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Income Redistribution Through Taxation in Canada and the United States: Implications for NAFTA

Sourushe Zandvakili¹

Recent economic integration in North America necessitates regional comparative analysis. In this study, income inequality and income tax progressivity in Canada and the United States are measured for comparative purposes. A number of indices are used to gauge the sensitivity of relative income inequality and income tax progressivity to the choice of an index. Income tax progressivity is measured as the difference between pre-tax and post-tax income inequality. Income inequality is decomposed according to income quintile, family size, and number of earners in the family. These decompositions demonstrate the degree to which income inequality and income tax progressivity differ in Canada and the United States.

I. Introduction

Recent global changes in the economic arena has brought about much more regional integration in production, exchange, and consumption. These changes bring about legal, business, economic, political, and social implications. Regional cooperation in Europe, Asia and North America, are underway and within the next decade will be fully implemented. In North America, the North American Free Trade Agreement (NAFTA) has been intensely debated, and it is at its implementation stage at this time. It has been advocated that NAFTA is welfare improving for all parties involved (Canada, Mexico, and the United States).

It is normal to expect that NAFTA will bring about structural change in the noted countries. This integration will effect the expectations of economic units (individuals, families, households) in each country. It is normal to expect that economic units will compare their economic well-being relative to those of the other two countries. This comparison could possibly result in immigration, shift of employment, changes in expenditure patterns, etc. In the case of Canada and the United States, the transaction cost of such a move is low. In the case of Mexico, the payoff is high. Also, there will be internal and external pressures to alter policies, such as taxation (income, corporate, property), regulations (labor, environment, safety), etc.

One of the areas of anticipated change is taxation and transfers. Changes of taxes and transfers will alter the distribution of income and ultimately the economic well-being of households. In order to understand the magnitude of the anticipated change in taxes and

1. Sourushe Zandvakili is Professor of Economics at the University of Cincinnati and the Jerome Levy Economics Institute. Support from a Taft Grant and the University Research Council at the University of Cincinnati is acknowledged.
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transfer, it is essential to examine the implications of taxes and transfers in each country prior to such an agreement. Unfortunately, only the data for Canada and the United States are presently available for this purpose. Canada and the United States are thought to be the two countries most similar in many respects. Each country uses a wide variety of tax schemes and transfer mechanisms. The economic well-being of each family and their relative position in the distribution of income is altered by these taxes and transfers. It is essential to know the exact differences between the two countries and the implications of these taxes from the pre-tax to post-tax distribution of income among families.

Two principles of equity have been used to justify progressive income taxation in both countries. "Horizontal equity" necessitates that income units with similar economic standing face similar tax liabilities. "Vertical equity" requires that the tax contribution of income units be related directly to their ability to pay. My objective is to investigate whether in fact the above principles are observed in each country. For this purpose, we must assume that individuals pool their incomes at the family level when they pay their income taxes in each country. Consequently we can observe the distribution of a family's income based on gross income and disposable income. The difference between the two income distributions provides an index of income tax progressivity. Horizontal and vertical equity can be addressed by means of decompositions as well as by examining the changes in within-group inequality.

This objective requires comparative data between the two countries. The past approaches in comparative analysis used aggregated data which resulted in loss of information. Also, aggregation techniques across countries are not comparable. At the same time, use of aggregated data imposed limitations upon the available methodology for comparative purposes. It is only recently that we have observed the emergence of comparative microdata (non aggregated data). The Luxembourg Income Study data sets provide us with comparative variables such as income, age, gender, education, family size, ethnicity, etc. This improvement has introduced a number of methodological issues such as: appropriate measure of income (wages and salaries, earnings), appropriate economic unit (individual, family, household), need for an equivalence scale (per capita, equivalent elasticity), and etc.

In this paper I demonstrate the observed differences in the distribution of income and income tax progressivity in Canada and the United States. A brief outline of the methodology is provided in section II. The estimated income inequality and income tax progressivity in each country is investigated based on income quintile, number of earners, and family size in sections III through V. Concluding remarks are then followed.

