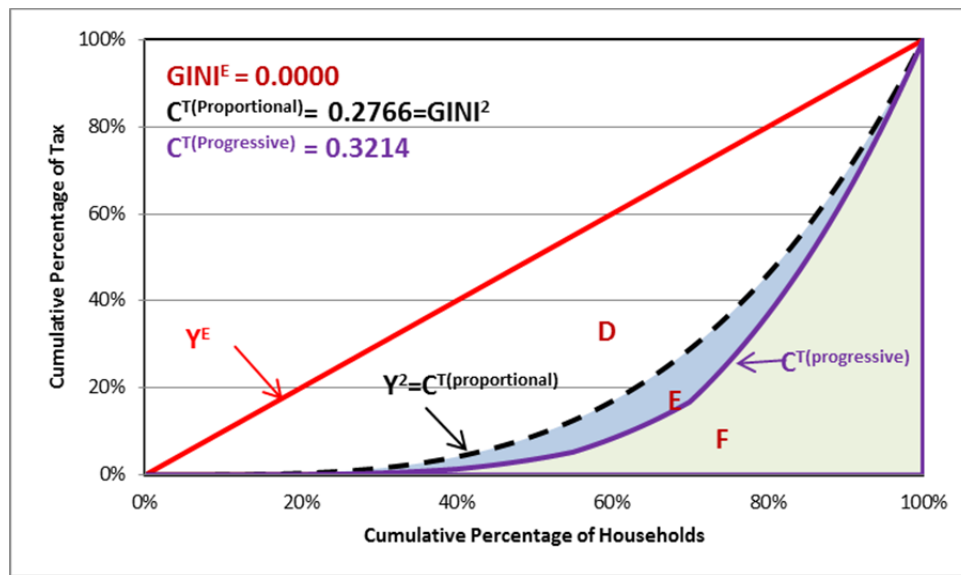
In effect, the Kakwani Index is a measure of the disproportionality of tax payments, given pre-tax incomes. If the income tax is proportional, then the Kakwani index will be "0" because the concentration curve will be coincident with the pre-tax Lorenz curve. If the tax is progressive, then the Kakwani index will be positive. It is important to recognize that the Kakwani index depends on the original income distribution through its inclusion of the pre-tax Gini coefficient. As noted by Amarante et al. (2011), a perfectly regressive tax would give a Kakwani index of the pre-tax Gini minus one,[71] while a perfectly progressive tax will yield a Kakwani index of the pre-tax Gini plus one.[72]

Urban (2012 p. 2) noted that Kakwani was the first to decompose the redistributive effect of a tax into a vertical effect and a horizontal effect.   In fact, the Kakwani index can be linked directly to the RS index (the vertical effect), assuming "t" is the average tax rate, through Equation (9) as follows:[73]

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[71] A concentration index is -1 if the poorest individual pays all the tax. Verbist (2014, fn 3).
[72] Appendix A is illustration of what happens to the plausible range for the concentration coefficient and the Kakwani index when net tax rates can take both negative and positive values. In these circumstances, the concentration coefficient could exceed one and the Kakwani index can fall outside of the range of -1 to 1.
[73] Verbist and Figari (2013, p. 4).

$$RS = \frac{t}{1-t} * K \qquad eqn\,(9)$$

In other words, the vertical (redistributive) effect or vertical equity of the tax depends on the tax rate "t" and the progressivity of the tax, as reflected by the Kakwani index.

When we are dealing with benefits or transfers, Heisz and Murphy (2014, p. 9) illustrate the relationship between difference in the Gini for market income and the Gini for total income takes the following form:[74]

$$GINI^{MARKET} - GINI^{TOTAL} = \frac{b}{1+b} * K^B \quad eqn\,(10)$$

where b ≡ is the benefit rate (that is, total benefits divided by total income) and K^B is the Kakwani index for benefits.

As well, Urban (2009, p. 17) reinforces the idea that the Kakwani index of the vertical effect can be readily applied to benefits. He notes that the simplest way to estimate the effects of single taxes and benefits is to calculate the redistributive effect of each instrument, one by one, after choosing an appropriate reference income base. However, contributions obtained in such way do not simply add to the total redistributive effect of the net tax system. Urban (2012, p. 9-10) suggests that the vertical effect can be decomposed into the contributions of taxes and benefits as follows:

$$V_K = \frac{\tau}{1-\tau+\beta} * (D_{TX} - G_X) + \frac{\beta}{1-\tau+\beta} * (G_X - D_{BX}) \quad eqn\,(11)$$

where τ ≡ the average tax rate; β ≡ the average benefit rate; D_{TX} is concentration coefficient for taxes, D_{BX} is concentration coefficient of benefits or transfers and G_X is the pre-tax Gini coefficient.

3.3.e   Indicators of Progressivity and Inequality – Musgrave and Thin Index

The last progressivity-related measure that this report utilizes and is employed in other applied analyses, albeit not as frequently as the RS index or the K index, is the Musgrave and Thin (MT) index.[75] Like the Reynolds-Smolensky and Kakwani indices, MT index measures a policy's progressivity as the ratio of one minus the post-policy Gini index to one minus the pre-policy index. When this measure exceeds one, the post-policy Gini index is smaller than pre-policy Gini coefficient. This implies that the policy is progressive. Although this measure is inferior to the K

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[74] For a detailed discussion of how the vertical effect is altered in the presence of benefits, see Lambert (1985, p. 44).
[75] Musgrave and Thin (1984).

index, it is still used by some policy groups. Sykes et al. (1987) make the argument that the Musgrave-Thin index is superior[76] to the K index.   The "MT" index is calculated as follows:[77]

$$MT = \frac{1 - GINI^{POSTPOLICY}}{1 - GINI^{PREPOLICY}} \qquad eqn(10)$$

3.2. Application to Newfoundland and Labrador

Table 2 provided a very brief overview of the 2014 rates and the tax brackets applicable to the Newfoundland and Labrador personal income tax system. While these tax rates and brackets do have an important influence on both the redistributive nature/progressivity of the income tax system, it is important to appreciate that many other factors also affect a tax system's vertical and horizontal equity characteristics. These other factors include the types and amounts of income exempt from tax, the level of expense deductions, and the size and applicability of allowances and credits.[78] It is also important to understand that the provincial income tax system operates alongside of the federal system, which defines the concept of incomes utilized for tax purposes. Finally, this analysis focuses on three measures of income: (1) market income, (2) total income which includes market income and transfers but excludes taxes and (3) disposable income which adds transfers to market income and deducts taxes.

The approach utilized in this paper is similar to the approach adopted by the OCED. Specifically, in measuring the redistributive impact of transfers, Joumard et al. (2012, p. 5 and p. 33-4), examined the difference between the concentration coefficient of market income and concentration coefficient of total income, where total income was equivalent market income plus transfers.[79] Correspondingly, the Kakwani index that they utilized was calculated as the concentration coefficient of cash transfers minus the concentration coefficient of market income. This is identical to the approach utilized below in the current analysis.

Similarly, the OCED study evaluated the redistributive impact of household taxes by comparing the difference between the concentration coefficient of total income and the concentration coefficient for disposable income (that is, market income plus transfers and minus taxes). The associated Kakwani index is calculated as concentration coefficient of taxes minus the concentration coefficient of total income. Interestingly, in measuring the impact of taxes and

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[76] In the sense that the M-T index does not violate the Atkinson (1970) Theorem, which requires post-tax dominance of the associated Lorenz curves. Such a violation can occur with the Suits and Kakwani indices.
[77] Urban (2009, p. 3).
[78] Verbist and Figari (2014, p. 6) illustrate the relationship between pre-tax income and taxable income.
[79] For their Canada-wide study Sharpe and Capeluck (2012, p. 2) use the Gini coefficient to measure "income inequality is measured in terms of market income, total income, and after-tax income." Note however that their coefficients are not based on individual incomes which have been adjusted by household size as is the normal practice and the one followed in our Report.

transfers, Joumard et al. (2012, p. 34) assumed that "cash transfers are received first and taxes paid afterwards."[80]

3.2.1　Application to Newfoundland and Labrador – Defining the Base Case

Table 3 below presents the primary revenues associated with provincial taxes and provincial transfers to individuals, by major category, estimated for 2015. These estimates are generated by utilizing Statistics Canada's Social Policy Simulation Database and Model (SPSD/M) version 22.0.[81] It should be noted that the database for SPSD/M analyzed in this particular study was not based on national growth projections, as is the normal practice by Statistics Canada. Instead, the growth projections were updated based on the 2011 Census and more current economic indicators for our province produced by Statistics Canada. As well, projections covering the period from 2015-2019 were based on information provided by the Economics and Statistics Branch of the Department of Finance, Government of Newfoundland and Labrador.[82]

The Government of Newfoundland and Labrador, as shown in Table 3, is estimated to collect $2.6 billion in income and commodity taxes from individuals in calendar year 2015 — $1.4 billion in income taxes and $1.2 billion in commodity taxes. In addition, it is estimated that there will be $462 million in provincial transfers paid out to individuals in 2015 — $243 million in social assistance, $144 million in worker's compensation, $48 million in elderly programs, $11 million in family programs, $14 million in other provincial transfers and $2 million in provincial refundable credits.

Table 3: Selected Estimated Tax Revenues and Transfer Programs, NL, 2015

Item	Magnitude (millions of dollars)
Provincial Taxes	**$2,623.1**
Provincial Income Tax	$1,393.3
Provincial Commodity Tax	$1,229.8
Provincial Transfers	**$462.1**
Family Programs	$11.4
Elderly Programs	$48.0
Worker's Compensation	$143.7
Social Assistance	$243.0
Other Prov. Transfers	$14.1
Prov. Refundable Credits	$1.9

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[80] One reason for invoking this assumption is that some transfers are subject to taxation.

[81] Version 22.0 was released on January 16, 2015 and incorporates an updated database as well as proposed changes to the federal personal income tax system. Readers can learn more about the system at http://www.statcan.gc.ca/microsimulation/spsdm-bdmsps/spsdm-bdmsps-enversg.htm. It should be noted that SPSM is available for free from Statistics Canada.

[82] While data projections in SPSM for the period up to 2019 are available for the Province, the analysis carried out in this Review focuses on 2015 only. Extending this analysis beyond 2015 might be a useful direction for future research

3.2.2 Application to Newfoundland and Labrador – Defining the Base Case – Reconciliation and Fine Tuning the Simulation

In undertaking this analysis, one area of concern was how representative the adapted Newfoundland and Labrador version of SPSD profiles were actual profiles for Newfoundland and Labrador taxpayers. In other words, we asked: to what extent could the sample of Newfoundland and Labrador taxpayers in SPSD/M represent the population of actual taxpayers?

In order to check this consistency for the purposes of this study, officials with the Department of Finance, Government of Newfoundland and Labrador accessed T1 taxpayer files and produced summary files for each of the years from 2011 to 2013, inclusive.[83] The results of this consistency check for 2013 are summarized in Table 4 below. This match is particularly important since one of the primary objectives of this study is to use the personal income tax and transfer system to promote tax fairness and to reduce income inequality within society by enhancing the progressivity of the actual Newfoundland and Labrador's income tax system.

When the distribution of income produced by SPSD/M was compared with the T1 Family Files that Statistics Canada used to produce tables relating to income distribution, the match was reasonably consistent. The observed differences can be ascribed to sampling variability. While the main groups involving the vast majority of taxpayers were accurately and consistently represented, the taxpayers at either end of the income distribution were not because of the relatively small sample size associated with each of the tails. Although adjustments were made to the sampling weights by Statistics Canada to better reflect these groups, there were some residual differences as indicated in Table 4 and Figures 22 and 23.

These differences at the tails of the distribution are certainly concerns, especially since tax fairness might imply increasing the rates at the top end of the income distribution.[84] However, the conclusion from this consistency check, which is also corroborated by the conclusion of the SPSD/M group at Statistics Canada, is that the differences between the sample data in SPSD/M utilized in this study and the taxfiler data are probably due to random effects in the data for the years in which the actual taxfiler data utilized in this study were available. Finally, for future years, including 2015, it is reasonable to expect that there may be forecasting errors in the data, but the forecasts utilized in this study are as good as that of any other group.

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[83] Given the confidentiality of T1 taxfiler data, the study team only had access to the summary files that were generated by officials of the Department of Finance, Government of Newfoundland and Labrador.
[84] This, of course, depends upon society's concept of fairness.

Table 4: 2013p Validation – NL T1 Taxfiler Data vs SPSM (adjusted for NL)

T1 Data ($M)							
Taxable Income Group	**Unit Count[2]**	**Wages & Salaries**	**Investment Income**	**Total Income (CRA)**	**Taxable Income**	**Federal Taxes**	**Provincial Taxes**
Minimum to $31,903	234,564	$1,482.6	$41.4	$4,035.2	$3,315.1	$90.3	$72.8
$31,904 to $63,806	111,524	$3,706.4	$90.4	$5,478.7	$4,996.2	$458.3	$321.7
$63,807 to $99,999	44,198	$3,235.2	$87.4	$3,860.7	$3,459.2	$489.6	$311.2
$100,000 to $150,000	17,206	$1,911.7	$82.5	$2,271.6	$2,057.4	$358.3	$210.2
$150,001 to Maximum	9,970	$1,642.3	$377.9	$3,273.2	$3,029.2	$676.2	$335.7
All Income Categories	417,462	$11,978.3	$679.6	$18,919.4	$16,857.1	$2,072.7	$1,251.6
SPSM ($M) (adjusted for NL)[1]							
Taxable Income Group	**Unit Count[2]**	**Wages & Salaries**	**Investment Income**	**Total Income (CRA)**	**Taxable Income**	**Federal Taxes**	**Provincial Taxes**
Minimum to $31,903	244,441	$1,773.9	$37.9	$4,595.7	$3,694.2	$110.9	$86.0
$31,904 to $63,806	105,889	$3,723.9	$71.3	$5,274.5	$4,799.2	$449.5	$313.4
$63,807 to $99,999	50,490	$3,736.6	$93.5	$4,350.0	$3,951.0	$564.3	$358.8
$100,000 to $150,000	14,417	$1,682.1	$68.6	$1,905.9	$1,743.8	$303.1	$181.5
$150,001 to Maximum	9,466	$2,136.1	$456.4	$2,940.2	$2,702.0	$606.8	$311.6
All Income Categories	424,703	$13,052.6	$727.7	$19,066.3	$16,890.2	$2,034.6	$1,251.3
SPSM - T1 Data Difference (Actual) ($M)							
Taxable Income Group	**Unit Count[2]**	**Wages & Salaries**	**Investment Income**	**Total Income (CRA)**	**Taxable Income**	**Federal Taxes**	**Provincial Taxes**
Minimum to $31,903	9,877	$291.3	-$3.5	$560.5	$379.1	$20.6	$13.2
$31,904 to $63,806	-5,635	$17.5	-$19.1	-$204.2	-$197.0	-$8.8	-$8.3
$63,807 to $99,999	6,292	$501.4	$6.1	$489.3	$491.8	$74.7	$47.6
$100,000 to $150,000	-2,789	-$229.6	-$13.9	-$365.7	-$313.6	-$55.2	-$28.7
$150,001 to Maximum	-504	$493.8	$78.5	-$333.0	-$327.2	-$69.4	-$24.1
All Income Categories	7,241	$1,074.3	$48.1	$146.9	$33.1	-$38.1	-$0.3
SPSM - T1 Data Difference (%)							
Taxable Income Group	**Unit Count[2]**	**Wages & Salaries**	**Investment Income**	**Total Income (CRA)**	**Taxable Income**	**Federal Taxes**	**Provincial Taxes**
Minimum to $31,903	4.0%	16.4%	-9.3%	12.2%	10.3%	18.6%	15.4%
$31,904 to $63,806	-5.3%	0.5%	-26.8%	-3.9%	-4.1%	-2.0%	-2.7%
$63,807 to $99,999	12.5%	13.4%	6.5%	11.2%	12.4%	13.2%	13.3%
$100,000 to $150,000	-19.3%	-13.7%	-20.2%	-19.2%	-18.0%	-18.2%	-15.8%
$150,001 to Maximum	-5.3%	23.1%	17.2%	-11.3%	-12.1%	-11.4%	-7.7%
All Income Categories	1.7%	8.2%	6.6%	0.8%	0.2%	-1.9%	0.0%

Notes: [1]Includes new NL weight files and database adjustments based on projections from ERA; [2]Includes all individuals with total income (CRA) > $0; and p - preliminary

Figure 22: A Comparison of People in Newfoundland and Labrador in 2012 by Income category Using Taxfiler Data, SPSM (Revised) and SPSM (Original)
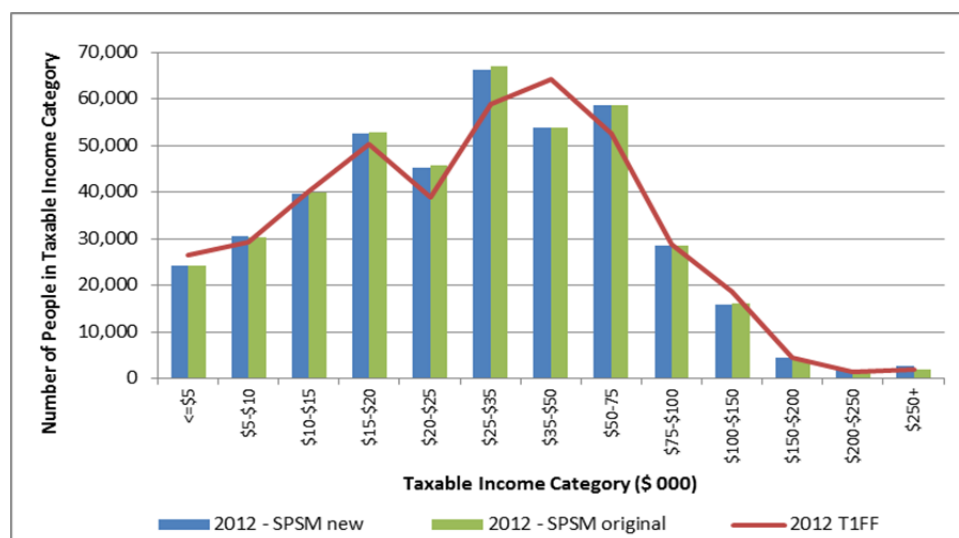
Figure 23: A Comparison of People in Newfoundland and Labrador in 2011 by Income category Using Taxfiler Data, SPSM (Revised) and SPSM (Original)

3.2.3 Application to Newfoundland and Labrador – Defining the Base Case – Base Line Results

Table 5 provides an overview of the projected equality and tax/transfer equity measures under the base case estimated in this study for 2015 and for the market, total and disposable income measures.[85] The base case scenario illustrates that the current combined federal and provincial

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[85] Note that total income refers to all government transfers that would be covered under the Income Tax Act plus market income.

tax systems[86] applicable to Newfoundland and Labrador are progressive overall and do promote a more equal after-tax income distribution.

Table 5: Base Case Results

Indicator	Base Case Value in Moving from Total Income to Disposable Income (Taxes)	Base Case Value in Moving from Market Income to Total Income (Benefits)	Base Case Value in Moving from Market Income to Disposable Income (Taxes Minus Benefits)
Pre-tax Gini	0.4001	0.5210	0.5210
Post-tax Gini	0.3511	0.3990	0.3501
Average Tax Rate, Benefit Rate or Net Tax Rate	0.2136	-0.1817	0.0711
Reynolds-Smolensky Index (RS)	0.0504	0.1280	0.1806
Kakwani Progressivity Index (K)	0.1857	-0.8329	2.3605
Re-ranking (RR)	0.0014	0.0061	0.0097
Musgrave-Thin Progressivity Index (MT)	1.0817	1.2547	1.3568
Atkinson-Plotnick Index (AP)	0.0020	0.0076	0.0138

The impact of taxes on income inequality is reflected by the post-tax Gini coefficient of 0.3511 for the move from total income (that is, market income plus transfers) to disposable income (that is, market income plus transfers minus taxes) being larger than the pre-tax Gini coefficient for total income of 0.4001. Likewise, the impact of transfers on income inequality can be determined by comparing the post-transfer Gini coefficient for the move from market income to total income, which is 0.3990, to the pre-tax-and-transfers Gini coefficient for market income, which is 0.5210.[87] As well, the combined impact of taxes and transfers or net taxes can be calculated by comparing the post-tax-and-transfer Gini coefficient (0.3501) to the corresponding pre-tax-and-transfer Gini coefficient or equivalently, to the Gini coefficient calculated for market income (0.5210). Since the post-tax/post-transfer/post-tax-and-transfer Gini coefficients are less than their corresponding pre-tax/pre-transfer/pre-tax-and-transfer Gini coefficients, it implies that both taxes and transfers reduce income inequalities in Newfoundland and Labrador. Overall, the Gini coefficients for both taxes and transfers fall by 0.1709 (that is, 0.5210 – 0.3501), which is 33% lower (that is, 0.1709/0.5210) than that calculated for market income. Since the Gini coefficient associated with transfers has fallen by 0.1220 (that is, 0.5210 – 0.3990) and the Gini coefficient associated with taxes has fallen by 0.0490 (that is, 0.4001-0.3511), then one can conclude that transfers account for 71.4% of the reduction in income inequality in Newfoundland and Labrador for the base case 2015 simulation, while taxes account for 28.7% of the reduction in income inequality. Alternatively, transfers reduced income inequality in

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[86] The personal income tax system is the one primarily responsible for overall progressivity.
[87] Note there are estimated to be 46,633 families in the sample with negative or zero market incomes. The Gini coefficients for disposable income under each scenario considered in this study may be different when comparing total and disposable incomes to those obtained when comparing market and disposable incomes. This difference is attributable to the fact that PROGRES, the Stata package used to calculate the indices, excludes observations associated with negative incomes. Because a number of families in the model have negative market incomes, the calculations that use market income data may be slightly different than that obtained when total incomes are used.

Newfoundland and Labrador by approximately 2.5 times more than did personal income taxes for the base case 2015 simulation.[88]

In discussing the progressivity of the current system and any proposed changes to the current system, one perspective that this study considers is the change of the relevant coefficient in moving to disposable income from market income. This approach enables one to evaluate the total effect of the tax/transfer system for a given scenario and compare it to a situation in which there are no taxes or transfers. This study also focuses on the changes in disposable income relative to total income. This perspective enables a comparison between the income distribution that would exist with transfers, but excludes taxes and the income distribution that would prevail if the entire tax/transfer system is considered. In addition, the progressivity and income inequality are assessed by comparing the relevant indices associated with a move from market income to total income. These numbers describe how each new scenario's transfer system affects the income distribution by comparing the income distribution that would prevail in the absence of a tax/transfer system to the income distribution that would prevail with the transfer system.

For the base case, the degree of progressivity associated only with personal income taxes is determined by comparing the relevant indicators for the move from total income to disposable income in Table 5. The RS index (0.0504), the K index (0.1857) and the M-T index (1.0817) being positive numbers indicate that the personal income tax system applicable in Newfoundland and Labrador to the end of 2014 was progressive. As well, the Newfoundland and Labrador personal income tax system resulted in the income distribution being more equal, which is demonstrated by the difference between the pre-tax Gini coefficient (0.4001) and the post-tax Gini coefficient (0.3511) being 0.0490, a positive number. There does seem to be a small amount of horizontal inequity as reflected by the Atkinson-Plotnick index (0.0020) and the re-ranking index (0.0014) both being positive. The small horizontal inequity effect should not be surprising given that different sources of income receive different treatments under the Income Tax Act and taxable income in Newfoundland and Labrador is comprised, albeit not uniformly, of these different sources of income. For example, dividend income from Canadian corporations is treated differently than wage and salary income.

In going from market income to total income, the changes in the income distribution and the associated indicators are due solely to the impact of transfers. That is, the only difference between the two income distributions is the presence of transfers as the impacts of taxes are not yet incorporated. For the base case, the pre-tax (really pre-transfers in this particular case) Gini coefficient (0.5210) illustrates the impact of market incomes only on the distribution of income in Newfoundland and Labrador and the post-tax (that is, really post-transfers in this

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[88] Sharpe and Capeluck (2012, p. 2 and 5), utilizing a similar approach for Canada and the provinces, found similar impacts on income inequality and the relative size of impacts from transfers and taxes were also of the same order of magnitude as was estimated for the base case scenario. Specifically, they subtracted the market income Gini coefficient from the total income Gini coefficient to determine the impact of transfers on income inequality and subtracted the total income Gini coefficient from the after-tax income Gini coefficient to illustrate how taxes offset income inequality. They also estimated that 71% of the reduction in income inequality was due to transfers and 29% to taxes.

particular case) Gini coefficient (0.3990) illustrate how the income distribution changes when transfers are added to market income, but before the effects of taxes are considered. Since the difference in the pre-transfer and post-transfer Gini coefficients is positive (0.1220), the provision of transfers makes the distribution of income in Newfoundland and Labrador more equal over what would have transpired with market income only. Moreover, the impact of transfers is almost 2.5 times larger than the impact of personal income taxes.

The transfer component of the personal income tax system increases progressivity and reduces inequality as indicated by the RS index of 0.1280, the K index[89] of -0.8329 and the M-T index of 1.2547. While the RS and M-T indices have the same interpretation as in the tax only illustration, the K index needs a little more explanation. Note that a negative K index indicates the fiscal instrument being examined falls more than proportionally on the lower income households. Since it is effectively a negative tax or a positive transfer, it implies that the after-transfer income distribution is made less equal. It is in this sense that the transfer is progressive, even though a negative value for K would normally be interpreted as an indication of regressivity. As well, there does seem to be a small amount of horizontal inequity as reflected by the positively-valued Atkinson-Plotnick index (0.0076) and the positively-valued re-ranking index (0.0061).

The final set of indicators describes a move from market income to disposable income. This comparison incorporates the combined impacts of taxes and transfers on the income distribution and the progressivity of the personal income tax system. The difference between the pre-transfer Gini coefficient and the post-transfer Gini coefficient is 0.1709, indicating a significant reduction in income inequality over that which would prevail with market incomes only. In other words, the reduction in inequality associated with the current tax-transfers system, as reflected in a change in the Gini coefficient of 0.1709, can be decomposed into two components: 71.4% (that is, 0.1220/0.1709) of the change is due to the transfer system and 28.7% (that is, 0.0490/0.1709) of the change in the equality of the income distribution is due to the tax system.

For the base case, the degree of progressivity of the income tax/transfer system is illustrated by positive values for the RS index (0.1806), the K index (2.3605), and the M-T index (1.3568). While the positive values for the RS and M-T indices do indicate that the personal income tax, net of transfers, redistributes income, reduces the inequality of the income distribution and is progressive, it is important to note that the K index value of 2.3605 is outside of the theoretical range of values -2.0 to 1.0. Even though the number is positive and would normally be reflective of a progressive structure, this index is ignored for taxes net of transfers in this study. As shown in Appendix A, when transfers exceed taxes for families at the low end of the income distribution, the K index can take on nonsense values that fall outside of the plausible range of -2.0 to 1.0.[90] We report the K index for taxes net of transfers and give it a zero weight because it

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[89] Note a negative value for the K index for a transfer indicates that it is progressive in that higher shares of the transfers are received by lower income families and transfers are equivalent to negative taxes.

[90] While the Progres subroutine in STATA does omit data points for which income is less than zero, there does not appear to be a filter applied to net taxes that switch from negative for low-income households to positive for higher income households. If the

is a valid indicator for either taxes or transfers on their own, but not together and it is part of the output displayed by the Progres subroutine in Stata.

Finally, there does seem to be a small amount of horizontal inequity as reflected by the positively-valued Atkinson-Plotnick index (0.0138) and the positively-valued re-ranking index (0.0097).

3.2.4 Application to Newfoundland and Labrador – Defining the Base Case – Tax Rate Progressivity

Progressive taxation implies that the average tax rate (or the effective tax rate) increases as income increases. It is a legitimate question to ask: is this observed for Newfoundland and Labrador? For this purpose, the average tax rate is defined as the taxes paid[91] divided by "total" income[92]. The average tax rates as a function of total incomes are plotted in Figure 24 for the 285,339 nuclear families[93] that were estimated in this study for Newfoundland and Labrador in 2015.[94]

Clearly, as demonstrated in Figure 24, the Newfoundland and Labrador tax system for 2015[95] does satisfy the concept of progressiveness throughout the income ranges. That is, the effective tax rate increases as total income increases.[96] For example, with an income in the $10,000 to $15,000 range, the average tax rate for a Newfoundland and Labrador family is estimated at 1.9%, or about $200 to $300. On the other hand, families with incomes in the $100,000 to $150,000 range would be subject to a 23.4% tax rate, which would correspond to family taxes of $23,400 to $35,100 in 2015.

In interpreting the results presented in this paper, one should be aware that there were an estimated 46,633 families with negative or zero market incomes.[97] Consequently, no average tax/transfer rate was computed for this group.[98] Table 6 illustrates the distribution of

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proportion of households is larger enough, the program will generate results outside of the plausible range. Also, even if the results are within the -2.0 to 1.0 range, the presence of negative net taxes implies that the Kakwani index cannot be utilized to accurately reflect progressivity under these circumstances.

[91] Commodity taxes have been excluded since the measures of low income ("poverty") used in this Report are based on market prices, which include commodity taxes such as HST.

[92] We used total income, which is basically market income plus most government income transfers since most transfers have a positive tax rate associated with them. Income support payments are taxable at a "0" rate; they must be reported as income.

[93] The concept of a "nuclear" family excludes children 18 years of age and older. This is relatively consistent with usage under the Income Tax Act.

[94] This diagram excludes about 100 families/individuals that had no reported total income or it was negative.

[95] It should be noted that the reported estimates are for 2015 and under the federal and provincial tax systems, which existed as of March 31, 2015.

[96] The unusual increase around the $25,000 to $30,000 income range or the unusual decrease around the $30,000 to $35,000 income range is likely due to small samples within the simulation model.

[97] Market incomes are incomes from employment including self-employment along with interest, rent, dividends and capital gains/losses.

[98] The Average Tax/Transfer Rates (ATTR) are not computed when market incomes are zero. The ATTR will be negative when families receive more in transfers than they pay out in taxes.

families/individuals which comprise the group of 46,633 families that had negative or zero market incomes.[99]

Figure 24: Effective Average Tax Rate for All Nuclear Families
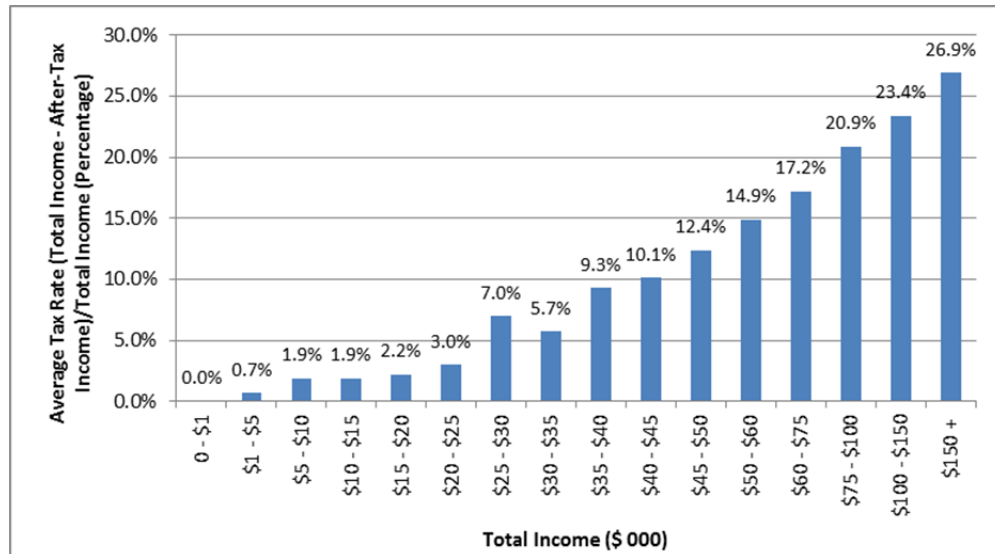
Table 6: Distribution of NL Families with Market Income Less Than or Equal to Zero, 2015

	Frequency	Percent
Married with Children (<18)	1,029	2.2%
Married – No Children (<18)	9,065	19.4%
Lone Parent (with Children <18)	2,638	5.7%
Single Adults (Unattached, <Age 65)	12,423	26.6%
Single Adults, (Unattached, Age 65+)	18,456	39.6%
Single Adults (Living with Family)	3,022	6.5%
Total	46,633	100.0%

Except for approximately 100 families, one would expect that these families would receive transfer income and, as such, they would be estimated as having received some positive total income. The maximum transfer estimated for this sample was $57,000.[100] As well, the average transfers estimated for families in this group is just over $19,300 and the total amount of transfers to all families in this group is estimated to be approximately $900 million. The average and median total incomes received all by nuclear families in the sample in 2015 were $72,428 and $45,240, respectively. Using our sample of SPSD/M, it was estimated that there were 265 families with total income in excess of $1.0 million and that 78.5% of the estimated 285,339 Newfoundland and Labrador nuclear families had less than $100,000 in total income in 2015.

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[99] The presence of families with negative incomes has implications for how Stata calculates Gini coefficients and various progressivity indicators. Specifically, families with negative market incomes are excluded from these calculations. If a transfer makes their income less negative, but still negative, then this change will not be reflected in the Gini coefficients or in the progressivity indicators.

[100] A transfer of this size may be explained by someone on disability.

The average and median total incomes received by nuclear families whose market income was positive for the sample in 2015 were $82,802 and $56,239, respectively. Using our sample of SPSM, it was estimated that there were 265 families with total income in excess of $1.0 million and that 74.3% of the estimate 238,706 Newfoundland and Labrador nuclear families had less than $100,000 in total income in 2015.

The average and median total incomes received by nuclear families whose market income was zero or negative for the sample in 2015 were $19,324 and $19,341, respectively. Using our sample of SPSM, it was estimated that all of Newfoundland and Labrador nuclear families in this group had less than $100,000 in total income in 2015.

The information on the sample of nuclear families utilized in this analysis is presented in Figures 25, 26 and 27. The information on the sample of nuclear families utilized in this analysis for which market income is positive is presented in Figures 28, 29 and 30. The information on the sample of nuclear families utilized in this analysis for which market income is less than zero is presented in Figures 31, 32, 33 and 34.

