Assimilation of Immigrant Household Cohorts over Time in Canada: An Examination of the Lower Tail of Income Distributions

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Abstract

This paper uses a poverty intensity measure to provide additional empirical evidence on the assimilation of immigrant cohorts over time in Canada. This method is used because one of the reliable, and conservative, indicators of the poor integration of immigrants is the disproportional, prolonged poverty in these immigrant cohorts. The Sen index of poverty intensity captures incidence, depth, and equality of poverty and permits subgroup decomposition and therefore is considered as one of good indicators. The immigrant cohorts, who arrived before 1946, from 1946 to 1955, from 1956 to 1965, from 1966 to 1970, from 1971 to 1975, from 1976 to 1980, from 1981 to 1985, and from 1986 to 1997, are examined with reference to several benchmarks. The empirical results show that the integration appeared to be stronger for the earlier immigrant cohorts in Canada but it was markedly slower for the 1981–1985 and 1986-1997 immigrant cohorts during the period of 1986–1997. (*JEL* I320, J000)

1 Introduction

This paper examines the poverty intensity of immigrant households in Canada in the 1980's and 1990's as an effective way to analyze the assimilation of immigrants over time based on the Consumer Survey of Finance data.

The issue of immigrant assimilation has been researched from various perspectives. It has been recognized in general that an immigration policy is designed to mitigate problems in a host country due to its low birth rate, shortage of skilled labor, and increasingly aging population. When the policy is implemented properly, it will benefit the host country [Borjas (1994) and Green (1999)]. Otherwise, it may lead to various social and economic problems and concerns. For example, if immigrants do not have the skills and quality matching the demand of the host country, they may have difficulties being integrated economically into the mainstream society of the host country [Wright and Maxim (1993) and Borjas (1995)]. Some immigrants may also have various kinds of problems to be assimilated socially [Dustmann (1996)]. The increasing inflow of immigrants may have some impact on the labor supply of the host country although one study shows that this impact appears to be of second order [Chiswick (1989)]. Immigrants may require different social assistance than their native-born counterparts [Borjas and Hilton (1996) and Borjas (1999)].

The United States and Canada have been recognized as two major host countries of immigrants for centuries. Both have been relatively successful in integrating immigrants into the main stream societies. However, the two countries, as pointed out by Bloom, Grenier, and Gunderson (1995), have projected very different images of their respective immigration practices. The stereotype about the United States is the so-called "melting pot" while that of Canada is the so-called "vertical mosaic." For the vertical mosaic to be successful, "the immigrants must have a reasonable opportunity to assimilate

throughout the vertical structure and not be segregated at lower rungs of the ladder" [Bloom, Grenier, and Gunderson (1995)].

Existing research have investigated the degree of immigrant integration by examining average earning differentials between immigrant and native-born populations by controlling for age, migrating cohort, education attainment, ethnic background, and other population characteristics. For example, Abbott and Beach (1993) found that the earning-experience profile of male immigrants was flattening while that of the corresponding native-born were steepening for Canada. Borjas (1994) found that the earning-age profile of immigrants was lower than that of the native-born before and around the age of 35 and higher beyond the age of 35. Some scholars such as Butcher and Card (1991) and Butcher and DiNardo (1998) examined the entire wage distributions of the two groups in the United States and their interactions. Butcher and Card (1991) studied the wage distributions at different quantile in selected US cities and found little interaction between immigrant inflow and the wage distribution of the native-born population. Butcher and DiNardo (1998) used the well-understood Blinder/Oaxaca differentials to show that the decline in wages of the immigrant population relative to that of the native-born population was not as significant as conventionally understood. All of these research findings have contributed to a better understanding of the integration of immigrants into the host countries.

It is noted, however, that the existing studies often examine the differences between the conditional mean income of the immigrants and that of the native-born by controlling for age, migrating cohort, education attainment, ethnic background, and other population characteristics. However, as can be seen from Figure 1, the conditional mean income (the upward-sloping dash line) represents the central tendency of an underlying income distribution dependent on a set of factors (education level is used here). A comparison between the conditional mean incomes across different social groups will not provide the information about the lower tail of income distributions. When considering

the economic integration of a particular social group in a larger society, the poverty line appears to be a fairly robust benchmark regardless of what characteristics an individual may have. More specifically, as shown in Figure 1, instead comparing the dash line (the conditional mean incomes) with some other dash lines (not showing here), the focus of a research may be on the lower tail of conditional distributions below the poverty line (marked A, B, and C).

[Please place Figures 1 about here]

The above approach is of particular interest in view of the criticism made by Yuesgert (1994) and Schultz (1998). They noted that the conventional methods cannot accommodate some unobservable factors that might potentially bias some estimated differences. However, when the lower tail of income distributions is studied, the comparison results are no longer subject to errors potentially made in estimating conditional mean incomes because they are based on the poverty lines. Given these cautionary notes, it appears useful to study how immigrants fared at the lower tail of income distributions relative to some benchmarks and how this trend changed for various immigrant cohorts over time in Canada.

There are certain advantages by examining the lower tail of income distributions. Integration of immigrants into the main stream society may take different forms at different stages of their lives in the host country. The integration process is unlikely to be uniform for all immigrants. When immigrants are not integrated properly into the main stream society, they as a social group will undoubtedly experience a substantially higher level of poverty than some benchmarks. In other words, good integration does not necessarily demand a nearly perfect equality in the conditional mean incomes between the immigrant and native-born populations but it surely will not lead to disproportional, prolonged poverty in some immigrant cohorts. From the policy point of view, this approach also has its merit. There is not much that the policy maker can, or should, do with the differences in conditional mean incomes between the immigrant and native-

born populations because at the mean income levels members of both populations are much better off than those at the lower tail of income distribution. However, if there is a disproportional, prolonged poverty in some social groups, this signals that there will be a higher demand for welfare assistance and that a policy evaluation or review may be warranted.

