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Poverty Intensity - How Well Do Canadian Provinces Compare?

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Abstract

This paper uses estimates of the Sen-Shorrocks-Thon measure of poverty intensity in Canadian provinces, and the 95% confidence interval surrounding such estimates, for 1984, 1989 and 1991-1996 to compare Canadian provinces over time and internationally. Coinciding with more general social assistance support, poverty intensity in Ontario declined in the late 1980s to a level similar to Northern Europe, but since 1994 cuts to social assistance have coincided with a significant rise in poverty intensity. Prince Edward Island has done relatively well in reducing poverty intensity. Nationally, the 1980s were a period of declining poverty intensity, but these gains have been eroded since 1994.

Introduction

Statements about whether poverty is increasing, or whether particular governments are doing a good job in reducing poverty, are the basic ingredients of many political debates. Indeed, it can be argued that the whole point of measuring poverty is to make comparisons - either over time or across jurisdictions - and to use such comparisons to help decide whether, and how, it is possible to reduce poverty. While international comparisons of poverty have become increasingly common in recent years, they are plagued by the differences between countries in poverty norms and measurement techniques. Inter-provincial comparisons within Canada do not face these problems, and are of considerable practical importance to Canadians, since the provinces bear the constitutional responsibility for social policy and directly administer most social spending and anti-poverty programmes.

In a federal system of government, such as Canada's, there is often an acute tension between national standards and provincial autonomy. The ideal of equal treatment for all citizens, wherever they may live, is constantly being balanced against the advantages of allowing provincial flexibility and experimentation with locally appropriate alternative policies. It has often been argued (e.g. by Thomas J. Courchene) that an important advantage of a federal system of government is the opportunity of sub-national governments to learn from the social experiments of other similar jurisdictions. Furthermore, in Canadian social policy, the pendulum is clearly swinging towards greater provincial autonomy and increasing differentiation of social policy.[1] However, if greater differentiation of policy is to produce greater learning from the experience of other jurisdictions, some comparison of outcomes is required. By what benchmarks should one assess the success or failure of provincial social policies in reducing poverty? What measure of poverty should be used? What

degree of difference in measured poverty is statistically meaningful? How can one decompose changes in measured poverty into underlying trends?

In the popular debate on poverty, the most commonly used measure is the poverty rate (the percentage of the population whose incomes lie below the poverty line), but such a measure does not reflect the amount by which the incomes of the poor fall below the poverty line. The average poverty gap ratio (the average percentage shortfall of the individuals' incomes below the poverty line) is also a common, simple measure, but it ignores the number of poor people and the degree of inequality among the poor. As measures of poverty, both the poverty rate and the average poverty gap ratio have obvious intuitive appeal, but they may not point to the same conclusion. In 1996, for example, B.C. had the lowest poverty rate of all Canadian provinces (at 9.51%) but the highest average poverty gap ratio (at 34.98% - see Table 1 below). Poverty researchers have therefore increasingly turned to measures of poverty intensity which do account jointly for the number of poor, depth of poverty and inequality among the poor.

The measurement of poverty intensity we use was initially advocated by Sen (1976), and modified recently by Shorrocks (1995). However, since Thon (1979, 1983) proposed a revision of the Sen index which in the limit is identical to that of Shorrocks, we refer henceforth to the SST index. This article begins by discussing the SST index of poverty intensity and its decomposition into the poverty rate, the average poverty gap ratio among the poor and the overall Gini index of poverty gap ratios. The article then sets the international context for poverty intensity comparisons, using Luxemburg Income Study data to compare the intensity of poverty in Canada to that in other developed countries in the 1990s and to the trends observed in the U.S. We then look beneath the national Canadian numbers to trace changes in poverty intensity in Canadian provinces over the

period 1984-1996, and rank provinces in terms of poverty intensity. To address the statistical uncertainty which arises from *estimates* based on *sample* data, we use bootstrap methods to establish the confidence interval which surrounds point estimates of the poverty intensity of Canadian provinces, and assess the statistical significance of poverty intensity differentials.

The SST Index: Decomposition and Inference

Since Sen (1976) proposed a poverty index and a set of desirable criteria for evaluating a poverty index, research on poverty indices has received considerable attention.[2] Hagenaars (1991) and Zheng (1997) have summarized the properties that ethically defensible measures of poverty should possess - in particular, the property that an acceptable measure of poverty should always register an increase in poverty whenever a pure transfer of income is made from someone below the poverty line to someone who has more income. This property is not possessed by the poverty rate, the poverty gap or, as originally formulated, the Sen index. Shorrocks (1995) has therefore proposed a modified Sen index for measuring the intensity of poverty.

The SST index of poverty intensity combines the poverty rate, average poverty gap ratio and inequality in poverty gaps. It can be decomposed [see Osberg and Xu (1997)] as:

$$P(Y; z) = (RATE)\ (GAP)\ (1+G(X)). \tag{1}$$

Here $P(Y; z)$ is the SST index for an N-person income vector Y and the poverty line z. The *poverty gap ratios* are given by

(2) $$X_i = \frac{z - Y_i}{z}, \qquad i = 1,2,\ldots,N,$$

with the non-poor population's X_i being set to zero. *RATE* is the poverty rate,

(3) $$RATE = \frac{Q}{N},$$

where Q is the number of the poor. *GAP* is the familiar average poverty gap ratio among the poor.

(4) $$GAP = \frac{1}{Q}\sum_{i=1}^{N} X_i.$$

$G(X)$ is the Gini coefficient of poverty gap ratios,[3]

(5) $$G(X) = 1 - \left(\frac{1}{N}\right) \sum_{i=1}^{N}\left(\frac{\sum_{j=1}^{i} X_j + \sum_{j=2}^{i} X_j}{\sum_{j=1}^{N} X_j}\right)$$

It is useful to transform Equation (1) into:

(6) $$\ln(P(Y; z)) = \ln(RATE) + \ln(GAP) + \ln(1+G(X)),$$

where the term $\ln(1+G(X))$ is an approximate of $G(X)$ based on the first-order Taylor series expansion.

The overall percentage rate of change in poverty intensity over time can therefore be expressed as the sum of the percentage changes in the poverty rate, average poverty gap ratio (among the poor), and Gini index of inequality in the poverty gap ratios (among all people).

$$\Delta \ln P(Y; z) = \Delta \ln(RATE) + \Delta \ln(GAP) + \Delta \ln(1+G(X)), \tag{7}$$

where $\Delta \ln (1 + G(X))$ is an approximation of $\Delta G(X)$. Equation (7) is also useful for decomposing the percentage differences in poverty intensity between two populations (e.g. between two provinces) into percentage differences in poverty rate, poverty gap and inequality of poverty.

In practice, as Osberg and Xu (1997) demonstrate using Luxemburg Income Study data, changes over time in the inequality measure $[1+G(X)]$ are empirically very small. Differences across countries in the inequality of poverty gaps $[1+G(X)]$ are also relatively small, compared to differences in the poverty rate and average poverty gap. Hence, for practical purposes the percentage change in poverty intensity can be approximated as the sum of the percentage changes of the poverty rate and the average poverty gap ratio.

One of the problems of the poverty literature is the wide gap between theoretically appropriate measures and the popular debate. Although new measures of poverty intensity, like the Foster-Greer-Thorbecke (1984) or the SST index, have desirable theoretical properties and although important theoretical advances in poverty measurement have been made in the academic community, these have had relatively little impact on public debate. However, equations (1) and (7) provide a straightforward decomposition of the SST index of poverty intensity which can be readily interpreted by policy makers, social science researchers and the general public.

In this paper, we want to assess whether observed differences between provinces in poverty intensity are statistically meaningful. We therefore use a bootstrap procedure to compute the standard deviation of the SST index estimator.[4]

Data and Methodology

This paper uses data on the total after-tax income of economic families and assumes that income is shared within families. However, the focus of welfare comparisons is the distribution of income among persons. We therefore calculate the "equivalent income" of all individuals, and measure poverty intensity in terms of equivalent income. In the literature, a number of equivalence scales have been used to account for the economies of scale of household consumption [see Burkhauser *et al.* (1996), Phipps and Garner (1994), and Figini (1998)].