II. The Framework

Income inequality is measured by Generalized Entropy (GE) family of measures since they possess the desirable properties of: scale independence, anonymity, the principle of transfer, smoothness, decomposability, and the principle of population; see Cowell and Kuga (1981). The inequality measure $I(Y; n)$ is a function of the population size n , $i=1 \dots n$, and income shares $y \in Y^n = \{ y=(y_1; \dots; y_n) \geq 0 \}$ and $\sum_{i=1}^n y_i = 1$. This class of measures is defined as:

$$(1) \quad L_\gamma(y) = \frac{1}{n} \sum_{i=1}^n [(ny_i)^{\gamma+1} - 1] / (\gamma+1) \quad \gamma \neq 0 \text{ or } -1.0$$

$$(2) \quad = \sum_{i=1}^n y_i \text{Log}(ny_i) \quad \gamma = 0$$

$$(3) \quad = \sum_{i=1}^n n^{-1} \text{Log}(1/ny_i) \quad \gamma = -1.0.$$

This family includes Theil's (1967) information measures as I_0 and I_1 . γ is the degree of inequality aversion. For every γ there exists a different index. Therefore, by using a number of different γ 's we can test the sensitivity of measured inequality to the choice of index. This family also includes monotonic transformations of inequality measures proposed by Atkinson (1970). Please note that $L_\gamma(y)$ and $I_\epsilon(y)$ are ordinarily equivalent.

The measurement of income tax progressivity can be approached from (a) the concentration index, or (b) inequality index. The former approach in the measurement of income tax progressivity can be seen in 1) Effective Progression [Musgrave and Thin (1948)]; 2) The Pechman - Okner Index [Pechman and Okner (1980)]; 3) The Reynolds-Smolensky Index [Reynolds and Smolensky (1977)]; 4) The Khetan Poddar Index [Khetan and Poddar (1976)]; 5) The Kakwani Index [Kakwani (1977)]; and 6) The Khetan - Poddar - Suits Index [Khetan and Poddar (1976)]. The above progressivity indexes are all based on the Gini Index and concentration indexes. Lambert (1989) provides a general discussion of each of the above. As we know, the Gini Index does not satisfy some desirable social welfare axioms [see Atkinson (1970), and Sen (1973)]. The latter approach assumes the existence of a social welfare function and uses the concept of an "equally distributed equivalent" introduced in Atkinson (1970). Using Atkinson's family of measures, the redistributive effect can be gauged by looking at the pre-tax and post-tax income distribution. Consider the income tax progressivity index:

$$(5) \quad P^* = I_\epsilon(GI) - I_\epsilon(DI),$$

introduced by Kiefer (1985), where (GI) and (DI) are gross and disposable incomes respectively. If $P_\epsilon > 0$, the tax is progressive; if $P_\epsilon = 0$, the tax is proportional; and if $P_\epsilon < 0$, the tax is regressive. P_ϵ is an indicator of the amount by which the tax system has increased the equally distributed equivalent income, given a social welfare function. An alternative approach is that introduced by Blackorby and Donaldson (1984) and it is given as:

$$(6) \quad B^* = I_\epsilon(GI) - I_\epsilon(DI) / [1 - I_\epsilon(GI)].$$

This index is normalized to zero and considers the percentage change. Thus if $P_\epsilon^* > 0$, the tax is progressive; if $P_\epsilon^* = 0$, the tax is proportional; and if $P_\epsilon^* < 0$, the tax is regressive.