Is the conventional poverty rate or the poverty gap a comprehensive measure of poverty intensity? Is it a good practice to use one of them alone? The answer to these questions is: No. The poverty rate—the percentage of the population whose incomes are below the poverty line—does not reflect the depth of poverty. If a portion of a poor person's income is taken away by a non-poor person, this worsening situation will not be captured by the poverty rate. Using the poverty rate as the only policy guide would be misleading because the most effective way to lower the poverty rate is to provide social assistance to the richest of the poor so that their incomes can rise above the poverty line. The poverty gap—the average relative shortfall of incomes below the poverty line—does not measure what is the proportion of the population who suffer from poverty and how incomes of the poor are distributed. Therefore, using the poverty gap alone could also misguide policy making because the proportion of the population who are in poverty is completely ignored in this context.

Having noticed these shortcomings of the conventional poverty measures, Sen (1976) proposed an axiomatic approach to poverty measures and, based on that approach, a poverty index now called the Sen index of poverty intensity. Clark, Hemming, and Ulph (1981) and Xu and Osberg (2002) showed that the Sen index possesses a multiplicative decomposability and, hence, can capture three crucial dimensions or components of poverty—the incidence, depth, and equality. This paper uses this result to further decompose the components of the Sen index.[1] The proposed framework is then used to

[1]According to Xu and Osberg (2002), the modified Sen index or the SST index does not possess this property because it is a product of the rate, gap and one plus Gini index of poverty gap ratios of the population. To show the Sen index permits subgroup decompositions, the Gini index's subgroup decomposition for discrete income distributions can be examined following Lambert and Aronson (1993).

analyze the poverty intensity of the immigrant cohorts and native-born populations in Canada during the period of 1986–1997.

The rest of the paper is organized as follows. In section 2, the methodological issues are discussed. In section 3, the data and empirical evidence are reported. Finally, concluding remarks are given in section 4.

2 The Methodology

2.1 Some Notation and Definitions

Let $\mathbf{y} \equiv [y_1, y_2, \ldots, y_n]^\top$ be an income vector of the population with n incomes sorted in non-decreasing order and $\overline{\mathbf{y}} \equiv \sum_{i=1}^{n} y_i/n$ the average income.[2] For a given poverty line z, an individual i is poor if his or her income is less than the poverty line and is non-poor otherwise. The poverty rate H is defined as the proportion of the poor in the population, $H \equiv q/n$, where q is the number of the poor in the population.[3] The income vector of the poor, $\mathbf{y}_p \equiv [y_1, y_2, \ldots, y_q]^\top$, is a truncated income vector containing incomes of the poor sorted in non-decreasing order. Poverty gap ratios, or poverty gaps are defined as $x_i \equiv (z - y_i)/z$ for $i = 1, 2, \ldots, q$ for the poor population. For the non-poor population, they are set to zero to reflect that there is no deprivation for members in this subpopulation. The vector of poverty gap ratios of the poor is expressed as

$$\mathbf{x}_p \equiv [x_1, x_2, \ldots, x_q]^\top \tag{1}$$

and the average poverty gap ratio of the poor is computed by $\overline{\mathbf{x}}_p \equiv \sum_{i=1}^{q} x_i/q$.

[2] "$\top$" denotes transposition.

[3] The weak definition of the poor is used here as it is generally adopted in the literature. A person is poor if his or her income is *less than* the poverty line z.

Now consider l subgroups in the population. Let $\mathbf{y}_{(k)} \equiv [y_{1(k)}, y_{2(k)}, \ldots, y_{n_k(k)}]^\top$ be an income vector of subgroup k for $k = 1, 2, \ldots, l$. The first subscript of $y_{i(k)}$ indicates $y_{i(k)}$'s ith rank within subgroup k while the second subscript specifies that $y_{i(k)}$ is in subgroup k. The average income of subgroup k is computed by $\overline{\mathbf{y}}_{(k)} \equiv \sum_{i=1}^{n_k} y_{i(k)}/n_k$. The average income of the population, $\overline{\mathbf{y}}$, and the average incomes of the subgroups, $\overline{\mathbf{y}}_{(k)}$'s, are related as $n\overline{\mathbf{y}} = \sum_{k=1}^{l} n_k \overline{\mathbf{y}}_{(k)}$.

The sum of subgroup sizes, n_1, n_2, ..., and n_l, gives the size of the total population, n; i.e., $n = \sum_{k=1}^{l} n_l$. Similarly, $q = \sum_{k=1}^{l} q_k$. The poverty rate in subgroup k is defined as $H_k \equiv q_k/n_k$. The weight of subgroup k in the population is defined as $w_k \equiv n_k/n$. The poverty rate of the population is the weighted sum of the poverty rates in all subgroups; i.e.,

$$H = \sum_{k=1}^{l} w_k H_k. \tag{2}$$

The vector of poverty gap ratios for subgroup k is defined as

$$\mathbf{x}_{p(k)} \equiv [x_{1(k)}, x_{2(k)}, \ldots, x_{q_k(k)}]^\top.$$

The average poverty gap ratio of the poor in subgroup k is computed by $\overline{\mathbf{x}}_{p(k)} \equiv \sum_{i=1}^{q_k} x_{i(k)}/q_k$. The proportion of the poor in subgroup k is defined as $p_k \equiv q_k/q$. The average poverty gap ratio of the poor is the weighted sum of average poverty gap ratios of the poor in all subgroups; i.e.,

$$\overline{\mathbf{x}}_p = \sum_{k=1}^{l} p_k \overline{\mathbf{x}}_{p(k)}. \tag{3}$$

2.2 The Sen Index of Poverty Intensity and Subgroup Decomposability

The Sen index satisfies some, but not all, important axioms[4] as the modified Sen index does. However, as pointed in Xu and Osberg (2002), the former is bounded by the latter in value and the former permits simpler, straightforward subgroup decomposition than the latter.