The issues raised by different equivalence scales are important, but to keep this paper focussed, and to maintain comparability with much of the international literature, we simply use the "OECD" equivalence scale, which calculates the equivalent income of each family member, Y, as:

$$Y = Y_f / (1 + .7(N_a - 1) + .5N_c). \tag{8}$$

Here Y_f is total family disposable income, N_a is the number of the adults in the family and N_c is the number of the children under age 18.[5]

As Hagenaars (1991) and many others have noted, there has long been a debate on how best to conceptualize poverty. In very poor countries, where many people may be continually hungry, poverty can best be seen in absolute terms, but in developed countries we take the view that social norms within each country as to a minimally adequate standard of living differ across countries and change over time and are in fact heavily influenced by the prevailing average standard of living [see

Osberg (1984), pp. 61-73]. We therefore adopt the commonly accepted international standard of half the median equivalent income as the poverty line, at each point in time for both international and interprovincial comparisons.[6] Since so much of the Canadian debate has used the Low Income Cut Offs (LICO) of Statistics Canada, we also use the LICO as an estimate of the "poverty line" for interprovincial comparisons. For the international comparisons we use the Luxemburg Income Study (LIS) data (which is based, for Canada, on the Survey of Consumer Finance), but for the interprovincial comparisons we use the Survey of Consumer Finance microdata of 1984, 1989 and from 1991 to 1996 directly.

We assume that within all provinces, at all dates: (i) family (after-tax) income is equally shared among all family members, (ii) the OECD equivalence scale adequately accounts for economies of scale in family consumption, and (iii) the poverty line is represented by either (a) half the median equivalent income or (b) the LICO. Clearly, these are strong assumptions. For example, Sharif and Phipps (1994) have demonstrated the sensitivity of child poverty in Canada to alternative assumptions about the intra-family distribution of resources, and sharing norms within families may vary over time and across provinces. Pendakur (1998) has argued for consumption rather than income as a measure of adequacy, and has criticized the use of price insensitive equivalence scales. There is a considerable literature on intra household allocation, equivalence scales and poverty lines, but we make these assumptions in order to focus attention on issues which have, thus far, been neglected in the literature.

The International Context for Canadian Poverty Intensity Comparisons

Differences in poverty intensity within Canada are important, but how do these levels compare internationally? Before proceeding to an examination of the differences between Canadian provinces in poverty intensity, we first set the context by discussing the much larger differences in poverty

intensity that can be observed among selected developed countries and over time. Chart 1 presents LIS data from the 1990s,[7] to make the point that by the mid 1990s, poverty intensity in Canada was, overall, comparable to the high end of the European poverty intensity spectrum - and quite different from that observed in the U.S.

Chart 2 is presented to make the point that the difference in poverty intensity between the U.S. and Canada was not always there, and has only emerged within the last twenty five years. Canada and the U.S. were statistically indistinguishable in poverty intensity in the early 1970s (indeed Canada's point estimate of poverty intensity in 1971 exceeds the U.S 1974 point estimate). But over the period 1971 to 1994, Canadian social policy diverged from that in the U.S. [see Card and Freeman (1993)], and Canadian and American poverty intensity moved in different directions. By the mid 1990s Canadian poverty intensity was clearly less than in the U.S. However, differences in poverty which emerge in a decade can, presumably, disappear just as quickly. Given the many cutbacks to Canadian social programmes of the last few years, the extent to which Canada will continue to differ from the U.S. remains to be seen.

[Please insert Charts 1 and 2 about here]

Poverty Intensity Comparisons among Canadian Provinces

Although Charts 1 and 2 present national data, Canada is a federal state, and much of social policy is set at the provincial level. How do Canadian provinces differ in poverty intensity? By constructing bootstrap estimates of the confidence intervals around point estimates of poverty intensity, we are able to distinguish between those differentials in poverty intensity that are significant and those that are not. Charts 3 and 4 present estimates of provincial poverty intensity using

alternative poverty lines, and the associated 95% statistical confidence intervals. It is apparent from either Chart that some differences between provinces in point estimates are not statistically meaningful. For example, point estimates of poverty intensity in Nova Scotia and New Brunswick may change in relative ranking from one year to the next, or under alternative definitions of the poverty line, but such changes in rankings do not really deserve much emphasis, since there is substantial overlap in the confidence interval surrounding these estimates. Indeed, in all years and by both criteria of the poverty line, there is a good deal of overlap among provinces in poverty intensity.

[Please insert Charts 3 and 4 about here]

However, some differences in poverty intensity *are* statistically significant. Although, compared to other provinces, Ontario had a relatively low rate of poverty intensity in 1984, it was not significantly different from Quebec or B.C. In 1989, the situation was different - Ontario's poverty intensity was clearly lower than that of all other provinces and the difference was statistically (and practically) significant. Despite the intense impact of the recession of the early 1990s on Ontario, until 1994 Ontario continued to do a clearly better job than most other provinces in mitigating the intensity of poverty. Dooley (1998) has noted that the period 1983 to 1991 saw very substantial increases in the real value of social assistance benefit levels in Ontario. [Social assistance benefits remained roughly constant from 1992 to 1994 but were cut by 21% in October 1995.]

Overall, the visual impression of Charts 3 and 4 is that there was a shift down in poverty intensity in several provinces between 1984 and 1989 (more pronounced for the LICO-based measures of poverty intensity). Table 1 presents the percentage change in poverty intensity by

province, and its decomposition into the underlying changes in poverty rate and the average poverty gap.[8] Newfoundland, Nova Scotia, New Brunswick, Quebec, Ontario, and British Columbia recorded statistically significant declines in poverty intensity from 1984 to 1989.

To place these estimates of poverty intensity in some context, the right panel of Chart 3 compares overall poverty intensity in Canada, Belgium and the United States, as calculated using Luxembourg Income Study data [see Osberg and Xu, (1997)].[9] In 1994, using the internationally comparable "one half the median equivalent income" concept of poverty, the LIS data indicate that the SST index of poverty intensity in the U.S. was .1246, over twice the Canadian level of .0538.

In the early 1990s, poverty intensity in some Canadian provinces (see Table 1) was roughly comparable to that in some European countries [see Osberg and Xu, (1997)]. For example, Ontario's poverty intensity level in 1994 (.0416) was higher than that in Sweden in 1992 (.0372), but since the 95% confidence interval for Sweden spans the range .0332 to .0412, it could be argued that the difference between Ontario and Sweden in poverty intensity in the early 1990s was at the edge of statistical significance. Prince Edward Island, with a point estimate of .0427 in 1994, but a wider range of statistical uncertainty (spanning .0281 to .0574) was also comparable with Sweden. However, since the other provinces had, in 1994, clearly higher levels of poverty intensity (e.g. Québec at .0567 in 1994, British Columbia at .0581 in 1994), their poverty intensity was more comparable to that of the U.K. in 1991 (.0562).[10]

Since demography or industrial structure may imply a structural tendency to greater poverty in some provinces, it can be argued that the trend of poverty within provinces is especially meaningful. Charts 5a, 5b and 5c therefore present the estimate of poverty intensity, and the confidence interval surrounding each estimate, within each province for 1984, 1989 and from 1991 to 1996.

Charts 5a-5c focus on Canadian provinces, with a comparison to aggregate Canadian poverty intensity and to LIS data on Canada, the U.S. and a pair of examples of European poverty intensity (Belgium and Sweden). As Chart 2 has already indicated, although poverty intensity in Canada was slightly greater than that in the U.S. in the early 1970s, poverty intensity since then has risen significantly in the U.S., and fallen significantly in Canada. The choices of social policy matter a good deal for the wellbeing of the poor - and the end result of twenty years of such choices is a very different intensity of poverty in the U.S. than in Europe, or in Canada.

Table 1 indicates that the statistically significant changes in poverty intensity from 1984 to 1989 were mostly driven by declines in the poverty rate, but in Nova Scotia and Ontario the average poverty gap also declined 26% and 22%, respectively. From 1989 to 1996, changes in overall poverty intensity within provinces generally came from large increases in the poverty rate, and small changes in the average poverty gap ratio.