In the spirit of Kiefer (1985), I will measure tax progressivity using the Generalized Entropy family of measures. Consider:

$$(7) \quad I^* = L_\gamma(GI) - L_\gamma(DI).$$

If $I^* > 0$, the tax is progressive; if $I^* = 0$, the tax is proportional; and if $I^* < 0$, the tax is regressive [see Zandvakili (1994)]. This type of measure does not account for reranking among families as taxes are imposed. However, since Generalized Entropy measures are decomposable [see Bourguignon F (1979)], I^* can be shown as:

$$(8) \quad I^* = I^b + I^w,$$

where I^b is the difference of the pre-tax and post-tax between-group component of income inequality, while I^w is the difference of average within-group inequality before and after taxes. The proportion of change in I^* due to I^b is:

$$(9) \quad D^b = I^b / [L_\gamma(GI) - L_\gamma(DI)],$$

while the proportion attributed to the changes within-group is:

$$(10) \quad D^w = I^{w*} / [L_y(GI) - L_y(DI)].$$

Thus by definition $D^w + D^b = 1$.

The data for this study is from the Luxembourg Income Study (LIS), which provided national household survey microdata. The data sets for both countries are based on a nationally representative sample of households and provide social, demographic, economic, and labor market information about each family and its members. For international comparability, the LIS data sets are corrected for differences in the definition of earnings and in the income recipient unit. Microdata is superior to aggregated data (with comparable variable definition) for the purpose of measurement of inequality and income tax progressivity across countries. The distributions represented by aggregated data rather than by microdata at the household or individual level suppress potentially relevant information. The data provided to LIS are based on surveys specific to the needs of each country. Thus each data set is different in content, and identical information is not always available for each country. In order to minimize inconsistencies in the definition of data, standardization of these data sets is one of the primary functions of LIS. The list of standardized variables currently stands at 120 [see Buhmann *et al.* (1989), and O'Higgins *et al.* (1989)]. This data was provided to LIS by Current Population Survey (1979) for the United States and Survey of Consumer Finances (1981) for Canada. The following variables for each country are used in this study: total family gross income, net family income after taxes, number of persons in the family, and number of earners in the family. In studying income tax progressivity, one should consider total fiscal impact in terms of taxes as well as noncash transfers. Such data, however, at the micro level is unavailable for most countries.

Families with positive income have been selected for this study. Some inequality measures, however, are not defined for income values of 0. The highest coding in the United States data set is \$50,000. Such noted problems with data sets alter the true inequality and affect our view of income tax progressivity. Member countries make these alterations prior to submitting the data sets to LIS. Our sample size for Canada is 4478 and for the United States is 4468. This is only a random sample of 30 percent of the entire sample for each country. This lowering of the sample size did not alter our results.

III. Income Share, Income Inequality and Income Tax Progressivity

There are a number of ways to compare the distribution of tax burden in the two countries. The simplest approach is to compare specific tax information and its distribution in each country. There are different types of taxes in the United States and Canada that can be compared. It is helpful to look at some of these taxes as a percentage of Gross Domestic Product (GDP). Some of these taxes are: taxes on personal income as a percentage of GDP (PIT), taxes on personal income as a percentage of total taxation (IT), taxes on corporate income as a percentage of total taxation (CT), social security contribution as a percentage of total taxation (SSC), taxes on property as a percentage of total taxation (PP), and taxes on goods and services as a percentage of total taxation (GS). For example, in 1982, taxes on personal income as a percentage of GDP was 10.8% and 10.9% in Canada and United States respectively. Taxes on personal income as a percentage of total taxation was 34.1% in Canada and 36.9% in the United States. Thus, personal income taxes play an important role

in revenue generation in both countries. The role of personal income taxes are slightly greater in the United States than Canada. Looking at taxes on corporate income as a percentage of total taxation reveals that they are fairly similar at 11.6% in Canada and 10.2% in the United States. Property taxes as a percentage of total taxation are very similar at 9.1% in Canada and 10.1% in the United States.

There are two major differences in the two countries. First, social security contribution as a percentage of total taxation is only 10.5% in Canada where it is 26.2% in the United States. Second, taxes on goods and services as a percentage of total taxation is 32.5% in Canada, while only 16.6% in the United States. Although the areas of emphasis with respect to some of the taxes are different, total tax revenue as a percentage of GDP are 31.9% and 29.5% in Canada and the United States respectively. Total tax revenue as a percentage of GDP could be a proxy with respect to the relative size of each government given its total output.