As demonstrated in Clark, Hemming, and Ulph (1981) and Xu and Osberg (2002), the Sen index, S, can be formulated simply as:

$$S \equiv H\overline{\mathbf{x}}_p(1 - G(\mathbf{x}_p)) \tag{4}$$

where $G(\mathbf{x}_p)$ is the Gini index of poverty gap ratios of the poor. That is, the Sen index can be decomposed multiplicatively into three familiar and commonly used poverty and equality measures—the poverty rate (H), average poverty gap ratio ($\overline{\mathbf{x}}_p$), and equality of the poor $[1 - G(\mathbf{x}_p)]$. The Gini index $G(\mathbf{x}_p)$ is a measure of inequality of the poor while $1 - G(\mathbf{x}_p)$ is a measure of equality of the poor. This decomposition captures the main dimensions of the poverty phenomenon—the incidence, depth, and equality.

In addition, three components of the Sen index—the poverty rate(H), average poverty gap ratio or, simply, poverty gap ($\overline{\mathbf{x}}_p$), and equality of the poor ($1 - G(\mathbf{x}_p)$)—can be decomposed further according to subgroups. As illustrated previously in equation (2), the poverty rate of the population is a weighted sum of subgroup poverty rates. This relationship can be used effectively in finding contributing shares of subgroup poverty rates to the population poverty rate. Similarly, as shown in equation (3), the average poverty gap ratio of the poor is a weighted sum of average subgroup poverty gap ratios. Researchers can use this relationship effectively to uncover contributing shares of average subgroup poverty gap ratios to the population average poverty gap ratio.

[4]The strong upward transfer and continuity axioms are not satisfied by the Sen index.

The Gini index of poverty gap ratios of the poor, $G(\mathbf{x}_p)$, is also readily decomposable into the between group Gini index, $G_B(\mathbf{x}_p)$,[5] the within group Gini indices, $G_k(\mathbf{x}_{p(k)})$'s, and the residual term $R(\mathbf{x}_p, \mathbf{x}_{p(\cdot)})$ as follows:

$$G(\mathbf{x}_p) = G_B(\mathbf{x}_p) + \sum_{k=1}^{l} b_k G_k(\mathbf{x}_{p(k)}) + R(\mathbf{x}_p, \mathbf{x}_{p(\cdot)}), \tag{5}$$

where the weight $b_k = \left(\frac{q_k}{q}\right)\left(\frac{q_k \overline{\mathbf{x}}_{p(k)}}{q \overline{\mathbf{x}}_p}\right)$, the product of the proportion of the poor in subgroup k and the proportion of the total poverty gap ratios in subgroup k, is the size-adjusted proportion of deprivation in subgroup k. $R(\mathbf{x}_p, \mathbf{x}_{p(\cdot)})$ measures the degree of segregation of the poor among subgroups in the population.[6] The column vector $\mathbf{x}_p$ may differ from the column vector $\mathbf{x}_{p(\cdot)}$ in the following sense. $\mathbf{x}_p$ consists of individual poverty gap ratios of the poor sorted in non-increasing order while $\mathbf{x}_{p(\cdot)}$ is formed by arranging subgroups by subgroup average poverty gap ratios in non-increasing order and by ordering individual poverty gap ratios within each subgroup in non-increasing order. The difference between $\mathbf{x}_p$ and $\mathbf{x}_{p(\cdot)}$ can be used to measure the degree of segregation of low incomes among subgroups. If $\mathbf{x}_p$ and $\mathbf{x}_{p(\cdot)}$ are identical, a complete segregation exists in the sense that sorted low incomes are clustered by subgroups. If the two vectors are different, the degree of segregation is not complete or low in the sense that members in each subgroup may come from different income backgrounds.

[5] $G_B(\mathbf{x}_p)$ is computed as the Gini index but with the actual values of $\mathbf{x}_p$ being replaced by their subgroup average poverty gap ratios. See Notes for the Use of the Referee for details.

[6] Although some economists note that the residual term is not as tidy, Silber (1989) finds that the residual term is not so troublesome and says that it has a clear and intuitive interpretation. It is indeed the case as noted later by many economists. The residual term here measures the intensity of the permutation which occur when instead of ranking all individual poverty gap ratios in non-increasing order, one ranks them, firstly by subgroup with average poverty gap ratios in non-increasing order, and secondly, within each subgroup, by poverty gap ratios in non-increasing order.

Substituting equations (2) and (3) into equation (4) yields another expression for the Sen index of poverty intensity:

$$\begin{aligned} S &= \left[\sum_{k=1}^{l} w_k H_k \right] \\ &\quad \times \left[\sum_{k=1}^{l} p_k \overline{\mathbf{x}}_{p(k)}\right] \\ &\quad \times \left[1 - \left(G_B(\mathbf{x}_p) + \sum_{k=1}^{l} b_k G_k(\mathbf{x}_{p(k)}) + R(\mathbf{x}_p, \mathbf{x}_{p(\cdot)})\right)\right]. \end{aligned} \tag{6}$$

This result describes how subgroup poverty measures are linked to the Sen index of overall poverty intensity of the population. These links can be illustrated by Figure 2 for the case with three subgroups.

[Please place Figure 2 about here]

As is shown in Figure 2, the Sen index permits multiplicative decomposition into the poverty rate, poverty gap, and equality of the poor. Each of these three components can be further decomposed additively according to subgroups. The weights w_k, p_k, and b_k demonstrate the contributing shares of subgroup poverty measures to their corresponding population poverty measures.

The decomposability of the Sen index is useful for policy analysis. Poverty as a social phenomenon must be measurable in an aggregate and defensible sense. The Sen index is a possible choice because it is ethically defensible according to the Sen's axiomatic approach. The incidence, depth, and equality of poverty must be evaluated more purposefully from the policy perspective. The Sen index can be decomposed into the poverty rate, average poverty gap ratio, and equality of the poor. Poverty is generally found in various social groups such as women, single parent families, unemployed, recent immigrants and so on, whose poverty experiences all contribute to the overall poverty in a society. The Sen index permits subgroup decomposition in a meaningful way. Therefore, applying the Sen index and its decomposition to the analysis of poverty among various subgroups would be indeed useful.