By contrast, there was little change over time, and there is little difference across provinces, in inequality among the poor [see Column 4, headed (1 +G)].[11] It is changes in the poverty rate, and/or the average poverty gap ratio, which explain changes in poverty intensity, almost entirely.

It may be asking a lot of participants in the poverty debate, when new data become available each year, to expect them to perform 300 bootstrap estimates before making any statement about whether a measured change in poverty, or a point estimate of the differential between provinces, is statistically significant. Currently, depending on the sample size available for the computation of a particular statistic, Statistics Canada usually follows the practice of reporting either a number or an asterisk - which effectively means that the statistical uncertainty that inevitably surrounds generalization from a sample of the population is dichotomized into “totally reliable” and “totally unreliable” estimates.

Statistics Canada could follow the practice of reporting both the point estimate, and the standard error of that estimate, for all computed statistics (like the poverty rate). However, until this is available Appendix Table A2 may be a useful set of rules of thumb. Since the standard deviation of poverty intensity estimates varies by province (being significantly larger in smaller provinces) and by concepts of poverty, the appropriate confidence interval varies accordingly. Table A2 can therefore be read as establishing the approximate width, plus or minus, of a 95% confidence interval. If one, for example, is interested in knowing whether, at a 95% level of confidence, another province has a lower/higher poverty gap than Nova Scotia's, one needs a differential of more than .0279 in the poverty gap (according to the LICO) and more than .026 (by the half median income concept).

For many people, the "new information" of Charts 3 and 4 may be how well Prince Edward Island has done in mitigating the impact of poverty. Even when the poverty line standard is set at half the median equivalent income of all Canadians, Prince Edward Island does nearly as well in 1996 in reducing poverty as Ontario (a much richer province). By the LICO criterion, which builds in some recognition of rural/urban differentials in costs of living, Chart 4 indicates that the PEI was very clearly superior to all other provinces in 1996 in poverty intensity. Although the smaller sample size of PEI data does imply a larger confidence interval surrounding PEI estimates, these differentials in poverty intensity *are* statistically significant.

Why does PEI do so well in reducing poverty intensity? Although there are some difference in poverty rate, the outstanding difference is in the level of the average poverty gap. There may be a straightforward explanation - Social Assistance benefits in PEI have not been as miserly as in other provinces. In 1994, for example, a couple with two children on social assistance in PEI would have received 38% of the estimated average income of such family types in PEI, which compared well to 24% in New Brunswick, 34% in Ontario and 27% in British Columbia. For all family types for which

comparisons were possible, Social Assistance benefits in PEI were the highest, of any province, as a percentage of the average income of comparable households in that province [see National Council of Welfare (1995), Table 4, p. 30].

On the other hand, although the decline in poverty intensity in Ontario from 1984 to 1989 does reflect the substantial increase in Social Assistance benefit levels of that period, the 1995 poverty intensity data for Ontario did not fully reflect the impact of the 21% reduction in Social Assistance support levels instituted by the current government, as these only came into effect in October 1995. To see the full impact of these cuts on Ontario poverty we had to await the 1996 data, which contained a full year's impact of reduced generosity of Social Assistance. As chart 5b indicates, there is a clear, statistically significant increase in poverty intensity in Ontario between 1994 and 1996 and (since Ontario is the largest province) there is a noticeable increase from 1994 to 1996 in overall national poverty intensity. Presumably, nobody will be greatly surprised by the direction of Ontario's trends - but there remains the crucial issue of the ultimate size of the impact on Canadian poverty intensity of a trend to reduced generosity of transfer payments.

Conclusions

This paper has presented estimates of the level of poverty intensity in Canada, and within each Canadian province, for the years 1984, 1989, and 1991-96 and has compared poverty intensity over time, across provinces and in relation to other countries and to long run trends in the U.S. Bootstrap methods have been used to establish the statistical confidence interval surrounding those estimates.

It is clear that in most provinces, the 1980s were a period of declining poverty intensity, and these gains have not yet been entirely erased in the 1990s.

One conclusion to be drawn is methodological - some measured changes in poverty intensity are not statistically meaningful. To distinguish those changes that are meaningful, it would be desirable for the debate on poverty to include, routinely, consideration of the level of statistical uncertainty surrounding estimates of poverty measures, or the ranking of jurisdictions in terms of poverty intensity. This consideration of the inevitable uncertainty that is inherent in sample data would be assisted if statistical agencies were to publish routinely both the point estimates, and the standard errors, of the poverty rate and the poverty gap. In the absence of such a change in statistical procedure, researchers can use bootstrap methods to estimate the confidence interval (if they have access to microdata) or the approximations of Table A2 (if they do not have microdata access).

Measurement of trends is only the first stage in causal analysis. The prevalence and depth of poverty is influenced by secular trends in household composition and formation, structural trends in low wage labour markets, the ups and downs of aggregate demand and the design and funding of transfer payments. In this paper, we have concentrated on measurement of the aggregate outcomes that need to be explained, and have not presented direct tests of alternative hypotheses. Nevertheless, the coincidence between more generous social assistance benefits levels and lessened intensity of poverty surely points to the potential importance of social policy.

More substantively, this paper has noted that comparing the early 1970s and 1994, poverty intensity in Canada diminished, with particularly large changes in the late 1970s for Canada as a whole and a downward trend in Ontario (which heavily influences the national figures) in the late 1980s and

early 1990s. These trends in Canada contrasted with those in the U.S., so that Canada moved from being statistically indistinguishable from the U.S. to being clearly different. By the early 1990s, poverty intensity in Canada, and particularly in Ontario and Prince Edward Island, was statistically indistinguishable from that in several European countries.

A general lesson of the international literature,[12] however, is the vulnerability of the poor. The poor do not have much in the first place, and a few dollars more or less can make a big difference in each of their lives. Since 1994 there have been major cutbacks to transfer payments, both federally and in Ontario. Poverty intensity in Canada increased significantly between 1994 and 1996, but it remains to be seen whether this marks the beginning of a long run trend to American levels of poverty intensity, or not.

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Table 1
Decomposition of SST Index -Poverty Line=1/2 the Median Equivalent Income