Figure 25: Distribution of All Nuclear Families by Total Income, 2015
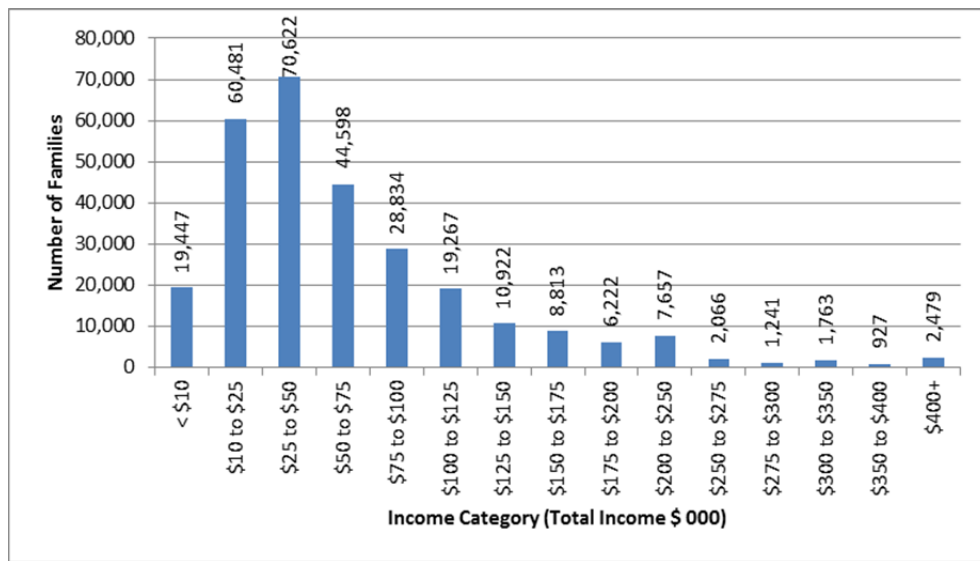
Figure 26: Frequency Distribution of All Nuclear Families by Total Income, 2015
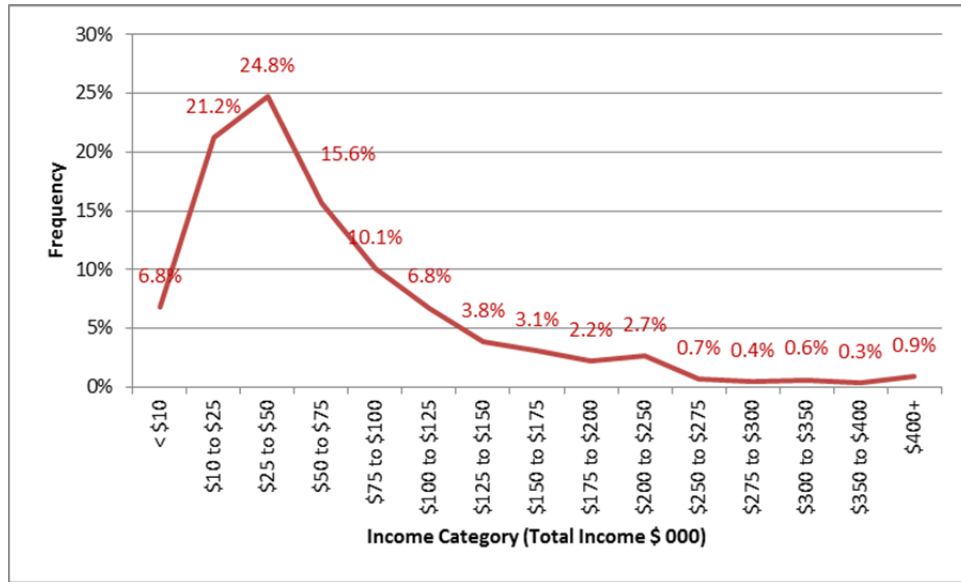
Figure 27: Cumulative Frequency Distribution of All Nuclear Families by Total Income, 2015
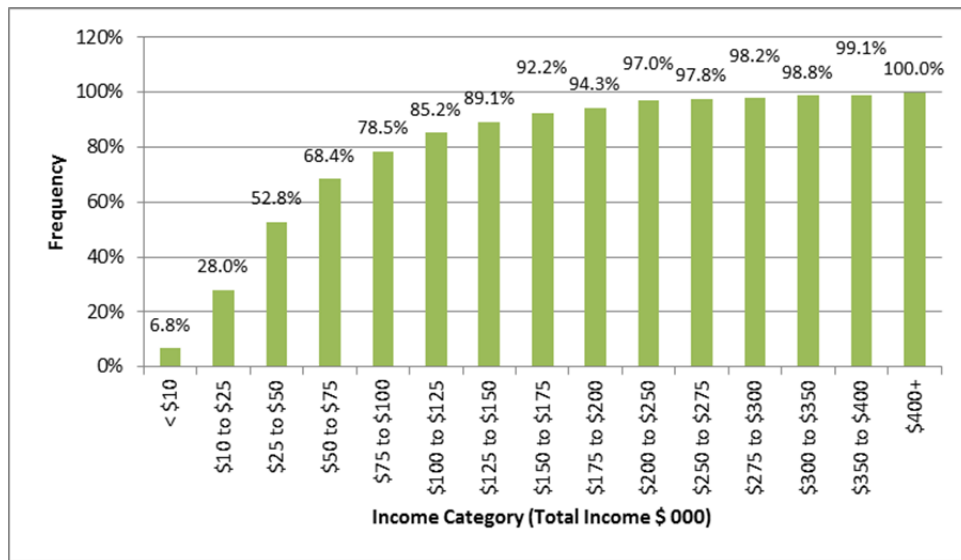
Figure 28: Distribution of All Nuclear Families with Market Income Greater than Zero by Total Income, 2015
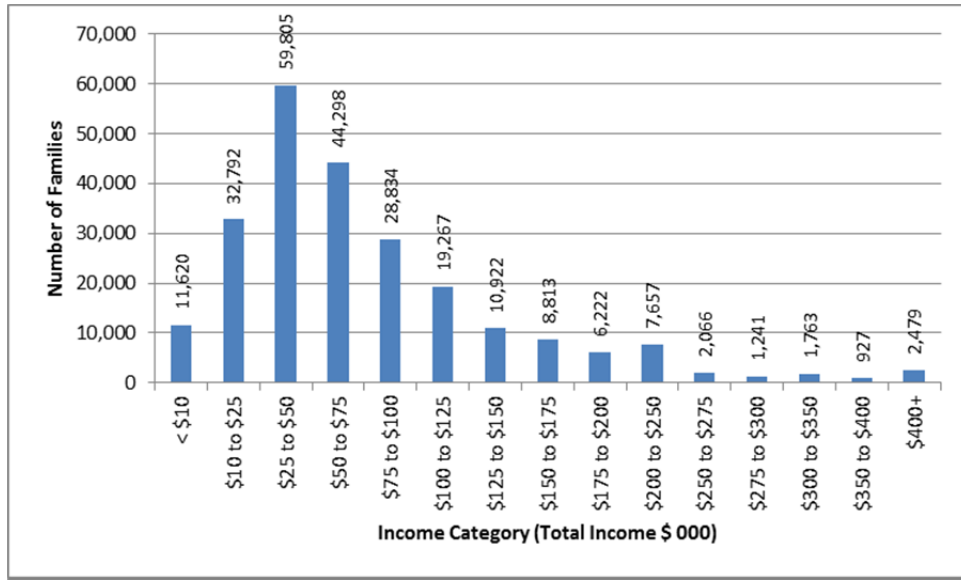
Figure 29: Frequency Distribution of All Nuclear Families with Market Income Greater than Zero by Total Income, 2015
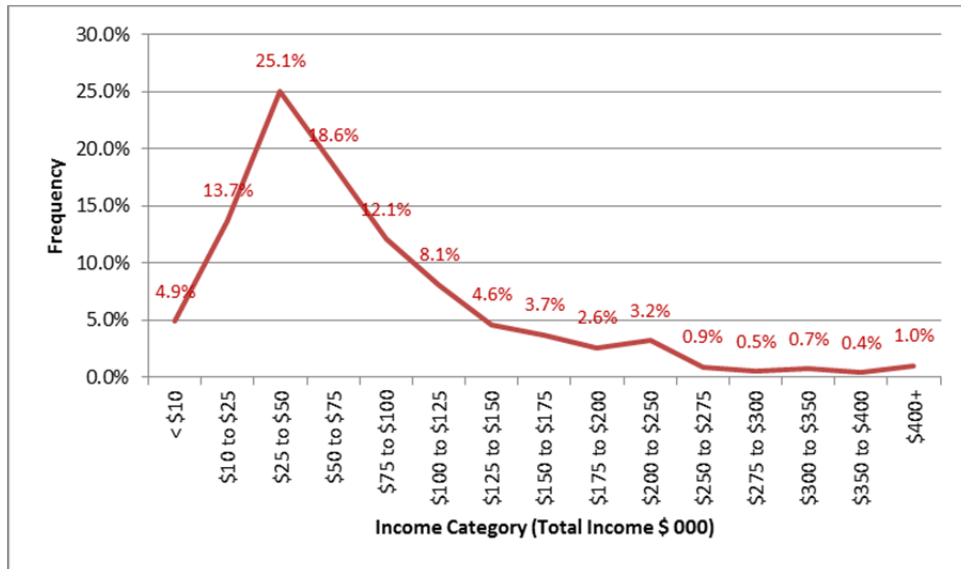
Figure 30: Cumulative Frequency Distribution of All Nuclear Families with Market Income Greater than Zero by Total Income, 2015
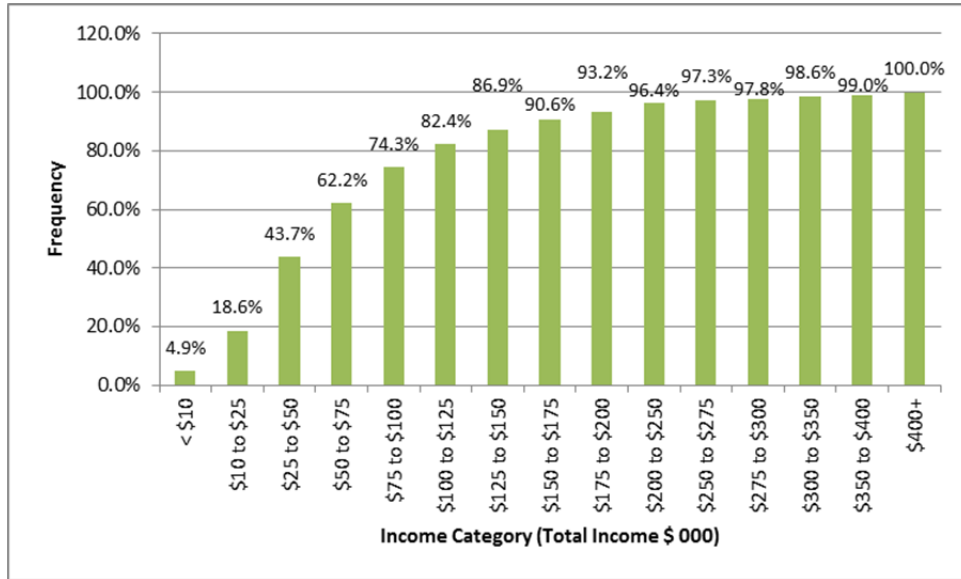
Figure 31: Distribution of All Nuclear Families with Market Income Less than or Equal to Zero by Total Income, 2015
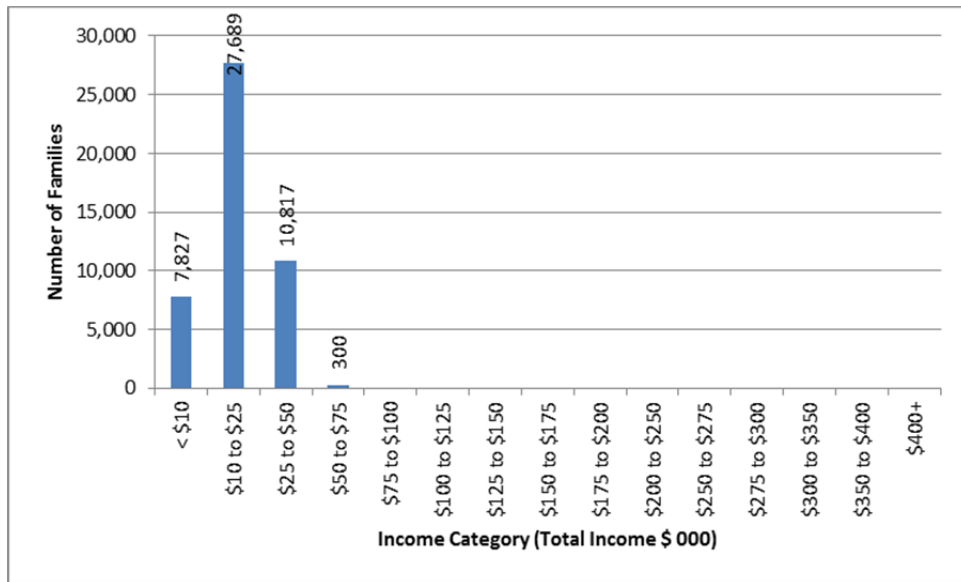
Figure 32: Distribution of All Nuclear Families with Market Income Less than or Equal to Zero by Total Income, 2015 (An Expanded Distribution)
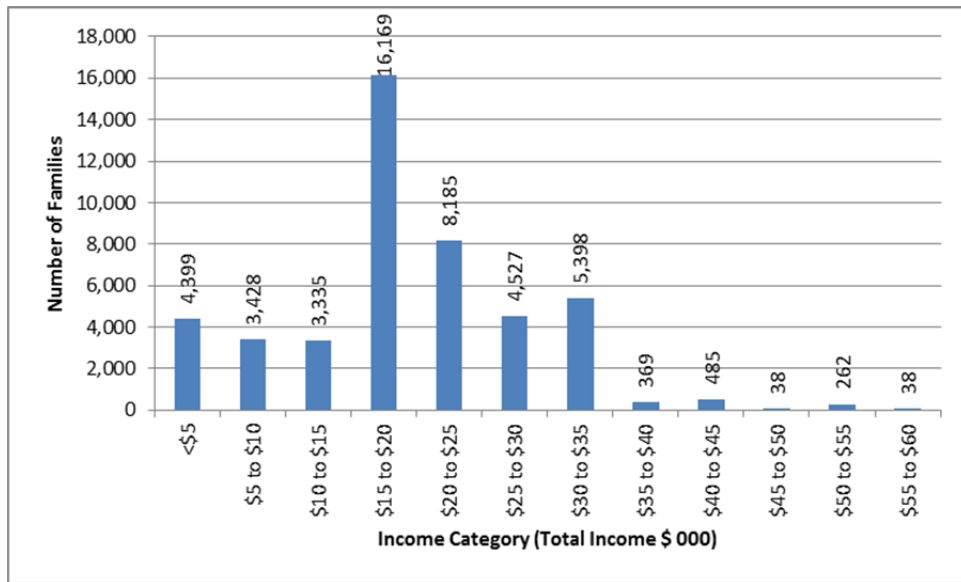
Figure 33: Frequency Distribution of All Nuclear Families with Market Income Less than or Equal to Zero by Total Income, 2015
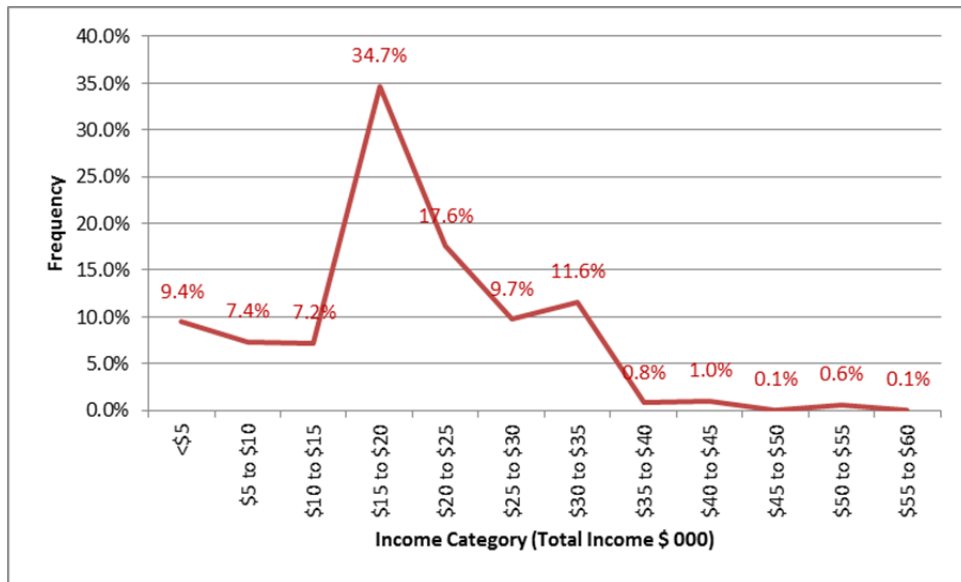
Figure 34: Cumulative Frequency Distribution of All Nuclear Families with Market Income Less than or Equal to Zero by Total Income, 2015
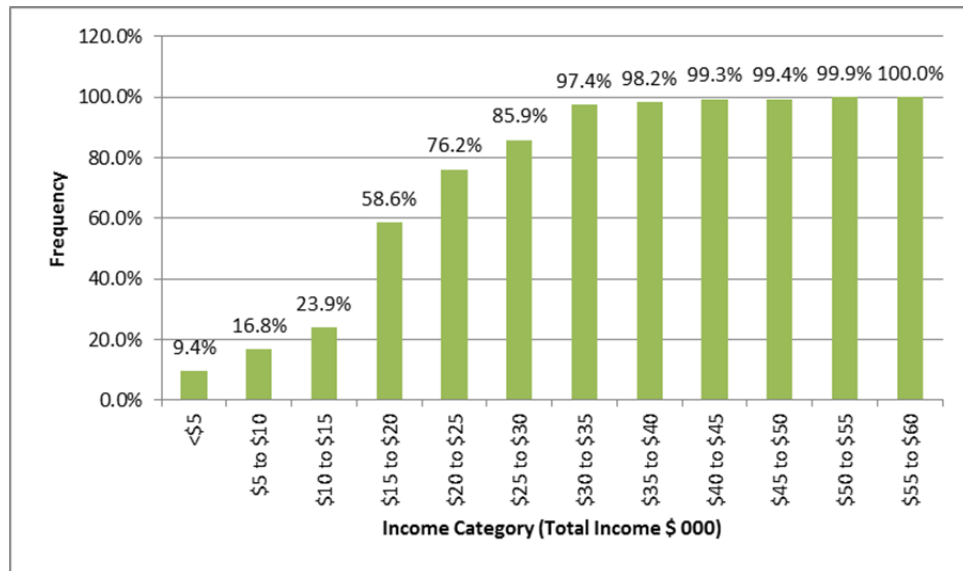
Figure 35 profiles the estimated average tax/transfer rate for families with market income that exceeds their corresponding after-tax income.[101] For these families, their tax payments exceed any transfers that they may receive. These nuclear families end up being net contributors to government. The number of families in this situation was estimated to be about 126,377 in 2015.   For this group of net contributors, the increasing average tax rate indicates that the tax/transfer system is generally progressive over a wide range of market incomes.

Figure 35: Effective Average Tax/Transfer Rate for All Nuclear Families Whose Market Income is Greater than or Equal to Their After-Tax Income

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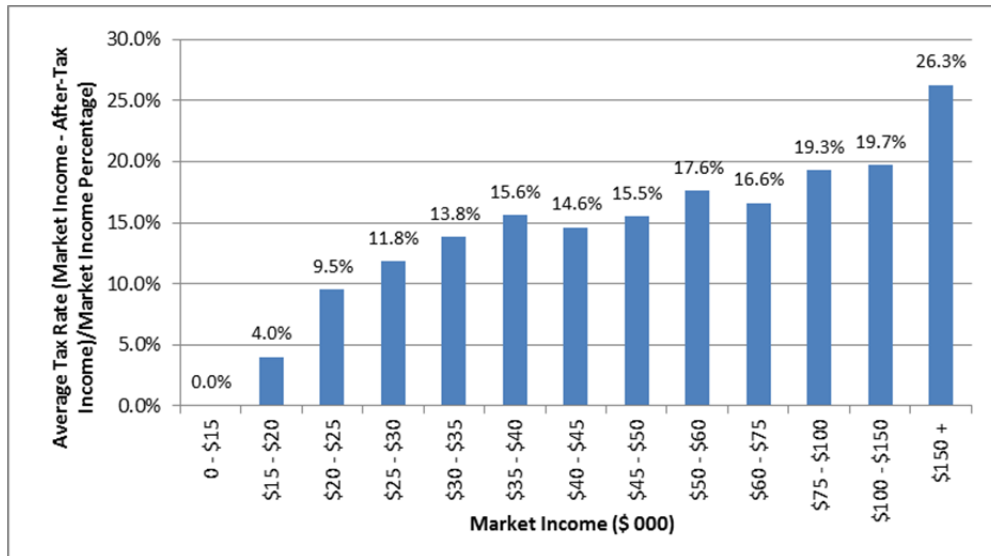
[101] Recall that after-tax income is equal to market income plus government transfers minus taxes.

There are 112,329 nuclear families estimated to have market incomes that are less than their after-tax incomes, implying that they are net fiscal beneficiaries. That is, transfers to these families are greater than the taxes they pay. Figure 36 depicts the average tax/transfer rates for the 103,135 families which were net recipients, but for which the level of transfers was not more than 10 times their market incomes. For example, in the range that a nuclear family's market income is between $0 and $15,000, their net transfers would be about 2.4 (-2.4) times as great as their market income. The higher the family's income, the less relative importance would be attached to net transfers. Clearly, the system is progressive, but it becomes the most progressive for families whose incomes are the lowest.

Together, Figures 35 and 36 present evidence of a tax/transfer system that is progressive over a very wide range of incomes. Figure 36 demonstrates that there are some individuals/families with relatively high market incomes that may be receiving more in transfers than they pay out in taxes.

Figure 36: Effective Average Tax/Transfer Rate for All Nuclear Families Whose Market Income is Less than or Equal to Their After-Tax Income
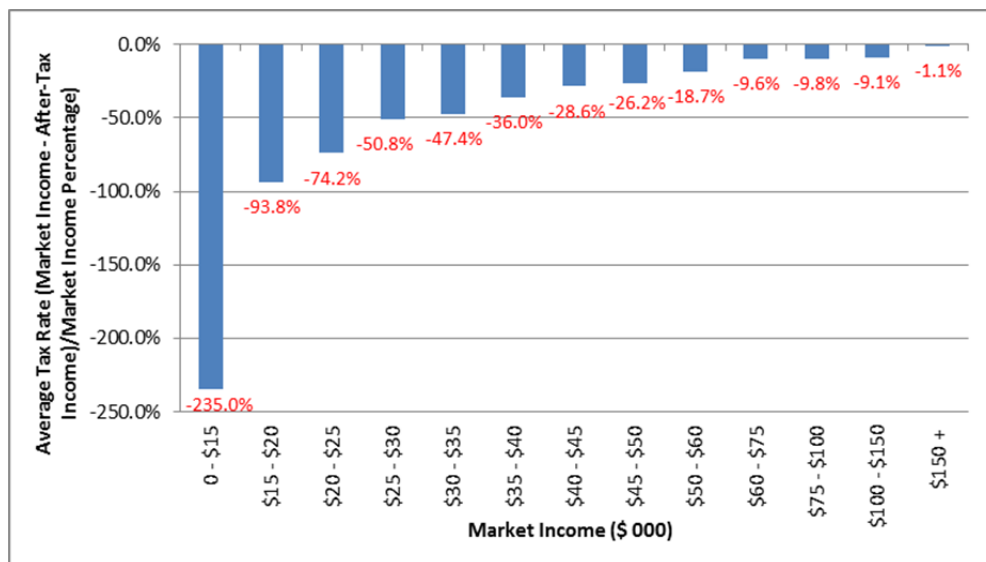
The next section investigates various options for making Newfoundland and Labrador's income tax system even more progressive, while maintaining revenue neutrality for the tax and transfer changes analyzed. This analysis investigates scenarios in which money is redistributed from families near the top of the income distribution to other families/individuals with lower incomes.

4. The Impact on Progressivity and Inequality of Alternative Policy Scenarios

A fundamental condition when considering this review of the fairness of the personal income tax system and the reduction of income inequality is that any proposed changes to the tax system should be revenue neutral. In other words, there should not be a planned increase or decrease in the net amount of government revenue. The implication being that any increase in tax revenue at one level of income would be spent in terms of transfers or tax reductions at some other level of income. While one could undertake the exercise of tax fairness in conjunction with a revenue-raising exercise, this study is based on the premise that equity considerations and revenue-raising needs of the government should not be linked. It is important that people be able to distinguish between tax increases that are motivated by a need to improve tax fairness and those that are motivated by a need to raise revenue.

A natural scenario to consider is a "Robin Hood" scenario. This scenario involves making the personal income tax more progressive at the top and distributing the extra revenue obtained from these more progressive taxes to those households at the bottom of the income distribution.

4.1 Identifying Low-Income Households

Before considering alternative scenarios, it is necessary to be able to distinguish or have a method for identifying those living in family circumstances with "low incomes". The analysis set out in this paper follows the policy convention that low-income thresholds or cut-offs are loosely associated with some sort of "poverty" line.[102]

There has been a great deal of discussion over the centuries as to what constitutes "poverty." For instance, discussions have focused on whether poverty should be considered in some "absolute" sense — not having enough to eat, or some relative sense — being in poverty excludes an individual from a reasonable standard of living and social engagement that citizens should, by right, expect. While there is an understanding amongst economists that measures of economic well-being, including poverty, should be based on measures of consumption, access to reliable data has resulted in most measures utilized in the literature being based on income. Jorgenson and Slesnick (1990), by focusing on consumption, would be an exception in this area.

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[102] This perception, in our opinion, appears to be consistent with what appears to be the general public's understanding of the relation between the poverty line and low-income thresholds.

There are many alternative measures of poverty based on income used by international agencies and national statistical offices. One measure of relative income poverty that is often used is the Low Income Cut-Off (LICO) measure. Although there is no official measure of poverty in Canada, Statistics Canada does publish this measure.[103] Economists such as Anderson and Ibbott (1998) make some strong arguments as to why the LICO measure should not be used in determining low-income or poverty status.

Another measure, which Statistics Canada publishes, is the low-income measure, after-tax (LIM-AT).[104] This measure of relative poverty is simply 50% of the "adjusted" median after-tax income of individuals in Canada where "adjusted" refers to the equivalence measures discussed earlier in this paper and therefore change according to family size.

Finally, Statistics Canada also produces a Market Basket Measure (MBM) of low income, which was developed by officials from the provinces, territories and Employment and Social Development Canada (ESDC) as well as officials from Statistics Canada and outside experts.[105] This measure is both a relative measure which reflects the concept of social inclusion and an absolute measure that calculates the cost of subsistence. This measure also permits provincial differences to exist in order to reflect cost of living differences across provinces. All three of the measures introduced above are explained by Statistics Canada (2014).

4.2   Transfers and Low Income – the Market Basket Measure

The need to produce a low-income measure, which reflected cost-of-living differentials amongst the various communities within the Province, was recognized over a decade ago by the Newfoundland and Labrador Statistics Agency. Of the various measures of low income, the market basket measure seemed to offer the strongest conceptual framework. A conceptual difficulty however, was that imputed rental income was not incorporated into this particular measure. This was a recognized deficiency at the time since many households, especially those in many rural communities, had mortgage/debt free, owner-occupied housing[106]. Giles, May and Quinlan (2004) produced a concept paper that incorporated the Foster, Greer, and Thorbeke (1984, 2010) indices, which measure the headcount ratio, poverty gap and the severity of poverty. Over the years, the NLMBM has been calculated and then used to estimate

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[103] Statistics Canada explains that the low-income cut-offs (LICOs) are income thresholds below which a family will likely devote a larger share of its income on the necessities of food, shelter and clothing than the average family. The approach is essentially to estimate an income threshold at which families are expected to spend 20 percentage points more than the average family on food, shelter and clothing. http://www.statcan.gc.ca/pub/75f0002m/2012002/lico-sfr-eng.htm.

[104] Statistics Canada notes that the Low-income measure after tax (LIM-AT) is a fixed percentage (50%) of median adjusted after-tax income of households observed at the person level, where 'adjusted' indicates that a household's needs are taken into account. http://www12.statcan.gc.ca/nhs-enm/2011/ref/dict/fam021-eng.cfm.

[105] Statistics Canada specified that the Market Basket Measure is a measure of low income based on the cost of a specific basket of goods and services representing a modest, basic standard of living. It includes the costs of food, clothing, footwear, transportation, shelter and other expenses for a reference family of two adults aged 25-49 and two children (aged 9 and 13). http://www.statcan.gc.ca/pub/75f0002m/2013002/mbm-mpc-eng.htm.

[106] ESDC officials recognized this shortcoming and changed the methodology in 2012.

low incomes for communities, by gender, by age and by family type. These measures are available in the Community Accounts for many larger communities for the period from 2003-2011, where confidentiality is not an issue.[107]

Figure 37 presents the low-income NLMBM thresholds for four member families by select communities for Newfoundland and Labrador. Variations in the cost of living do occur because of housing and transportation costs and because of the cost of food may vary by community. Interestingly, Labrador communities cover both ends of the spectrum. Churchill Falls, comprised primarily of NALCOR public sector workers, has one of the lowest NLMBM low-income thresholds, while some coastal communities along the northern part of Labrador, such as Hopedale, experience some of the highest costs of living in the Province. It is also important to appreciate that even within the St. John's Census Metropolitan Area (CMA), there are large variations in living costs associated with transportation and rental costs.

Figure 37: Community NLMBM Low-Income Thresholds (4 Member Families): Ranked Low to High NLMB, 2011
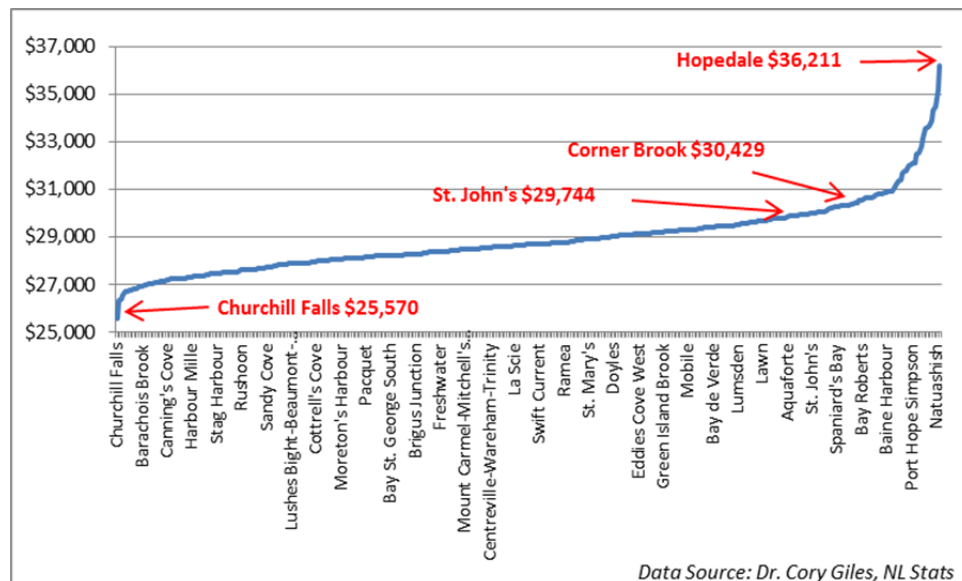
The incidence of low incomes, using adjusted after-tax income for all persons in the Province based on T1FF data, is shown in Figure 38. Two general observations stand out: females (including children) make up a slightly larger portion and the incidence has been falling quite dramatically, especially in the 2003-2008 period. In 2003, the number of persons in low income was 97,502 (54,159 females and 43,343 males). By 2011, this number dropped to 62,081 (33,879 females and 28,201 males).

Figure 39 examines the incidence of low income by family type over the selected time period. Notice that couple families are the least at risk, while those in lone parent families are the most at risk. This is not to say that most of those in low incomes are members of lone parent families.

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[107] View the data for Clarenville at http://nl.communityaccounts.ca/table.asp?_=0bfAjIydpaWrnbSTh5-FvKWcv6FlTLTGtp2nxmqnl8eJXGI_

However, it does imply that lone parent families have a higher probability of being in the low-income category. In fact, in 2011, 22,701 low-income individuals were in lone-parent families. The corresponding estimates for couple families and single individuals were 20,676 and 18,711, respectively. Interestingly, this profile was different from that observed in 2003, when most low-income individuals were in couple families.

Figure 40 below illustrates that the average increase per person needed to bring individuals in these families out of low income is the most for single individuals. Figure 41 helps to explain this by showing that the severity of low income is greatest among single individuals.[108]

Figure 38: All Person, Male and Female Incidence of Low Income, NLMBM, 2003 to 2011

Data Source: Dr. Cory Giles, NL Stats

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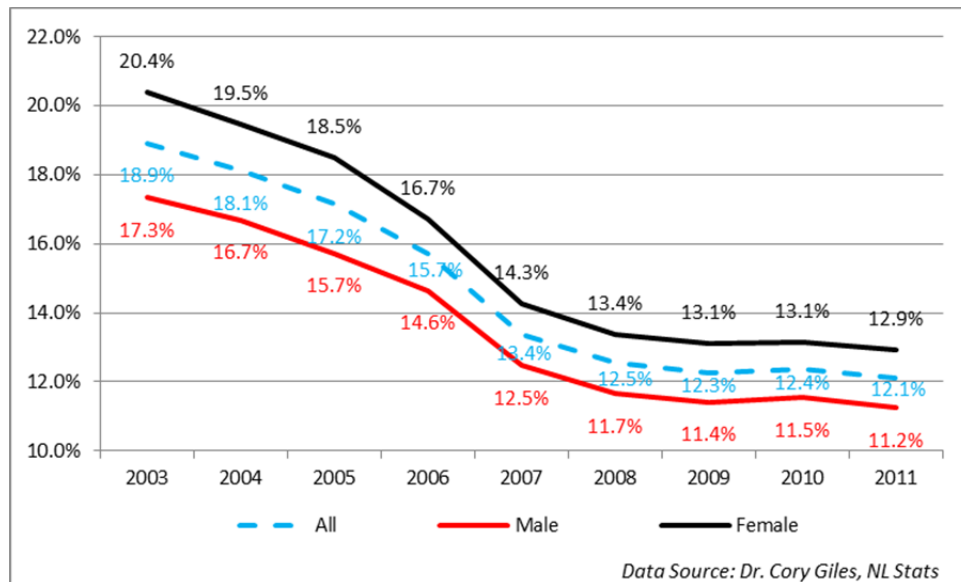
[108] The severity of poverty index is the square of the "poverty gap" or the average amount of income by which individuals fall below the threshold. See Haughton and Kandkhar (2009, p. 64) and more generally, Chapter 4 for details.