3 Empirical Analysis

3.1 Basic Statistics

The theoretical framework of the Sen index has been applied to the Canadian Survey of Consumer Finance (Economic Families) data for the period of 1986–1997 to examine poverty trends across the immigrant cohorts arriving in different years. In the period of 1986-1997, the survey's definitions of the immigrant cohorts are consistent and the information on the number of the children in each household are collected more precisely.

Before the analysis, some explanations on the data should be given. In the Survey of Finance data, the number of the records is 32,756 for 1986, 43,710 for 1987, 38,027 for 1988, 41,406 for 1989, 45,580 for 1990, 42,804 for 1991, 40,007 for 1992, 39,489 for 1993, 39,487 for 1994, 34,296 for 1995, 35,689 for 1996, and 35,485 for 1997.

The Survey specifies the status of immigration for the head of household but does not give this information for the spouse. This permits the examination of immigrant households where the head of the household is an immigrant, with reference to non-immigrant households where the head of the household is a non-immigrant. It is likely that a non-immigrant household head marries or cohabits with an immigrant spouse. But the data limitation disallows the researcher to separate them. While this is a disadvantage, it seems unreasonable to evaluate income and deprivation experiences of immigrants without considering households within which they actually live. Hence, using households as the analysis unit gives a more realistic picture of income and deprivation experiences although these immigrant household heads are joined by their spouses and children.

The head of a household may be male or female. For the native-born, about 24-25 percent of the total households are headed by females while this number for the

immigrants is lower around 20-22 for most years. See Table 1 for more information. Hence, the immigrant households are more likely to be headed by a male member.

[Please place Table 1 about here]

It is useful to examine the average income sources and the equivalent incomes of Canadian, native-born and immigrant households. According to Table 2, the sources of household income are the total social assistance (socass), which is the sum of child tax benefit (chtxbn), old age security and guaranteed income supplement (oasgis), employment insurance benefit (eibenf), and social assistance and provincial income supplements (sapis), and family after tax income (incftx). In order to reflect the actual welfare, the individual equivalent after tax income (eqinc) is also computed based on the OECD equivalent income scale, which gives the first adult, 18 years of age or older, a weight of 100%, the second adult 70% and any of children 50% weight. As can be seen from Table 2, the child tax benefit received by immigrant households, on average, are lower than their native-born counterparts in 1986-1988. During the period of 1989-1993 two sub-populations received more or less similar amounts. Starting from 1994, immigrant households received significantly more child tax benefit dollars. Generally, immigrant households on average received more old age security, guaranteed income supplement than their native-born counterparts but received less employment insurance benefits. The average amounts of social assistance and provincial income supplements received by two sub-populations changed over time: the native-born households received more during 1986-1990, the two populations had approximate equal amounts during 1991-1992, after 1992 the immigrant households clearly received more social assistance and provincial income supplements. It is also interesting to note that household after-tax incomes for immigrant households are higher than their native-born counterparts over the period of 1986-1997 while their individual equivalent incomes are lower. This reflects different characteristics between two types of households.

[Please place Table 2 about here]

The characteristics of different households can be summarized in Tables 3 and 4. Two tables are used to illustrate the basic statistics of the household characteristics—one for 1986-1988 and the other for 1989-1997. The education levels for the later period are more refined than the earlier period. In the earlier period, the levels of education ranges 1-8, the higher the value higher the education level. In the later period, there are two indicators of education. the first indicator ranges 0-3 showing from grade 8 or lower to grade 11-13, graduated from high school; the second indicator ranges 0-6 indicating from no other education to university degree or certificate above bachelor's level.

[Please place Tables 3 and 4]

Several observations can be made about the household characteristics. First, both heads and spouses of the immigrant households are somewhat older than their native-born counterparts and their family sizes are also slight larger. Second, the education level for the heads of the immigrant households are slightly higher than that of the native-born households. But the contrary is true for the spouses. Third, the immigrant families tend to have more children aged between 12-17 than their native-born counterparts in the 1980s but this pattern become less prominent in the 1990s. Given the above observations, it is necessary to adopt an income measure that takes into account of varying characteristics of different households. Hence, the individual equivalent income is used in this study.

While it is possible to explore other basic statistics, it is relevant to examine how average individual equivalent incomes varied across different immigrant cohorts. Tables 5 and 6 give the average individual equivalent incomes across different immigrant cohorts. Several observations can be made about the information provided in these two tables: (1) The native-born and immigrants as two social groups do not differ in terms of average individual equivalent incomes at from 1986 to 1990. However, the latter group lagged the former group slightly on average over the period of 1991-1997. (2) The corresponding changes occurred in the immigrant group appear to be caused by

the substantial lower incomes of new immigrant cohorts (1986–1997) that offset higher incomes of older immigrant cohorts. (3) While the standard deviations give some useful information as to the dispersion of incomes, it appears useful to learn the lower tails of income distributions.

[Please place Tables 5 and 6]

3.2 Analysis of the Lower Tail of Income Distributions

Integration of immigrants into the mainstream society in Canada had been evaluated in different ways. This paper takes an alternative approach by focusing on the bottom of income distributions and the trend of the poverty in different immigrant cohorts. Apparently, if disproportional, prolonged poverty in some immigrant cohorts is found, then it is reasonable to say that there is a reliable, and conservative, indicator of poor integration for these cohorts.

The poverty line is computed as the half of the median income of the survey year. Some scholars favor other kinds of poverty lines such as the Low Income Cut Off (LICO) provided by Statistics Canada although Statistics Canada stated that LICO is not the official poverty line and is considering to establish the proper level of income as the poverty line. With the absence of the official poverty line, using half of the median income of a particular year as the estimated poverty line for that year is a reasonable and generally accepted practice. This also enables international comparison.