	SST Index	Decomposition of Level				Decomposition of change		
	(P)	RATE	GAP	(1+G)	Δ ln(P)	Δ ln(RATE)	Δ ln(GAP)	Δ ln(1+G)
NFLD 84	0.137	0.245	0.304	1.844				
89	0.095	0.169	0.296	1.897	-0.370*	-0.372*	-0.027	0.028
94	0.105	0.184	0.304	1.884	0.104	0.086	0.026	-0.007
95	0.125	0.212	0.316	1.864	0.168	0.141	0.038	-0.010
96	0.092	0.164	0.294	1.897	-0.307	-0.254	-0.071	0.018
PEI 84	0.070	0.138	0.265	1.922				
89	0.068	0.141	0.252	1.924	-0.028	0.019	-0.048	0.001
94	0.043	0.107	0.205	1.945	-0.471	-0.277	-0.205	0.011
95	0.056	0.121	0.240	1.938	0.274	0.121	0.157	-0.004
96	0.0581	0.123	0.244	1.929	0.032	0.023	0.014	-0.004
NS 84	0.084	0.148	0.297	1.911				
89	0.061	0.139	0.229	1.923	-0.314*	-0.060	-0.261*	0.006
94	0.077	0.147	0.272	1.915	0.223	0.055	0.172	-0.004
95	0.082	0.155	0.278	1.908	0.067	0.051	0.021	-0.004
96	0.078	0.148	0.276	1.915	-0.048	-0.048	-0.005	0.004
NB 84	0.108	0.194	0.297	1.880				
89	0.074	0.133	0.290	1.916	-0.388*	-0.381*	-0.027	0.019
94	0.073	0.137	0.280	1.917	-0.002	0.031	-0.034	0.000
95	0.086	0.155	0.291	1.904	0.158	0.126	0.039	-0.007
96	0.076	0.144	0.275	1.916	-0.122	-0.071	-0.058	0.006
QUE 84	0.068	0.141	0.251	1.920				
89	0.053	0.109	0.252	1.933	-0.242*	-0.250*	0.002	0.007
94	0.057	0.125	0.235	1.927	0.061	0.133	-0.068	-0.003
95	0.067	0.128	0.271	1.924	0.165	0.027	0.140*	-0.001
96	0.065	0.124	0.272	1.924	-0.027	-0.032	0.004#	0.000
ONT 84	0.060	0.093	0.332	1.946				
89	0.033	0.064	0.267	1.965	-0.584*	-0.375*	-0.218*	0.009
94	0.042	0.079	0.268	1.958	0.219	0.219	0.004	-0.003
95	0.050	0.090	0.282	1.951	0.175	0.126	0.053	-0.004
96	0.059	0.100	0.306	1.944	0.167#	0.107#	0.066	-0.004
MAN 84	0.087	0.131	0.346	1.922				
89	0.063	0.126	0.256	1.929	-0.328	-0.032	-0.300*	0.004
94	0.071	0.116	0.316	1.929	0.127	-0.084	0.211*	0.000
95	0.056	0.118	0.245	1.934	-0.241	0.012	-0.256*	0.003
96	0.067	0.127	0.275	1.923	0.186	0.078	0.114	-0.006
SAS 84	0.093	0.156	0.312	1.908				
89	0.095	0.161	0.310	1.903	0.018	0.027	-0.006	-0.003
94	0.082	0.136	0.316	1.913	-0.145	-0.168	0.018	0.006
95	0.082	0.137	0.311	1.918	-0.003	0.011	-0.016	0.002
96	0.077	0.137	0.294	1.919	-0.057	-0.001	-0.058	0.001
ALB 84	0.071	0.111	0.330	1.937				
89	0.068	0.114	0.306	1.937	-0.041	0.034	-0.075	0.000
94	0.060	0.113	0.272	1.934	-0.128	-0.009	-0.117	-0.002
95	0.070	0.112	0.322	1.936	0.154	-0.015	0.167	0.001
96	0.069	0.116	0.307	1.934	-0.011	0.037	-0.047	-0.001
BC 84	0.069	0.116	0.308	1.933				
89	0.047	0.090	0.266	1.949	-0.394*	-0.258	-0.145	0.008
94	0.058	0.104	0.288	1.938	0.218	0.144	0.079	-0.005
95	0.060	0.103	0.302	1.942	0.037	-0.009	0.044	0.002
96	0.065	0.095	0.350	1.944	0.070	-0.080	0.149	0.001

*year to year change is significant at the 95% confidence level.

[#]change from 1994 to 1996 is significant at 95% confidence level.

Appendix:

Table A1
Decompostion of SST Index - Poverty Line =After Tax LICO

	SST Index	Decomposition of Level				Decomposition of change		
	(P)	RATE	GAP	(1+G)	Δ ln(P)	Δ ln(RATE)	Δ ln(GAP)	Δ ln(1+G)
NFLD 84	0.083	0.177	0.251	1.900				
89	0.053	0.111	0.248	1.938	-0.450*	-0.462*	-0.011	0.020
94	0.070	0.132	0.276	1.921	0.272	0.173	0.108	-0.009
95	0.094	0.153	0.323	1.942	0.300*	0.147	0.155	-0.009
96	0.0713	0.131	0.283	1.914	-0.279*	-0.155	-0.130	0.006
PEI 84	0.043	0.081	0.270	1.961				
89	0.040	0.073	0.278	1.963	-0.067	-0.097	0.029	0.000
94	0.029	0.066	0.227	1.965	-0.316	-0.112	-0.202	0.000
95	0.040	0.070	0.285	1.963	0.304	0.071	0.228	-0.001
96	0.0397	0.0759	0.267	1.961	0.010	0.0759	-0.065	-0.001
NS 84	0.073	0.127	0.301	1.924				
89	0.044	0.096	0.241	1.945	-0.491*	-0.279*	-0.223*	0.011*
94	0.068	0.124	0.284	1.929	0.420	0.259	0.167	-0.008
95	0.073	0.134	0.283	1.921	0.077	0.079	-0.004	-0.004
96	0.071	0.125	0.293	1.927	-0.031	-0.070	0.035	0.003
NB 84	0.084	0.155	0.288	1.909				
89	0.051	0.096	0.274	1.941	-0.503*	-0.475*	-0.048	0.017
94	0.061	0.115	0.278	1.932	0.182	0.176	0.012	-0.005
95	0.066	0.120	0.291	1.923	0.095	0.044	0.046	-0.004
96	0.066	0.118	0.292	1.929	-0.012	-0.018	0.003	0.003
QUE 84	0.091	0.165	0.294	1.901				
89	0.065	0.125	0.271	1.923	-0.345*	-0.277*	-0.080	0.012
94	0.081	0.152	0.281	1.907	0.221	0.192	0.037	-0.009
95	0.090	0.155	0.308	1.905	0.121	0.021	0.092	-0.001
96	0.095	0.166	0.303	1.897	0.048[#]	0.069	-0.017	-0.004
ONT 84	0.073	0.114	0.334	1.934				
89	0.038	0.073	0.268	1.960	-0.648*	-0.444*	-0.221*	0.014
94	0.054	0.098	0.285	1.945	0.346	0.295*	0.061	-0.008
95	0.063	0.116	0.284	1.935	0.161*	0.163*	-0.004	-0.005
96	0.073	0.121	0.313	1.930	0.141[#]	0.046[#]	0.098	-0.002
MAN 84	0.097	0.147	0.350	1.910				
89	0.068	0.125	0.285	1.925	-0.360*	-0.158	-0.208*	0.008
94	0.082	0.138	0.312	1.920	0.185	0.096	0.093	-0.003
95	0.072	0.134	0.284	1.918	-0.115	-0.029	-0.095	-0.001
96	0.081	0.146	0.289	1.915	0.100	0.087	0.016	-0.002
SAS 84	0.077	0.137	0.292	1.926				
89	0.067	0.107	0.322	1.937	-0.138	-0.243*	0.097	0.006
94	0.070	0.119	0.306	1.926	0.043	0.101	-0.050	-0.006
95	0.070	0.119	0.305	1.932	0.003	-0.003	-0.003	0.003
96	0.073	0.124	0.304	1.928	0.039	0.047	-0.006	-0.002
ALB 84	0.091	0.140	0.343	1.917				
89	0.073	0.114	0.334	1.935	-0.219*	-0.201*	-0.027	0.009
94	0.074	0.127	0.307	1.923	0.014	0.104	-0.083	-0.006
95	0.085	0.137	0.324	1.922	0.136	0.077	0.053	-0.001
96	0.087	0.136	0.333	1.919	0.0195	-0.007	0.026	-0.002
BC 84	0.091	0.151	0.319	1.910				
89	0.054	0.098	0.283	1.943	-0.533*	-0.431*	-0.121	0.018
94	0.077	0.132	0.305	1.921	0.358	0.297	0.074	-0.011
95	0.075	0.128	0.305	1.927	-0.020	-0.032	0.001	0.001
96	0.085	0.128	0.342	1.926	0.1116	0.003	0.114	0.001

*year to year change is significant at the 95% confidence level.
[#]change from 1994 to 1996 is significant at 95% confidence level.

Table A2
Statistically Significant Differences in Poverty Measures
-Average Value of Two Standard Deviations of Bootstrap Estimates

	RATE		GAP		SST Index	
Province	LICO	½ median	LICO	½ median	LICO	½ median
Newfoundland	0.0113	0.0216	0.0290	0.0260	0.0089	0.0147
Prince Edward Island	0.0101	0.0236	0.0530	0.0440	0.0086	0.0151
Nova Scotia	0.0103	0.0179	0.0279	0.0260	0.0078	0.0113
New Brunswick	0.0083	0.0167	0.0244	0.0242	0.0064	0.0110
Quebec	0.0099	0.0108	0.0171	0.0174	0.0068	0.0066
Ontario	0.0067	0.0081	0.0203	0.0231	0.0052	0.0054
Manitoba	0.0128	0.0175	0.0278	0.0303	0.0097	0.0120
Saskatchewan	0.0102	0.0175	0.0293	0.0276	0.0083	0.0124
Alberta	0.0095	0.0137	0.0250	0.0280	0.0077	0.0094
British Columbia	0.0105	0.0131	0.0287	0.0337	0.0088	0.0098
Simple Average	0.0099	0.0161	0.0283	0.0280	0.0078	0.0108
Population Weighted Average	0.0088	0.0115	0.0223	0.0242	0.0068	0.0077
Canada-Wide Estimates	0.0041	0.0047	0.0092	0.0097	0.0030	0.0031

Endnotes

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1. The federal government's replacement of Canada Assistance Plan (CAP) by the Canadian Health and Social Transfer (CHST) is one example, since CAP was a cost-sharing programme with some national standards [in that need was the only basis for social assistance and that an appeal mechanism had to be provided] while CHST is block-funded, and requires only that provinces not impose a residency requirement. The devolution of responsibility for social housing and for training to the provinces are other examples.