Figure 39: Incidence of Low Income by Family Type, NLMBM, 2003 to 2011

Data Source: Dr. Cory Giles, NL Stats
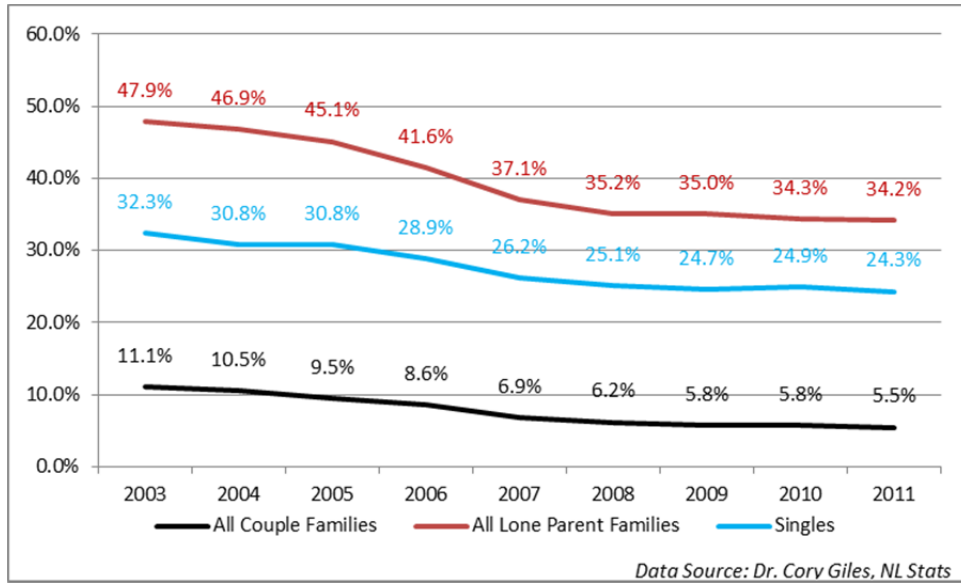
Figure 40: Adjusted Low-Income Gap by Family Type, NLMBM, 2003 to 2011

Data Source: Dr. Cory Giles, NL Stats
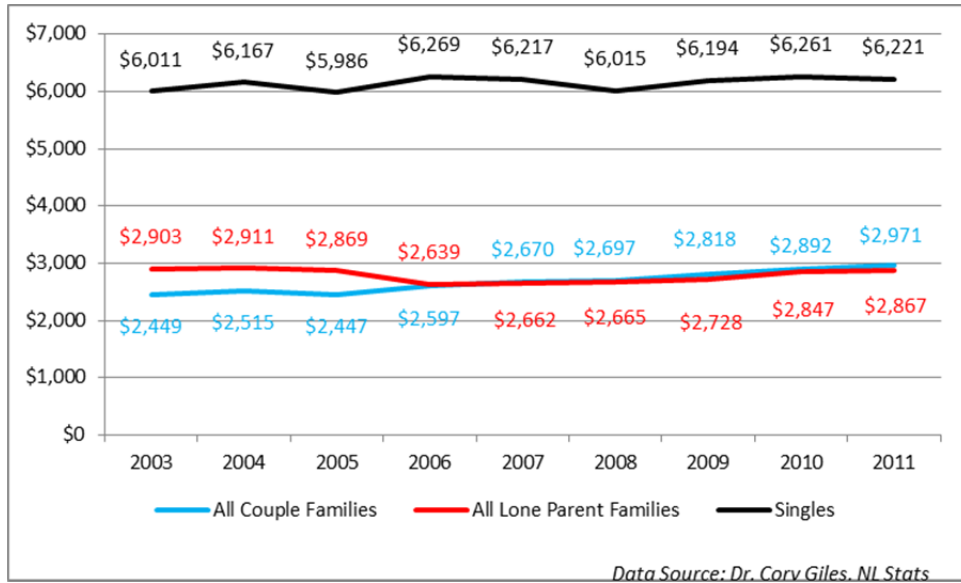
Figure 41: Low-Income Severity by Family Type, NLMBM 2003 to 2011
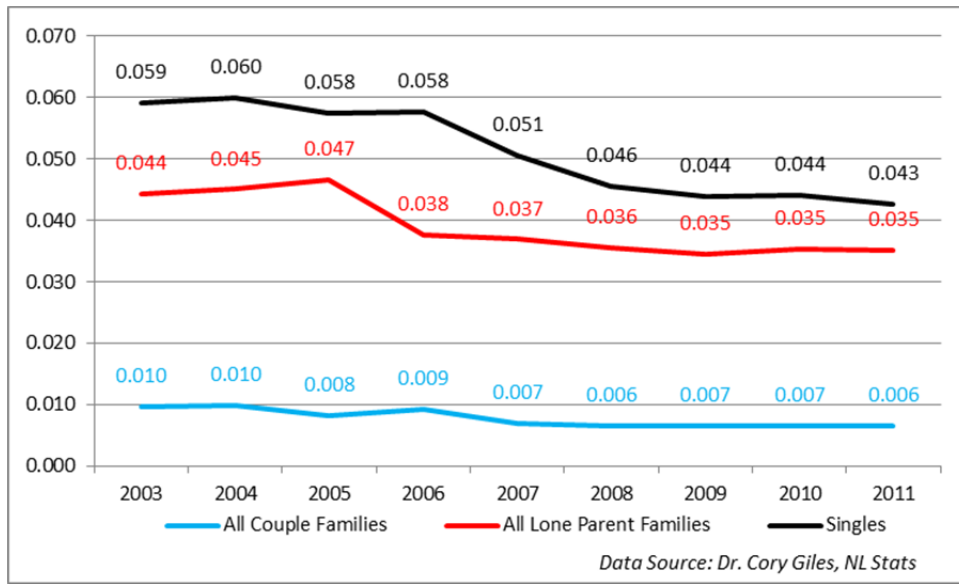
Although annual statistics of low-income parameters are informative, it is also useful to observe the income distributions, which are profiled in Figures 42 to 53. Figures 42 to 44 illustrate that the incidence of low-income for all families has fallen during a recent decade—14.2% of all families were at or below the low-income threshold in 2012, while 21.6% of all families were below the low-income threshold in 2003. As well, the number of low-income families below the low-income threshold has fallen — 33,820 families were at or below the income threshold in 2012, while 47,240 families were below the low-income threshold in 2003. Figure 42 below illustrates a feature common to almost all of the family types. In the period from 2003 to 2012, the number of families who fall into the range from 0% to 50% remains virtually unchanged! The "poorest of the poor" in terms of numbers remains constant. Longitudinal data would be needed to understand if the families which fell into this group in 2003 comprised the majority of the families there in 2012. If they were this is a large poverty trap.

Figure 42: A Comparison of the Distribution of All Families by Family Income as a Percent of the Low-Income Threshold, NLMBM for 2003 and 2012
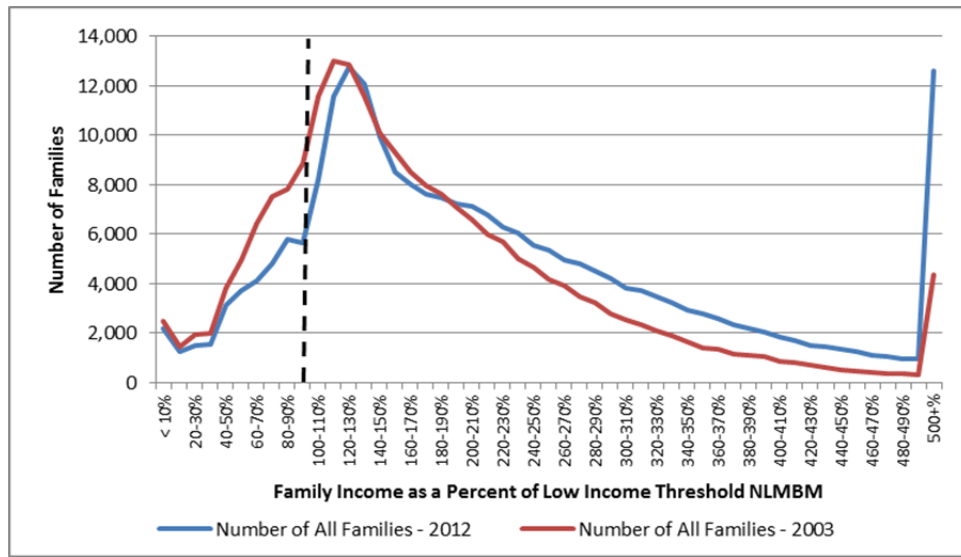
Figure 43: A Comparison of the Percentage Distribution of All Families by Family Income as a Percent of the Low-Income Threshold, NLMBM for 2003 and 2012
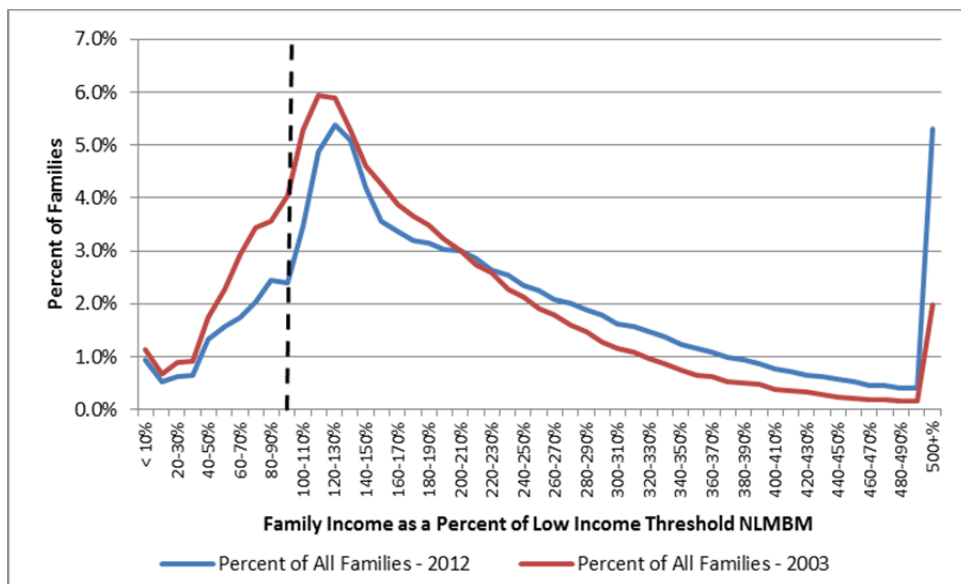
Figure 44: A Comparison of the Cumulative Percentage Distribution of All Families by Family Income as a Percent of the Low-Income Threshold, NLMBM for 2003 and 2012
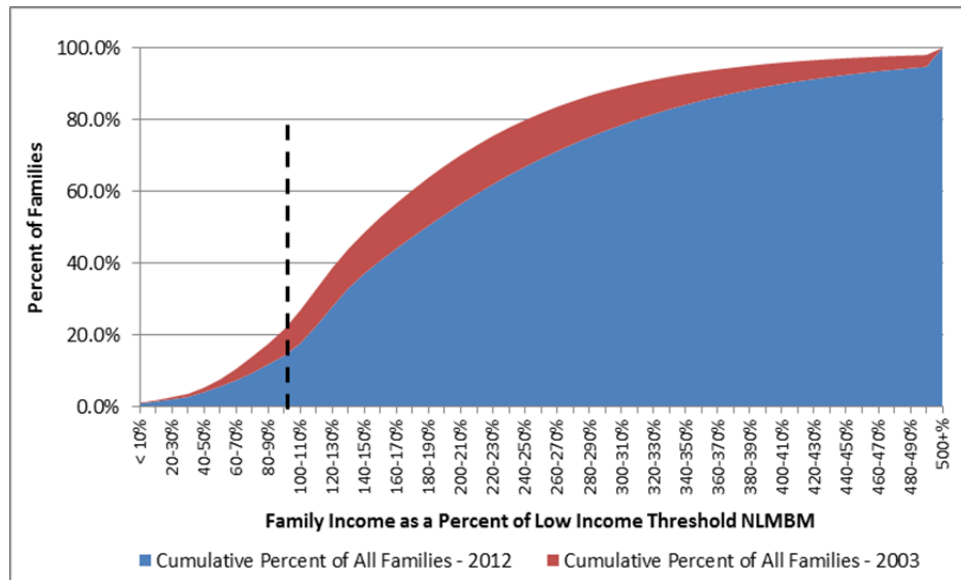
Figures 45 to 47 illustrate that the incidence of low-income for couple families has fallen — 5.6% of couple families were at or below the low-income threshold in 2012, while 11.1% of couple families were below the low-income threshold in 2003. Correspondingly, the number of low-income couple families below the low-income threshold has fallen —6,720 couple families were at or below the income threshold in 2012, while 14,460 couple families were below the low-income threshold in 2003.

Figure 45: A Comparison of the Distribution of Couple Families by Family Income as a Percent of the Low-Income Threshold, NLMBM for 2003 and 2012

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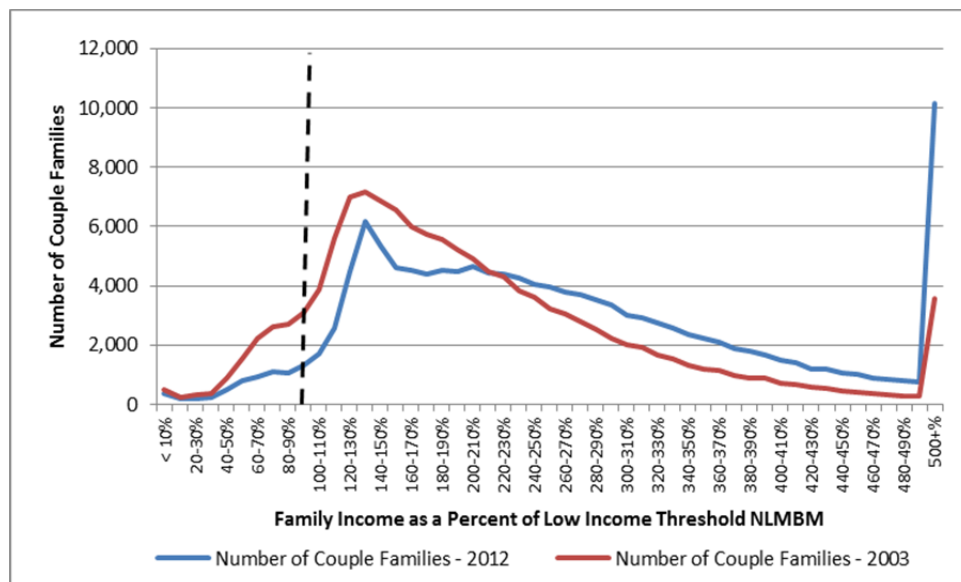
Figure 46: A Comparison of the Percentage Distribution of Couple Families by Family Income as a Percent of the Low-Income Threshold, NLMBM for 2003 and 2012
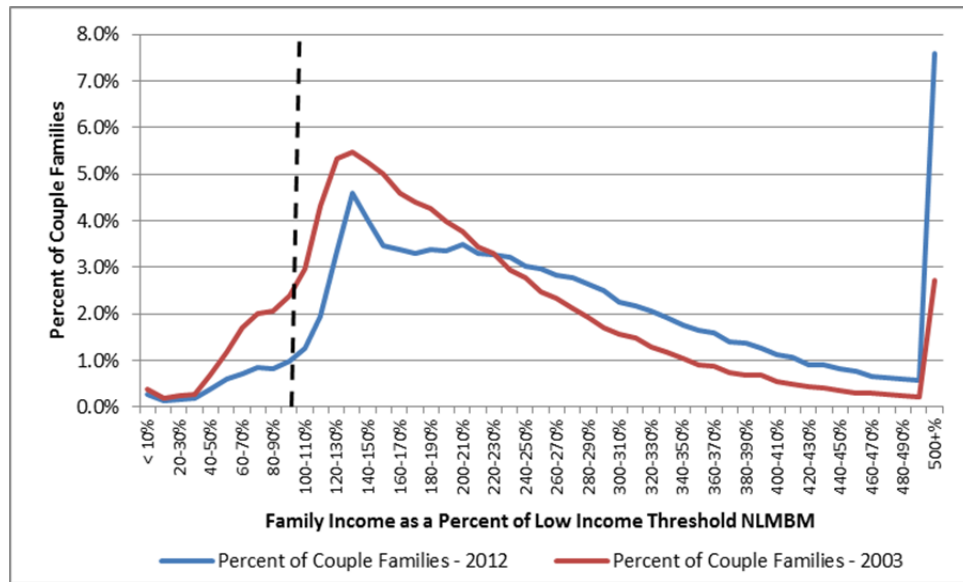
Figure 47: A Comparison of the Cumulative Percentage Distribution of Couple Families by Family Income as a Percent of the Low-Income Threshold, NLMBM for 2003 and 2012
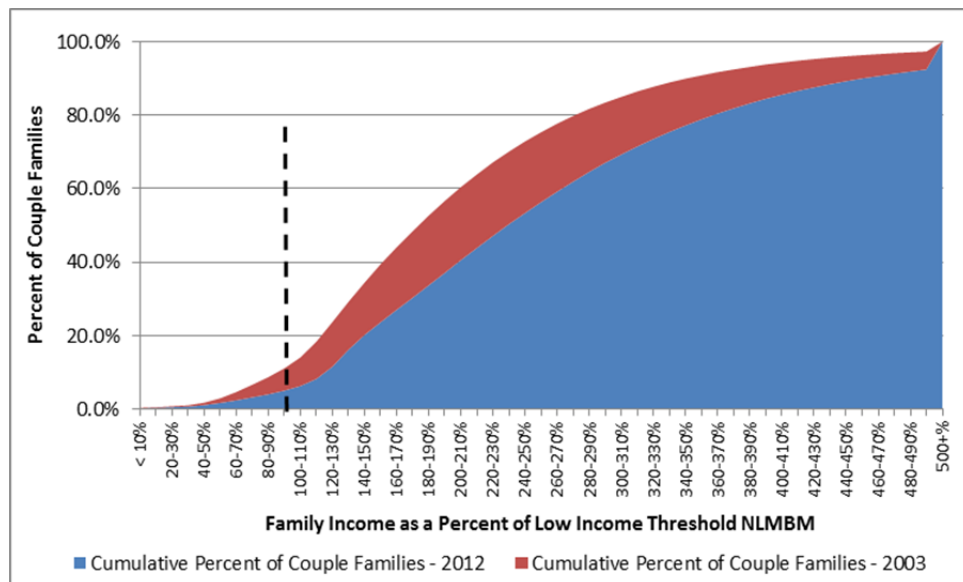
Similarly, Figures 48 to 50 illustrate that the incidence of low income for lone parent families has fallen — 33.7% of lone parent families were at or below the low-income threshold in 2012, while 48.1% of lone parent families were below the low-income threshold in 2003. In addition, the number of low-income lone parent families below the low-income threshold has fallen —8,570 lone parent families were at or below the income threshold in 2012, while 12,960 lone parent families were below the low-income threshold in 2003.

Figure 48: A Comparison of the Distribution of Lone Parent Families by Family Income as a Percent of the Low-Income Threshold, NLMBM for 2003 and 2012
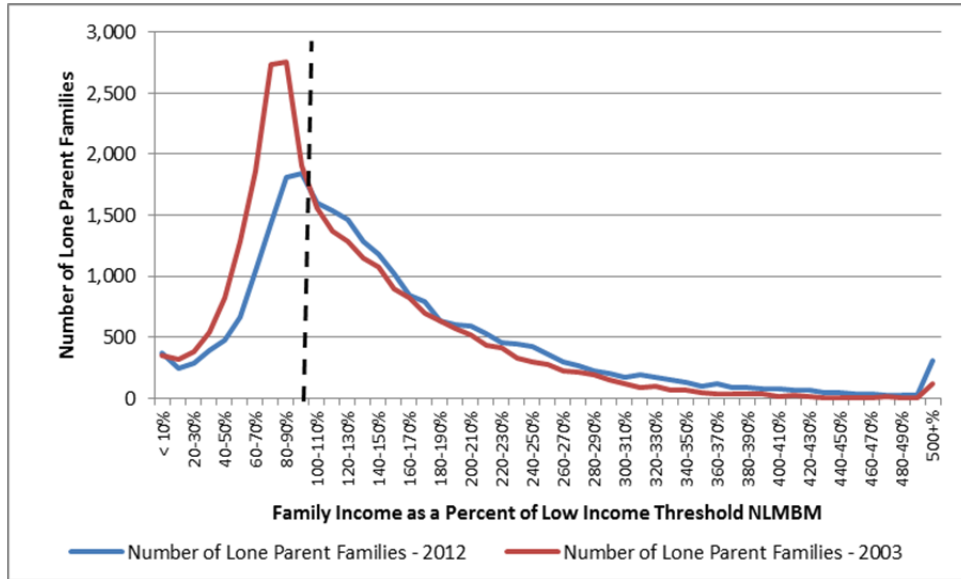
Figure 49: A Comparison of the Percentage Distribution of Lone Parent Families by Family Income as a Percent of the Low-Income Threshold, NLMBM for 2003 and 2012
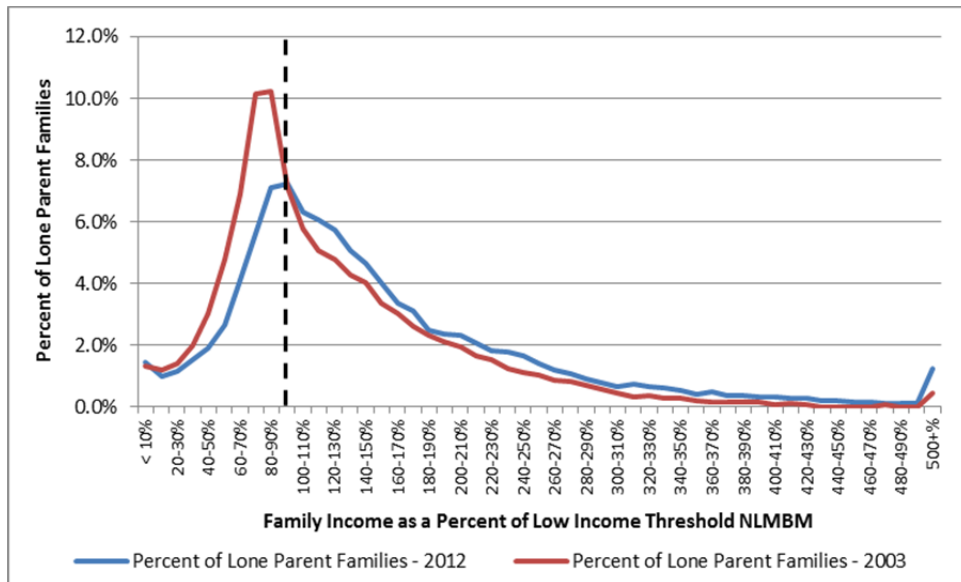
Figure 50: A Comparison of the Cumulative Percentage Distribution of Lone Parent Families by Family Income as a Percent of the Low-Income Threshold, NLMBM for 2003 and 2012
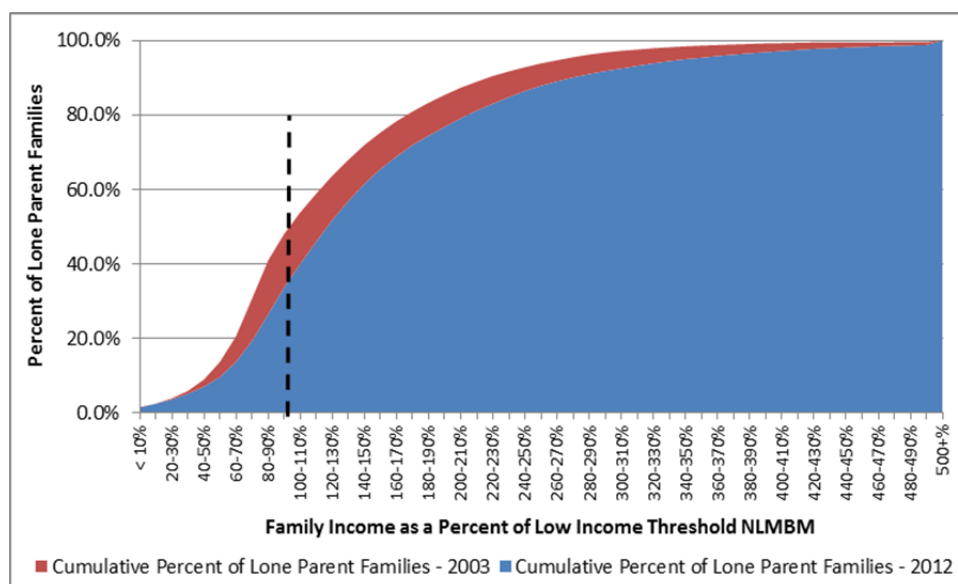
Figures 51 to 53 illustrate that the incidence of low-income for NFP families[109] has fallen —23.5% of NFP families were at or below the low-income threshold in 2012, while 32.3% of NFP families were below the low-income threshold in 2003. Similarly, the number of low-income NFP families below the low-income threshold has fallen —18,530 NFP families were at or below the income threshold in 2012, while 19,820 NFP families were below the low-income threshold in 2003.

Figure 51: A Comparison of the Distribution of NFP Families by Family Income as a Percent of the Low-Income Threshold, NLMBM for 2003 and 2012

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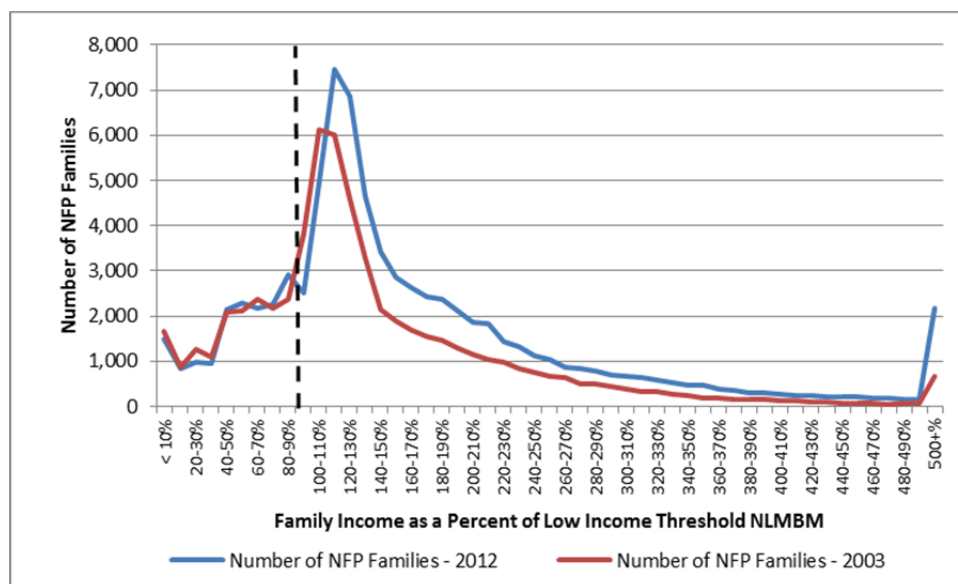
[109] NFP families refer to non-family persons which are equivalent to single individuals.

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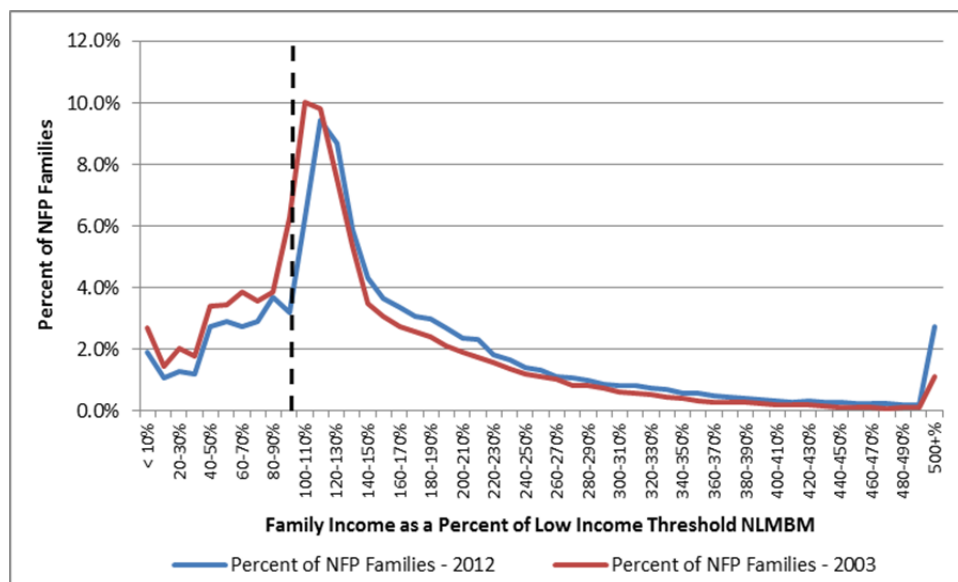
Figure 53: A Comparison of the Cumulative Percentage Distribution of NFP Families by Family Income as a Percent of the Low-Income Threshold, NLMBM for 2003 and 2012
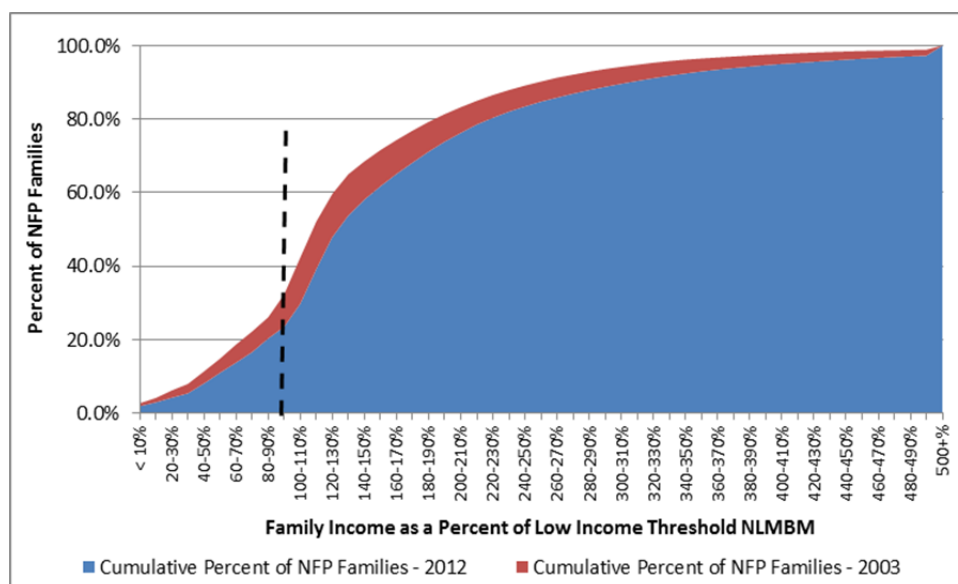
It would be interesting to learn the sources of disposable income for those at various parts of the income distribution. This would help one understand not only the importance of transfers or labour market income at different parts of the distribution, but it would also reveal those industries, in the case of labour income, in which these individuals are working. It is quite clear that the decreasing incidence of low income has slowed down in the last few years and that the number of those at the bottom of the low-income ladder has not changed a great deal. Given the remarkable increase in wages since around 2005 due to the direct and indirect impacts of

offshore oil development and production along with rising minimum wages, this lack of movement should be a concern for everyone. It is a concern for the authors of this study.

The challenge now is to develop scenarios that would increase the "fairness" of the tax system given growing income inequalities at the top percentile, while simultaneously helping those families who are below the low-income threshold. We are particularly interested in measures that may help those at the bottom of the income distribution who have somehow not participated in, or benefitted from, the resource-boom experienced by other families within Newfoundland and Labrador.

4.3 Some Possible Scenarios

The purpose of this section is neither to produce a comprehensive list of scenarios that would represent a menu of choices over all eventualities nor is it to seek advice as to what people consider to be the best option of all feasible scenarios to address income distributional issues within Newfoundland and Labrador. Rather, the scenarios provided in this report evaluate the impacts of various revenue-neutral policy options that would be feasible and could be utilized to improve the equality of the after-tax/after-transfers income distribution within Newfoundland and Labrador. That is, the specific analyses presented below are meant to facilitate and promote an informed discussion within the Province on ways of increasing the equality of the distribution of income, of enhancing tax progressivity, and of addressing tax fairness as they relate to the personal income tax system in place in Newfoundland and Labrador.

In interpreting the results from the scenarios evaluated in this report, it is important to understand that the scenarios analyzed did not attempt to incorporate behavioral effects that may emanate from the tax and transfer changes analyzed. In particular, in response to changes in taxes and transfers considered, no adjustments were made to reflect: changes in the work incentives of households, increased tax avoidance, modification of savings and investment activities, decisions associated with changing official residences to lessen tax burdens, attempts to divert income from more heavily taxed sources of income to less heavily taxed sources of income, or any other taxpayer behavior that would alter the size of the taxable income base within Newfoundland and Labrador.

Since our analysis has ignored any behavioural responses to the policy changes implied by our scenarios, we have effectively assumed that individuals will not change their hours of work or reported incomes in response to changes in the tax/transfer system being analyzed. We recognize that this assumption, although a standard assumption in this type of analysis,[110] may

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[110] Joumard et al. (2012, p. 22) highlight that most studies, which evaluate the impact of the tax and transfer system on income distribution either ignore their impact on the economy or these studies implicitly "assume that taxes and transfers do not affect economic behaviour." Likewise, IMF (2014, p. 14) emphasizes that in assessing the incidence of fiscal policies, one should, in

reduce the validity of our results for two reasons. First, economic theories of labour supply suggest that individuals determine how much to work by choosing their preferred available combinations of leisure time and disposable income. Extending new transfers to people or increasing the taxes on their wages could lead them to change their chosen combination of leisure and income, which would in turn affect the cost associated with transfers and the revenue associated with taxes, as well as the number of people collecting certain transfers or within certain tax brackets. This stands to affect both the fiscal and redistributive impacts of the scenarios. Second, increased taxes on high-income earners could lead these people to either relocate or somehow avoid income taxation. Milligan and Smart (2013) suggest that, after the adoption of the tax-on-income system of provincial income taxation in 2000-2001, some high-income earners from other provinces moved their assets to Alberta to take advantage of lower marginal tax rates on high earnings.