The subgroups considered here are the native-born and immigrant populations. To analyze the degree of immigrant integration over time, the immigrant population is divided into the following different cohorts based on the Survey of Consumer Finance: the arrivals before 1946, from 1946 to 1955, from 1956 to 1965, from 1966 to 1970, from 1971 to 1975, from 1976 to 1980, from 1981 to 1985, and from 1986 to 1997, respectively.

The immigrant arrivals from 1946 to 1970 were mainly from Europe and the United States. In 1967, a new "point system" was adopted. The main objective was "to eliminate discrimination based on race, nationality and country-of-origin in Canadian immigration policy" [Wright and Maxim (1993)]. Since then, the mix of country-of-origin has changed gradually over time. In addition to the immigrants from Europe and the United States, Asia becomes the dominant source of new immigrants to Canada. Figure 3 gives the number and source of new immigrants to Canada from 1955 to 2001 and shows that the change indeed has taken place.

[Please place Figure 3 about here]

Most immigrants, regardless of their country-of-origin, tend to be in their prime age at the time of migration due to the so-called self-selection behavior [Borjas (1987)]. They are supposed to be in the labor force and less likely to be unemployed and/or dependent and, hence, in poverty. Therefore, disproportional, prolonged poverty in these immigrant cohorts is indeed a reliable, and conservative, indicator of poor integration.[7]

When the surveys were conducted from 1986 to 1997, earlier immigrant cohorts (such as the arrivals before 1946, in the 1950s, 1960s, and 1970's) had spent a few decades in the host country and had generally been integrated into, and had made contributions in, the Canadian society. Their poverty experience at the time of the surveys might be different from that of later immigrant cohorts (such as the 1981–1985 and 1986–1997 arrivals). The data allows an interesting comparison of the economic condition of the earlier immigrant cohorts with that of the later cohorts. Of course, these comparisons must be made with a cautionary note to the fact that migration between Canada and other countries occurs constantly although at a much smaller scale and the fact that the cross-sectional data will not allow researchers to track different cohorts over time. What can be said from the data is about the immigrant cohorts who lived in Canada during the survey years.

[7]Note that one cannot draw inferences about the average poverty duration of any subgroup in this case. To do so, one must use the panel data in which same individuals are interviewed over time.

Figures 4–5 shows the time trends for the poverty rate (or rate), average poverty gap ratio (or gap), Gini index of inequality of the poor (or Gini index), and Sen index of poverty intensity (or Sen index) of the Canadian population and the native-born population, respectively. As is shown in Figure 4, the poverty rate of the Canadian population decreased gradually from 1986, reached its lowest level in 1989, and then gradually moved up. The poverty gap was below 30% for most of the years and reached to or surpassed the 30% mark in 1990, 1996, and 1997. The Gini index also varied only slightly over time. These trends interacted with each other so that the Sen index was relatively stable from 1986 to 1997. The poverty measures for the native-born Canadian shown in Figure 5 closely resembled those for the Canadian population in Figure 4.

[Please place Figures 4–5 about here]

Figures 6–7 illustrate the poverty measures for the immigrant arrivals in 1981–1985 and 1986–1997, respectively. As is shown in Figure 6, the 1981–1985 immigrant cohort generally scored high in the poverty rate, poverty gap, Gini index, and Sen index for the first three years in Canada. But their poverty measures decreased within a few years. Figure 7 shows that the 1986–1997 immigrant cohorts had experienced a longer period of lower incomes compared with those earlier cohorts. The contrast between these two immigrant groups is very prominent.

[Please place Figures 6–7 about here]

To better understand the phenomenon, this is useful to analyze the data further based on the proposed theoretical framework. Tables 7–18 provide the complete information on both aggregate poverty measures and subgroup poverty measures and associated weights.[8] The first column of these tables gives the Canadian population and its subgroups—native-born and immigrants arriving in different time periods. The next two columns provide the poverty rates and their weights, respectively. The following two columns list the poverty gaps and their weights. Then the Gini indices and their

[8]Tables 7–18 are provided for the use by the referee. For the reader, only Tables 7 and 18 are needed.

weights are presented in the following two columns. The last column shows the Sen indices. The between group Gini index, which measures the inequality of the poor across all subgroups, and the residual term R, which measures the degree of segregation of the poor among subgroups, are given in the bottom row of these tables.

While the interpretations of the poverty rate, poverty gap, Gini index and Sen index are straightforward (as given in Figures 4, 5, 6, and 7), the theoretical framework gives researchers more information for identifying how poverty in different subgroups contributes to the overall poverty in a society.

The weights for the subgroup poverty rate and subgroup poverty gap convey important information. The weight for a subgroup poverty rate [or Weight for (2) in the tables] represents the proportion of the subgroup in the population. This column describes the population structure in terms of the native-born population and different immigrant cohorts. Table 7 indicates that the native-born population accounts for about 79.1% of the Canadian population in 1986. The immigrant arrivals in 1976–1980 and 1981–1986 were around 2.0% and 1.8%, respectively. These were lower than those for the 1946–1955 cohort (about 4.0%), the 1956–1965 cohort (about 4.7%), the 1966–1970 cohort (about 3.2%) and the 1971–1975 cohort (about 3.1%). In Table 18, which is based on the 1997 survey, the native-born population dropped to 78.5% of the Canadian population. While all other cohorts accounted for about 0.5–3%, the 1986–1997 cohorts represented about 7.2% of the Canadian population, a fairly large increase in the Canadian immigration history.