2. See, among others, Atkinson (1987), Besley (1990), Blackorby and Donaldson (1980), Donaldson and Weymark (1986), Foster, Greer and Thorbecke (1984), Foster and Shorrocks (1988, and 1991), Takayama (1979) and Thon (1979, 1983). In addition, Kakwani (1980), Foster (1984), Hagenaars (1986), Seidl (1988), and Zhang (1997) have provided useful surveys of this literature. Statistical inferences of different poverty measures have been provided by Bishop, Chow and Zheng (1995), Davidson and Duclos (1998), Osberg and Xu (1997), Rongve (1997), Preston (1995), Xu (1998), and Zheng, Cushing and Chow (1995).

3. Note that in equation (5), individual poverty gap ratios are ordered from smallest to largest.

4. To compute the bootstrap standard deviation of the modified SST index estimator, we resample randomly both equivalent incomes and corresponding sampling weights. The new sample is used to compute a new SST index estimate. Repeating this process T times (e.g. $T=300$) gives T SST index estimates. The bootstrap variance is computed as the sample variance of the T SST index estimates from the resampling. Under the assumption of normality, one can approximate a 95% confidence interval by adding two bootstrap standard deviations on each side of the SST index estimate when ranking provinces. Alternatively, a distribution free estimate of the 95% confidence interval is given by ordering all 300 bootstrap estimates by size, and selecting the 8th and 293rd largest. Both methodologies give highly similar results [see Osberg and Xu (1997) and the references therein].

5. See Burkauser et al. (1996) for comparison OECD and other equivalence scales. Figini (1998, p. 2) notes that "OECD" and other two-parameter equivalence scales empirically used show a similarity of results (in measurement of inequality) to one parameter equivalence scales with elasticity around 0.5.

6. We note that this does *not* imply either that poverty cannot be eliminated or that poverty and inequality are identical issues, since the fraction of a population below half the median is a characteristic of only the lower tail of the distribution of income. Statistics Canada refers to this concept of poverty as the "Low Income Measure" or LIM.

7. See Osberg and Xu (1997) for details.

8. Table 1 presents decomposition of the SST index using the "one half median income" conception of the poverty line while Appendix Table A1 presents a comparable table, using the LICO.

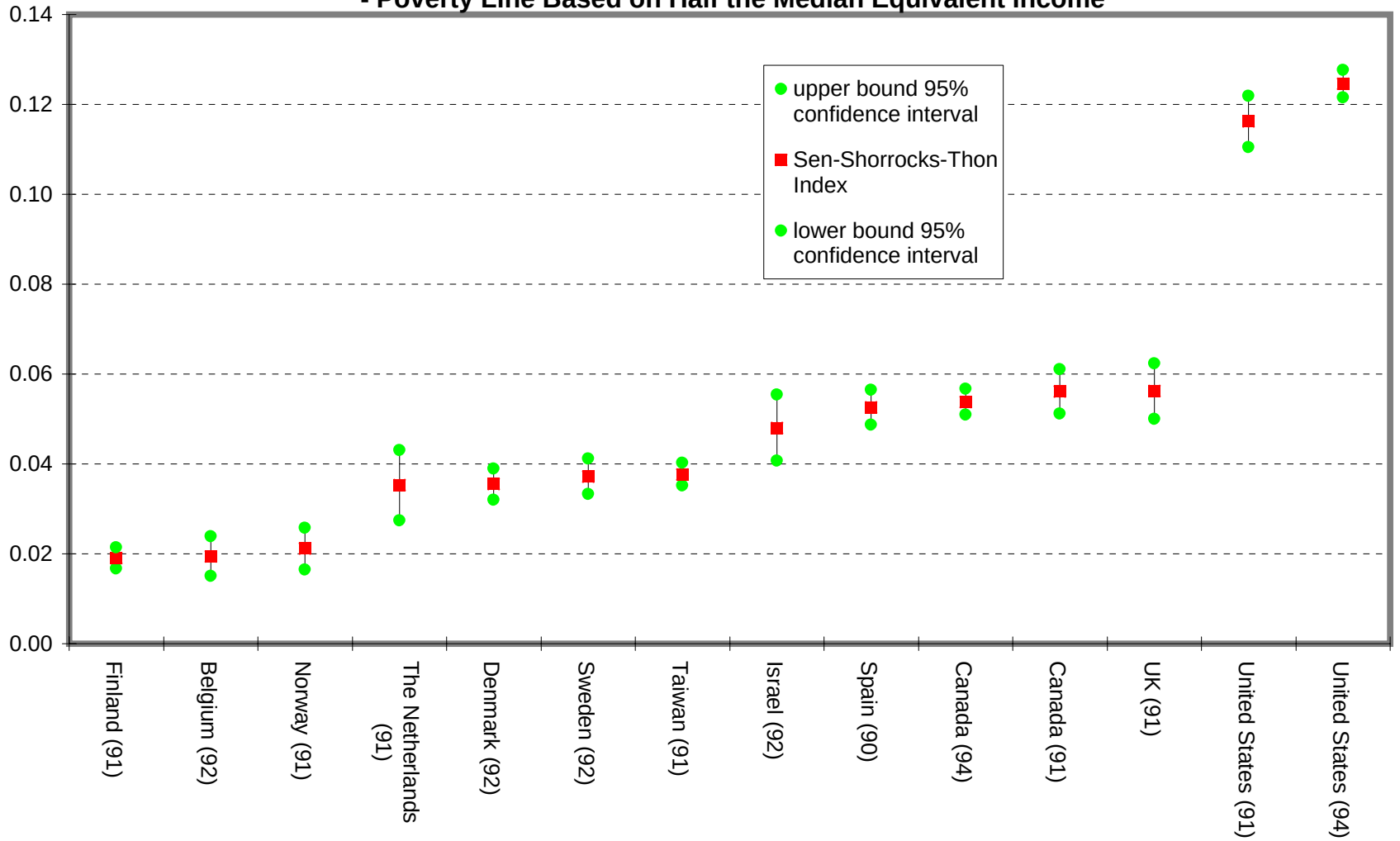
9. Since Luxembourg Income Study data is organized to present household income data, while the Canadian debate on poverty has traditionally been framed in terms of the poverty of economic families, LIS- based estimates of poverty intensity will be slightly lower than economic family-based estimates. Note that this implies that the gap between actual poverty in Canadian provinces and European countries is slightly less than a comparison of LIS household data and SCF economic family data would indicate.

10. It should be noted that poverty intensity in the U.K. increased rapidly in the 1980s -- from .032 in 1979, to .048 in 1986 to .0562 in 1991. Poverty intensity in Sweden was .026 in 1975, before increasing to .029 in 1981 and .039 in 1987 [see Osberg and Xu (1997)].

11. The coefficient of variation of column 4 of Table 1 is an indicator of the variability among provinces and over time in inequality among the poor. Its value is .011, which is far below the coefficient of variation of the average poverty gap ratio in Column 3 (.106) and the cu of the poverty rate in column 1 (.248).

12. See Osberg and Xu (1997) for documentation of the large changes in poverty observed in several OECD countries in the 1975-1995 period.