To first discuss the former concern, a body of literature explores the effect of income maintenance programmes on work incentives in the Canadian context. Hum and Simpson (1993) discuss the results of the Manitoba Basic Annual Income Experiment, which took place in the 1970s. This joint project between the federal government and Manitoba's provincial government provided residents of Dauphin, Manitoba with a guaranteed minimum income of $3,800; the experiment withdrew its benefit gradually with income increases, but at a rate such that earned income was effectively taxed at a rate of 50 per cent. Reporting results from analysis using non-structural ANOVA model and a structural model, Hum and Simpson find a weak labour-supply response to the guaranteed annual income.

Hanratty and Blank (1992) compare poverty trends in Canada and the United States from 1970 to 1986 and investigate why poverty has decreased in the former, but not in the latter. In a note on the possible work disincentives of Canada's more generous income maintenance programmes, they note that single-parent families, which are most likely to depend on transfers, increased their work hours in Canada more than in the United States despite the increased availability of transfer income. Hanratty and Blank use this observation to argue that any work disincentives of transfer expansions in Canada were insignificant compared to other factors.

What can we learn from extant analysis of the labour-supply response of basic income guarantees? It is worth nothing that the NLMBM transfer established by some of this study's scenarios is comparable to a guaranteed minimum income insofar as it ensures a family's income never falls below a certain amount (this amount depends on the family size), its benefit is gradually withdrawn as income increases, and the benefit is withdrawn such that a family can always increase its total income by increasing its market income. It is a benefit much smaller, however, than that offered in Manitoba's experiment when inflation is considered. One may expect from the findings of Hum and Simpson and Hanratty and Blank, then, that any labour supply response would be trifling. If so, the study's simplifying assumption of no labour supply

principle, take into account the behavioral responses to taxes and transfers. However, the IMF does recognize that, in practice, "most studies do not incorporate this aspect, since sufficient data on behavioral responses are often unavailable."

response due to transfer changes would not be particularly problematic for the validity of its results.

Considering provincial differences in tax rates on high incomes from 1988 to 2011, Milligan and Smart (2014) estimate the elasticity of reported income with respect to marginal tax rates for various income fractiles. They find that higher marginal tax rates have no significant effect on the reported incomes of the top 10 per cent of earners or the top five per cent of earners, but that they have a significant and sizable negative effect on the reported incomes of the top one per cent and 0.1 per cent of earners largely due to the response of the latter group. This implies that the very top earners report significantly less income when taxes increase, and they respond strongly enough that tax hikes for this group decrease revenue. In fact, Milligan and Smart suggest that the revenue-maximizing marginal tax rate for the top 0.1 per cent is just 27.5 per cent, so all provinces could increase revenue by lowering marginal tax rates for particularly high incomes.

In another paper, Milligan and Smart (2013a) consider a counterfactual case in which provinces add a new top tax bracket five percentage points higher than their existing highest bracket. For Newfoundland and Labrador, they imagined a new top rate of 18.3 per cent for income above $168,904[111], which is roughly the threshold to qualify for the top one per cent of earners. Milligan and Smart estimate that, ignoring a behavioural response, such an increase would raise $24 million in revenue, but that half of this revenue would be eliminated by a behavioural effect.

There are two reasons to suspect that the responsiveness of high-income earners' reported incomes to marginal tax rates on top brackets may be lower than it was in the past. First, as raised by Milligan and Smart (2013b), actions by the federal government and Supreme Court of Canada have restricted the ability of investors to hold wealth in trusts outside their provinces of residency. Second, Alberta seems poised to increase its marginal income tax rates for larger amounts, moving away from its flat rate of taxation above the basic personal amount. This would reduce the possible tax savings of relocating or shifting assets.

These changes considered, however, a strong behavioural response by the highest earners to changes in provincial marginal income tax rates seems likely. This implies that the ability of new taxes to raise revenue to fund provincial transfer programmes is limited, and that the fiscal estimates provided by this study corresponding to each scenario could significantly overstate the revenue resulting from tax increases that occur at the very top bracket when if that bracket is over $200 thousand. The effect of new taxes on the wealth is left somewhat ambiguous: if higher taxes would lead high-income earners to relocate, then they would circuitously promote income inequality in the Province. But if these people rather shifted assets to avoid taxation, then tax hikes could have little effect on progressivity.

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[111] From CANSIM Table 204-0004, we know that the threshold total income for Newfoundland and Labrador in 2012 was $184,000 and $233,600 for the St, John's Census Metropolitan Area. Given a significant increase in wages for salaried workers between 2012 and 2015 of about 11.1% (CANSIM 281-0049), then an estimated threshold income of $200 thousand is not unreasonable.

In other words, ignoring the behavioural effects of the taxes and transfers analyzed in this report may result in the calculated redistribution effects being somewhat overstated. In particular, if taxes induce those households who are taxed to work less and induce those households who receive transfers to work less, then the amount of tax revenue available for transfers will be smaller and the number of households requiring the transfer will be higher so that the impact on low-income households will be less significant.[112] While the distribution may be more equal, the standard of living for all taxpayers may be lower.

The five scenarios analyzed in this study are:

Scenario 1. This scenario introduces a new low-income credit which is based on the NLMBM of low income[113] to replace the current NLHST credit.[114] To ensure revenue neutrality, this new, low-income transfer is funded through eliminating the NLHST credit and increasing the Newfoundland and Labrador personal income tax rates applied to additional income tax brackets introduced at the upper end of the income distribution;[115]

Scenario 2. This scenario involves a higher basic personal exemption applied to Newfoundland and Labrador taxable income.[116] To ensure revenue neutrality, the lost personal income tax revenue resulting from the expanded basic personal exemption is funded by the higher personal income tax rates and additional tax brackets at the upper end of the income distribution that were specified in Scenario 1. As well, the NLHST credit remains in place unaltered;

Scenario 3. This scenario reduces personal income tax rates for lower income tax brackets and, to ensure revenue neutrality, institutes the higher personal income tax rates and additional tax brackets at the upper end of the income distribution that were specified in Scenario

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[112] According to Milligan (2014, p. 11) the responsiveness of high-income earners to taxes is much larger than that of low-income earners. This might be explained by individuals and firms responding through changes in their actual consumption, labour, savings, residence or investment choices or by increasing tax-avoidance activities that shift income across tax bases, to lower-tax jurisdictions, or through time to lower their tax burden. As well, Romer and Romer (2014, p. 279) estimate that taxes are indeed distortionary but the distortions are small. In addition, Ferede (2013, p. 152) found a negative effect of income tax progressivity on entrepreneurial risk-taking for the self-employed.

[113] Under the NLMBM, a person in low income is someone whose available family income is less than the cost of the market basket in their community. For this indicator, a market basket is a selection of goods and services used to determine the cost of a "minimally accepted" standard of living. The income level at which this becomes operative depends on family size and the community in which the family lives. These points are explained in more detail in the main body of the report.

[114] Prior to the 2015 provincial budget, the NLHST credit is a refundable tax credit for low-income residents of the province. The credit amounts are: $40 per adult and $60 per child for taxpayers with net family income of $15,000 or less. The credit is reduced by 5% when net family income exceeds $15,000. The credit is paid in October of each year and is included with the federal GST credit. The amount of the credit is based on net family income from the previous year. This credit is provided under Section 34 of the Income Tax Act. http://www.fin.gov.nl.ca/fin/tax_programs_incentives/personal/hstcredit.html

[115] The personal income tax rates in place prior to the 2015 budget were: 7.70% applied on the first $34,254 (or $35,008 in 2015 after adjusting for inflation); 12.5% applied to income between $34,255 and $68,508 (or $35,009 and $70,015, respectively, in 2015 after adjusting for inflation); and 13.3% applied to income over $68,509 (or $70,016 in 2015 after adjusting for inflation). Under Scenario 1, the income tax rates will be identical for taxable income up to $100,000, but 13.8% will apply to taxable income between $100,001 and $160,000; income between $160,001 and $220,000 will be taxed at 14.3%, while taxable incomes in excess of $220,000 will be taxed at 17.6%.

[116] The basic personal exemption applied to Newfoundland and Labrador taxable income is increased from $8,578 to $11,312.

1. As well, the tax brackets are identical to those assumed in Scenario 1, but the lower tax rates are assumed to change;[117]

Scenario 4.   This scenario enhances the NLHST credits. To ensure revenue neutrality, these enhanced provincial HST credits are funded by higher personal income tax rates and additional tax brackets at the upper end of the income distribution as specified in Scenario 1;[118] and

Scenario 5.   This scenario considers the enhanced NLMBM credit which, to ensure revenue neutrality, is funded by a surtax on the highest income tax bracket and the elimination of the existing NLHST credit.[119]

4.3.a.   Scenario 1 – Higher Personal Income Tax Rates and Brackets and a New NLMBM Credit

The first scenario was developed by considering the transfers and then, to ensure revenue neutrality, using a "goal seek" option in SPSM to develop the tax rates given the specified income brackets.

For 2015, the Department of Finance estimates that the NLMBM low-income threshold will be $16,455 on average across communities for a single individual.[120] Using the family equivalence scales, it is possible to estimate what the NLMBM low-income threshold would be for families of different sizes. To illustrate, a family of four would have a low-income threshold of $32,910.

An iterative procedure was used to determine the "base" transfer. In particular, it was decided to allocate the largest transfers to those individuals whose incomes were 50% of the threshold and below. These were the individuals most in need, that is, the "poorest of the poor" and appear to be caught in some poverty trap since we observed that it was this group whose numbers had not changed in the decade between 2003 and 2012. Economists such as Atkinson (2015) argue effectively that these individuals should receive a higher "weight" when deciding how to redistribute money from those at the top of the income distribution to those near the bottom.

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[117] The lowest three tax bracket had the rates lowered for the three lowest brackets as follows: 7.7% to 7.3% for taxable incomes below $35,008, 12.5% to 12.1% for taxable incomes between $35,009 and $70,016 and 13.3% to 13.0% for incomes between $70,016 and $100,000.

[118] The basic adult rate (including spouse if present) is assumed to increase from $40 to $500 and child rates are increased from $60 to $190 and the income threshold is increased from $15,000 to $20,000 before the claw back of the credit begins. The tax rates and brackets utilized are identical to those utilized in Scenario 1.

[119] The surtax is assumed to be 12.7% of taxes paid on taxable incomes above $70,015, which, before the 2015 budget, was the highest income tax bracket utilized for Newfoundland and Labrador personal income taxes.

[120] The NLMBM low-income threshold of $16,455is based in the amount of disposable, that is, after-tax income that would be needed to buy the low-income market basket. Note that the prices of goods and services in this basket are at market prices and therefore include HST.

Initially, it was decided that these individuals would receive $3,000 per year. This level of transfer would represent up to 36.5% of the gap between their income and the NLMBM low-income threshold. The amount of the maximum transfer (that is, $3,000 per year) would be reduced by 15% for each 10 percentage points that one's equivalized income is above 50% of the NLMBM low-income threshold. For instance, a single person with an after-tax income at 90% of the NLMBM low-income threshold would receive $1,200 per year — this is calculated as $3,000 minus 15%*((90%-50%)/10%)*$3,000. Subsequently, following our principles outlined above, it was decided to further increase the credit to those in the bottom (that is, with an income that is 25% or less of the NLMBM low-income threshold and who are truly "the poorest of the poor") by an additional 20% (or $600). This enhanced NLMBM credit would imply that this particular family would receive $3,600 on an individual basis, or $7,200 for a family of four. Families with income up to 10% above the threshold also receive an amount as the entire credit is only reduced to $0 when income is more than 10% above the threshold.

The grant would also be *equivalized* or "adjusted" for family size by the square root of the size of the family. The implication of this adjustment is that if it costs a family of four twice as much to live as a single person, then the transfer that they receive should increase accordingly. Table 7 below illustrates the estimated NLMBM thresholds by family size for 2015. For instance, assuming the family has an income that is less than or equal to 25% of the NLMBM low-income threshold, a family of 4 would receive a maximum grant of $7,200, while a family of six would receive 2.45 times the base (single) amount or $8,820.

Table 7: Estimated NLMBM Thresholds by Family Size, 2015

Family Size	Equivalized Size	Threshold
1	1.000	$16,455
2	1.414	$23,271
3	1.732	$28,501
4	2.000	$32,910
5	2.236	$36,794
6	2.449	$40,306
7	2.646	$43,536
8	2.828	$46,542
9	3.000	$49,365
10	3.162	$52,035

It is important to appreciate that this NLMBM grant or credit would replace the provincial portion of the NLHST credit,[121] which is $40 per adult and $60 per child under 19 for families with net incomes less than $15,000. The current NLHST credit is reduced by 5% by the amount that the family net income is above $15,000.

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[121] This refers to the HST credit that existed prior to the 2015 budget.

By way of comparison, consider that under the current NLHST credit, a single-mother with a net income of $20,000 and two children would not receive a NLHST credit. Because her net income is $5,000 above the $15,000 cut-off, all of her NLHST credit would be eliminated even though she and her family are in the NLMBM low-income group.[122] Under the NLMBM credit being considered in this scenario, her family's net income is just over 70% of the NLMBM threshold[123] and consequently, she would receive 55% of the proposed credit or about $2,858.[124]

A feature that one could build into any program is a claw-back. For example, a claw-back could be designed that would apply if the actual family disposable income turned out to be more than 10% above the threshold.

This scenario and the scenarios presented below do not incorporate cost-of-living differences between communities. It was felt that the introduction of such differences would unduly complicate the analysis and distract from the main objective of demonstrating how income progressivity can be addressed in Newfoundland and Labrador in a relatively straightforward way. However, referring back to Figure 37, it would be relatively simple to have a two-tiered system to acknowledge that northern parts of coastal Labrador may face particularly higher costs-of-living.

Table 8 outlines the tax rates changes required to fund the enhanced NLMBM transfer envisioned under Scenario 1. For this scenario, the personal income tax rates and the tax brackets remain the same as those which existed in Newfoundland and Labrador as of December 31, 2014 for families with taxable income of $100,000 or less. For the 2015 simulation considered in this scenario, this corresponds to 78.5% of all nuclear families in Newfoundland and Labrador. Specifically, the 7.70% tax rate applies to income up to $35,008 the 12.50% tax rate applies to incomes between $35,009 and $70,015 and the 13.30% tax rate applies to incomes of $70,016 and $100,000. However, three new brackets are considered — $100,001 to $160,000; $160,001 to $220,000, and over $220,000. Note that the top tax bracket is close to the threshold income level of those in the top 1% of tax-filers in the St. John's Census Metropolitan Area (CMA) for 2012.

This scenario's rates are still lower than those of the other Atlantic Provinces.[125] In addition, the elimination of the provincial HST will save $1.9 million and, as such, this amount will be added to the new NLMBM credit to ensure revenue neutrality.

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[122] For the single mother, the NLHST credit before claw-back would be $160 (that is, $40 for the adult and two times $60 for the children), but up to $250 would be clawed back (5% of $20,000-$15,000). Since the claw-back exceeds the entitlement, the single mother would not receive any NLHST.

[123] With an equivalized family size of 1.732 (the square root of 3), $20,000 would be equivalent to $11,574.34 which is 70% of the $16,455 NLMBM low-income threshold or $20,000 is 70% of the corresponding $28,501 in Table 7 for the NLMBM low-income threshold for a family of three.

[124] The $2,858 credit is calculated as follows: the maximum credit for a family of three is given by 1.732 * $3,000 = $5,196. An income of $20,000 is over 70% of the NLMBM low-income threshold so that the size of the grant is reduced by 45% or the family would receive $2,858 = $5,196 * 55%.

[125] That is when one includes the 10% surtax in Prince Edward Island.

Marginal Tax Rate Base Case	Income Bracket Base Case	Marginal Tax Rate Scenario 1	Income Bracket Scenario 1
7.7%	$35,008 and under	7.7%	$35,008 and under
12.5%	$35,009 to $70,015	12.5%	$35,009 to $70,015
13.3%	$70,016 and over	13.3%	$70,016 to $100,000
		13.8%	$100,001 to $160,000
		14.3%	$160,001 to $220,000
		17.6%	Over $220,000
Other Changes			
NL HST Credit	Unchanged for Base Case	NL HST Credit	Eliminated for Scenario 1
New NLMBM Credit	Not Introduced in Base Case	New NLMBM Credit	Introduced in Scenario 1
Basic Personal Exemption	Unchanged for Base Case	Basic Personal Exemption	Unchanged for Scenario 1
Surtax	Not Introduced in Base Case	Surtax	Not Introduced in Scenario 1

Table 9 displays the budgetary impact of Scenario 1. The revised system is designed to be revenue neutral, utilizing modest tax rate increases at the top end to fund transfers to individuals who live in families below the "low-income" threshold (that is, families that live below what is deemed to be the minimally accepted standard of living). These changes are estimated to generate an additional $54.7 million in provincial government income taxes and result in $54.8 million in additional provincial transfers being paid out in net transfers for total transfer program costs of $56.7 million.[126]

Table 9: Budgetary Impacts of Scenario 1 for 2015 – Effects of Combined Tax Changes and Enhanced NLMBM Credits

Scenario 1 Summary (NL - 2015)	Base ($M)	Scenario 1 ($M)	Net Change ($M)
Provincial Taxes	**$2,623.1**	**$2,677.8**	**$54.7**
Provincial Income Tax	$1,393.3	$1,448.0	$54.7
Provincial Commodity Tax	$1,229.8	$1,229.8	$0.0
Provincial Transfers	**$462.1**	**$516.9**	**$54.8**
Family Programs	$11.4	$11.4	$0.0
Elderly Programs	$48.0	$48.0	$0.0
Worker's Compensation	$143.7	$143.7	$0.0
Social Assistance	$243.0	$243.0	$0.0
Other Prov. Transfers	$14.1	$14.1	$0.0
Prov. Refundable Credits	$1.9	$0.0	-$1.9
NLMBM Credit	$0.0	$56.7	$56.7
Provincial Net Balance	**$2,161.0**	**$2,160.9**	**-$0.1**

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[126] While the NLMBM credit increases by $54.8 million, other provincial refundable credits fall by $1.9 million.

For Scenario 1, as in the base case, the degree of progressivity associated only with personal income taxes is determined by comparing the relevant summary indicators which are displayed in Table 10 for the analysis comparing total income to disposable income.[127] For instance, the RS index (0.0531) increases from 0.0504 in the base case, while the K index of 0.1924 exceeds the 0.1857 derived for the base case and the 1.0858 estimate for the M-T index is larger than the 1.0817 estimate determined for the base case. These summary indicators demonstrate that Scenario 1 improves the progressivity and vertical equity associated with Newfoundland and Labrador's personal income tax system. As well, Scenario 1 adjustments cause the income distribution to be more equal. Specifically, the pre-tax Gini coefficient (0.3984) exceeds the post-tax Gini coefficient (0.3468) by 0.0516 or Scenario 1 corresponds to more redistribution in that 0.0516 exceeds the 0.0490 difference calculated for the base case. There does appear to be a small increase in horizontal inequity as reflected by the Atkinson-Plotnick index increasing to 0.0021 with Scenario 1 from 0.0020 in the base case.

Table 10: Scenario 1 – Equity and Progressivity Impacts for 2015 of the Combined Tax Changes and Enhanced NLMBM Credits

Indicator	Scenario 1 Value in Moving from Total Income to Disposable Income (Taxes)	Scenario 1 Value in Moving from Market Income to Total Income (Benefits)	Scenario 1 Value in Moving from Market Income to Disposable Income (Taxes Minus Benefits)
Pre-tax Gini	0.3984	0.5210	0.5210
Post-tax Gini	0.3468	0.3974	0.3459
Average Tax Rate, Benefit Rate or Net Tax Rate	0.2161	-0.1835	0.0726
Reynolds-Smolensky Index (RS)	0.0531	0.1296	0.1847
Kakwani Progressivity Index (K)	0.1924	-0.8358	NA[128]
Re-ranking (RR)	0.0014	0.0059	0.0096
Musgrave-Thin Progressivity Index (MT)	1.0858	1.2582	1.3657
Atkinson-Plotnick Index (AP)	0.0021	0.0075	0.0138

The isolated effects of transfers on the income distribution are shown in Table 10 by comparing the summary coefficients associated with the move from market to total income. The pre-tax (really pre-transfers) Gini coefficient (0.5210) exceeds the post-tax (that is, the post-transfers) Gini coefficient (0.3974) by 0.1236. Since the difference in the pre-transfer and post-transfer Gini coefficients exceeds the 0.1220 difference estimated for the base case, it implies that the income distribution associated with transfers has increased relative to that observed in the base case. Hence, the provision of the enhanced transfers makes more equal the distribution of income in Newfoundland and Labrador over what would have transpired with market income only and over what would have been recorded for the base case. As in the base case, transfers have a larger impact (2.4 times) on redistribution than personal income taxes. The transfer component of Scenario 1 increases progressivity and reduces inequality as indicated by the RS

[127] Since total income includes market income plus transfers and disposable income includes market income plus transfer less taxes, the difference between the two income measures is due to the impact of taxes.
[128] See Appendix A for an explanation for why the Kakwani index is not reported in this study for net taxes.

index of 0.1296, which is even larger than the 0.1280 determined for the base case, indicating that vertical equity has been improved with the enhanced transfer component of Scenario 1. The K index[129] of -0.8358 is larger in absolute value than -0.8329 estimated for the base case, illustrating that the transfer component of Scenario 1 increases the progressivity of the income tax system over that which occurs under the base case. The M-T index of 1.2582 has increased relative to 1.2547 observed in the base case. This latter result further corroborates the finding that the personal income tax system has become more progressive with Scenario 1. There does seem to be a small reduction in horizontal inequity as reflected by the Atkinson-Plotnick index (0.0075) falling from 0.0076 in the base case and as reflected in the re-ranking index (0.0059) decreasing from 0.0061 in the base case.

The final set of calculations incorporates the combined impacts of taxes and transfers on the income distribution and the progressivity of the personal income tax system embodied in Scenario 1. The change in the pre-transfer Gini coefficient and the post-transfer Gini coefficient with Scenario 1 is 0.1751, representing an increase from 0.1709 in the base case. This larger difference in the pre-policy and post-policy changes represents a significant reduction in income inequality over that which would prevail with market incomes only under both Scenario 1 and the base case. As in the base case, the reduction in inequality associated with the current tax-transfers system, as reflected in a change in the Gini coefficient of 0.1751, can be decomposed into two components – 70.6% (0.1236/0.1751) of the change is due to the transfer system and 29.5% (0.0516/0.1751) of the change in the equality of the income distribution is due to the tax system.

For Scenario 1, the degree of progressivity of the income tax/transfer system is illustrated by positive values for the RS index (0.1847), which increased from 0.1806 in the base case and the M-T index of 1.3657, which increased from 1.3568 in the base case.

While the summary indicators do demonstrate that the changes considered in Scenario 1 represent a more equal income distribution and an increase progressivity of the tax system, it does not capture all of the salient implications of the move from the base case to Scenario 1. Figure 54 compares the difference between the base case and Scenario 1 at various points in the income distribution. As shown by the circled section of the income distributions, Scenario 1 also reduces the incidence of the "poorest of the poor". For instance, there is a lower incidence of families who are 20% or less of the low-income threshold with Scenario 1 than would exist with the base case. Those families whose incomes are only 10% of the low-income threshold have received an increase in incomes so that this group no longer exists. This scenario completely eliminates the incidence of severely low incomes. Appendix B analyses the impact of Scenario 1 by family type to show that single individuals benefit more than lone parents. Married couples in the upper income brackets effectively fund these groups.

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[129] Note a negative value for the K index for a transfer indicates that it is progressive in that lower income families receive higher shares of the transfers.
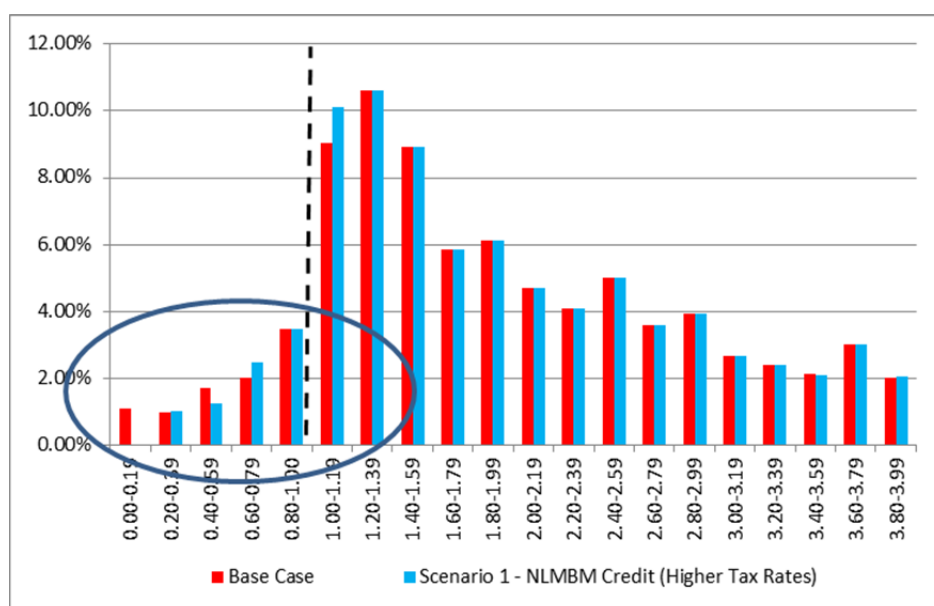
4.3.b.   Scenario 2 – Higher Tax Rates and Brackets and Basic Exemption Expanded

For Scenario 2, the tax brackets are identical to those utilized in Scenario 1. However, instead of introducing a new NLMBM credit targeted at lower income families, the basic personal exemption for Newfoundland and Labrador taxes is increased to $11,312. The level of the new basic personal exemption was chosen in order to ensure revenue-neutrality. In other words, the basic personal exemption increased to $11,312, the reduction in taxes payable by all families just matches the extra taxes collected from the higher tax rates and expanded tax brackets. The changes associated with Scenario 2 are indicated in Table 11.

Table 11: Tax System Changes in Scenario 2 Relative to Base Case

Marginal Tax Rate Base Case	Income Bracket Base Case	Marginal Tax Rate Scenario 2	Income Bracket Scenario 2
7.7%	$35,008 and under	7.7%	$35,008 and under
12.5%	$35,009 to $70,015	12.5%	$35,009 to $70,015
13.3%	$70,016 and over	13.3%	$70,016 to $100,000
		13.8%	$100,001 to $160,000
		14.3%	$160,001 to $220,000
		17.6%	Over $220,000
Other Changes			
NL HST Credit	Unchanged for Base Case	NL HST Credit	No Change for Scenario 2
New NLMBM Credit	Not Introduced in Base Case	New NLMBM Credit	Not Introduced in Scenario 2
Basic Personal Exemption	Unchanged for Base Case	Basic Personal Exemption	Increased to $11,312 for Scenario 2
Surtax	Not Introduced in Base Case	Surtax	Not Introduced in Scenario 2

Table 12 outlines the budgetary effect of Scenario 2. With the additional after-tax income that flows to lower income taxpayers as a result of the change in the basic exemption, commodity tax revenues will be higher by $1.5 million. It important to understand that the basic personal exemption for Newfoundland and Labrador taxes was adjusted until the net revenue flowing to the government was zero. That is, the basic personal exemption was adjusted higher until it just equaled the extra revenue generated with the higher tax rates and additional tax brackets consider in Scenario 1.

Table 12: Budgetary Impacts of Scenario 2 for 2015

Scenario 2 Summary (NL - 2015)	Base ($M)	Scenario 2 ($M)	Net Change ($M)
Provincial Taxes	**$2,623.1**	**$2,623.1**	**$0.0**
Provincial Income Tax	$1,393.3	$1,391.8	-$1.5
Provincial Commodity Tax	$1,229.8	$1,231.3	$1.5
Provincial Transfers	**$462.1**	**$462.1**	**$0.0**
Family Programs	$11.4	$11.4	$0.0
Elderly Programs	$48.0	$48.0	$0.0
Worker's Compensation	$143.7	$143.7	$0.0
Social Assistance	$243.0	$243.0	$0.0
Other Prov. Transfers	$14.1	$14.1	$0.0
Prov. Refundable Credits	$1.9	$1.9	$0.0
NLMBM Credit	$0.0	$0.0	$0.0
Provincial Net Balance	**$2,161**	**$2,161**	**$0.0**

For Scenario 2, the degree of progressivity associated only with personal income taxes is determined by comparing the relevant summary indicators in Table 13 for the move from total income to disposable income. The fact that the RS index (0.0531) increases relative to the base case (0.0504); the K index (0.1953) increases from in the base case estimate (0.1857); and the M-T index (1.0862) exceeds the base case estimate (1.0817) together indicate that the revisions to personal income taxes analyzed in Scenario 2 increase the progressivity and make the income distribution more equal than the personal income tax rates that existed in the base case. The reduction in inequality of the income distribution in Newfoundland and Labrador is also corroborated by the fact that the pre-tax Gini coefficient (0.4001) exceeds the post-tax Gini coefficient (0.3484) for Scenario 2 by 0.0513. Since 0.0513 exceeds 0.0490, the estimate in the base case, the after-tax income distribution is more equal with Scenario 2. There was no change in horizontal inequity in that neither the Atkinson-Plotnick index nor the re-ranking index changed with Scenario 2 over the base case.

Recall that in analyzing the change from market income to total income, the analysis is reflecting the changes in the income distribution and the associated indicators due solely to the impact of transfers. Specifically, the only difference between the two

income distributions is the presence of transfers in that the impact of personal income taxes is not yet incorporated.   The effects of transfers only on the income distribution are shown in Table 13. Notice that the pre-tax and pre-transfers Gini coefficient (0.5210) exceeds the post-tax (really post-transfer) Gini coefficient (0.3990) by 0.1220, which is unaltered from the base case. This finding is reasonable in that Scenario 2 involves no changes to transfers relative to the base case.

Table 13: Scenario 2 - Equity and Progressivity Impacts for 2015

Indicator	Scenario 2 Value in Moving from Total Income to Disposable Income (Taxes)	Scenario 2 Value in Moving from Market Income to Total Income (Benefits)	Scenario 2 Value in Moving from Market Income to Disposable Income (Taxes Minus Benefits)
Pre-tax Gini	0.4001	0.5210	0.5210
Post-tax Gini	0.3484	0.3990	0.3475
Average Tax Rate, Benefit Rate or Net Tax Rate	0.2138	-0.1817	0.0712
Reynolds-Smolensky Index (RS)	0.0531	0.1280	0.1833
Kakwani Progressivity Index (K)	0.1953	-0.8329	NA
Re-ranking (RR)	0.0014	0.0061	0.0097
Musgrave-Thin Progressivity Index (MT)	1.0862	1.2547	1.3624
Atkinson-Plotnick Index (AP)	0.0020	0.0076	0.0140

Combining the impact of transfers and taxes on the income distribution and the progressivity of the personal income tax system for Scenario 2 involves analyzing the move from market income to disposable income. The change in the pre-tax/pre-transfer Gini coefficient and the post-tax/post-transfer Gini coefficient is 0.1735. This estimate has increased from 0.1709 in the base case, indicating a significant reduction in income inequality over that which would prevail with market incomes only and it is an increase over the base case. The reduction in inequality associated with the current tax-transfers system (0.1735) can be decomposed into 70.3% (0.1220/0.1735) of the change being accounted for by the transfer system and 29.8% (0.05167/0.1735)) of the change in the equality of the income distribution emanating from changes to the personal income tax system. Interestingly, the relative impact of transfers was lower than the 71.4% estimated above for the base case and the impact of taxes was relatively higher than the 28.7% estimate for personal income taxes in the base case. This change in the relative importance of taxes and transfers is explained by the fact that the change to the basic personal exemption resulted in lower effective personal income tax rates and this would have been relatively more important for low-income individuals. In addition, there was no assumed change in the transfers and this would have caused the tax effect to appear relatively stronger than in the base case.

As well, it is clear that progressivity and income distributional impact has increased with Scenario 2 relative to the base case. Specifically, RS index increases to 0.1833 from the 0.1806 estimate in the base case and the M-T index increases to 1.3624 from the 1.3568 estimate in the

base case. There does seem to be a small increase in horizontal inequity as reflected by the Atkinson-Plotnick index increasing to 0.0140 from 0.0138 in the base.

Although the summary indicators do show that the changes considered in Scenario 2 engender a more equal income distribution and an increase in the progressivity of the tax system, Figure 55 indicates that the membership of the "poorest of the poor" is unaffected by the move from the base case. This should not be particularly surprising since the main impact of Scenario 2 is to reduce effective tax on lower income individuals and this will have no impact on those taxpayers who already do not pay tax under the base case.

Figure 55: After-Tax/Transfers Income Distribution – Base Case Compared to Scenario 2 (Taxes & Lower Basic Exemption)
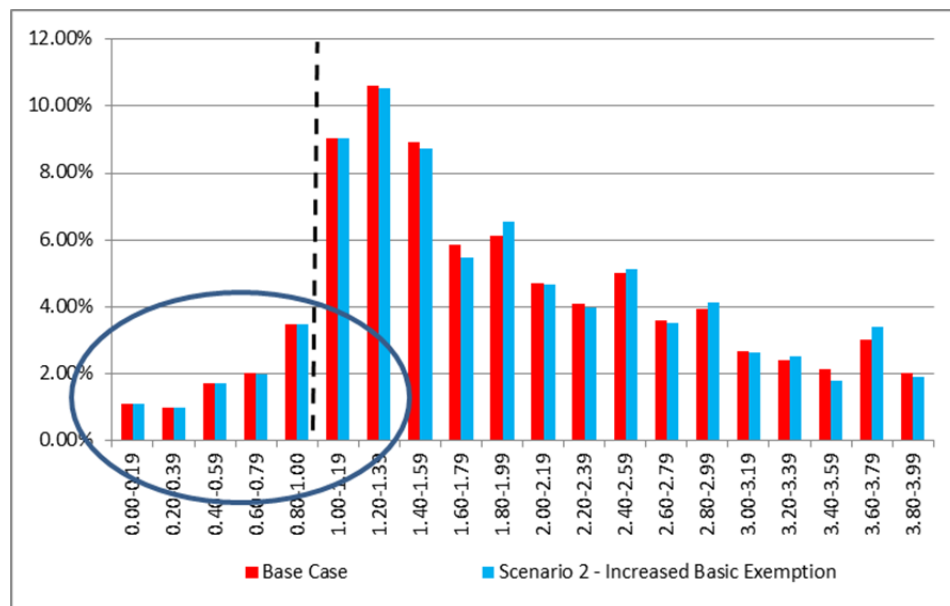
4.3.c.   Scenario 3 – Offsetting Tax Rates

Scenario 3 copies Scenario 1 for the higher income tax rates and brackets, but maintains revenue-neutrality by lowering the tax rates on the lower income tax brackets — see Table 14 below for the details. The differences in taxes between Scenario 3 and Scenario 1 are reflected in Table 14 and the differences in tax rates for lower income tax brackets are highlighted in "green".