It is obvious that these aggregated averages hide substantial amounts of information. We can enhance our view of these differences by looking at the average rate of income taxation by specific characteristics. For example, the average rate of income tax paid, in 1982, by single persons was about 20.0% in Canada and 23.6% in the United States. Also, the average rate of social security paid by single persons in Canada is only 2.7%, while it is 6.7% in the United States. The average rate of income tax paid by married couples (with two children) in Canada was 12.2% and 14.4% in the United States. The average rate of social security paid by married couples (with two children) are the same as those for single persons in both countries. It is clear that the average rate of personal income taxation was slightly higher in the United States compared to that of Canada. This lower rate in Canada is compensated by much higher taxes on goods and services (see various OECD publications).

The first part of Table 1 provides pre-tax and post-tax income shares of family for the two countries divided into five quintiles. Quintile 1 represents those with the least income; Quintile 5 represent those with the highest incomes. In both countries, income clearly is transferred from the top 20% (Quintile 5) to the lower quintiles. In Canada, the transfer is made from the top 40% to the bottom 60% of the population [for further discussion, see McWatters and Beach (1990)]. For those quintiles whose share of income increases after taxes, a larger proportion of after-tax income than of before-tax income is available. However, because of differentials in tax treatment, within-group inequality could increase in some of these groups, even though overall inequality exhibits a pattern of decline. Thus, the income shares for each quintile, before and after taxes, tell us something about the transfer that is taking place, but not necessarily about the distribution of income among families. It is important to gauge not only the reallocation of income between groups to test for the principles of horizontal and vertical equity, but also the distribution of income within groups. This is essential for policy purposes.

It has been an accepted view that income taxes are progressive in Canada and the United States. However, this does not mean that all tax units are treated according to the same criterion. For example, family size and the number of earners alter the progressivity of the tax system in both countries. In order to view the implications of such factors, this analysis uses Generalized Entropy family of measures because they are decomposable. Four values of γ for GE family of measures are used to cover a wide range of measures and to test the robustness of our results. The impact of taxation in both countries is gauged by looking at pre-tax and post-tax income distributions, an index of progressivity I^* (the difference

between pre-tax and post-tax income distribution), the between-group and a weighted average of within-group components of I^* denoted respectively by I^b and I^w , and the group-specific inequality, namely I_g^* . Also, the proportion of the change in overall income tax progressivity attributed to the between and weighted average of within-group inequality is provided and denoted by D^b and D^w .

The first set of results based on Generalized Entropy measures and decomposed by quintile is presented in the second part of Table 1. The magnitude of overall inequality is sensitive to the choice of inequality measure; that is the level of measured inequality generally becomes smaller as γ approaches 0. Income inequality is lower in Canada compared to that of the United States both before (GI) and after taxes (DI). These results are consistent with that of Bishop, Formby and Smith (1991).

Income tax progressivity varies across Canada and the United States. Income taxes are generally more progressive in the United States compared to Canada. In general the perception has been a higher income tax progressivity in the Canadian system. How can we explain this observation? Let us imagine a country in which the pre-tax distribution becomes more equal while the tax structure remains the same. In such a country, it is likely that the reduction in inequality by taxation will diminish, and hence, the measured income tax progressivity will decline. The relationship between the inequality in the pre-tax distribution and the measured progressivity is complex, but to say that the progressivity is independent of the income distribution leads to inconsistent conclusions.