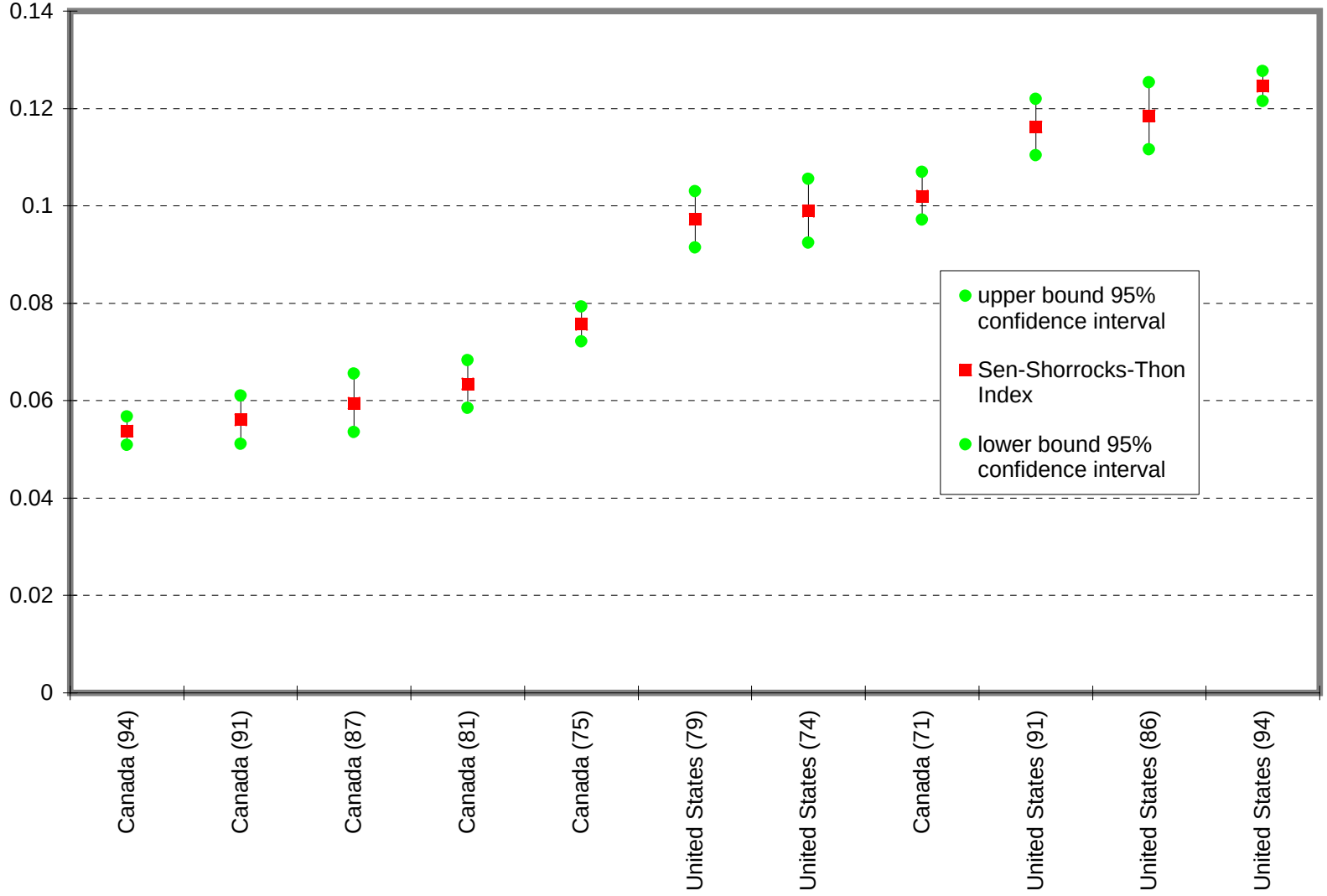
Chart 1
1990s - Country Rankings by SST Poverty Index
- Poverty Line Based on Half the Median Equivalent Income



note: [95% confidence interval = mean +/- 2 standard deviations] of 300 bootstraps

Source: Luxembourg Income Study, Osberg and Xu, 1997.

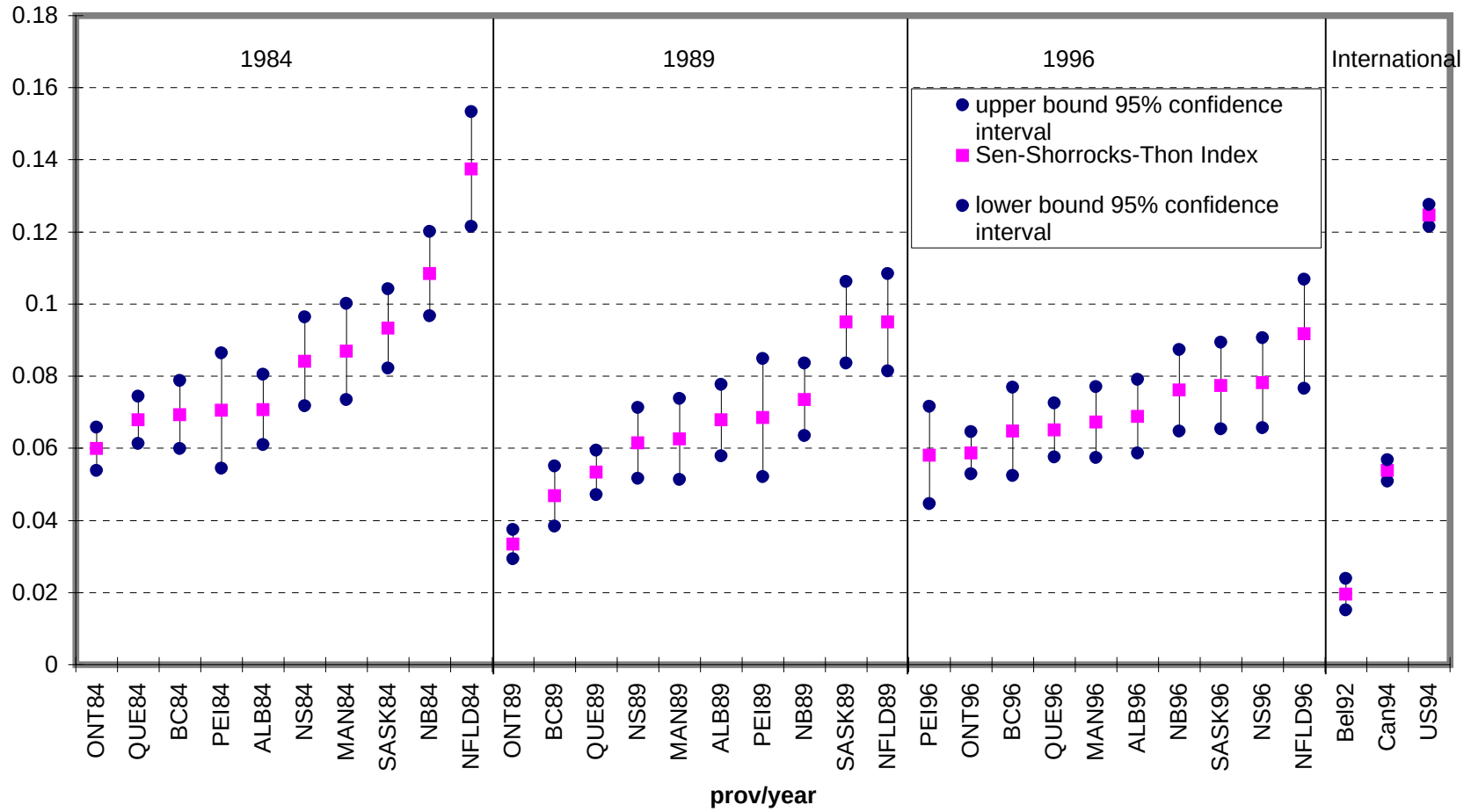
Chart 2
Canada-United States Comparison-The SST Index From 1971 to 1994
- Poverty Line Based on Half the Median Equivalent Income



note: [95% confidence interval = mean +/- 2 standard deviations] of 300 bootstraps

Source: Luxembourg Income Study, Osberg and Xu, 1997.