The weight for a subgroup poverty gap [or Weight for (3) in the tables] is the proportion of the poor in the subgroup. This column in Tables 7–18 illustrates the structure of the poor in terms of the native-born and different immigrant cohorts. Table 7 shows that about 83.3% of the poor were in the native-born population in 1986. It fell gradually over time: 79.2% in 1987 (Table 8), 83.2% in 1988 (Table 9), 81.6% in 1989 (Table 10), 78.8% in 1990 (Table 11), 75.8% in 1991 (Table 12), 76.7% in 1992 (Table 13), 75.9%

in 1993 (Table 14), 73.9% in 1994 (Table 15), 71.7% in 1995 (Table 16), 72.2% in 1996 (Table 17), and 71.3% in 1997 (Table 18). Corresponding to this falling trend, the proportion of the poor in the latest immigrant cohort surveyed—the 1981–1985 immigrant cohort—was only about 4.4% of the total poor in 1986 (Table 7). In 1997, the latest immigrant cohort, or the 1986–1997 arrivals, accounted for about 18.3% of the total poor (Table 18).

During the period of 1986–1997, the poverty rate and poverty gap for the native-born and the Canadian populations were similar because the native-born accounted for about 78-80% of the Canadian population while this subgroup represented approximately 71–79% of the total poor. The changes in these two weights—the proportion of the total population and the proportion of the poor—reflected the changes of poverty experience of the dominant subgroup.

As is shown in Table 7, the native-born population accounted for about 79.1% of the total population in 1986 but about 83.3% of the poor. This implies that about 20.9% of the total population in 1986 were immigrants while 16.7% of the poor were in this group. In 1986, the immigrant cohorts arriving before 1946, in 1946–1955, in 1956-1965, in 1966–1970, and in 1971–1975 represented the majority of the immigrant population in 1986. The data indicate that they had substantially lower subgroup poverty rate, poverty gap, Gini index, and Sen index than those of their native-born counterparts. However, during the survey year of 1986, the new immigrant cohorts arriving in 1976–1980 and 1981–1985 had higher poverty rate and/or higher poverty gap but the new cohorts represented much smaller proportions of the total population (2.0% and 1.8%, respectively) and of the poor population (2.4% and 4.4%, respectively).

At the end of the survey period in 1997 (Table 18), the native-born population fell to 78.5% of the total population but the proportion of the poor in this group fell even more to 71.3% in the same survey year. Several observations can be made for Table 18. First, the 1981–1985 and 1986–1997 immigrant cohorts had a substantially higher

poverty rate (20.7% and 29.7%, respectively) in 1997 than the national level (11.7%). While the 1981–1985 cohort had a lower poverty gap (23.8%) than the national level (30.3%), the 1986–1997 cohort had a higher poverty gap (42.8%). The 1986–1997 cohort accounted for only 7.2% of the total population in 1997 but 18.25% of the total poor in the same year.

The Gini index of poverty gap ratios is also reported from 1986 to 1997 for the Canadian population and its subgroups including the native-born and immigrant cohorts (Tables 7–18). The Gini index for the native-born population did not differ too much from that of the total population; it varied from 42% to 45% during the period of 1986–1997 (Tables 7–18). It was the immigrant cohorts who demonstrated a substantial variation of inequality in poverty. The latest immigrant cohorts in most of survey years during 1986–1997 (Tables 7–18) had a lower level of poverty inequality. That means that their poverty experiences were more or less similar. In addition, the weight associated with the Gini index [or Weight for (4) in the tables] or the size-adjusted proportion of deprivation of the native-born population dropped from 67.3% in 1986 (Table 7) to 46.5% in 1997 (Table 18). While this proportion varied substantially across various immigrant cohorts, it was merely 0.4% for the latest immigrant cohort in 1986 (Table 7) but it became 4.7% for the latest immigrant cohort in 1997 (Table 18).

The between group Gini index did not change much over time (see Tables7–18). The residual term R, which would equal to zero if poverty gap ratios are completely segregated by subgroup, did differ from zero. It was valued at about 9.8% in 1986, peaked at 17.7% in 1994, and fell back to 13.5% in 1997. These reflected that the poor are concentrated in certain social groups only to a certain degree.

Generally speaking, in the period of 1986-1997 (see Tables 7–18), the subgroup poverty rate, poverty gap, Gini index, and Sen index of the native-born Canadians were very similar to those of the Canadian population. However, the immigrant cohorts arriving lately in each survey year from 1986 to 1997 generally had the high poverty

rate, poverty gap, and Sen index. The immigrant cohorts arriving in the 1940s-1970s generally had low poverty rates, poverty gaps, and Sen indices. It is interesting to note that the immigrant cohorts arriving in 1981-1985 and 1986-1997 generally experienced persistently high poverty with the latter cohort increased in size to about 7% of the Canadian population in 1997 (see Table 18). Hence, the earlier immigrant cohorts fared extremely well in the Canadian society while the latest immigrant cohorts fared less well so far. Indeed, the earlier immigrant cohorts have had a few decades more living and working in Canada than their later counterparts do. More time may be needed for researchers to observe the similar trend in the later immigrant cohorts. Overall, is there any converging patterns at the bottom of income distributions for different immigrant cohorts? The answer is "Yes, but not evenly so over the last few decades."

4 Concluding Remarks

What is the state of immigrant integration in Canada over the last two decades is an interesting and important policy issue pursued by many researchers. This paper adopts a somewhat different approach to evaluate the immigrant assimilation in Canada by examining the lower tail of income distributions. It is hoped that this work can add new empirical evidence to improve our current understanding of immigrant integration in recent years.

In order to so do, a method based on the properties of the Sen index is employed because (1) the index of poverty can be decomposed into three components—the poverty rate, poverty gap and equality of the poor and (2) each of the components of the index can be further decomposed into subgroup components.

Then this method is applied to the Canadian data from 1986 to 1997 to analyze poverty intensity of different subgroups. The empirical results demonstrate that the overall poverty of the earlier immigrant cohorts arriving before 1980 was substantially

low, even lower than the Canadian national average, either by the individual poverty measures or by the more comprehensive Sen index of poverty intensity. This is a strong indicator of the good integration of the earlier immigrant cohorts. But it was not the case for the more recent cohorts, in particular for the 1981–1985 and 1985–1997 immigrant cohorts. These cohorts accounted for a relatively large proportion of the Canadian population over the last two decades. Their integration appeared to be much slower so far relative to the earlier immigrant cohorts.