The analysis of income tax progressivity without investigating the between-group, as well as the average within-group decompositions, is inadequate. Between-group inequality in pre-tax and post-tax income is larger than within-group inequality, both in Canada and the United States, for all the values of $\gamma > -2.0$. This means that most of the observed inequality is across groups and within-group inequality is minimal. The objective of the two tax system is to compress the distribution of income and bring about more equalization. The question of interest is to observe the extent that this objective is accomplished. Table 1 demonstrates that the proportion of change in I^* attributed to between-group equalization is substantial in both countries for $\gamma > -2.0$. For example, for $\gamma = -0.5$, in Canada 100% of the equalization is between the five quintiles, while it is 97% in the United States. The within-group proportion is minimal for the same index. However, there are some interesting within-group patterns that deserve attention. In both countries lower income quintiles report higher inequality. The post-tax income inequality for quintiles one, two, and five is lower in both countries. Income inequality after taxes increase for quintiles three and four. Thus, although the tax system brings about more overall equalization, two groups have become more unequal. From the welfare perspective this might not be desirable. If individual tax units have not traded their position from pre-tax to the post-tax income distribution, this should not cause the policy makers concern.

IV. Income Tax Progressivity and Number of Earners

In the past two decades, both Canada and the United States have seen a shift toward multi-earner families. This phenomenon has many possible explanations. A number of studies have documented this evidence. Data indicates that both macroeconomic conditions and the lowering of real wages and salaries for primary earners are explanations for the rise of multi-earner families. Additionally, barriers to women entering the labor market

are much lower than in the past, thereby attracting a second individual from a family into the market. For tax purposes, however, it is anticipated that some families will use income splitting in determining their taxes since such a provision is allowed to reduce their taxes.

The reduction of the overall inequality is expected to be most strongly attributable to the reduction of the weighted average of within-group inequality when the number of earners are considered. Income taxes are considered distortionary if within-group inequality is smaller than between-group inequality. That means more cross-group equalization. In both countries the objective of the tax system is not to make single tax payers and multi-earner families more equal. However, cross-group equalization exists and we should be concerned about its magnitude. For those who are not engaged in market activity but are retired or are receiving some kind of payment from the government, their status relative to that of other families might be a policy objective.

Both Canada and the United States have progressive income taxation — $I^* > 0$, as discussed previously. The decomposition of L_y and I^* based on the number of earners in the family reveals the following patterns for both countries. First, the post-tax inequality generally creates more within-group equalization which is a large component of the overall reduction. Second, measured pre-tax and post-tax inequality decreases as the number of earners increases. Third, the “no-earner” group has higher reported pre-tax and post-tax inequality than do the groups with two or more earners. In both countries, the “no-earner” group generally consists of those who receive government transfers and those who receive transfers as well as returns on their accumulated wealth. It is evident that the tax structure has different effects on families with such different characteristics. Income taxes are structured in each country with different policy objectives in mind. It should not come as a surprise that the magnitude of the between-group and within-group inequalities differ across the two countries. However, the patterns are very similar in Canada and the United States.

After taxes, in general, multi-earner families are better off compared to single-earner families. In the United States, married couples can file jointly, but income splitting is available for tax purposes. Canada considers the individual as the tax unit. Married couples receive no tax advantage in Canada [see Pechman and Engelhardt (1991)]. In general, these countries differ greatly in their treatment of the number of earners and in the marital status of the tax unit. Although we observe some similarities in policies and results, the motivations for such policies are quite different in each country. Furthermore, the four groups under consideration are subject to differential income tax progressivity. For example, the single earner families report the highest income tax progressivity in both countries. Income taxes are more progressive for this group in the United States than Canada. The lowest income tax progressivity is reported for the groups with three earners in both countries. The second highest income tax progressivity is for the multi earner families followed by the “no-earner” families in the United States for $\gamma > -2.0$. Canada shows the reverse order of that of the United States.

V. Household Size and Income Tax Progressivity

It is common practice to provide a deduction based on family size in order to compute taxable income in both the United States and Canada. This is the most common type of deduction. It is not clear whether deductions based on family size provide an incentive to have larger families or whether persons in smaller families are being penalized. One could

argue that a decline in between-group inequality among families of different sizes is not desirable because vertical equity among families of different sizes does not hold. Yet a reduction in the average within-group component of overall inequality is desirable because families of the same size are treated more equally. In both countries many other types of deductions are involved as well. For example, interest paid is deductible in the United States, while in Canada it is not. Also, there is no capital gains tax in Canada. These two countries use personal exemptions as a method of allocating income tax burden. Furthermore, both countries provide some form of tax relief for dependent children.