From Table 15, one observes that the change in the tax rates for the lower income tax brackets will not be completely offset by the increase in the higher tax rates for the higher income tax brackets in Scenario 3. This is reflected by the fact that provincial income tax revenues fall by $2.0 million, while commodity tax revenues increase by $1.4 million. Hence, although Scenario 3 is not completely revenue neutral, it is effectively revenue neutral. Moreover, it is as close

revenue-neutrality as the analysis will permit without having to resort to tax rates that are four and five places past the decimal point.

Table 14: Tax System Changes in Scenario 3 Relative to Base Case

Marginal Tax Rate Base Case	Income Bracket Base Case	Marginal Tax Rate Scenario 3	Income Bracket Scenario 3
7.7%	$35,008 and under	7.3%	$35,008 and under
12.5%	$35,009 to $70,015	12.1%	$35,009 to $70,015
13.3%	$70,016 and over	13.0%	$70,016 to $100,000
		13.8%	$100,001 to $160,000
		14.3%	$160,001 to $220,000
		17.6%	Over $220,000
Other Changes			
NL HST Credit	Unchanged for Base Case	NL HST Credit	No Change for Scenario 3
New NLMBM Credit	Not Introduced in Base Case	New NLMBM Credit	Not Introduced in Scenario 3
Basic Personal Exemption	Unchanged for Base Case	Basic Personal Exemption	Unchanged for Scenario 3
Surtax	Not Introduced in Base Case	Surtax	Not Introduced in Scenario 3

Table 15: Budgetary Impacts of Scenario 3 for 2015

Scenario 3 Summary (NL - 2015)	Base ($M)	Scenario 3 ($M)	Net Change ($M)
Provincial Taxes	**$2,623.1**	**$2,622.5**	**-$0.6**
Provincial Income Tax	$1,393.3	$1,391.3	-$2.0
Provincial Commodity Tax	$1,229.8	$1,231.2	$1.4
Provincial Transfers	**$462.1**	**$462.1**	**$0.0**
Family Programs	$11.4	$11.4	$0.0
Elderly Programs	$48.0	$48.0	$0.0
Worker's Compensation	$143.7	$143.7	$0.0
Social Assistance	$243.0	$243.0	$0.0
Other Prov. Transfers	$14.1	$14.1	$0.0
Prov. Refundable Credits	$1.9	$1.9	$0.0
NLMBM Credit	$0.0	$0.0	$0.0
Provincial Net Balance	**$2,161**	**$2,160.4**	**-$0.6**

The degree of progressivity associated only with personal income taxes changes in Scenario 3 is determined by comparing the relevant indicators derived from analyzing the move from total income to disposable income in Table 16. Relative to the base case, the progressivity of the personal income tax system and the income distribution have increased. Specifically, the RS index (0.0512) increases relative to the base case estimate (0.0504); the K index (0.1934)

increases relative to the base case estimate (0.1857) and the M-T index (1.0853) improves relative to the base case estimate (1.0817). The income distribution has become more equal in that the difference between the pre-tax and pre-transfer Gini coefficient (0.4001) exceeds the post-tax Gini coefficient (0.3489) by 0.0512, an increase from 0.0490 in the base case estimate. There is no change in the degree of horizontal inequity.

Table 16: Scenario 3 for 2015: Equity and Progressivity Impacts

Indicator	Scenario 3 Value in Moving from Total Income to Disposable Income (Taxes)	Scenario 3 Value in Moving from Market Income to Total Income (Benefits)	Scenario 3 Value in Moving from Market Income to Disposable Income (Taxes Minus Benefits)
Pre-tax Gini	0.4001	0.5210	0.5210
Post-tax Gini	0.3489	0.3990	0.3480
Average Tax Rate, Benefit Rate or Net Tax Rate	0.2138	-0.1817	0.0712
Reynolds-Smolensky Index (RS)	0.0526	0.1280	0.1827
Kakwani Progressivity Index (K)	0.1934	-0.8329	NA
Re-ranking (RR)	0.0014	0.0061	0.0097
Musgrave-Thin Progressivity Index (MT)	1.0853	1.2547	1.3613
Atkinson-Plotnick Index (AP)	0.0020	0.0076	0.0139

The impact of transfers in Scenario 3 is determined by analyzing the impact of going from the market income to total income. This information presented in Table 16 indicates that the impact of transfers with Scenario 3 is identical to the base case. The lack of difference between Scenario 3 and the base case should not be surprising since Scenario 3 involved changing the tax rates of higher and lower income tax brackets without modifying the transfer system in place in Newfoundland and Labrador.

The combined effect of taxes and transfers for Scenario 3 are determined by comparing the move from market income to disposable income. The change in the pre-tax and pre-transfer Gini coefficient and the post-tax and post-transfer Gini coefficient is 0.1730. This change is higher than 0.1709 calculated for the base case and indicates an increase in the reduction in income inequality over that which would prevail with market incomes only and over that which was estimated for the base case. The improvement in equality associated with Scenario 3, as reflected in a change in the Gini coefficient of 0.1730, can be decomposed into two components – 70.5% (0.1220/0.1730) due to the transfer system and 29.6% (0.0512/0.1730) due to the tax system.

For Scenario 3, the degree of progressivity of the income tax/transfer system has increased over the base case as the RS index (0.1827) increases from in the base case estimate (0.1806) and the M-T index (1.3613) increases from the base case estimate (1.3568). There does seem to be a small decrease in horizontal inequity as reflected by the increase in the Atkinson-Plotnick index (0.0139 increased from 0.0138 in the base case).

Even though the summary indicators do show that the changes considered in Scenario 3 represent a more equal income distribution and an increased progressivity of the tax system, Figure 56 indicates that the incidence of the "poorest of the poor" is unaffected by the move from the base case. This should not be particularly surprising since the main impact of Scenario 3 is to reduce the tax rate on lower income individuals and this will have no impact on those taxpayers who already do not pay tax under the base case.

Figure 56: After-Tax/Transfers Income Distribution – Base Case Compared to Scenario 3 (Offsetting Higher and Lower Rates)
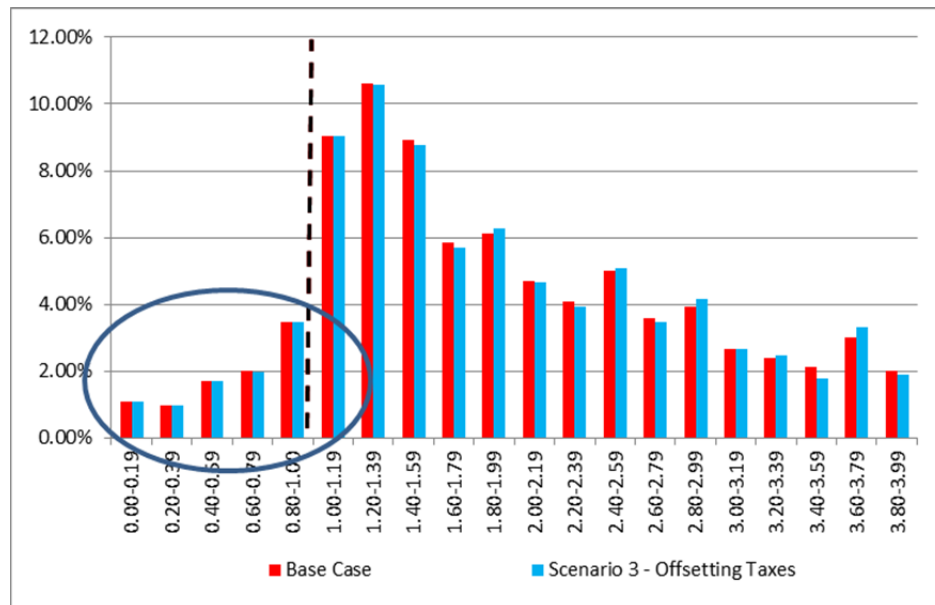
4.3.d.   Scenario 4 – Enhanced Provincial HST Credit

As shown in Table 17, Scenario 4 involves the same tax rates and income tax brackets that were considered in Scenario 1 but it increases the amounts transferred under the provincial HST credit. Specifically, the tax credit amount for adults is increased from $40 to $500 and the credit for children is increased from $60 to $190, while the income threshold over which the credit is clawed back increases from $15,000 to $20,000. The budgetary effect of Scenario 4 is given by Table 18.

For Scenario 4, Table 19 presents the summary indicators utilized for assessing the degree of progressivity associated with personal income taxes only by comparing the move from total income to disposable income. The RS index (0.0531) increases from the base case estimate (0.0504), the K index (0.1928) increases from the base case estimate (0.1857) and the M-T index (1.0858) increases from the base case estimate (1.0817). These combined effects indicate that the tax changes associated with Scenario 4 stand to make the income distribution more equal and to increase the tax system's progressivity relative to the base case. The scenario's ability to

promote equity is evidenced by the fact that the difference between the pre-tax and pre-transfer Gini coefficient (0.3980) exceeds the post-tax Gini coefficient (0.3463) by 0.0517, which exceeded the 0.0490 change observed in the base case. There does seem to be a small decrease in horizontal inequity as reflected by the Atkinson-Plotnick index increasing to 0.0021 from 0.0020 in the base case and the re-ranking index increasing to 0.0015 from 0.0014 in the base case.

Table 17: Tax System Changes in Scenario 4 Relative to Base Case

Marginal Tax Rate Base Case	Income Bracket Base Case	Marginal Tax Rate Scenario 4	Income Bracket Scenario 4
7.7%	$35,008 and under	7.7%	$35,008 and under
12.5%	$35,009 to $70,015	12.5%	$35,009 to $70,015
13.3%	$70,016 and over	13.3%	$70,016 to $100,000
		13.8%	$100,001 to $160,000
		14.3%	$160,001 to $220,000
		17.6%	Over $220,000
Other Changes			
NL HST Credit	Unchanged for Base Case	NL HST Credit - Enhanced	Higher basic adult rate ($40 to $500) and child rates ($60 to $190) and higher income ($15,000 to $20,000) before claw back of the credit for Scenario 4
New NLMBM Credit	Not Introduced in Base Case	New NLMBM Credit	Not Introduced in Scenario 4
Basic Personal Exemption	Unchanged for Base Case	Basic Personal Exemption	Unchanged for Scenario 4
Surtax	Not Introduced in Base Case	Surtax	Not Introduced in Scenario 4

Table 18: Budgetary Impacts of Scenario 4 for 2015

Scenario 4 Summary (NL - 2015)	Base ($M)	Scenario 4 ($M)	Net Change ($M)
Provincial Taxes	**$2,623.1**	**$2,679.4**	**$56.3**
Provincial Income Tax	$1,393.3	$1,448.0	$54.7
Provincial Commodity Tax	$1,229.8	$1,231.4	$1.6
Provincial Transfers	**$462.1**	**$518.4**	**$56.3**
Family Programs	$11.4	$11.4	$0.0
Elderly Programs	$48.0	$48.0	$0.0
Worker's Compensation	$143.7	$143.7	$0.0
Social Assistance	$243.0	$243.0	$0.0
Other Prov. Transfers	$14.1	$14.1	$0.0
Prov. Refundable Credits	$1.9	$74.5	$56.3
NLMBM Credit	$0.0	$0.0	$0.0
Provincial Net Balance	**$2,161.0**	**$2,161.0**	**$0.0**

The impact of transfer changes are calculated by comparing the move from market income to total income because the only difference between the two income distributions is the presence of transfers, as the impacts of taxes are not yet incorporated.   For the effects of transfers only, notice that the pre-tax and pre-transfers Gini coefficient (0.5210) exceeds the post-transfer Gini coefficient (0.3969) by 0.1241, which is larger than the 0.1220 estimate for the base case. This indicates that the provision of transfers makes the distribution of income in Newfoundland and Labrador more equal than it would be without a tax/transfer system but also more than it would be under the base case scenario. The transfer component of the personal income tax system increases progressivity and reduces inequality as indicated by the RS index of 0.1301 which has increased from 0.1280 in the base case, the K index of -0.8351 which increased in absolute value from -0.8329 in the base case and the M-T index of 1.2591 which has increased from 1.2547 in the base case. There does seem to be a small reduction in horizontal inequity as reflected by the fall in the re-ranking index to 0.0060 from 0.0061 in the base case.

Table 19: Scenario 4 for 2015: Equity and Progressivity Impacts

Indicator	Scenario 4 Value in Moving from Total Income to Disposable Income (Taxes)	Scenario 4 Value in Moving from Market Income to Total Income (Benefits)	Scenario 4 Value in Moving from Market Income to Disposable Income (Taxes Minus Benefits)
Pre-tax Gini	0.3980	0.5210	0.5210
Post-tax Gini	0.3463	0.3969	0.3454
Average Tax Rate, Benefit Rate or Net Tax Rate	0.2159	-0.1846	0.0715
Reynolds-Smolensky Index (RS)	0.0531	0.1301	0.1853
Kakwani Progressivity Index (K)	0.1928	-0.8351	2.4063
Re-ranking (RR)	0.0014	0.0060	0.0097
Musgrave-Thin Progressivity Index (MT)	1.0858	1.2591	1.3666
Atkinson-Plotnick Index (AP)	0.0021	0.0076	0.0141

The combined effects of taxes and transfers are calculated through analyzing the move from market income to disposable income. The change in the pre-transfer Gini coefficient and the post-transfer Gini coefficient is 0.1756, which increased from 0.1709 in the base case. This increase indicates a reduction in income inequality over that which would prevail with market incomes only and that which prevails in the base case. The increase in equality associated with the tax/transfer system can be decomposed into two components – 70.7% (0.1241/0.1756) due to the transfer system and 29.4% (0.0517/0.1756) due to the tax system.

For Scenario 4, the degree of progressivity of the income tax/transfer system has increased over the base case as illustrated by a positive value for the RS index (0.1853) that is larger than in the base case estimate (0.1806) and the M-T index (1.3666) increases from the base case estimate (1.3693). There does seem to be a small increase in horizontal inequity as reflected by the increase the Atkinson-Plotnick index to 0.0141 from 0.0138 in the base case.

While the summary indicators demonstrate that the changes considered in Scenario 4 engender a more equal income distribution and an increase in the progressivity of the tax system, Figure 57 indicates that Scenario 4 also reduces the incidence of the "poorest of the poor." However, the impact is not as dramatic as was estimated for Scenario 1. In other words, although Scenario 4 would result in greater transfers to low-income earners, it does not fix the issues identified above with the HST credit. That is, it does not help the poorest groups in society as much as the NLMBM credit. Specifically, it is does not equivalize for family size and is not necessarily targeted at those most in need. The NLMBM can be precisely focused on people with income below the threshold level of income associated with poverty in Newfoundland and Labrador. To facilitate more social inclusion, the NLMBM gives relatively more weight to the poorest of the poor.

Figure 57: After-Tax/Transfers Income Distribution – Base Case Compared to Scenario 4 (Taxes and Enhanced HST Credit)
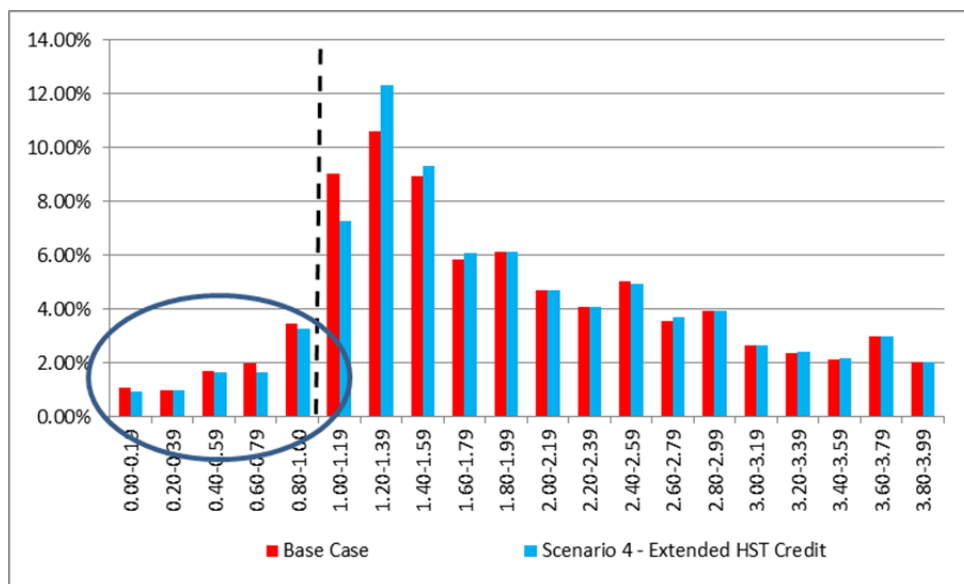
4.3.e. Scenario 5 - Surtax

Scenario 5 is the final scenario considered in this analysis. It involves eliminating the provincial HST credit and replacing it with a new provincial NLMBM credit. This new credit will be funded through the $1.9 million savings that will result from eliminating the provincial HST credit and through the imposition of a surtax of 12.7% on provincial income taxes payable above the threshold for income taxes paid at the highest tax bracket. For Newfoundland and Labrador taxpayers, the highest tax bracket, pre-Budget 2015, starts at $70,015 taxable income and has a tax payable amount of $7,071.49. The surtax is an additional 12.7% levy for tax payable above

the threshold, which implies a marginal tax rate for the highest taxpayers of 15%.[130] The detailed description for Scenario 5 is provided in Table 20. The NLMBM is identical to that which has already been described for Scenario 1.

Table 20: Tax System Changes in Scenario 5 Relative to Base Case

Marginal Tax Rate Base Case	Income Bracket Base Case	Marginal Tax Rate Scenario 5	Income Bracket Scenario 5
7.7%	$35,008 and under	7.7%	$35,008 and under
12.5%	$35,009 to $70,015	12.5%	$35,009 to $70,015
13.3%	$70,016 and over	13.3%	$70,016 and over
Other Changes			
NL HST Credit	Unchanged for Base Case	NL HST Credit	Eliminated for Scenario 5
New NLMBM Credit	Not Introduced in Base Case	New NLMBM Credit	Introduced in Scenario 5
Basic Personal Exemption	Unchanged for Base Case	Basic Personal Exemption	Unchanged for Scenario 5
Surtax	Not Introduced in Base Case	Surtax 12.7% for tax payable at the highest income threshold	Introduced in Scenario 5

Table 21: Budgetary Impacts of Scenario 5 for 2015

Scenario 5 Summary (NL - 2015)	Base ($M)	Scenario 5 ($M)	Net Change ($M)
Provincial Taxes	**$2,623.1**	**$2,678.0**	**$54.9**
Provincial Income Tax	$1,393.3	$1,448.2	$54.9
Provincial Commodity Tax	$1,229.8	$1,229.8	$0.0
Provincial Transfers	**$462.1**	**$516.9**	**$54.8**
Family Programs	$11.4	$11.4	$0.0
Elderly Programs	$48.0	$48.0	$0.0
Worker's Compensation	$143.7	$143.7	$0.0
Social Assistance	$243.0	$243	$0.0
Other Prov. Transfers	$14.1	$14.1	$0.0
Prov. Refundable Credits	$1.9	$0.0	-$1.9
NLMBM Credit	$0.0	$56.7	$56.7
Provincial Net Balance	**$2,161**	**$2,161.1**	**$0.1**

It should be acknowledged that Scenario 5 places a higher tax burden on the highest earners by instituting a surtax on tax payable on income earned over the highest tax bracket threshold under the base case — that is, on income over $70,015.   The main difference between Scenario 1 and Scenario 5 is that the latter institutes a surtax whereas Scenario 1 creates three new rates

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[130] The $7,071.49 tax payable is calculated as follows: 7.7% is payable on the first $35,008 (=$2,695.62); 12.5% is payable on income between $35,008 and %70,015 (=$4,375.86). For incomes above the highest bracket, the marginal tax rate would 13.3% plus an additional 12.7% for a marginal tax rate of 15.0% on the highest income group.

applied to the three new tax brackets specified. The essential difference is who pays for new transfer spending – for Scenario 5, the most affluent households pay a higher share.

As illustrated in Table 21, Scenario 5 is approximately revenue neutral, although the specific taxpayers who fund the NLMBM credit will be different than observed in Scenario 1.

For Scenario 5, the degree of progressivity associated only with personal income taxes is determined by comparing the relevant indicators for the move from total income to disposable income. This information is presented in Table 22. Given that the RS index (0.0527) increases from the base case (0.0504); the K index (0.1911) increases from the base case (0.1857); and the M-T index (1.0852) increases from the base case (1.0817), the personal income tax system is more progressive and the income distribution is more equal with Scenario 5 than with the base case. As well, the difference between the pre-tax and pre-transfer Gini coefficient (0.3984) exceeds the post-tax Gini coefficient (0.3472) by 0.0512, which is larger than the change recorded with the base case estimate (0.0490). There does seem to be a small increase in horizontal inequity as reflected by the increase in the Atkinson-Plotnick index to 0.0021 from 0.0020 in the base case) and the increase in the re-ranking index to 0.0015 from 0.0014 in the base case).

Table 22: Scenario 5 for 2015: Equity and Progressivity Impacts

Indicator	Scenario 5 Value in Moving from Total Income to Disposable Income (Taxes)	Scenario 5 Value in Moving from Market Income to Total Income (Benefits)	Scenario 5 Value in Moving from Market Income to Disposable Income (Taxes Minus Benefits)
Pre-tax Gini	0.3984	0.5210	0.5210
Post-tax Gini	0.3472	0.3974	0.3463
Average Tax Rate, Benefit Rate or Net Tax Rate	0.2161	-0.1835	0.0726
Reynolds-Smolensky Index (RS)	0.0527	0.1296	0.1844
Kakwani Progressivity Index (K)	0.1911	-0.8358	2.3557
Re-ranking (RR)	0.0015	0.0059	0.0096
Musgrave-Thin Progressivity Index (MT)	1.0852	1.2582	1.3648
Atkinson-Plotnick Index (AP)	0.0021	0.0075	0.0139

As noted previously, in going from the market income to total income, the changes in the income distribution and the associated indicators are due solely to the impact of transfers. The effects of transfers only on the income distribution are shown in Table 22. Notice that the pre-tax and pre-transfer Gini coefficient (0.5210) exceeds the post-transfer Gini coefficient (0.3974) by 0.1236. This has increased from 0.1220 estimated in the base case. The transfer component of the personal income tax system increases progressivity and reduces inequality as indicated by the RS index of 0.1296, which increased from 0.1280 in the base case; the K index of -0.8358, which increased in absolute value from -0.8329 in the base case; and the M-T index of 1.2582, which increased from 1.2547 in the base case. There does seem to be a small reduction in horizontal inequity as reflected in the reduction of the Atkinson-Plotnick index to 0.0075 from

0.0076 in the base case and the reduction in the re-ranking index to 0.0059 from 0.0061 in the base case.

The combined impact of transfers and tax changes on the income distribution and progressivity is determined by examining the move from market income to disposable income. The change in the pre-tax and pre-transfer Gini coefficient and the post-transfer Gini coefficient is 0.1747. This has increased from 0.1709 in the base case and indicates that there is a reduction in income inequality over that which would prevail with market incomes only and that which would prevail with the base case scenario. The increase in equality associated with the current tax/transfer system can be decomposed into two components – 70.7% (0.1236/0.1747) due to the transfer system and 29.3% (0.0512/0.1747) due to the tax system.

For Scenario 5, the decrease in inequality and tax/transfer system's degree of progressivity is illustrated by positive and higher values for the RS index (0.1844) relative to that which occurred with the base case (0.1806) and the M-T index (1.3648), which has increased from the base case estimate (1.3548). There does seem to be a small, but ambiguous, impact on horizontal inequity as reflected by change of the Atkinson-Plotnick index to 0.0139 from 0.0138 in the base case and of the re-ranking index which fell to 0.0096 from 0.0097 in the base case.

Even though the summary indicators do show that the changes considered in Scenario 5 bring about a more equal income distribution and an increase in the progressivity of the tax system, Figure 58 indicates that the incidence of the "poorest of the poor" is reduced by the move from the base case.

Figure 58: After-Tax/Transfers Income Distribution – Base Case Compared to Scenario 5 (Surtax and NLMBM Credit)
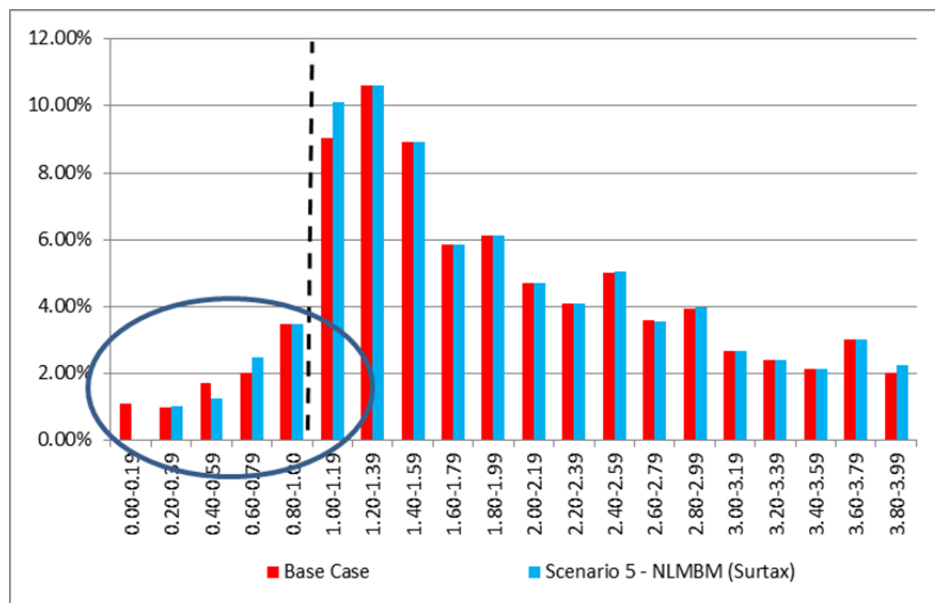
4.3.f.   Scenario Summary

The summary statistics for each of the scenarios are presented in Tables 23 to 28 and are illustrated in Figures 59 to 75. As well, Figure 76 compares Scenario 1 to Scenario 4.

Scenario 4 (the enhanced HST credit) performs the best in terms of its ability to equalize the after-tax income distribution. It is followed by the targeted NLMBM credit. The enhanced NLHST credit affects more individuals by spreading smaller amounts of transfer funds over more people in our population. Note that many of these people are above the NLMBM low-income threshold and so would not be considered "poor" by that standard. The NLMBM credit of Scenario 1 is targeted to helping the poorest of the poor by spending much more money on individuals living alone or in families that fall below the NLMBM threshold. Scenario 4 also has the larger impact on increasing progressivity of the income tax system as reflected in the Reynolds-Smolensky, the Kakwani index, and the Musgrave-Thin index. There are no substantial differences in the horizontal inequity introduced by the scenario. There is therefore an interesting trade-off between general progressivity and poverty reduction when considering which scenario best represents an increase in social well-being.

Table 23: Change in Pre-Tax/Transfer and Post-Tax/Transfer Gini Coefficients for Each Scenario

	Base Case	Offsetting Tax Rates	Increased Basic Exemption	NLMBM Credit - Surtax	NLMBM Credit – Higher Tax Rates	Extended HST Credit
Scenario #	0	3	2	5	1	4
Total to Disposable Income - Taxes	0.0490	0.0512	0.0517	0.0512	0.0516	0.0517
Market to Total Income - Transfers	0.1220	0.1220	0.1220	0.1236	0.1236	0.1241
Market to Disposable Income – Taxes and Transfers	0.1709	0.1730	0.1735	0.1747	0.1751	0.1756

Table 24: Reynolds-Smolensky Index for Each Scenario

	Base Case	Offsetting Tax Rates	Increased Basic Exemption	NLMBM Credit - Surtax	NLMBM Credit – Higher Tax Rates	Extended HST Credit
Scenario #	0	3	2	5	1	4
Total to Disposable Income - Taxes	0.0504	0.0526	0.0531	0.0527	0.0531	0.0531
Market to Total Income - Transfers	0.1280	0.1280	0.1280	0.1296	0.1296	0.1301
Market to Disposable Income – Taxes and Transfers	0.1806	0.1827	0.1833	0.1844	0.1847	0.1853

Table 25: Kakwani Index for Each Scenario

	Base Case	NLMBM Credit - Surtax	NLMBM Credit – Higher Tax Rates	Extended HST Credit	Offsetting Tax Rates	Increased Basic Exemption
Scenario #	0	5	1	4	3	2
Total to Disposable Income - Taxes	0.1857	0.1911	0.1924	0.1928	0.1934	0.1953
Market to Total Income - Transfers	-0.8329	-0.8358	-0.8358	-0.8351	-0.8329	-0.8329

Table 26: Musgrave-Thin Index for Each Scenario

	Base Case	Offsetting Tax Rates	Increased Basic Exemption	NLMBM Credit - Surtax	NLMBM Credit – Higher Tax Rates	Extended HST Credit
Scenario #	0	3	2	5	1	4
Total to Disposable Income - Taxes	1.0817	1.0853	1.0862	1.0852	1.0858	1.0858
Market to Total Income - Transfers	1.2547	1.2547	1.2547	1.2582	1.2582	1.2591
Market to Disposable Income – Taxes and Transfers	1.3568	1.3613	1.3624	1.3648	1.3657	1.3666

Table 27: Atkinson-Plotnick Index for Each Scenario

	Base Case	NLMBM Credit – Higher Tax rates	NLMBM Credit - Surtax	Offsetting Tax Rates	Increased Basic Exemption	Extended HST Credit
Scenario #	0	1	5	3	2	4
Total to Disposable Income - Taxes	0.0020	0.0021	0.0021	0.0020	0.0020	0.0021
Market to Total Income - Transfers	0.0076	0.0075	0.0075	0.0076	0.0076	0.0076
Market to Disposable Income – Taxes and Transfers	0.0138	0.0138	0.0139	0.0139	0.0140	0.0141

Table 28: Re-Ranking Effect Index for Each Scenario

	Base Case	NLMBM Credit – Higher Tax rates	NLMBM Credit - Surtax	Offsetting Tax Rates	Increased Basic Exemption	Extended HST Credit
Scenario #	0	1	5	3	2	4
Total to Disposable Income - Taxes	0.0014	0.0014	0.0015	0.0014	0.0021	0.0014
Market to Total Income - Transfers	0.0061	0.0059	0.0059	0.0061	0.0061	0.0060
Market to Disposable Income – Taxes and Transfers	0.0097	0.0096	0.0096	0.0097	0.0097	0.0097