References

[1] Abbott, M. G. and C. M. Beach (1993) "Immigrant Earnings Differentials and Birth-Year Effects for Men in Canada: Post-War–1972," *Canadian Journal of Economics*, 26, 505–524.

[2] Anand, S. (1983). *Inequality and Poverty in Malaysia: Measurement and Decomposition*, Oxford University Press, New York.

[3] Bhattacharya, N. and B. Mahalanobis (1967). "Regional Disparities in Household Consumption in India," *Journal of the American Statistical Association*, 62, 143–161.

[4] Bloom, D. E., G. Grenier, and M. Gunderson (1995). "The Changing Labour Market Position of Canadian Immigrants," *Canadian Journal of Economics*, 28(4b), 987–1005.

[5] Borjas, G. (1987). "Self-Selection and the Earnings of Immigrants," *American Economic Review*, 77, 531–553.

[6] Borjas, G. (1994). "The Economics of Immigration," *Journal of Economic Literature*, 32, 1667–1717.

[7] Borjas, G. (1995). "Assimilation and Changes in Cohort Quality Revisited: What Happened to Immigrant Earnings in the 1980s?" *Journal of Labor Economics*, 13, 201–245.

[8] Borjas, G. (1999). *Heaven's Door: Immigration Policy and the American Economy*, Princeton University Press, Princeton.

[9] Borjas, G. (1999). "Immigrantion and Welfare Magnets," *Journal of Labor Economics*, 17, 607–637.

[10] Borjas, G. and L. Hilton (1996). "Immigration and the Welfare State: Immigrant Participation in Means-Tested Entitlement Programs," *Quarterly Journal of Economics*, 111, 575–604.

[11] Butcher, K. F. and D. Card (1991). "Immigration and Wages: Evidence from the 1980's," *American Economic Review*, 81, 292–296.

[12] Butcher, K. F. and John DiNardo (1998). "The Immigrant and Native-Born Wage Distributions: Evidence from United States Censuses," NBER Working Paper 6630, National Bureau of Economic Research.

[13] Chiswick, C. U. (1989). "The Impact of Immigration on the Human Capital of Natives," *Journal of Labor Economics*, 7, 464–486.

[14] Clark, S., R. Hemming, and D. Ulph (1981). "On Indices for Measurement of Poverty," *Economic Journal*, 91, 515–526.

[15] Dustmann, C. (1996). "The Social Assimilation of Immigrants," *Journal of Population Economics*, 9, 37–54.

[16] Green, D. A. (1999). "Immigrant Occupational Attainment: Assimilation and Mobility over Time," *Journal of Labor Economics*, 17, 49–79.

[17] Lambert, P. J. and J. R. Aronson (1993). "Inequality Decomposition Analysis and the Gini Coefficient Revisited," *Economic Journal*, 103, 1221–1227.

[18] Mookherjee, D. and A. F. Shorrocks (1982). "A Decomposition Analysis of the Trend in UK. Income Inequality," *Economic Journal*, 92, 886–902.

[19] OECD (1995). *The Job Study*, Paris: Organization for Economic Cooperation and Development.

[20] Osberg, L. and K. Xu (2000). "International Comparisons of Poverty Intensity: Index Decomposition and Bootstrap Inference," *Journal of Human Resources*, 35, 51–81.

[21] Pyatt, G. (1976). "The Interpretation and Disaggregation of Gini Coefficients," *Economic Journal*, 86, 243–255.

[22] Rao, V. M. (1969) "Two Decompositions of the Concentration Ratio," *Journal of the Royal Statistical Society*, Series A, 132, 418–425.

[23] Sen, A. K. (1976). "Poverty: An Ordinal Approach to Measurement," *Econometrica*, 44, 219–231.

[24] Schultz, T. P. (1998). "Immigrant Quality and Assimilation: A Review of the US Literature," *Journal of Population Economics*, 11, 239–252.

[25] Silber, J. (1989). "Factor Components, Population Subgroups and the Computation of the Gini Index of Inequality," *Review of Economics and Statistics*, 71, 107–115.

[26] Xu, K. and L. Osberg (2002) "The Social Welfare Implications, Decomposability, and Geometry of the Sen Family of Poverty Indices," *Canadian Journal of Economics*, 35, 138–152.

[27] Wright, R. E. and Maxim, P. (1993). "Immigration Policy and Immigrant Quality: Empirical Evidence from Canada," *Journal of Population Economics*, 6, 337–352.

[28] Yitzhaki, S. and R. I. Lerman (1991). "Income Stratification and Income Inequality," *Review of Income and Wealth*, 37, 313–329.

[29] Yuesgert, A. M. (1994). "Immigrant Earnings, Relative to What? The Importance of Earnings Function Specification and Comparison Points," *Journal of Applied Econometrics*, 9, 71–90.

Notes for the Use of the Referee: Interpretation of Subgroup Decomposition of $G(\mathbf{x}_p)$

As illustrated in Figure 2 and equation (5), the subgroup decomposition of $G(\mathbf{x}_p)$ is a bit more complex. Hence, some explanation may be necessary.

If all the poor had the same poverty gap ratio, then there would be a perfect equality of deprivation. In this case, the bottom $w\%$ of the poor population would have $w\%$ of the sum of poverty gap ratios. When inequality exists, the share of poverty gap ratios increases at a much slower rate than the poor population share does.[9] These can be captured by the Lorenz curve of poverty gap ratios of the poor

$$L\left(\frac{r}{q}\right) \equiv \frac{1}{q\overline{\mathbf{x}}_p}\sum_{i=1}^{r} x_i, \tag{7}$$

for $r = 1, 2, \ldots q$. The geometric definition of the Gini index is

$$G(\mathbf{x}_p) \equiv \frac{2}{q}\sum_{i=1}^{q}\left(\frac{i}{q} - L\left(\frac{i}{q}\right)\right). \tag{8}$$

That is, inequality is measured as the function of the difference between the Lorenz curve of perfect equality and that of inequality.