Table 3 presents decomposition based on family size for the tax unit in the United States and Canada. The groups are family size 1 through 5+. The following general observations are made. First, the weighted average of within-group inequality is the dominant portion of the overall inequality based on GI and DI. Second, the decline in overall inequality after taxes results in greater reduction within each group, so that cross-group equalization is minimal. Third, the post-tax inequality for each group is smaller than the pre-tax inequality for $\gamma > -2.0$. These observations show that inequality among families of equal size has decreased with exception of family size of one and two for the United States and $\gamma = -2.0$. The between-group component of the reduction of the overall inequality constitutes a very small proportion of this reduction. Thus, both countries favor differential treatment of families.

Both the United States and Canada seem to display a pattern with respect to the size of family and the level of measured inequality. The measured inequality for each group generally becomes smaller as family size grows larger for all values of γ . This is particularly true for families of up to four people. On the contrary, it could be that larger families (five+) are of two different kinds: those who are financially sound and can afford to have large families, and those whose members must remain in the same family to take advantage of economies of scale in consumption. This results in higher measured inequality. The patterns described above are true with respect to within-group income tax progressivity; that is, smaller families generally have higher progressivity than do larger families of up to four persons.

VI. Conclusions

This paper examined differences in income inequality and income tax progressivity between Canada and the United States. This was done by the analysis of the pre-tax and post-tax income inequality among families in the two countries. A family of income tax progressivity measures using Generalized Entropy was employed for this purpose. Income taxes are shown to be progressive in both countries. Caution must be taken in making judgments about the nature and the effect of income taxation in each country. This family of income tax progressivity indices shows that our results are sensitive to the choice of an index. It has been shown that inequality in pre-tax and post-tax income is higher in the United States than Canada. Also, United States experienced a higher degree of income tax progressivity. At the same time, Canada shows greater degree of transfers from the top two income quintiles to the lower income quintiles.

Decompositions based on factors such as income quintile, number of earners, and family size provided some interesting insights. They are also useful in policy analysis to gauge the magnitude of the reduction of inequality attributed to income taxes between and within groups of families. These factors are shown to have differential effects in the United

States and Canada. Both countries generally follow similar policies regarding family size. We observe differential effects regarding the treatment of the number of earners in the family.

Recent trends toward more extensive regional economic integration due to NAFTA will result in further changes in the tax and transfer mechanisms across these countries. I anticipate a more similar system of tax and transfer mechanisms across these two countries in the years to come.

Appendix

Table 1. Redistribution Through Taxation by Quintile

	Overall	Between	Within	Quint 1	Quint 2	Quint 3	Quint 4	Quint 5
Income Share by Quintile								
Canada								
GI				.049	.112	.178	.251	.409
DI				.056	.122	.184	.249	.389
US								
GI				.041	.098	.165	.251	.445
DI				.050	.113	.176	.254	.407
Inequality and Income Tax Progressivity by Quintile								
$\gamma = -2.0$								
Canada								
GI	.6840	.3283	.3566	.4231	.0158	.0057	.0051	.0280
DI	.5629	.2597	.3041	.4138	.0144	.0071	.0074	.0262
I^*, I^b, I^w	.1211	.0686	.0525					
D^o, D^b, D^w	1.0	.5665	.4335					
US								
GI	1.5697	.4400	1.1306	1.1399	.0162	.0095	.0065	.0353
DI	1.2495	.3221	.9283	1.1367	.0157	.0098	.0072	.0306
I^*, I^b, I^w	.3202	.1179	.2023					
D^o, D^b, D^w	1.0	.3682	.6318					
$\gamma = -1.0$								
Canada								
GI	.2695	.2318	.0378	.1327	.0155	.0056	.0051	.0300
DI	.2293	.1925	.0370	.1293	.0141	.0070	.0068	.0275
I^*, I^b, I^w	.0402	.0393	.0008					
D^o, D^b, D^w	1.0	.9776	.0199					
US								
GI	.3426	.2936	.0492	.1777	.0157	.0093	.0065	.0369
DI	.2762	.2289	.0474	.1759	.0153	.0097	.0072	.0293
I^*, I^b, I^w	.0664	.0647	.0018					
D^o, D^b, D^w	1.0	.9744	.0271					

Table 1 (cont.)