Figure 59: Change in the Gini Index – Market to Disposable Income
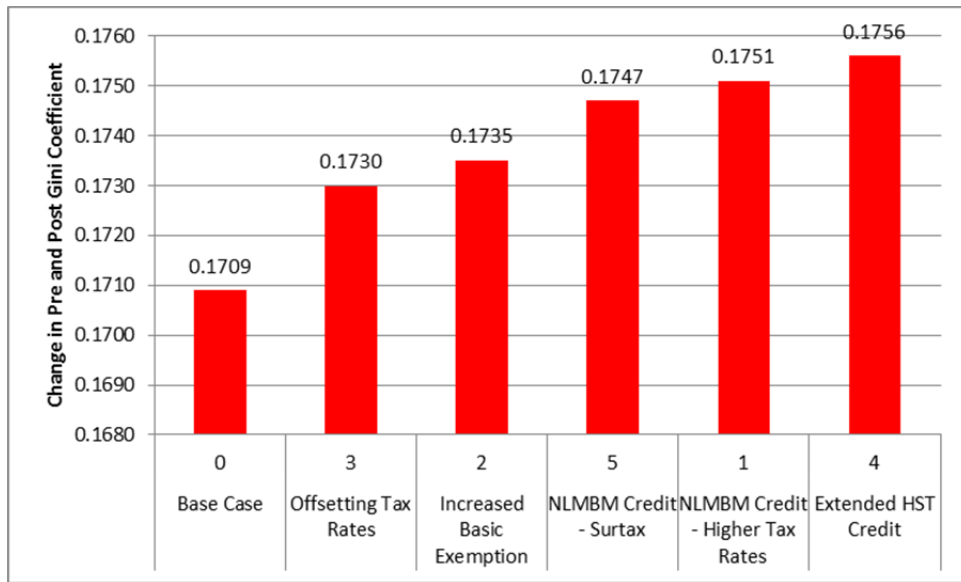
Figure 60: Change in the Gini Index – Total to Disposable Income
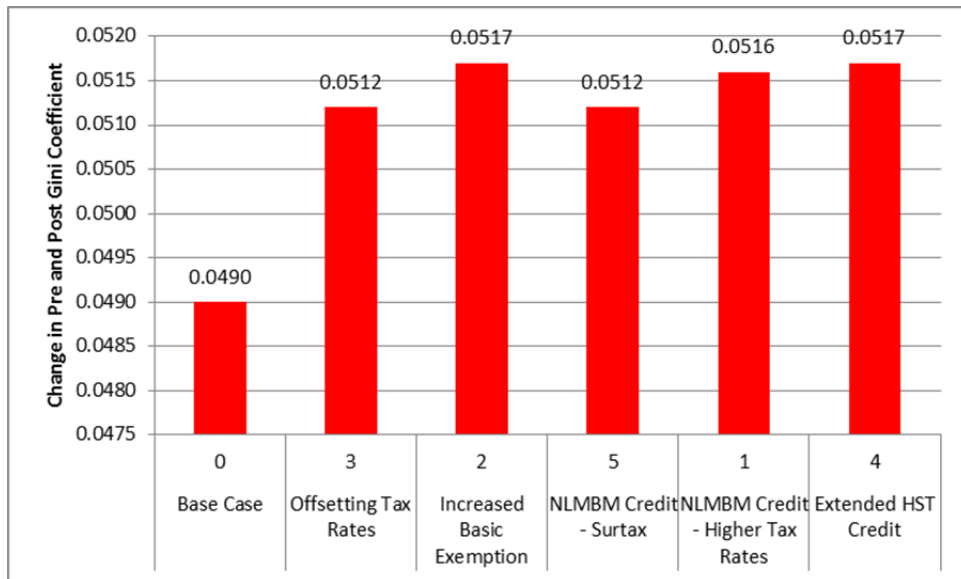
Figure 61: Change in the Gini Index – Market to Total Income
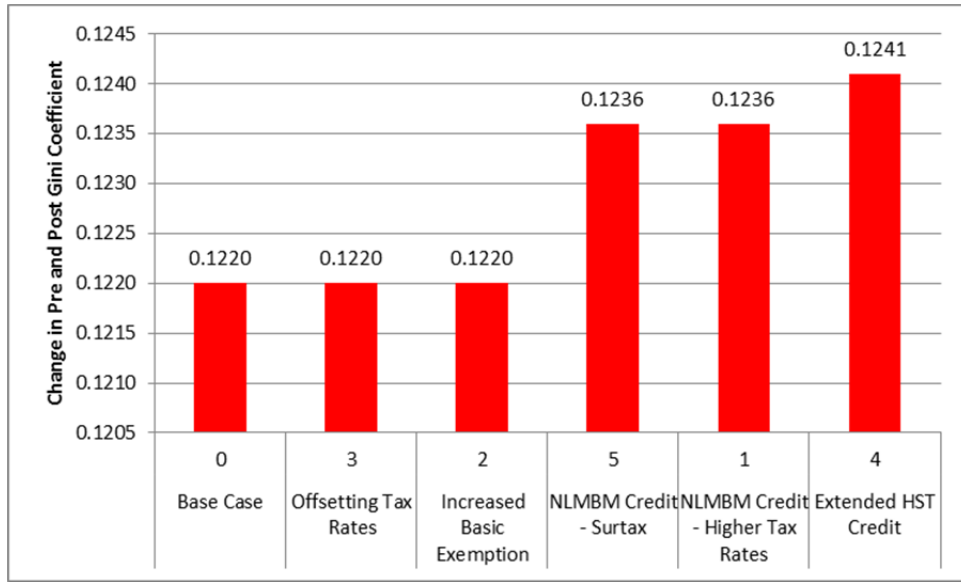
Figure 62: Reynolds-Smolensky Index – Market to Disposable Income
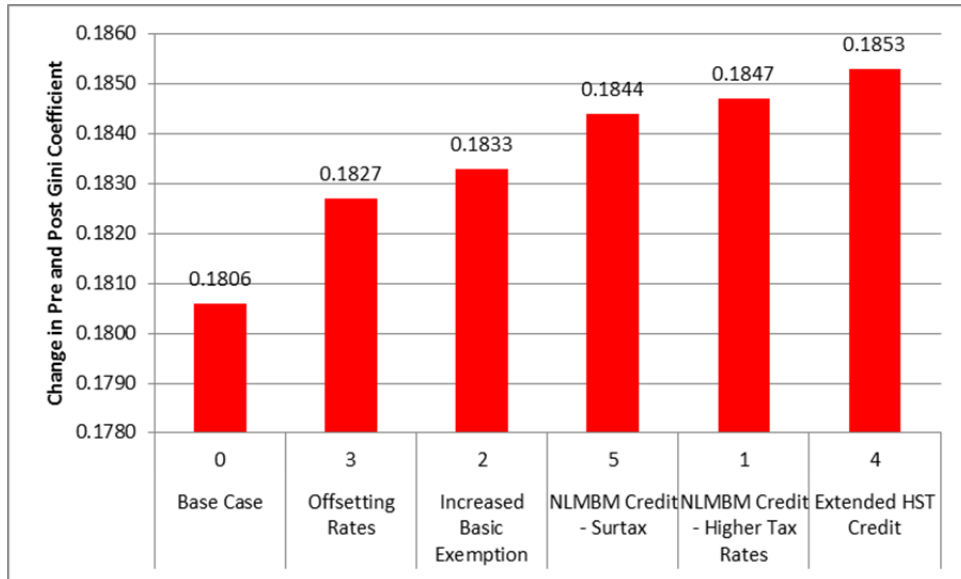
Figure 63: Reynolds-Smolensky Index – Market to Total Income

Reynolds-Smolensky Index - Market to Total Income

	Base Case (0)	Offsetting Rates (3)	Increased Basic Exemption (2)	NLMBM Credit - Surtax (5)	NLMBM Credit - Higher Tax Rates (1)	Extended HST Credit (4)
Change in Pre and Post Gini Coefficient	0.1280	0.1280	0.1280	0.1296	0.1296	0.1301
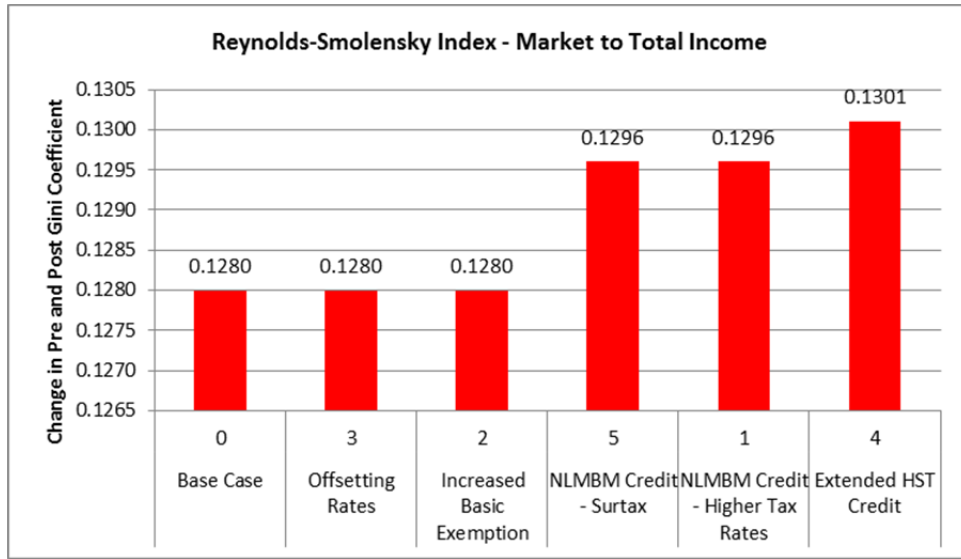
Figure 64: Reynolds-Smolensky Index – Total to Disposable Income

	Base Case (0)	Offsetting Rates (3)	Increased Basic Exemption (2)	NLMBM Credit - Surtax (5)	NLMBM Credit - Higher Tax Rates (1)	Extended HST Credit (4)
Change in Pre and Post Gini Coefficient	0.0504	0.0526	0.0531	0.0527	0.0531	0.0531
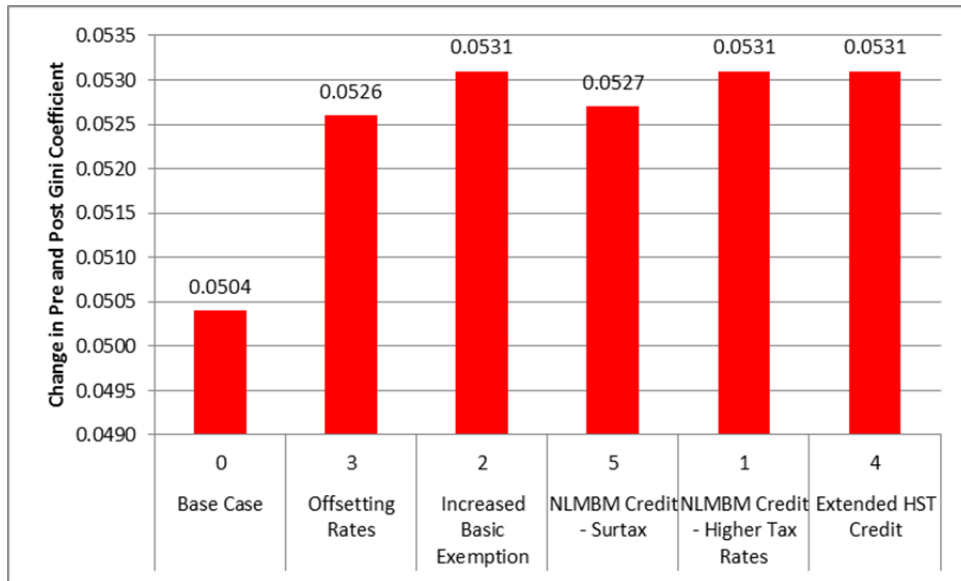
Figure 65: Kakwani Index – Market to Total Income
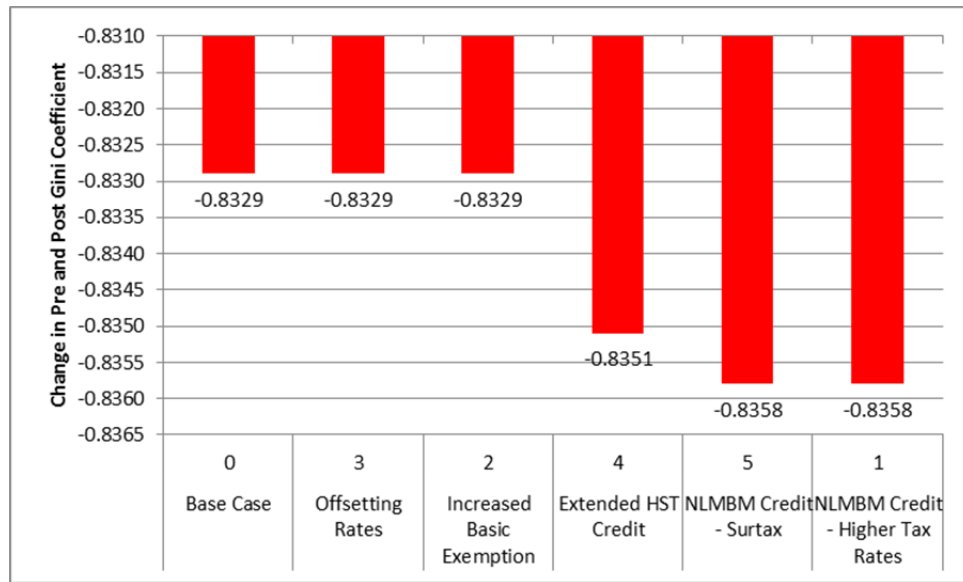
Figure 66: Kakwani Index – Total to Disposable Income
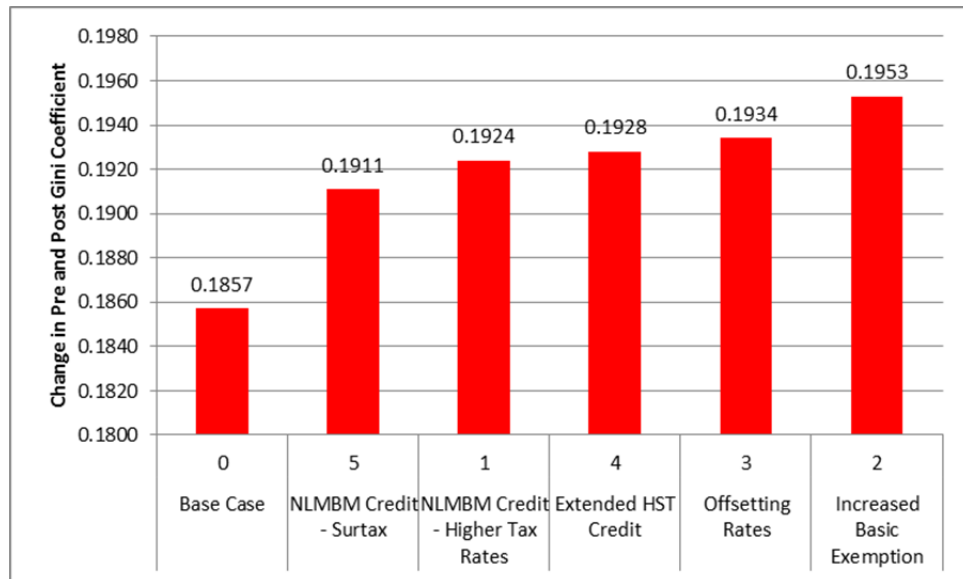
Figure 67: Mugrave-Thin Index – Market to Disposable Income
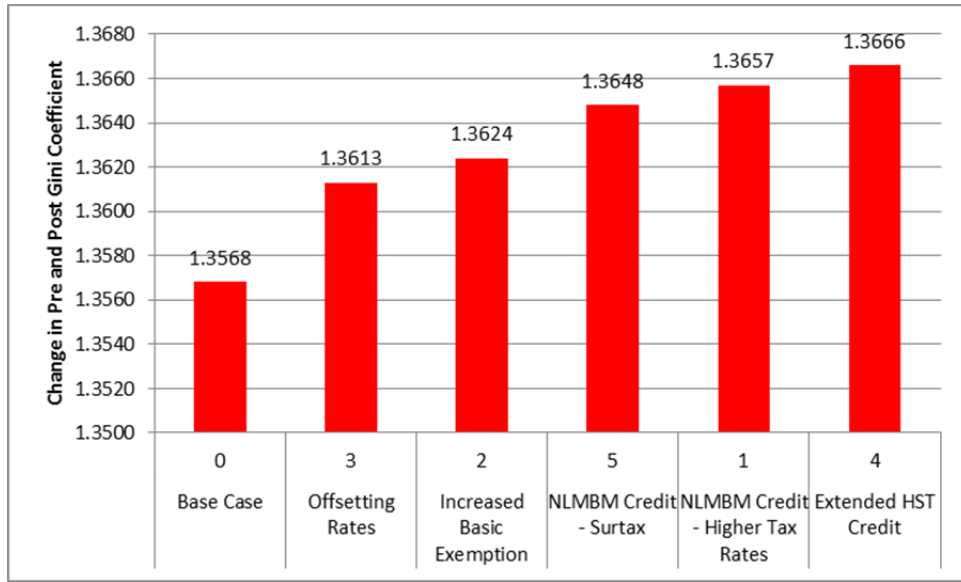
Figure 68: Mugrave-Thin Index – Market to Total Income
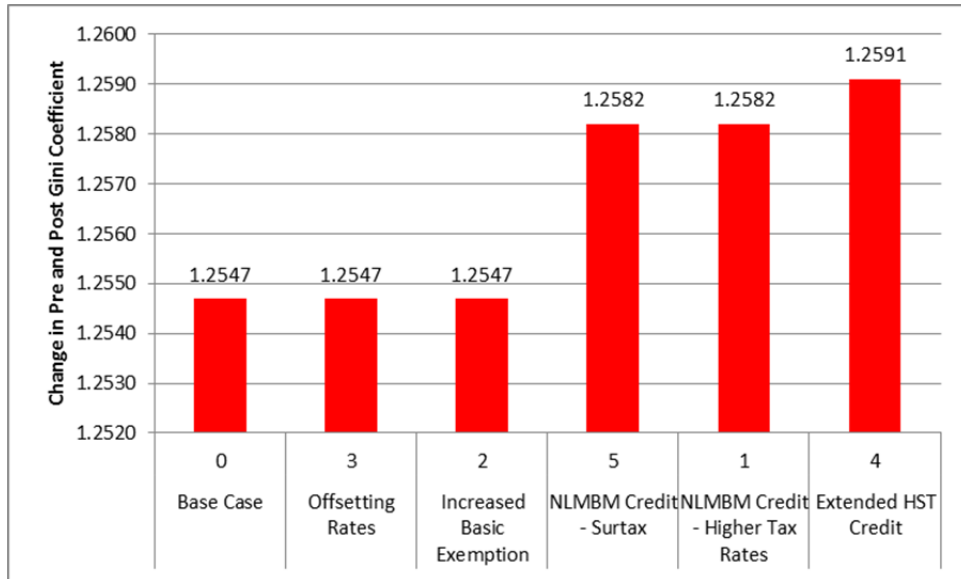
Figure 69: Mugrave-Thin Index – Total to Disposable Income
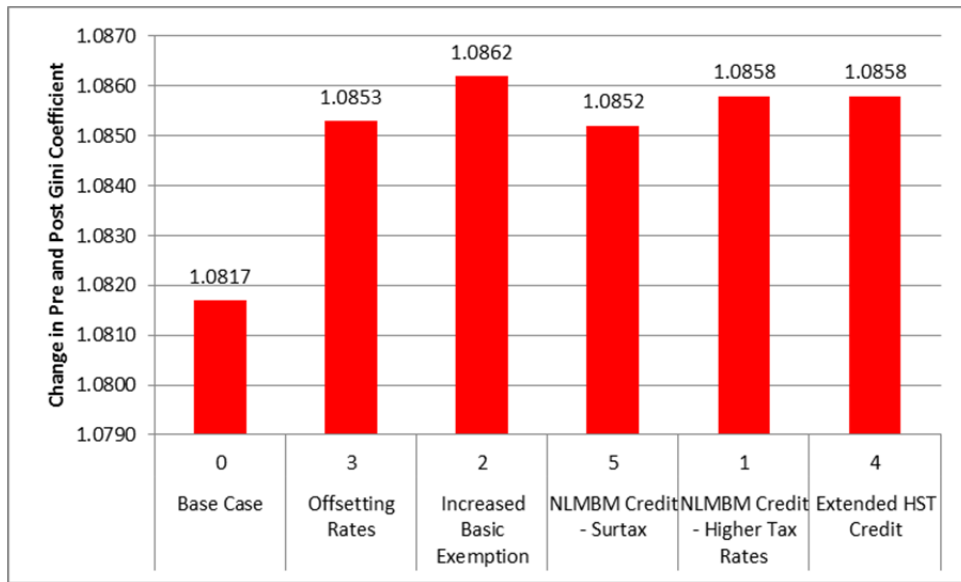
Figure 70: Atkinson-Plotnick Index – Market to Disposable Income
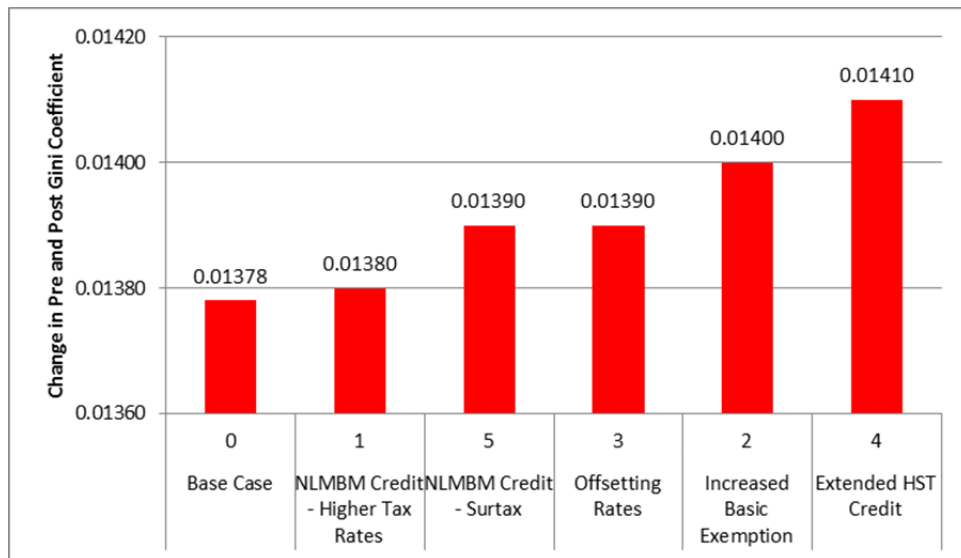
Figure 71: Atkinson-Plotnick Index – Market to Total Income

Figure 72: Atkinson-Plotnick Index – Total to Disposable Income

Figure 73: Re-Ranking Effect – Market to Disposable Income

Figure 74: Re-Ranking Effect – Market to Total Income

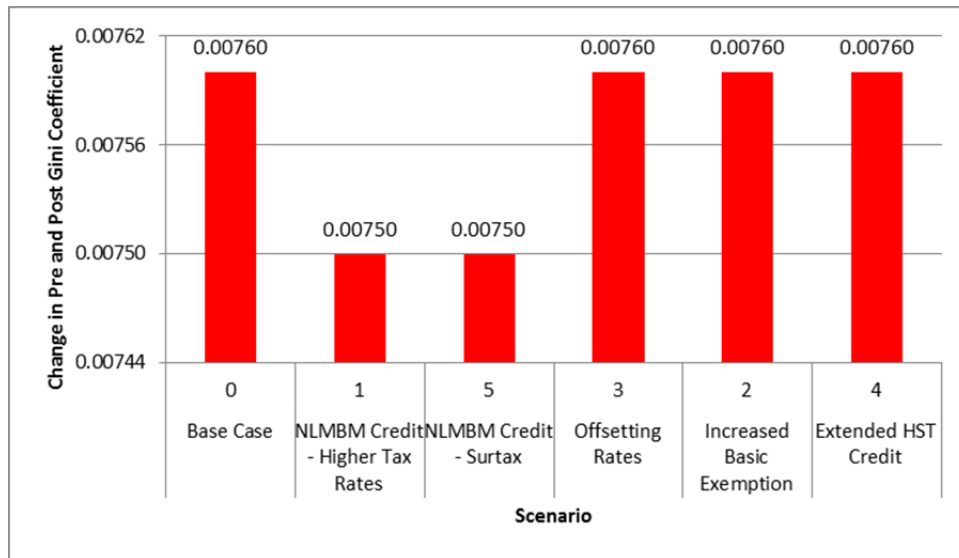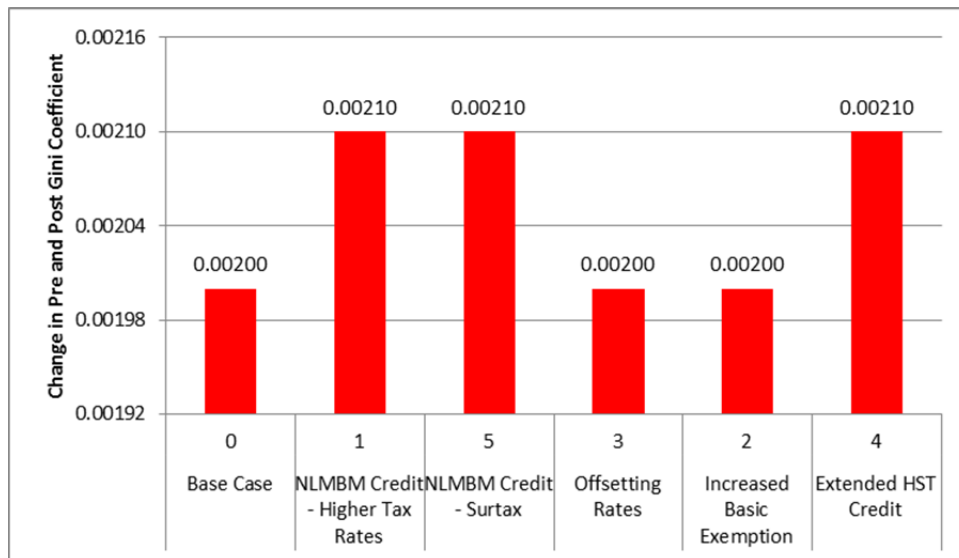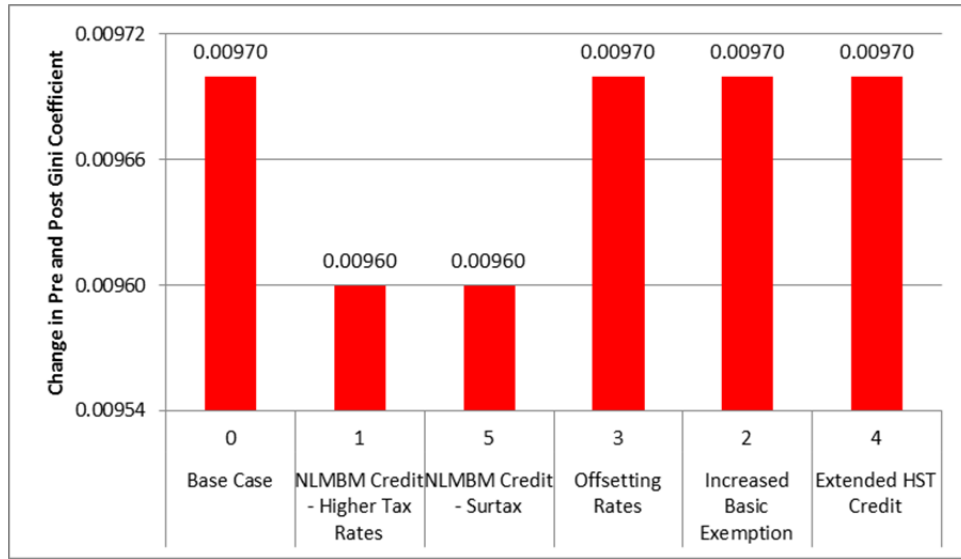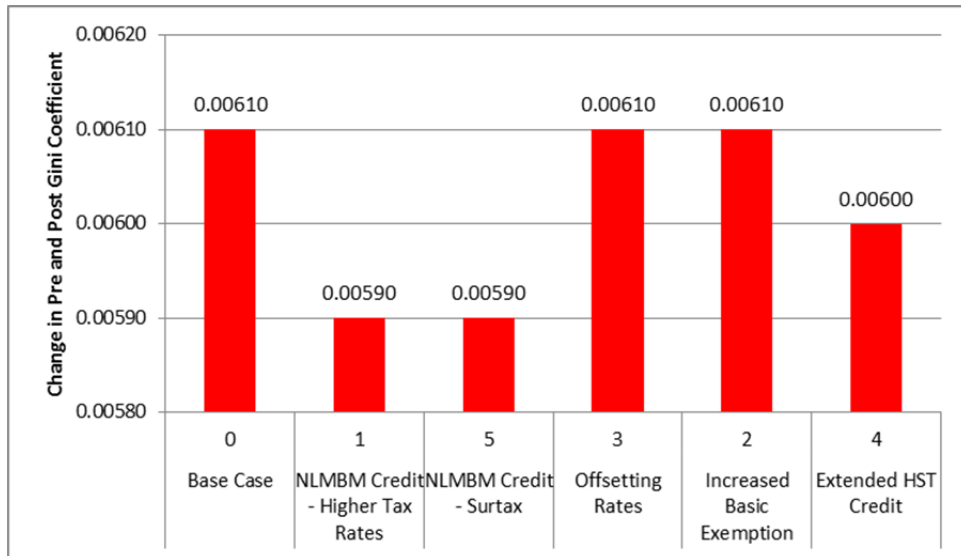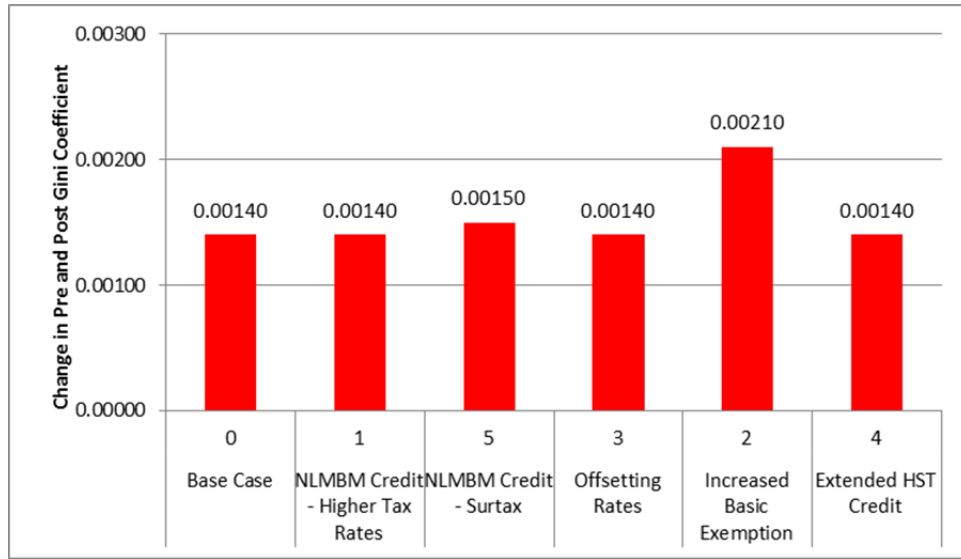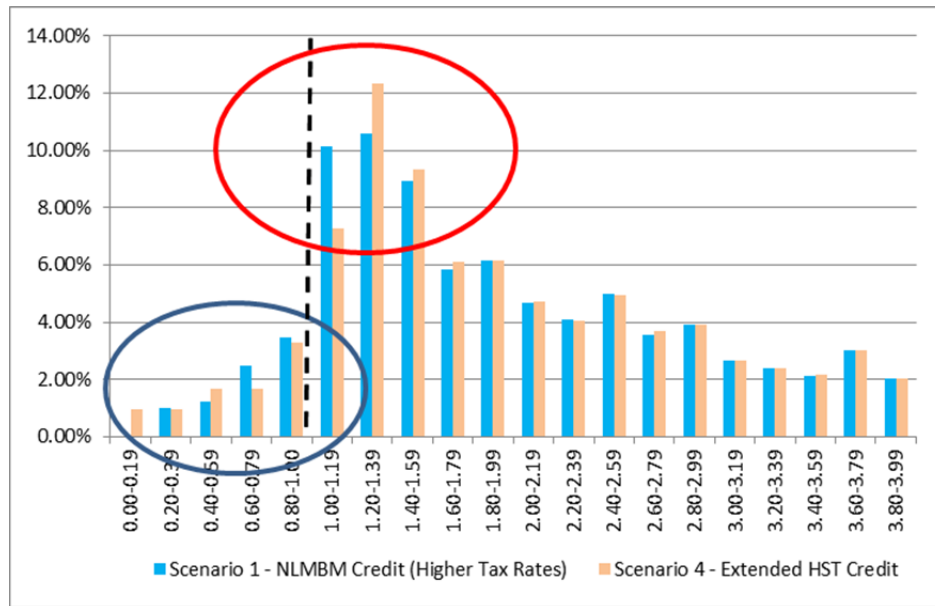**Figure 75: Re-Ranking Effect – Total to Disposable Income**

Figure 76: After-Tax/Transfers Income Distribution – Scenario 1 (Tax and NLMBM Credit Compared to Scenario 4 (Tax and Enhanced HST Credit)

5 Summary and Observations

The Collaborative Applied Research in Economics (CARE) initiative had been asked by the Government of Newfoundland and Labrador to independently review the Province's personal income tax system to assess whether or not this system met the test of fairness across income groups. Public finance economists define tax fairness in terms of vertical and horizontal equity. With respect to personal income taxes, vertical equity implies that those taxpaying units (normally individuals) with greater (taxable) income should pay a relatively greater share of their income towards taxes since their ability to pay is greater. A tax system, which is vertically equitable with average tax rates increasing as income increases, is said to be "progressive". Horizontal equity implies that those of equal ability in terms of pre-tax/transfer income should pay equal amounts of tax or equals should be treated equally.

In any income tax system, there is the challenge of deciding what one should count as taxable income. This question, in turn, engenders a complex discussion of the appropriate types and levels of exempt income, allowances, deductions and credits, which is sidestepped in this study. If one agrees with the principle of vertical equity and tax progressivity, then the practical question arises as to how many tax brackets should there be and what should be the appropriate (marginal) tax rate associated with each bracket. As an aside, the income tax base is shared between the federal and provincial governments and this constrains the feasible options that can be considered for improving the progressivity of the income tax system.

The need for a review of personal income tax fairness may have been generated by discussions in the international and national media about growing income inequality in most industrialized countries, particularly the United States. Figure 2 demonstrated that income inequality had increased in nine of the 10 provinces over almost 35 years, with Prince Edward Island being the exception and Newfoundland and Labrador the increase being very modest. One might suspect that such growing income inequality would be more pronounced in Newfoundland and Labrador because of the development and production associated with its offshore oil resources.

While other factors might have been involved, it is interesting to discover that the development of Newfoundland and Labrador's petroleum resources, along with the dramatic rise in oil prices, resulted in a remarkable increase in the real standard of living across all general income groups[131]. Although not researched specifically in this paper, one could conjecture that the development of the oil and gas resources; coupled with increased oil company profits, increased corporate tax revenues and oil royalties, and enhanced public sector wages through a multiplier mechanism as well as increases in the minimum wage did permit all "boats to rise with this tide". Interestingly, the increase in inequality appeared to have taken place before 2000. However, there was an increase in the threshold of the top 1% of income earners relative to the

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[131] This statement is a generalization to which there will be individual exceptions.

median income earner since 2006 as well as a surge in this group's income share in the late 1990s. Even so, surprisingly, there was no marked increase in the total percentage of after-tax income held by the top 1% income earners in the last 15 years.

Our firm income data stops in 2012 and is not strictly comparable to previous years. Given the events of the past nine months or so with respect to the dramatic fall in world oil prices and the economic fallout associated with this decline, one might expect a reversal over the next couple of years of any modest increase in income inequality that was witnessed amongst a small segment of our population in Newfoundland and Labrador over the past few years.

Growing income inequality is a real concern for both economic and social reasons. While growing income inequality is a real phenomenon in many parts of the industrialized world, individual country and province/state experiences can differ from the general phenomenon. To date, it appears that Newfoundland and Labrador is an exception. Income inequality has not noticeably increased over the past couple of decades, even though the general standard of living has improved.

This paper, utilizing various technical indices, analyzed tax progressivity and tax fairness, the latter in terms of horizontal and vertical equity. The conclusion from this analysis is that both tax and transfers have made Newfoundland and Labrador's tax/transfer system progressive. It is generally understood, however, that the main tax policy mechanism used to promote progressivity is the personal income tax regime. It is interesting to note, however, that in terms of reducing income inequality associated with market incomes, government transfers seemed to play a greater role than taxes.

Despite the redistributive properties of by the tax/transfer system, the question of whether fairness under the personal income tax system is still an issue that remains important. The ideal distribution of income is in many senses a value judgment or, at the very least, it is a matter of subjective collective taste or opinion.

As the analysis presented in this paper showed, all provinces have progressive tax systems. However, the present personal income tax system, while delivering progressivity and horizontal equity, may still not support Newfoundlanders' and Labradorians' concept of what constitutes the ideal level of progressivity in 2015. For example, when the Department of Finance, Government of Newfoundland and Labrador recently surveyed residents about potential solutions to meet the current fiscal challenges, 68.6% of the respondents indicated increased taxation should be considered as an option. Moreover, 82.3% chose increased personal income taxes for those above certain income levels. This is an interesting finding from the survey given that, as illustrated in the results reported above, Newfoundland and Labrador's personal income tax rates were substantially below those of other provinces, with the exception of Alberta. In other words, it does appear that there may be room for changing the income tax rates to improve the progressivity of the income tax system and improve the perceived equity associated with funding public goods and services within Newfoundland and Labrador.

