Income Redistribution, Reranking, and Progressivity of Taxes and Transfers in Canada: An Ordinal Approach Using New Census Data

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Introduction

The fact that net income inequality has risen in the last decade raises concerns about a weakening role of the Canadian redistribution system. To measure the effect of state interventions to moderate inequality, researchers often report summary statistics and mainly compare differences in inequality measures between the gross income and net income of families. Such statistics, however, often neglect an important issue of redistributive justice: horizontal inequity, that is, when individuals whose welfare status is alike before government intervention are treated unequally by the tax-transfer system. The presence of horizontal inequity, therefore, undermines the effect of income redistribution. In addition, comparisons based on cardinal inequality measures (such as the Gini coefficient) are often not robust because the results may be very sensitive to the choice of indices.

With the development of statistical theory for distributive dominance, ordinal comparisons have been used considerably to measure redistribution. For instance, one can determine whether a tax-transfer system is redistributive and reduces inequality by performing statistical testing for the difference between the ordinates of the Lorenz curves of gross income and net income at each value in the sample. Such testing procedures, though well established, may be quite complicated, especially when non-independently drawn samples are compared. Yet, these procedures may suffer from low power as there are usually insufficient observations at the tails of the distribution. One way to increase power is to restrict the range of the test, but to the detriment of generality. Alternatively, one can apply statistical tests

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for the difference only at several abscissas (such as deciles) rather than at every point. However, as emphasized by Howes (1993), with such an approach, one may not be able to ensure that the probability of type I error is never greater than the significance level used.

Using newly enhanced census data, this paper employs an ordinal approach to assess the redistributive effect of the tax-transfer system in Canada. The paper provides a useful addition to the Canadian literature in several respects. First, it examines the net effect of the tax-transfer system by acknowledging both aspects of redistributive justice: vertical equity and horizontal equity. The effect of the vertical component is measured in terms of progressivity and can be further decomposed into the contribution of tax and of separate transfer components. The effect of the horizontal component is assessed to find out if there is reranking in the redistribution of incomes.[1] Second, unlike previous studies that mostly relied on survey data, this paper uses enhanced census data, which are augmented with predicted taxes (both federal and provincial) recently developed by Statistics Canada.[2] The use of sizable census files significantly increases statistical power and greatly reduces challenges faced with survey data as mentioned above. It ensures broader (or whole) ranges of comparisons over the income distribution. Third, this paper offers a trend pattern of redistribution from 1980 to 2000, based on a consistent data source.[3] During these decades, the fiscal system of Canada has also undergone significant changes, including a reduction in the generosity of several income-transfer programs and major tax reforms. Investigation of the performance and the equity of the tax-transfer system over time may reveal whether changes in a certain state treatment (e.g. social assistance) would be an important factor in explaining rising inequality, therefore shedding light on policy discussions.

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1. The only exception is Davidson and Duclos (1997), who also use Canadian data to measure redistribution, progressivity and horizontal inequity. However, their analysis does not separate the vertical inequity into the contribution of different tax and transfer components, and their data covers the period from 1990 to 2000, when there was a noticeable rise in net income inequality.

2. Taxes are predicted based on information available from administrative tax data. See Frenette, Green, and Milligan (2006) for their tax-predicting approach and validation technique.

3. Note that other Canadian studies documented the redistribution trend during this period. However, these studies rely on two different data sources, namely the Survey of Consumer Finances (from 1976 to 1997) and the Survey of Income and Labour Dynamics (from 1993 to present), to document the trend pattern.

Methodology

The empirical analysis on the measurement of redistribution, progressivity, and reranking in this paper draws extensively on the theory of dominance, which can be used to establish an ordinal ranking of poverty or equity across distributions. That is, by comparing the distributions of different social welfare functions, one may judge whether equity is higher or lower in one distribution than in another. Following Duclos and Araar (2006, 145), the net distributive effect of taxes and transfers can be expressed as the difference between the Lorenz curves of net and gross income, $L_N(p) - L_G(p)$. The difference can be decomposed into the following vertical equity (*VE*) and reranking (*RR*) components by adding and subtracting $C_N(p)$, which is the concentration curve for net income:

$$L_N(p) - L_G(p) = \underbrace{C_N(p) - L_G(p)}_{VE} - \underbrace{[C_N(p) - L_N(p)]}_{RR}$$

The first term, *VE,* in above expression is often referred to as income redistribution (IR) progressivity in the literature, and the second term, *RR,* indicates the presence of horizontal inequity. To measure the significance of various state treatments in total progressivity, *VE* is further decomposed into the contribution of the tax/transfer components (*j*):

$$C_N(p) - L_G(p) = \sum_{j=1}^{J} \frac{(1-t_j)\{C_{Nj}(p) - L_G(p)\}}{1-t}$$

where t_j is the average of the tax/transfer *j* as a proportion of average gross income.

With the advantage of large sample sizes, tests of welfare dominance are calculated in fairly small sections of the income distribution (i.e., percentiles). That is, we reject the null hypothesis of non-dominance in favor of alternative of dominance only if one concentration curve is significantly greater than another at each percentile at a 5% level of significance. The distribution-free approach as proposed by Davidson and Duclos (1997) is used to test for dominance between welfare functions that may be correlated.

Expectations

In this paper, we use an ordinal analysis, based on the comparison of the distribution of various social welfare functions, to assess the redistributive effect of taxes and transfers in Canada. Specifically, we are expecting the following results. First, the effect of redistribution derived from differences in simple cardinal inequality indices will be deceptive when it comes to ranking distributions. Second, the current tax-transfer system will induce reranking (i.e., horizontal inequity) because most taxes and transfers are not a deterministic function of gross income. The presence of reranking, therefore, undermines the effect of income redistribution. Finally, due to changes in the fiscal system as well as the aging of the population, we also expect that some state treatments, particularly child benefits and public pension, will contribute in a relatively large portion to total progressivity in recent years than it did decades ago.

References

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