	Overall	Between	Within	Quint 1	Quint 2	Quint 3	Quint 4	Quint 5
$\gamma = -.5$								
Canada								
GI	.2324	.2091	.0238	.1042	.0153	.0056	.0051	.0313
DI	.1990	.1757	.0238	.1012	.0140	.0070	.0067	.0285
I*, I ^b *, I ^w *	.0334	.0334	.0000					
D ^o , D ^b , D ^w	1.0	1.0	.0000					
US								
GI	.2902	.2623	.0284	.1291	.0155	.0093	.0065	.0382
DI	.2331	.2069	.0267	.1271	.0152	.0097	.0072	.0294
I*, I ^b *, I ^w *	.0571	.0554	.0017					
D ^o , D ^b , D ^w	1.0	.9702	.0298					
$\gamma = 0.0$								
Canada								
GI	.2187	.1967	.0219	.0896	.0152	.0056	.0051	.0331
DI	.1873	.1661	.0211	.0868	.0139	.0070	.0066	.0298
I*, I ^b *, I ^w *	.0314	.0306	.0008					
D ^o , D ^b , D ^w	1.0	.9745	.0255					
US								
GI	.2739	.2469	.0269	.1070	.0154	.0093	.0065	.0401
DI	.2175	.1948	.0226	.1051	.0151	.0096	.0072	.0298
I*, I ^b *, I ^w *	.0564	.0521	.0043					
D ^o , D ^b , D ^w	1.0	.9238	.0762					

Table 2. Redistribution Through Taxation by Number of Earners

	Overall	Between	Within	One	Two	Three	None
$\gamma = -2.0$							
Canada							
GI	.6848	.1081	.5768	.5333	.1471	.1222	.6559
DI	.5637	.0900	.4738	.4324	.1137	.0957	.6066
I^*, I^b, I^w	.1211	.0181	.1030	.1009	.0334	.0265	.0493
D^o, D^b, D^w	1.0	.1495	.8505				
US							
GI	1.5699	.1273	1.4432	1.6382	.1977	.1432	1.1714
DI	1.2497	.0919	1.1584	1.3369	.1413	.1045	1.1045
I^*, I^b, I^w	.3202	.0354	.2848	.3013	.0564	.0387	.0669
D^o, D^b, D^w	1.0	.1106	.8894				
$\gamma = -1.0$							
Canada							
GI	.2695	.0902	.1794	.2349	.1126	.0959	.2348
DI	.2293	.0787	.1507	.1965	.0901	.0770	.2094
I^*, I^b, I^w	.0402	.0115	.0287	.0384	.0225	.0189	.0254
D^o, D^b, D^w	1.0	.2861	.7139				
US							
GI	.3427	.1056	.2372	.3023	.1430	.1058	.3079
DI	.2762	.0824	.1939	.2451	.1039	.0802	.2803
I^*, I^b, I^w	.0665	.0232	.0433	.0572	.0391	.0256	.0276
D^o, D^b, D^w	1.0	.3489	.6511				
$\gamma = -.5$							
Canada							
GI	.2328	.0847	.1481	.2042	.1066	.0905	.2136
DI	.1994	.0754	.1240	.1707	.0861	.0729	.1871
I^*, I^b, I^w	.0334	.0093	.0241	.0335	.0205	.0176	.0265
D^o, D^b, D^w	1.0	.2784	.7216				
US							
GI	.2906	.0995	.1911	.2599	.1352	.0978	.2776
DI	.2336	.0800	.1536	.2076	.0973	.0745	.2470
I^*, I^b, I^w	.0570	.0195	.0375	.0523	.0379	.0233	.0306
D^o, D^b, D^w	1.0	.3421	.6579				
$\gamma = 0.0$							
Canada							
GI	.2186	.0810	.1376	.1935	.1049	.0881	.2137
DI	.1871	.0732	.1140	.1605	.0851	.0709	.1837
I^*, I^b, I^w	.0315	.0078	.0236	.0330	.0198	.0172	.0300
D^o, D^b, D^w	1.0	.2476	.7492				
US							
GI	.2737	.0958	.1780	.2503	.1347	.0934	.2820
DI	.2173	.0787	.1386	.1959	.0949	.0712	.2433
I^*, I^b, I^w	.0564	.0171	.0394	.0544	.0398	.0222	.0387
D^o, D^b, D^w	1.0	.3032	.6986				