The objective of this study was to review the Province's personal income tax system and suggest revenue neutral changes to the provincial personal-income-tax/transfer system. As well, this paper attempted to demonstrate how one might go about assessing progressivity and tax fairness in a Newfoundland and Labrador context.

To meet the primary objective of this paper, five illustrative policy options were developed that would, if implemented, decrease income inequality through the provincial personal income tax system. These options were developed under the constraint that any scenario considered had to be revenue neutral. The analysis was undertaken for 2015. It utilized forecasts of provincial economic indicators provided by the Department of Finance, Government of Newfoundland and Labrador to provide the necessary data for Statistics Canada's simulation model, SPSD/M. In designing the increases in marginal tax rates and introducing new tax brackets,[132] the rates which existed in the other provinces were considered. The authors of this study felt that it was important to remain competitive with other provinces and not produce major behavioral impacts.[133] These behavioral impacts might be manifested in terms of tax evasion, lower productivity, or migration to another jurisdiction in response to higher taxes in Newfoundland and Labrador.

This report also addressed the issue that if revenue were to be raised by changing the tax rates and brackets applicable to the personal income tax system, then to whom would these funds be transferred to ensure that the policy would be revenue neutral. It is the opinion of the authors of this report that a natural solution would be to transfer to those most in need.

Individuals and families in this low-income group could be identified through the use of the Market Basket Measure of low-income households for each community within Newfoundland and Labrador that was developed for the Province by the Government of Newfoundland and Labrador more than a decade ago. Those in low income or "poverty" were studied by family type. The analysis presented in this report demonstrated that the incidence of low income had diminished over time, but it still existed for many individuals and families. Consequently, it remains a concern. It was also noted that the numbers of individuals and families who could be classified as being in the "poorest of the poor" group seem to be relatively constant or they were at least not affected by the improved prosperity to the same extent as other family units within Newfoundland and Labrador. With limited funds available to transfer between income groups, it was decided to analyze, in Scenario 1, how to transfer to those most in need by utilizing the NLMBM low-income threshold for the Province.

The following five scenarios beyond the existing base case were considered:

Scenario 1.   Enhanced low-income credit (NLMBM) funded by increased tax rates and tax brackets at the upper end of the income distribution;

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132 This was developed before any survey results were available.
133 These behavioral impacts are potentially important, but due to time constraints and the complexity of programming them into our simulation model, they were not analyzed.

Scenario 2.   Lower basic personal exemption funded by higher tax rates and brackets at the upper end of the income distribution;

Scenario 3.   Reduced tax rates for lower income individuals funded by higher tax rates and brackets at the upper end of the income distribution;

Scenario 4.   Enhanced HST credits funded by higher tax rates and brackets at the upper end of the income distribution; and

Scenario 5.   Enhanced low-income credit (NLMBM) funded by a surtax on the highest income tax bracket.

While all the scenarios increased the progressivity of the tax system, Scenario 4 seemed to dominate. This scenario was an extension of the existing NLHST credit. Scenario 1 was second in terms of the contribution to reducing after-tax income inequality. An interesting trade-off emerged. Scenario 4 probably reduced income inequality more than Scenario 1 because it affected more people, whereas Scenario 1 affected fewer people, but was targeted at those most in need. Scenario 1 was better at fighting poverty. Atkinson (2015, p. 15) quotes Martin Feldstein, former chairman of the Council of Economic Advisors in the U.S., who states "the emphasis should be on eliminating poverty and not on the overall distribution of income or the general extent of inequality."[134]

This research has revealed some unanswered questions and a desire for further research. Specifically, it is important to attempt to model potential behavioral impacts within SPSD/M. This is a complex task. Associated with this effort is a need to trace the impacts on individuals of any tax/transfer changes that might be introduced. Secondly, the provincial government through its anti-poverty program does have a number of initiatives to help those most in need, including direct income support, housing and rent subsidies, transportation, and medical drugs assistance. While cash transfers are recorded in total income in the SPSD/M simulations, transfers-in-kind are not. Ideally, they should be. While not part of the purpose of this review, in general, research in this area should follow the current OECD social accounting perspective of including all social transfers in-kind to individuals. This practice will enhance our understanding of who is benefitting and the contribution that these transfers make to social progress.

Some readers may be disappointed that this paper does not make a particular recommendation as to a specific policy to follow. Rather, the scenarios provided are examples or illustrations of different types of policy options to reduce income inequality, should that be deemed to be desirable. The tax increases in the scenarios considered were to some degree arbitrary. A more real world assessment may see decision-makers increasing these rates, decreasing them or dismissing the scenarios completely. As well, scenarios could be combined for many reasons. The mandate of this study was not to make a recommendation, but to inform the public and the

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[134] Feldstein, (2005, p. 12).

decision-makers and, by doing so, to promote informed discussion on this issue. Hopefully, this study was successful, at least when measured against this metric of facilitating informed debate!

Post Script –Budget 2015

The Government of Newfoundland and Labrador's budget for 2015 was released at the end of April. Since a final version of this paper had not been compiled at that time, it was decided to compare the changes suggested in Budget 2015 to the base case and to the results derived for Scenarios 1 and 4.

The Budget introduced two changes to the Personal Income Tax system, which contained features common to the two Scenarios noted above. Firstly, two new tax brackets were introduced: the first at 14.3% for taxable incomes running from $125,001 to $175,000 and the second bracket was for incomes in excess of $175,000 with a marginal tax rate of 15.3%. The tax rate increases were more modest than the ones proposed in Scenarios 1 and 4. We estimated that for 2015 these changes would produce an extra $32.7 million revenue for the Province. The second change was similar to Scenario 4 and proposed introducing an extended NLHST credit in 2016. This refundable credit raised the credit from the current $40 per adult to $300 per eligible adult but left the credit for children under 18 unchanged at $60. In addition, the "claw-back" level was doubled from $15,000 to $30,000 on "adjusted"[135] family incomes. Using SPSM this change to the NLHST credit is estimated to increase Provincial transfers by some $37 million[136].

Unlike our scenarios these changes were not intended to be revenue neutral. The extension to the NLHST credit was to assist in mitigating the impact on lower income families of the proposed increase of 2% in the HST starting in 2016. SPSM estimated that this increase in HST would have brought in another $180.5 million had it been applied in this year.

All the indicators demonstrate that while the measures introduced in Budget 2015 improve progressivity and income equality over the base case, they do not go as far as would be achieved with either Scenario 1 or Scenario 4.

Table 29: Change in Pre-Tax/Transfer and Post-Tax/Transfer Gini Coefficients – Post Budget

	Base Case	Budget	NLMBM Credit – Higher Tax rates	Extended HST Credit
Scenario #	0		1	4
Total to Disposable Income - Taxes	0.0490	0.0505	0.0516	0.0517
Market to Total Income - Transfers	0.1220	0.1232	0.1236	0.1241
Market to Disposable Income – Taxes and Transfers	0.1709	0.1736	0.1751	0.1756

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[135] "Adjusted" used here does not mean equivalized for family size, rather it is to be interpreted as taking into consideration the details of the Income Tax Act.

[136] Assuming this change had been applied to 2015 rather than 2016.

Table 30: Reynolds-Smolensky Index – Post Budget

	Base Case	Budget	NLMBM Credit – Higher Tax rates	Extended HST Credit
Scenario #	**0**		**1**	**4**
Total to Disposable Income - Taxes	0.0504	0.0505	0.0531	0.0531
Market to Total Income - Transfers	0.1280	0.1232	0.1296	0.1301
Market to Disposable Income – Taxes and Transfers	0.1806	0.1834	0.1847	0.1853

Table 31: Kakwani Index – Post Budget

	Base Case	Budget	NLMBM Credit – Higher Tax rates	Extended HST Credit
Scenario #	**0**		**1**	**4**
Total to Disposable Income - Taxes	0.1857	0.1898	0.1924	0.1953
Market to Total Income - Transfers	-0.8329	-0.8337	-0.8358	-0.8329

Table 32: Musgrave-Thin Index – Post Budget

	Base Case	Budget	NLMBM Credit – Higher Tax rates	Extended HST Credit
Scenario #	**0**		**1**	**4**
Total to Disposable Income - Taxes	1.0817	1.0841	1.0858	1.0858
Market to Total Income - Transfers	1.2547	1.2573	1.2582	1.2591
Market to Disposable Income – Taxes and Transfers	1.3568	1.3626	1.3657	1.3666

Table 33: Atkinson-Plotnick Index – Post Budget

	Base Case	NLMBM Credit – Higher Tax rates	Budget	Extended HST Credit
Scenario #	**0**	**1**		**4**
Total to Disposable Income - Taxes	0.0020	0.0021	0.0021	0.0021
Market to Total Income - Transfers	0.0076	0.0075	0.0076	0.0076
Market to Disposable Income – Taxes and Transfers	0.0138	0.0138	0.0140	0.0141

Table 34: Re-Ranking Effect Index – Post Budget

	Base Case	NLMBM Credit – Higher Tax rates	Budget	Extended HST Credit
Scenario #	0	1		4
Total to Disposable Income - Taxes	0.0014	0.0014	0.0021	0.0014
Market to Total Income - Transfers	0.0061	0.0059	0.0061	0.0060
Market to Disposable Income – Taxes and Transfers	0.0097	0.0096	0.0097	0.0097

Figure 77: Change in Pre-Tax/Transfer and Post-Tax/Transfer Gini Coefficients – Post Budget (Net Taxes)
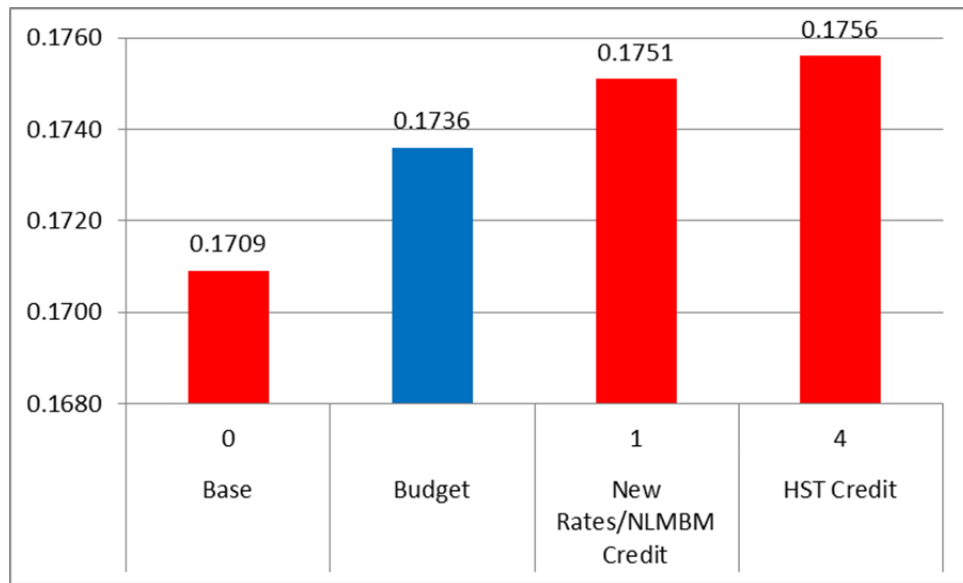
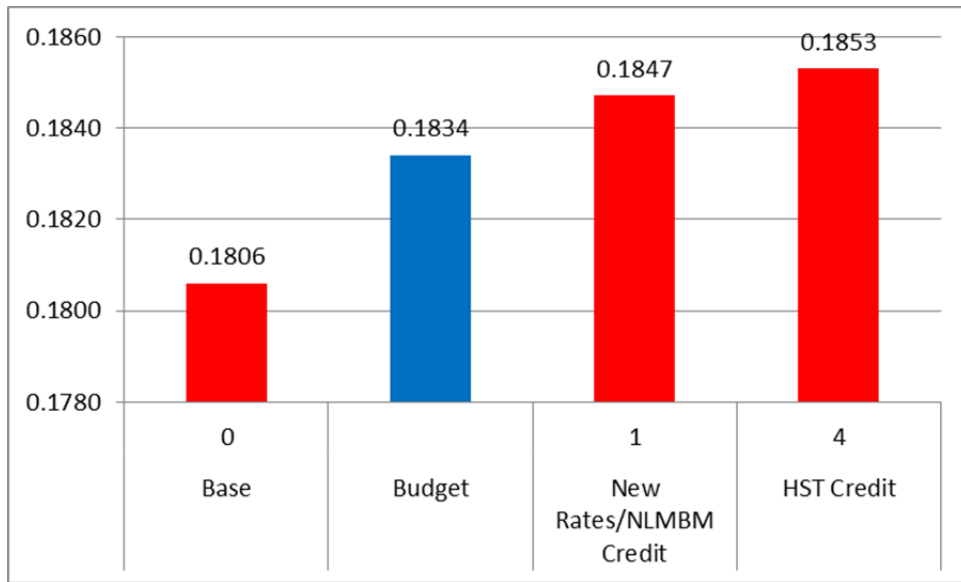Figure 78: Reynolds-Smolensky Index – Post Budget (Net Taxes)

Figure 79: Kakwani Index – Post Budget (Taxes)
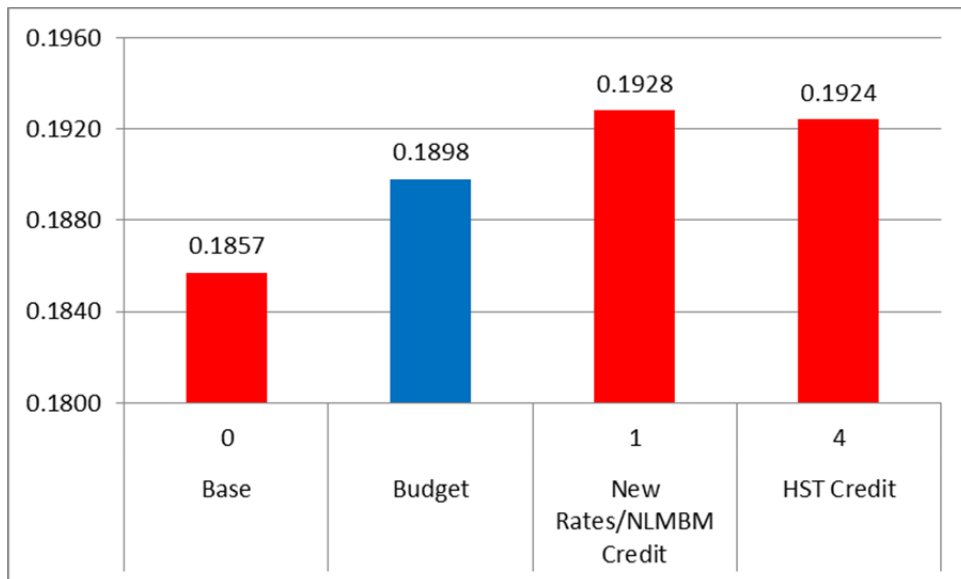
Figure 80: Kakwani Index – Post Budget (Transfers)
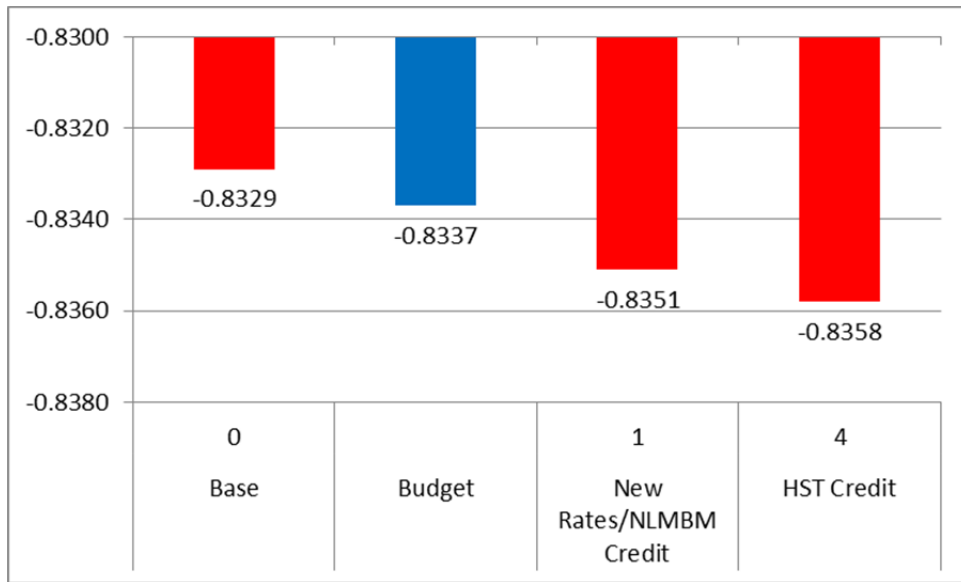
Figure 81: Musgrave-Thin Index – Post Budget (Net Taxes)
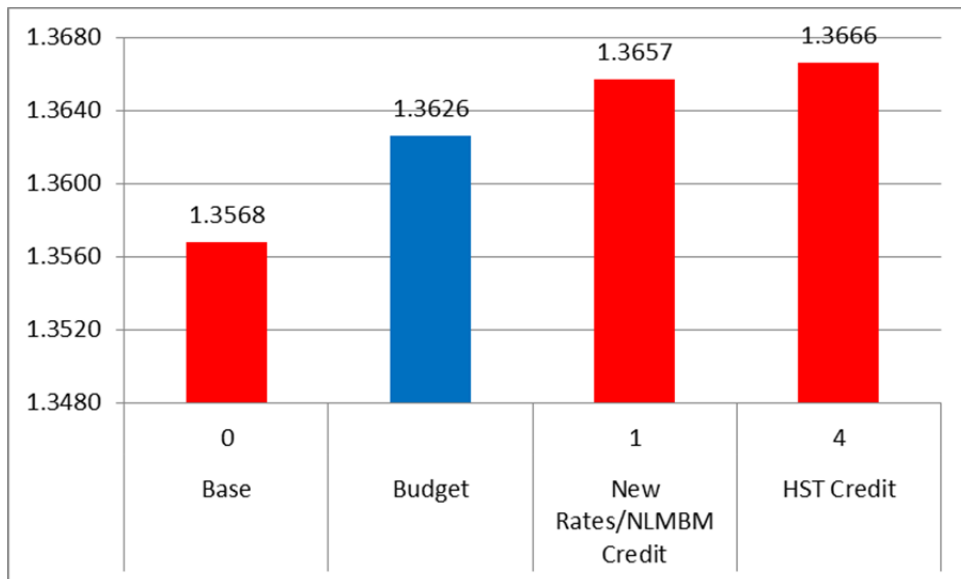
Figure 82: Atkinson-Plotnick Index – Post Budget (Net Taxes)
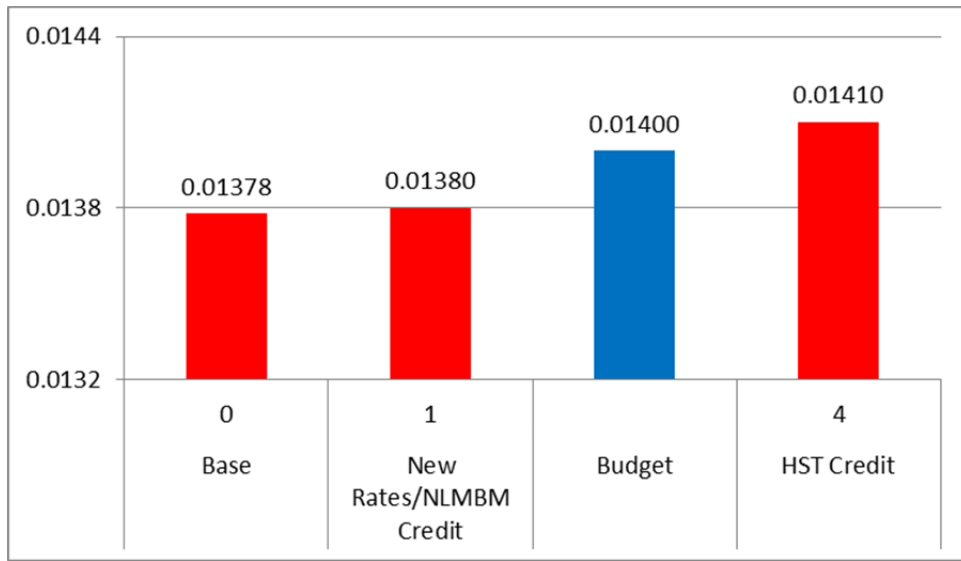
Figure 83: Re-Ranking Effect Index – Post Budget (Net Taxes)
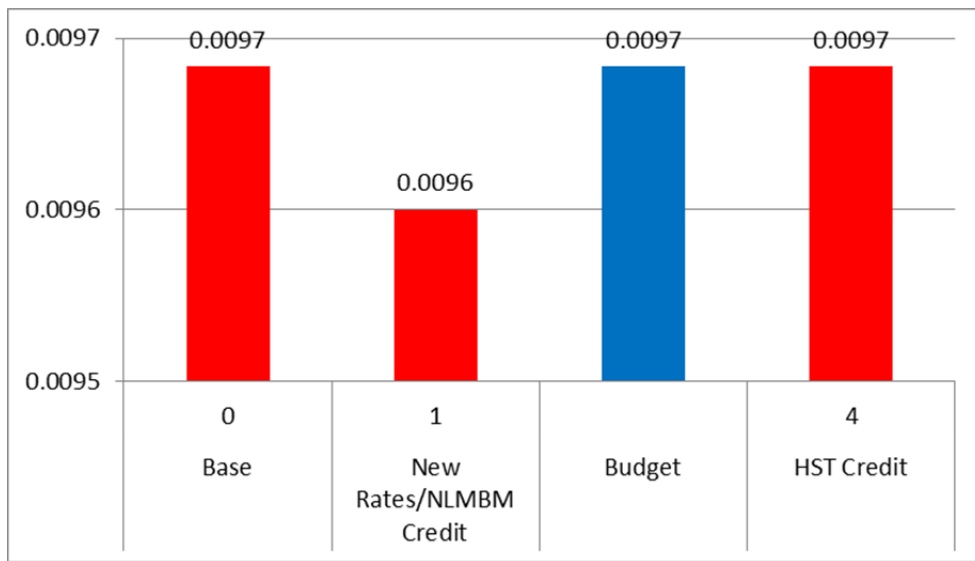
While the above analysis is informative as to the impact of those who might benefit from the extended NLHST proposed in Budget 2015, a caveat is needed since the "disposable income" used in this report accounts for the deduction of direct taxes such as payroll taxes[137] and income taxes but not commodity taxes such as the HST. The implication is that although the increase in the HST will not affect disposable income, it will affect "consumable income" and therefore, the amount of goods and services that residents can buy will be reduced. On the other hand, the amount of extended household income through government transfers-in-kind might be greater than would otherwise be the case. In any case, our analysis here does not examine the impact

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[137] Such as EI and CPP premiums made by employees.

of changes to the HST. Figure 84, compares the impact of the changes to the income tax brackets and rates as well as the extended NLHST credit outlined in Budget 2015 to what exists now as though these changes were applied to the current calendar year. We observe that those families who benefit the most are those above the NLMBM threshold. In particular, those families whose incomes are in the 1.20-1.39 range receive a significant benefit with the proposal contained in Budget 2015. We suspect that this observation may be a result of not adjusting for household size coupled with not reducing the NLHST credit for some families whose adjusted income is above the threshold, but below $30,000.

Figure 84: After-Tax/Transfers Income Distribution – Base Case Compared to Budget 2015
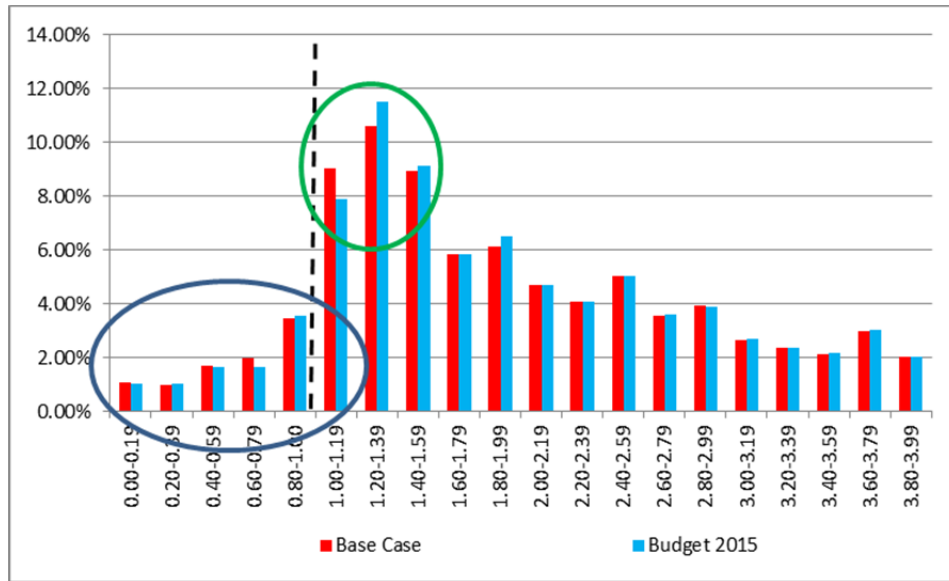
Figure 85: After-Tax/Transfers Income Distribution – Scenario 1 Compared to Budget 2015
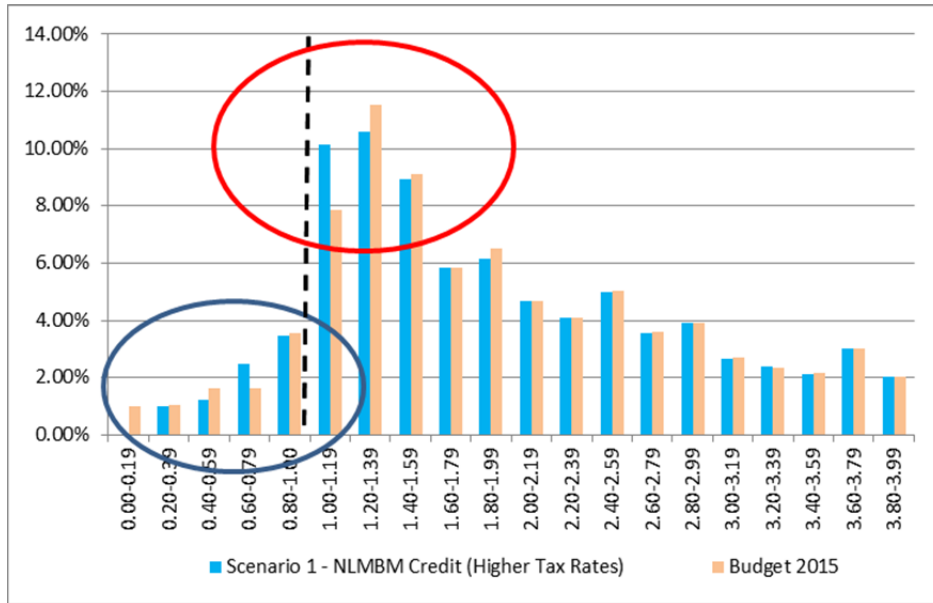
As is shown in Figure 85, Scenario 1 is much more targeted to those in poverty. However, Scenario 1 does extend the NLMBM credit to those who are up to 10% above the threshold. One could question as to whether these funds would be better spent by channeling them towards the bottom end of the distribution?

Figure 86: After-Tax/Transfers Income Distribution – Scenario 4 Compared to Budget 2015
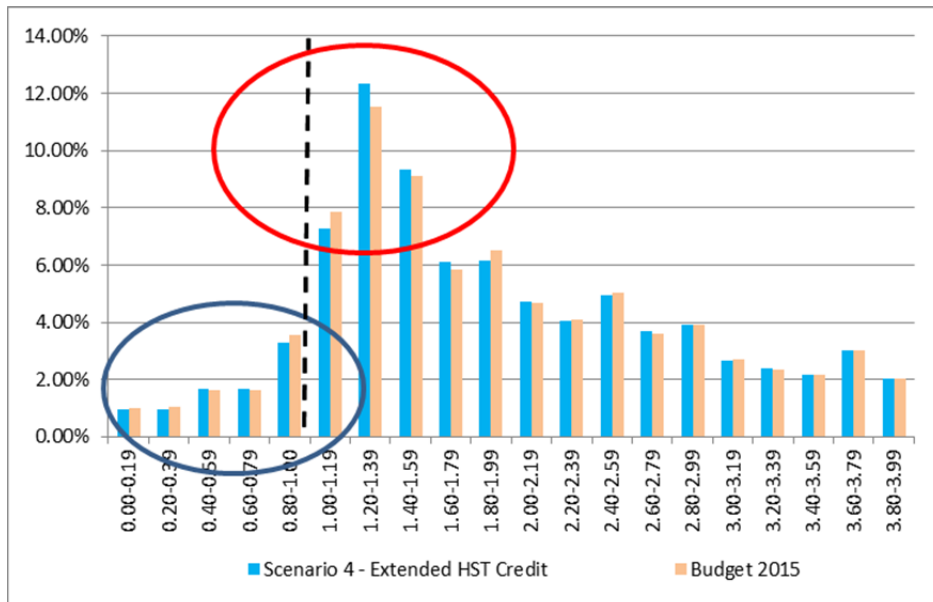
Figure 86 compares Scenario 4 and the extended NLHST. The impact is quite similar and differences may be primarily the result of differences in the level of transfers, some $20 million more under Scenario 4.

The analysis here has focused on "all families" and following the methodology of Appendix B we recommend that it would be instructive to break down the impacts by family types and to include an analysis on these families of the increase in the HST.

The objective of this post-script is to illustrate how the analytical framework developed for this Review can be used to help evaluate the impacts of proposed changes to the Income Tax Act. The analysis also permits us to relate these changes to the scenarios we proposed. We recognize that in considering changes to the Income Tax Act there are many factors that governments must consider beyond the impact on the income distribution and equity. However, the Review that Government requested us to undertake was to focus on the equity issue, the fairness of the existing system and under the constraint of revenue neutrality.

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Appendix A: Concerns with the Kakwani Index for Net Taxes

The Gini coefficient is one of the most commonly used measures for analyzing changes in the income distribution.[138] Normally, the Gini coefficient is expected to have a value between zero and one and represents the ratio of the area between the Lorenz curve and the line of perfect equality and the total area under the line of equality.[139] A Gini coefficient of 1 indicates maximum inequality, as a single person (household) in a society has all of the income and the remainder of the population has none and a Gini coefficient of 0 indicates maximum equality where everyone has exactly the same income. The Gini coefficient is a convenient summary statistic to use in the study of income inequality because the lower the number, the more equal is the income distribution.

However, when income can take on negative values, the Gini coefficient can fall outside of the zero to one range. For example, Chen et al. (1982, p. 474) recognized that the Gini coefficient could take a value outside of the normal range when incomes can take negative and positive values and suggests a normalized Gini to reflect this fact. As well, OECD (2013, p. 171) highlighted that the Gini coefficient could be greater than one when wealth (income) could take on negative values. This occurs when the Lorenz curve is "below the horizontal axis, and the area between the curve and the line of equality may be greater than one." Other studies that have raised the concern with negative income and the Gini coefficient taking a value in excess of one are Litchfield (1999, fn. 6), and Scott and Litchfield (1994).

The fact that the Gini coefficient could exceed one is not normally a problem in this type of analysis since negative incomes are normally dropped before the Gini coefficient is calculated. This is how the Progres subroutine in Stata handles negative value for income.

For illustration purposes, Table 35 has a simple income distribution and Figure 87 plots the corresponding Lorenz curve. The Gini coefficient is calculated as 0.1397 — a value that falls in the zero-one range that would normally be expected. The Gini coefficient is calculated utilizing the following formula:

$$G = \frac{1}{2*n^2*\mu} * \sum_{i=1}^{n} \sum_{j=1}^{n} \left| y_i - y_j \right|$$

where $\mu \equiv$ the mean income, $n \equiv$ number of people, y_i and y_j is the income of the ith and j^{th} person
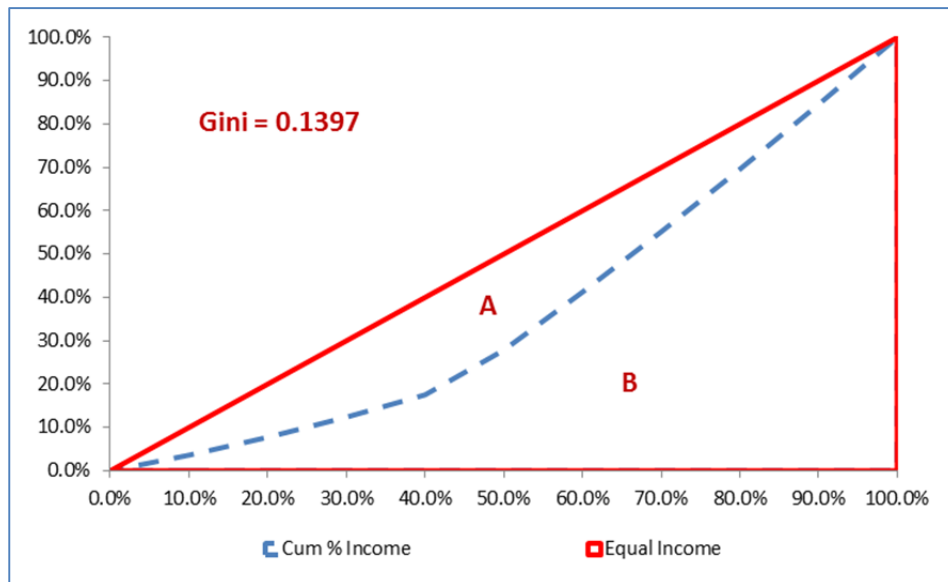
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[138] Cingano (2014, p. 13), Bastagli et al. (2012, p. 6), Wagstaff et al. (1999, p. 74), and Sharpe and Capeluck (2012, p. 4).
[139] Standing Committee on Finance (2013), Bastagli et al. (2012, fn 5), IMF (2014, p. 7), and Alves (2012, p. 43).

Taxpayer	Income
1	$70
2	$80
3	$90
4	$100
5	$200
6	$260
7	$270
8	$280
9	$290
10	$300

Figure 87: Illustrate Income Distribution with Generates a Gini Coefficient between 0 and 1


Again, for the purpose of illustration another simple income distribution is profiled in Table 36 and the corresponding Lorenz curve is illustrated in Figure 88. Notice that the income distribution has both negative and positive values, as does the income distribution utilized in this study. The Gini coefficient is calculated as the area ABD over ABC and since the Lorenz curve drops below the horizontal axis, there is no reason why this ratio should be less than or equal to one. In fact, given the income distribution considered, the area ABD exceeds ABC by 3.33% or the calculated Gini coefficient is 1.033.