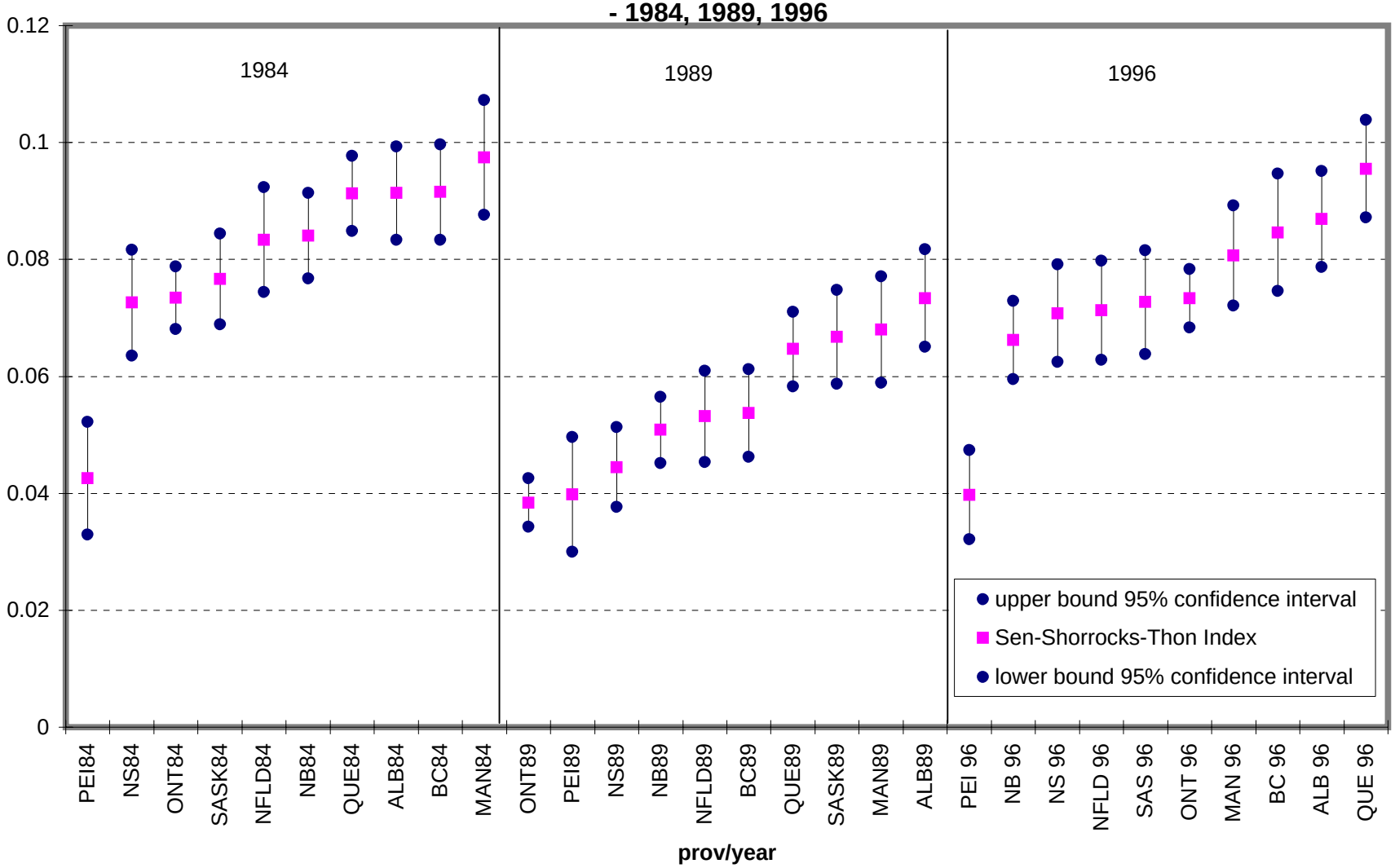
Chart 3
Sen-Shorrocks-Thon Index of Poverty Intensity
- 1/2 Median After Tax Income
1984,1989,1996



note: [95% confidence interval = mean +/- 2 standard deviations] of 300 bootstraps

Source: Authors' calculations, Survey of Consumer Finances, various years.
Luxembourg Income Study, Osberg and Xu, 1997.

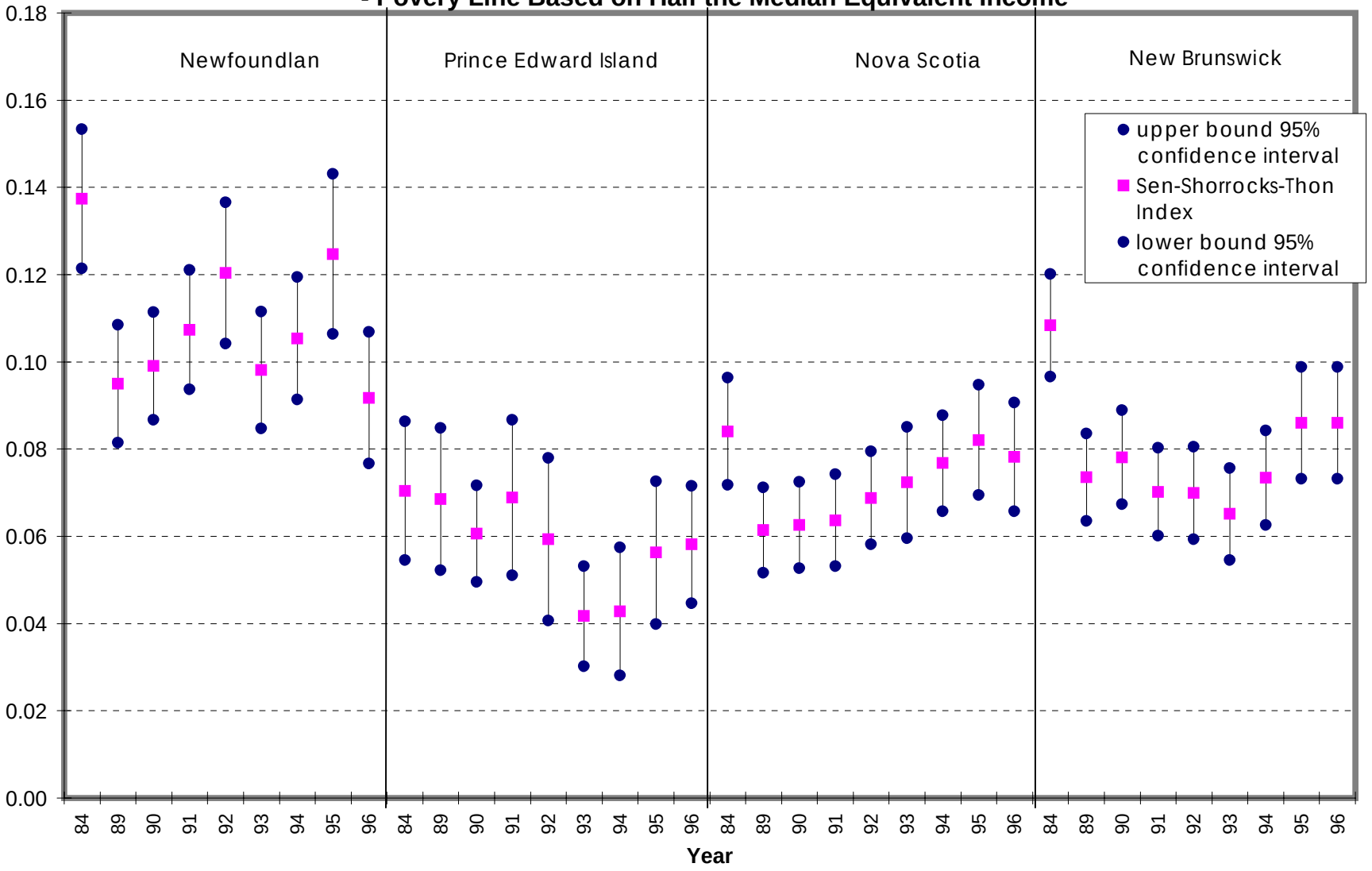
Chart 4
Sen-Shorrocks-Thon Index Using After Tax LICO
- 1984, 1989, 1996



note: [95% confidence interval = mean +/- 2 standard deviations] of 300 bootstraps