Table 3. Redistribution Through Taxation by Household Size

	Overall	Between	Within	One	Two	Three	Four	Five
$\gamma = -2.0$								
Canada								
GI	.6842	.0660	.6188	.7836	.5861	.2649	.2251	.2007
DI	.5631	.0649	.4988	.6373	.4747	.2091	.1794	.1567
I*, Ib*, Iw*	.1211	.0011	.1200	.1463	.1114	.0558	.0457	.0440
D ^o , D ^b , D ^w	1.0	.0091	.9909					
US								
GI	1.5699	.0743	1.4962	.3937	.4400	.5239	2.2257	.4046
DI	1.2497	.0718	1.1785	1.1186	1.1278	.3953	1.7343	.3088
I*, Ib*, Iw*	.3202	.0025	.3177	-.7249	-.6878	.1286	.4914	.0958
D ^o , D ^b , D ^w	1.0	.0079	.9921					
$\gamma = -1.0$								
Canada								
GI	.2695	.0562	.2134	.3125	.2263	.1744	.1471	.1448
DI	.2293	.0552	.1742	.2568	.1811	.1433	.1228	.1174
I*, Ib*, Iw*	.0402	.0010	.0392	.0557	.0452	.0311	.0243	.0274
D ^o , D ^b , D ^w	1.0	.0249	.9751					
US								
GI	.3427	.0642	.2786	.3574	.2888	.2331	.2066	.2123
DI	.2762	.0623	.2140	.2764	.2157	.1822	.1612	.1650
I*, Ib*, Iw*	.0665	.0019	.0646	.0810	.0731	.0509	.0454	.0473
D ^o , D ^b , D ^w	1.0	.0286	.9714					
$\gamma = -.5$								
Canada								
GI	.2324	.0526	.1803	.2747	.2036	.1582	.1343	.1344
DI	.1990	.0517	.1477	.2259	.1625	.1310	.1134	.1098
I*, Ib*, Iw*	.0334	.0009	.0326	.0488	.0411	.0272	.0209	.0246
D ^o , D ^b , D ^w	1.0	.0269	.9760					
US								
GI	.2902	.0604	.2302	.3115	.2535	.2007	.1758	.1886
DI	.2332	.0588	.1748	.2365	.1863	.1565	.1360	.1455
I*, Ib*, Iw*	.0570	.0016	.0554	.0750	.0672	.0442	.0398	.0431
D ^o , D ^b , D ^w	1.0	.0281	.9719					
$\gamma = 0.0$								
Canada								
GI	.2186	.0496	.1960	.2651	.1969	.1515	.1289	.1305
DI	.1872	.0488	.1384	.2176	.1560	.1257	.1096	.1068
I*, Ib*, Iw*	.0314	.0008	.0306	.0475	.0409	.0258	.0193	.0237
D ^o , D ^b , D ^w	1.0	.0255	.9745					
US								
GI	.2737	.0574	.2163	.3045	.2450	.1873	.1651	.1806
DI	.2174	.0560	.1614	.2253	.1760	.1447	.1265	.1366
I*, Ib*, Iw*	.0563	.0014	.0549	.0792	.0690	.0426	.0386	.0440
D ^o , D ^b , D ^w	1.0	.0249	.9751					

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