Table 36: Illustrate Income Distribution with Generates a Gini Coefficient Outside the 0 and 1 Range

Taxpayer	Income
1	-$400
2	-$350
3	-$300
4	$240
5	$250
6	$260
7	$270
8	$280
9	$290
10	$300

Figure 88: Illustrate Income Distribution with Generates a Gini Coefficient Outside the 0 and 1 Range
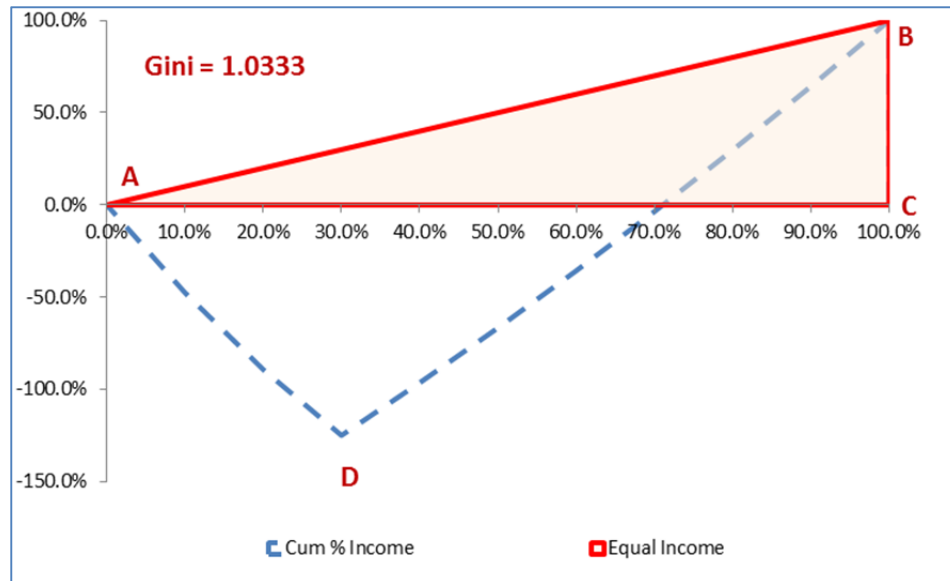
O'Donnell et al. (2008 p. 193) note that the Kakwani index is the most widely used summary measure of progressivity in both the tax and the health finance literatures. Verbist and Figari (2014, p. 5) and O'Donnell et al. (2008 p. 172) measure progressivity by the Kakwani index, which they calculate as the difference between the concentration coefficient of taxes and the Gini coefficient of pre-tax income.

While the possibility of the Gini taking a value outside of the zero-one range has been recognized for some time, the fact that the Kakwani index could take a value outside of the

acceptable range does not appear to be as well known.[140] For example, Verbist and Figari (2014, p. 12) report a Kakwani index for the Netherlands (exemptions) of 2.857.

The one exception to recognizing that the Kakwani could fall outside of the -2.0 to 1.0 range seems to be O'Donnell et al. (2008 p. 97) who indicated that, in dealing with health statistics and the Kakwani index, if the variable of interest (health in their case and income and taxes in our analysis) takes negative as well as positive values, then the concentration index is not bounded within the range of –1.0 and 1.0). This implies that the Kakwani index can fall outside the range -2.0 and 1.0, which is reported as the plausible range for the index.[141]

While the Progres subroutine in Stata does omit data points for which income is less than zero, there does not appear to be a filter applied to net taxes that switch from negative for low-income households to positive for higher income households. If the proportion of households is larger enough, the program will generate results for the Kakwani index that are outside of the theoretical range. Also, even if the results are within the -2.0 to 1.0 range, the presence of negative net taxes implies that the Kakwani index cannot be utilized to accurately reflect progressivity under these circumstances.

To illustrate our concern with the use of the Kakwani index to measure the progressivity of net taxes, we will use a simple example, where taxes are calculated as 10% of income less a $70 personal income exemption. The transfers are calculated as 70% of the taxes collected and are distributed to the taxpayers within the lowest 40% of income groups. The transfers are distributed so that the lowest income taxpayers receive the highest transfers. This information is provided in Table 37 below.

Table 37: Income, Taxes and Transfers that Yield a Kakwani Index Greater than One

	Income	Taxes	Transfers	Net Taxes
1	$70	$0	$25.53	-$25.53
2	$80	$1	$22.98	-$21.98
3	$90	$2	$20.42	-$18.42
4	$100	$3	$17.87	-$14.87
5	$200	$13		$13.00
6	$260	$19		$19.00
7	$270	$20		$20.00
8	$280	$21		$21.00
9	$290	$22		$22.00
10	$300	$23		$23.00
Sum		**$124**	**$86.80**	**$37.20**

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[140] Wagstaff (2005, p. 429) emphasized that when the health sector variable whose inequality is being investigated is binary, the range of the possible values of the concentration index outside of the zero-one range.
[141] Smith (2001, p. 265), Verbist and Figari (2014, fn 3) and O'Donnell et al. (2008 p. 172) all report that the plausible range for the Kakwani index is -2 to 1.

Figure 89 illustrates the calculation of the concentration coefficient for taxes and the corresponding Kakwani index. The value of taxes is calculated as 0.0788, a value within the plausible range. Likewise, Figure 90 involves calculating the concentration coefficient and the Kakwani index for transfers. The estimate Kakwani index is -0.5191, which, again, is in the plausible range. Finally, the Kakwani index and concentration coefficient for net taxes (that is, taxes minus transfers) is calculated in Figure 91. The estimated value is 1.4741, which exceeds the upper limit of the theoretical range.

As Table 37 illustrates, with net taxes, the series is negative and then turns positive so the Lorenz curve dips below the horizontal axis. Since the area bounded by the net tax concentration curve exceeds the area bounded by the pre-tax Lorenz curve, the concentration coefficient can exceed one and will yield results outside of the theoretical range. To avoid this problem, we ignore the Kakwani index when estimating the progressivity associated with net taxes.

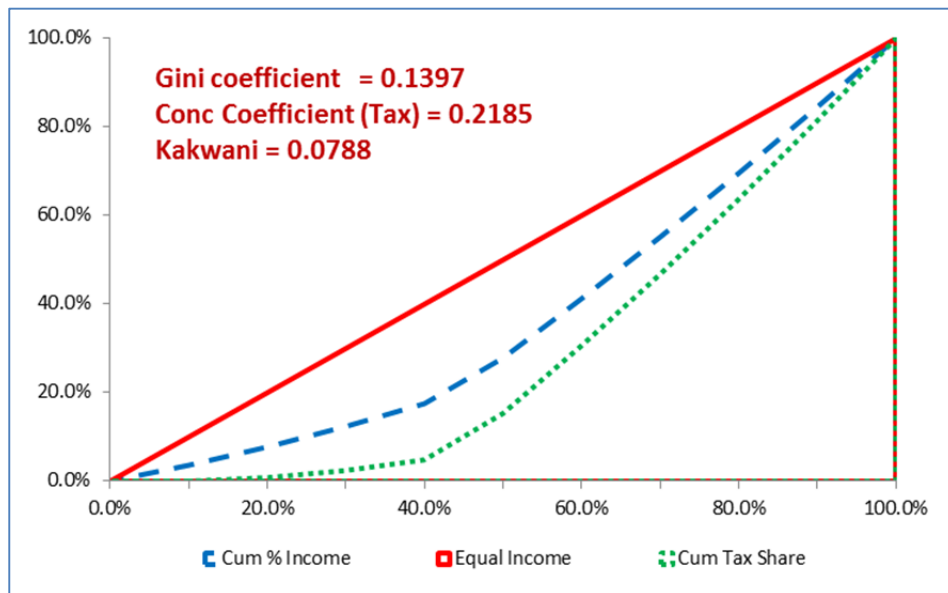**Figure 89: Concentration Coefficient and Kakwani Index for Taxes**

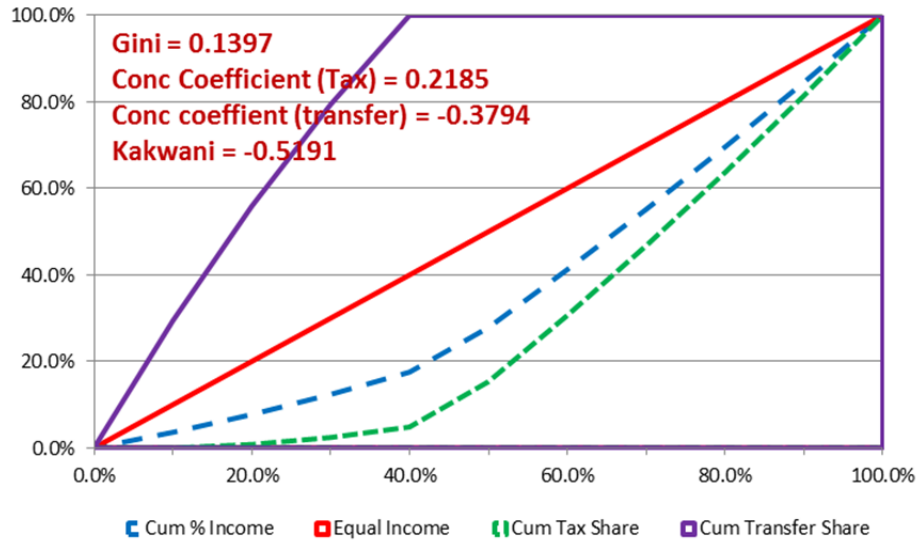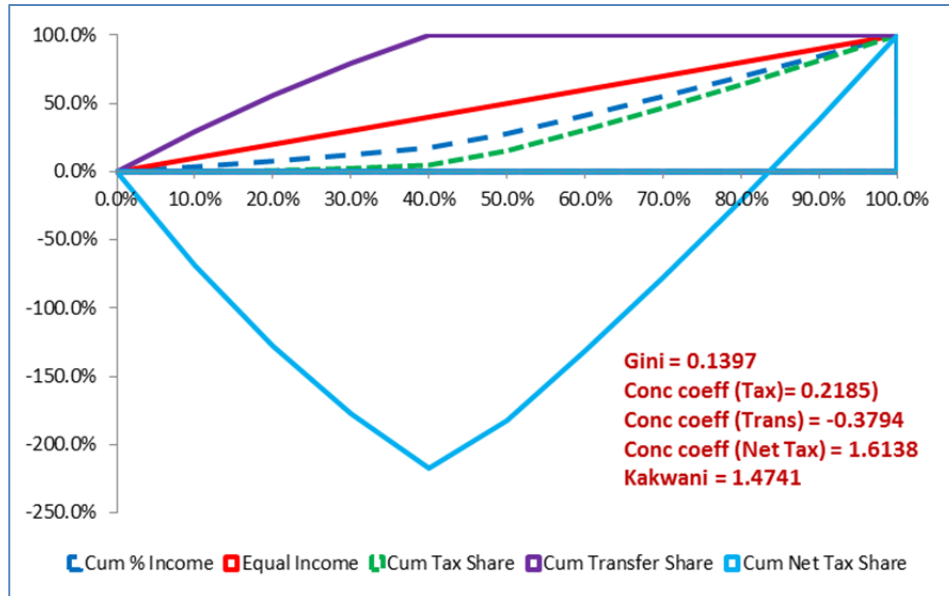**Figure 90: Concentration Coefficient and Kakwani Index for Transfers**

Gini = 0.1397
Conc Coefficient (Tax) = 0.2185
Conc coeffient (transfer) = -0.3794
Kakwani = -0.5191

C Cum % Income   □ Equal Income   [I Cum Tax Share   □ Cum Transfer Share

Figure 91: Concentration Coefficient for Taxes and Kakwani Index Greater Than One

Gini = 0.1397
Conc coeff (Tax)= 0.2185)
Conc coeff (Trans) = -0.3794
Conc coeff (Net Tax) = 1.6138
Kakwani = 1.4741

C Cum % Income □ Equal Income [I Cum Tax Share □ Cum Transfer Share □ Cum Net Tax Share

Appendix B: The Effects of Scenarios 1 and 4 by Family Type

The main body of this report focuses on the tax/transfer system's effects on households in various income ranges, with a particular emphasis on the group we call "the poorest of the poor." We also, however, investigated the distribution of the system's effects across family types. First, we calculated the indices used throughout the text for those of certain family structures, namely single-person households; married couples; married couples with children; married couples without children; and lone parents – see Table 38 and Table 39. We also generated charts illustrating the nature of scenarios' effects on families of each of these types – see Figures 92 to 99. Given our particular interest in Scenarios 1 and 4, this note provides an analysis by family type of these hypothetical packages of policy changes.

Tables 38 and 39 describe the move from disposable income under the base case to disposable income under the scenario in question. This is important to note, as much of our foregoing analysis has examined the switch from market income to disposable income under the scenarios. Although this latter approach is useful in parsing the effects of taxes and transfers, our focus in this note is on how each scenario would affect different families when compared to the status quo. Hence we spare the detail of decomposing the tax/transfer system's effects.

Table 38: Scenario 1 by Family Type

	All families	Single persons	Married couples	Married couples with children	Married couples without children	Lone parents
Pre-tax Gini	0.3511	0.334	0.3451	0.3228	0.3666	0.2505
Post-tax Gini	0.3466	0.3257	0.342	0.3197	0.3635	0.2466
Average tax/benefit rate	0.0016	-0.0094	0.0041	0.0048	0.0033	-0.0057
Reynolds-Smolensky (RS)	0.0043	0.0086	0.0031	0.0032	0.003	0.004
Re-ranking (RR)	0	0.0003	0	0	0	0.0001
Muskgrave-Thin (MT)	1.0066	1.0124	1.0047	1.0047	1.0048	1.0052
Atkinson-Plotnick (AP)	0.0001	0.0004	0	0	0	0.0002

Table 39: Scenario 1 by Family Type

	All families	Single persons	Married couples	Married couples with children	Married couples without children	Lone parents
Pre-tax Gini	0.3551	0.334	0.3451	0.3228	0.3666	0.2505
Post-tax Gini	0.3463	0.3285	0.3409	0.3187	0.3622	0.2459
Average tax/benefit rate	0.0004	-0.0071	0.0024	0.003	0.0016	-0.0088
Reynolds-Smolensky (RS)	0.0048	0.0055	0.0042	0.0042	0.0044	0.0046
Re-ranking (RR)	0	0	0	0	0	0
Muskgrave-Thin (MT)	1.0073	1.0083	1.0065	1.0061	1.007	1.0061
Atkinson-Plotnick (AP)	0	0	0	0	0	0.0001

A number of details presented in the table above should be noted. First, the average tax/benefit rate indicates whether members of each household type are collectively net beneficiaries or net contributors to the revenue-neutral policy changes in question. Specifically, a negative rate indicates that a group mostly benefits, whereas a positive rate indicates that a group mostly contributes. Hence, this data could be useful in investigating how each scenario affects inequality *between* groups. Second, differences in the RS index between family types provide a relatively straightforward means of discussing how the scenarios affect each group's internal income distribution. That is, it enables analysis of the inequality *within* each group.

Under both scenarios, married couples collectively fund changes whereas single persons and lone parents collectively benefit. A notable difference between the scenarios is that Scenario 1 benefits single persons more than lone parents, but Scenario 4 benefits lone parents more than single persons.

Why may this be the case? Unlike the provincial sales tax credit enhanced under Scenario 4, the NLMBM-based transfer instituted in Scenario 1 accounts for the fact that larger families can lower living costs per person by sharing resources. The HST credit determines the transfer amount for which an individual is eligible using that person's individual income, whereas the NLMBM-based transfer considers family income divided by the square root of family size. Consequently, the NLMBM-based transfer implicitly recognizes that income does not quite go as far for singles and transfers them more than an equivalently sized sales tax credit transfer programme would.

Also worth noting is that both scenarios promote equality within each grouping of families, while introducing negligible or no horizontal inequities.

The below charts present the distributions of equivalized disposable incomes relative to families' NLMBM low-income threshold under the base case, Scenario 1, and Scenario 4. The area under a curve represents the share of people in a given income range; this implies that a smaller area under a curve to the left of the vertical reference line (which marks the low-income threshold), the fewer people are considered to be low income. The primary facts communicated by these charts are:
- The effects of both scenarios are concentrated on lone parents and single persons;
- Whereas the impact of Scenario 1 is narrowly distributed across low-income individuals, the effect of Scenario 4 is more widely distributed across income levels, as this scenario also seems to noticeably boost the incomes of those just above the low-income threshold;
- The chart for all families under Scenario 1 shows that this scenario completely eliminates the incidence of severely low incomes. This is revealed by the fact that the red line representing the income distribution under Scenario 1 does not begin at or near zero, as does the blue line representing the base case's income distribution. This effect is not as marked for Scenario 4: the all families chart for this scenario shows that the income distribution for those with very low incomes changes little under this scenario, but that the distribution of those earning just below and above the threshold markedly shifts upward (or, in the chart, to the right).

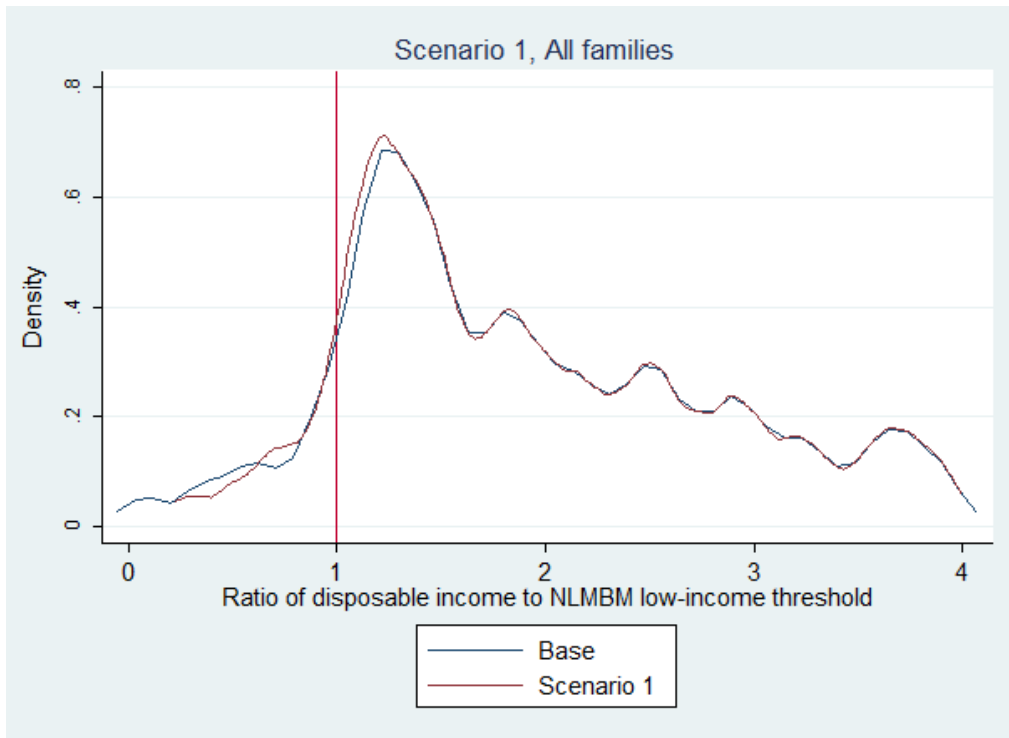**Figure 92: A Comparison of Scenario 1 and Base Case for All Families**

Scenario 1, All families

Figure 93: A Comparison of Scenario 1 and Base Case for Lone Parent Families
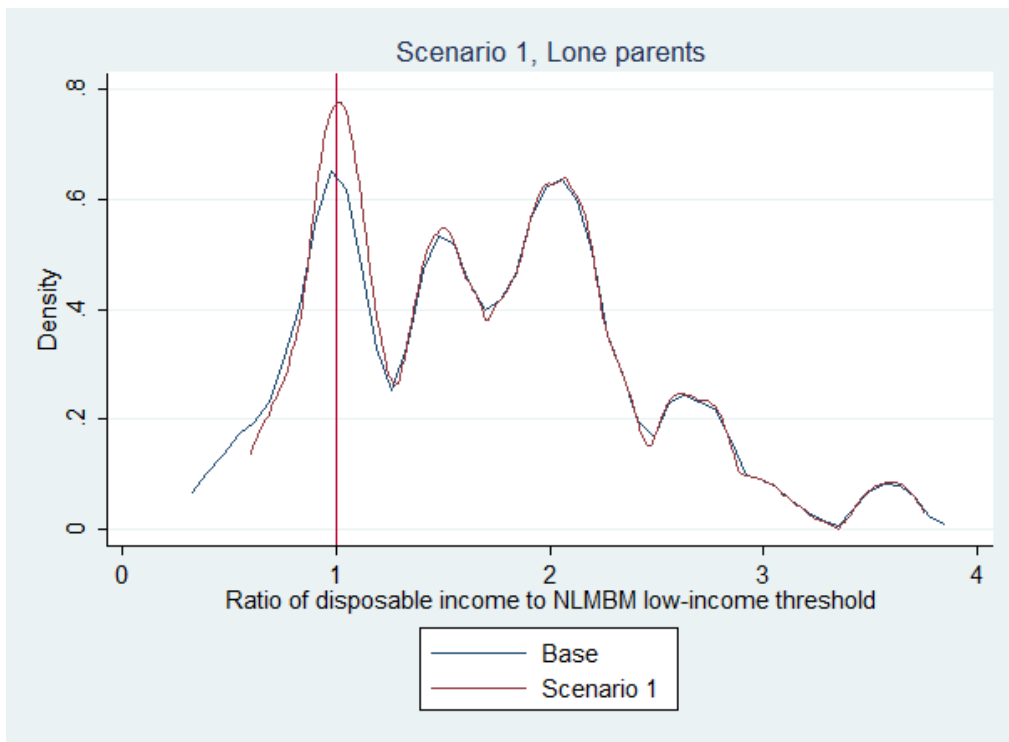

Scenario 1, Lone parents

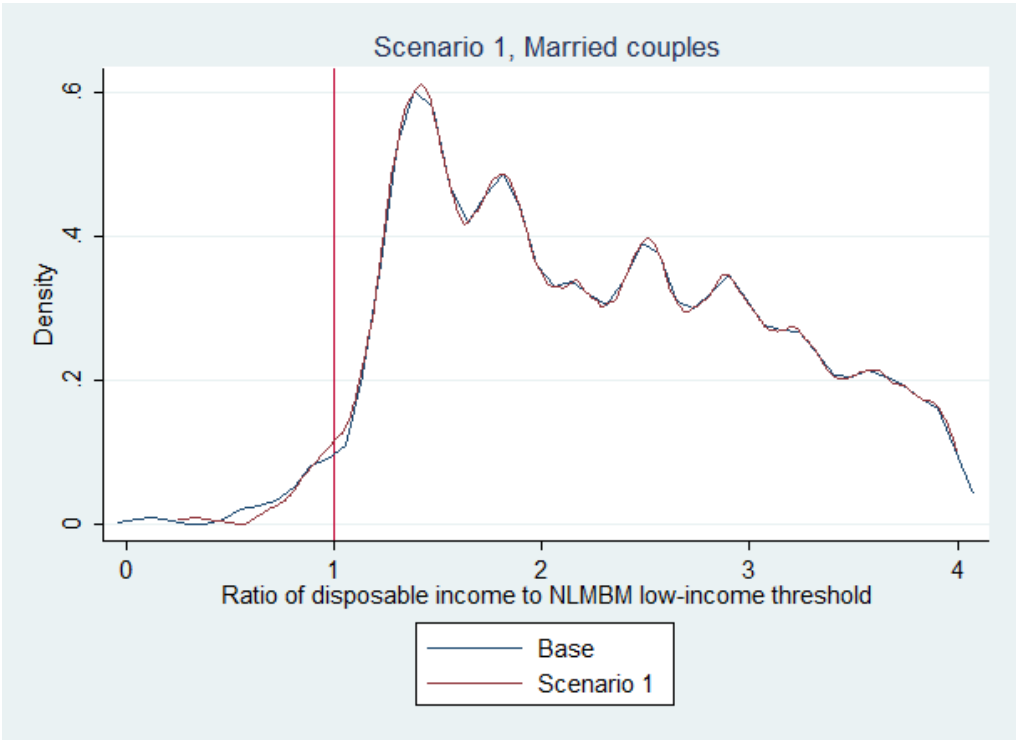**Figure 94: A Comparison of Scenario 1 and Base Case for Married Couple Families**

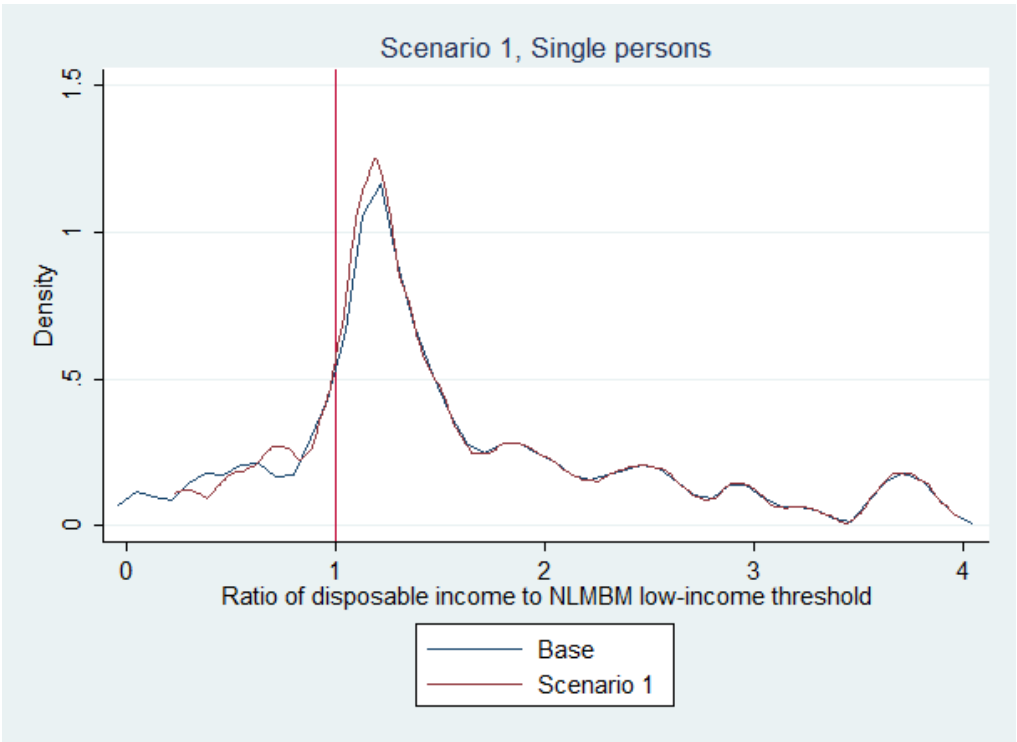**Figure 95: A Comparison of Scenario 1 and Base Case for Single Person Families**

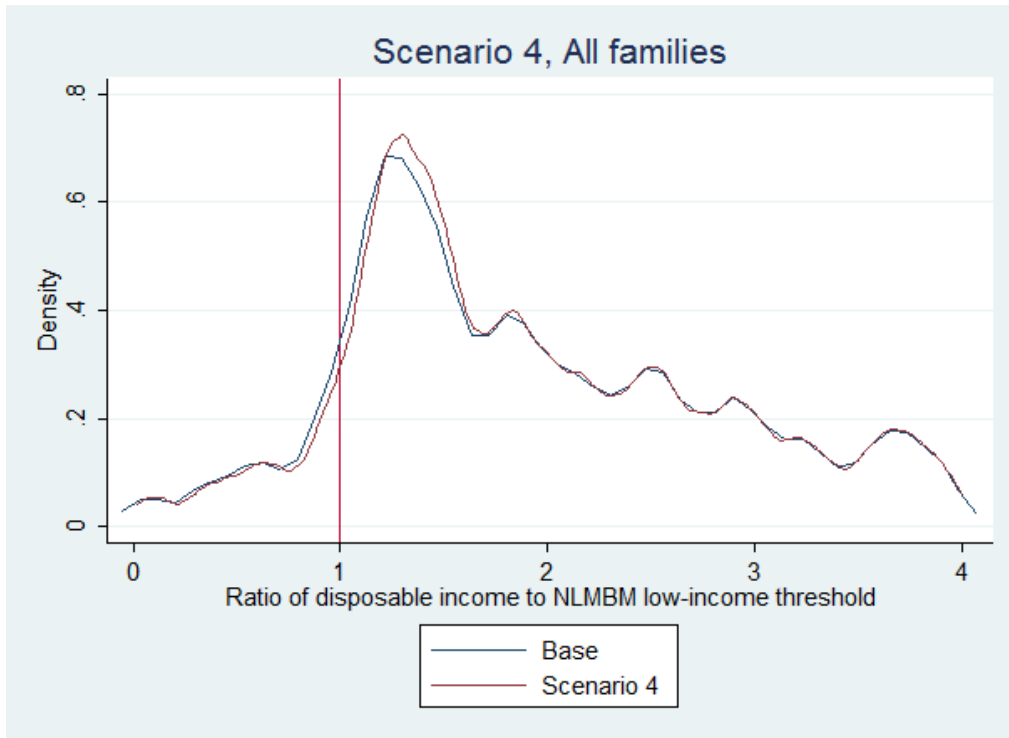**Figure 96: A Comparison of Scenario 4 and Base Case for All Families**

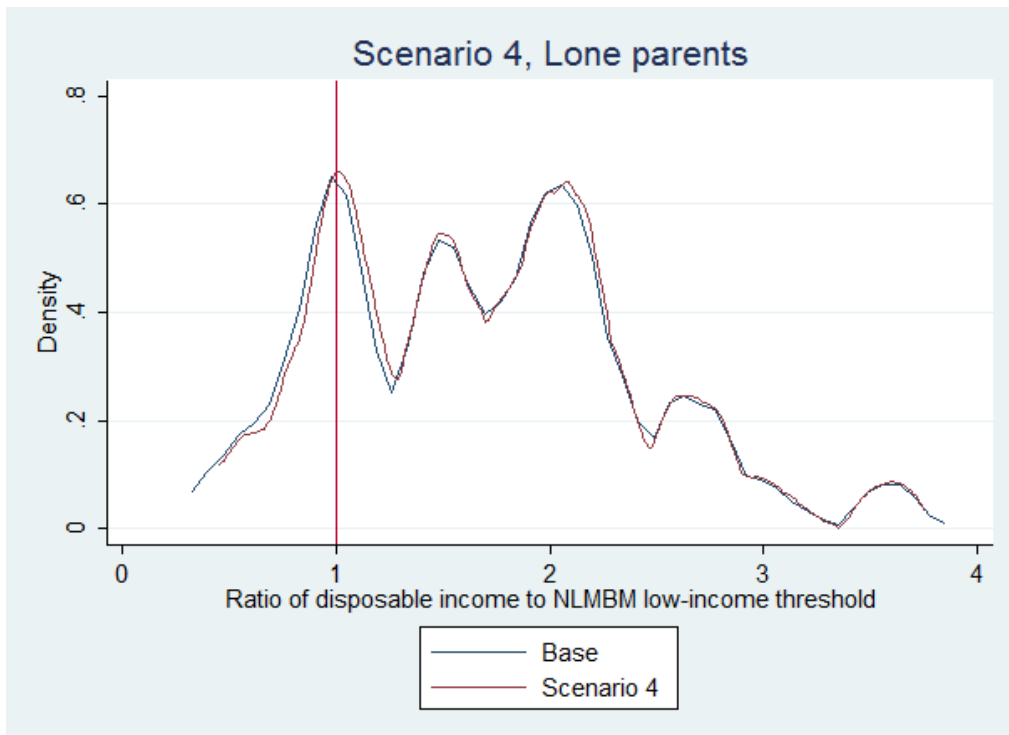**Figure 97: A Comparison of Scenario 4 and Base Case for Lone Parent Families**

Figure 98: A Comparison of Scenario 4 and Base Case for Married Couple Families
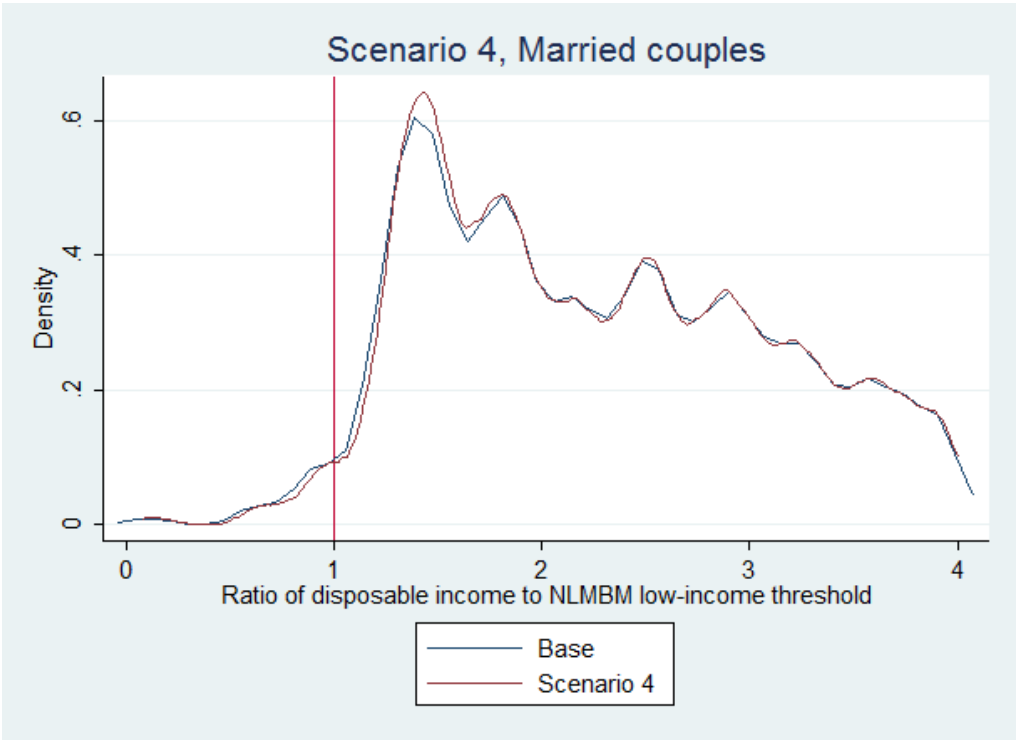

Scenario 4, Married couples

Figure 99: A Comparison of Scenario 4 and Base Case for Single Person Families

Scenario 4, Single persons