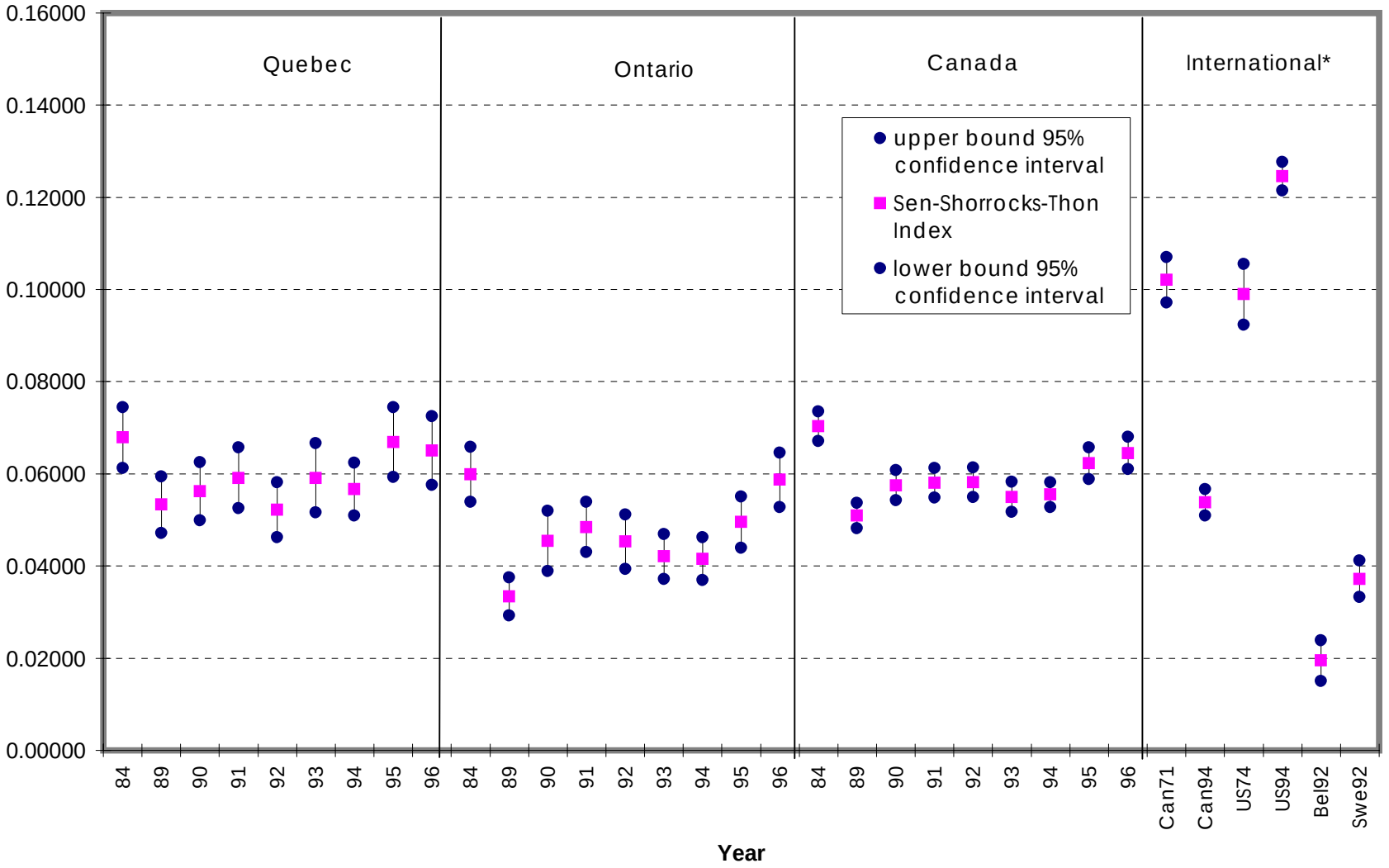
Source: Authors' calculations, Survey of Consumer Finances, various years.

Chart 5a
Atlantic Provinces - Trends in Poverty Intensity
- Povery Line Based on Half the Median Equivalent Income



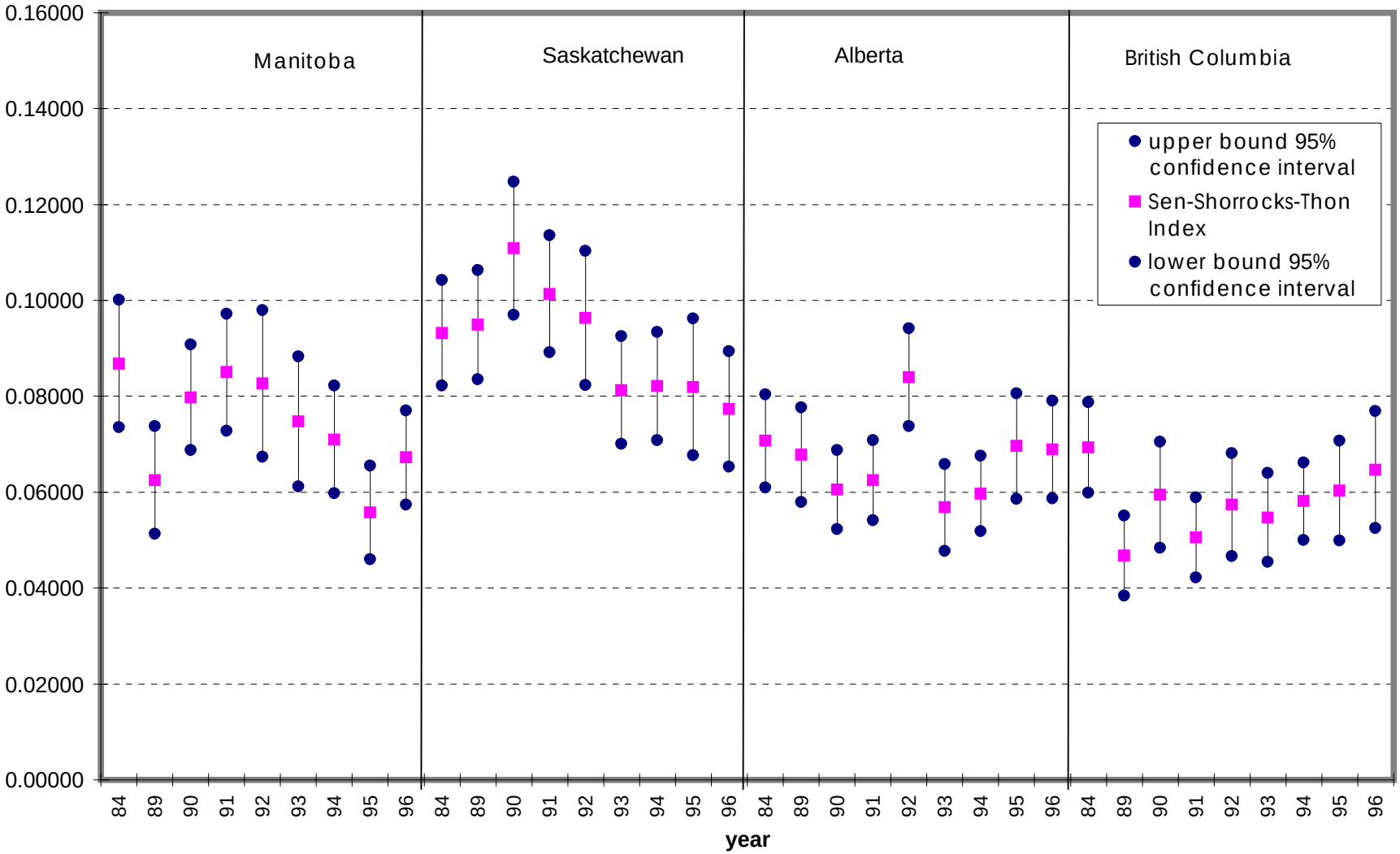
Source: Authors' calculations, Survey of Consumer Finances, various years

Chart 5b
Quebec, Ontario, Canada and International - Trends in Poverty Intensity
- Povery Line Based on Half the Median Equivalent Income



Source: Authors' calculations, Survey of Consumer Finances, various years.
* The international data uses household income from the Luxembourg Income Study (Osberg and Xu, 1997)

Chart 5c
Western Provinces -Trends in Poverty Intensity
- Povery Line Based on Half the Median Equivalent Income



note: poverty line=1/2 the median equivalent income
Source: Authors' calculations, Survey of Consumer Finances, various years.