Many authors have made their contributions to the better understanding on subgroup decomposition of the Gini index.[10] In this notes I follow Lmbert and Aronson (1993) to explain the subgroup decomposition of $G(\mathbf{x}_p)$ in the context for discrete distributions of poverty gap ratios.

As shown in equation (5), the Gini index of poverty gap ratios of the poor, $G(\mathbf{x}_p)$, can be decomposed into three terms: (a) $G_B(\mathbf{x}_p)$, the between group Gini index, is defined

[9] For the ease of exposition, we assume that x_i's are sorted in non-decreasing order. This makes the Lorenz curve of poverty gaps similar to that of incomes.

[10] See, for example, Bhattacharya and Mhalanobis (1967), Rao (1969), Pyatt (1976), Mookherjee and Shorrocks (1982), Anand (1983), Silber (1989), Yitzhaki and Lerman (1991), and Lambert and Aronson (1993). All have made improvements in our understanding on subgroup decomposition of the Gini index.

as the Gini index as $G(\mathbf{x}_p)$ but with poverty gap ratios in subgroup k, $x_{i(k)}$'s, being replaced by their subgroup's average poverty gap ratios, $\overline{\mathbf{x}}_{p(k)}$'s; (b) $\sum_{k=1}^{l} b_k G_k(\mathbf{x}_{p(k)})$ is the weighted average of the Gini indices for all subgroups with $b_k = \left(\frac{q_k}{q}\right)\left(\frac{q_k \overline{\mathbf{x}}_{p(k)}}{q\overline{\mathbf{x}}_p}\right)$ as the weight for subgroup k; and (c) $R(\mathbf{x}_p, \mathbf{x}_{p(\cdot)})$ is the term reflecting the degree of segregation. $R(\mathbf{x}_p, \mathbf{x}_{p(\cdot)})$ is zero if subgroup income ranges do not overlap or subgroups have the highest degree of segregation.

Since $R(\mathbf{x}_p, \mathbf{x}_{p(\cdot)})$ is a function of $\mathbf{x}_p$ and $\mathbf{x}_{p(\cdot)}$, it is useful to specify elements of $\mathbf{x}_{p(\cdot)}$ more generally by using subscript r so that $x_{r(\cdot)}$, $r = 1, 2, \ldots, q$, form the vector $\mathbf{x}_{p(\cdot)}$

$$\mathbf{x}_{p(\cdot)} \equiv [x_{1(\cdot)}, x_{2(\cdot)}, \ldots, x_{q(\cdot)}]^\top. \tag{9}$$

The systematic relationship between any element in $\mathbf{x}_p$ and its corresponding element in $\mathbf{x}_{p(\cdot)}$ is $x_{r(\cdot)} = x_{i(k)}$, where $r = \sum_{s \leq k-1} q_s + i = 1, 2, \ldots, q$ for $k = 1, 2, \ldots, l$ and $i = 1, 2, \ldots, q_k$.[11]

To compute the between group Gini index, replace $x_{r(\cdot)}$ in $\mathbf{x}_{p(\cdot)}$ with the corresponding $x_{i(k)}$ $\overline{\mathbf{x}}_{p(k)}$ to get

$$\left[\underbrace{\overline{\mathbf{x}}_{p(1)}, \ldots, \overline{\mathbf{x}}_{p(1)}}_{q_1}, \underbrace{\overline{\mathbf{x}}_{p(2)}, \ldots, \overline{\mathbf{x}}_{p(2)}}_{q_2}, \ldots, \underbrace{\overline{\mathbf{x}}_{p(l)}, \ldots, \overline{\mathbf{x}}_{p(l)}}_{q_l}\right]^\top. \tag{10}$$

The between group Lorenz curve is given by

$$L_B\left(\frac{r}{q}\right) \equiv \frac{1}{q\overline{\mathbf{x}}_p}\left(\sum_{s \leq k-1} q_s \overline{\mathbf{x}}_{p(s)} + q_k \overline{\mathbf{x}}_{p(k)} \frac{i}{q_k}\right), \tag{11}$$

[11] For example, if $q = 6$ and $q_1 = q_2 = q_3 = 2$, for $k = 1$ and $i = 2$, $r = 0 + 2 = 2$; for $k = 2$ and $i = 2$, $r = q_1 + i = 2 + 2 = 4$; for $k = 3$ and $i = 2$, $r = q_1 + q_2 + i = 2 + 2 + 2 = 6$.

where $r = \sum_{s \leq k-1} q_s + i = 1, 2, \ldots, q$ for $k = 1, 2 \ldots, l$ and $i = 1, 2, \ldots, q_k$.[12] The between group Gini index is then computed as

$$G_B(\mathbf{x}_p) \equiv \frac{2}{q} \sum_{r=1}^{q} \left(\frac{r}{q} - L_B\left(\frac{r}{q}\right) \right). \tag{12}$$

The Lorenz curve for poverty gap ratios within subgroup k is computed by

$$L_k\left(\frac{r}{q_k}\right) \equiv \frac{1}{q_k \overline{\mathbf{x}}_{p(k)}} \sum_{i=1}^{r} x_{i(k)}, \tag{13}$$

for $r = 1, 2, \ldots, q_k$. The within group Gini index is defined as

$$G_k(\mathbf{x}_{p(k)}) \equiv \frac{2}{q_k} \sum_{r=1}^{q_k} \left(\frac{r}{q_k} - L_k\left(\frac{r}{q_k}\right) \right). \tag{14}$$

Having defined $G_B(\mathbf{x}_p)$ and $G_k(\mathbf{x}_{p(k)})$, we must explain $R(\mathbf{x}_p, \mathbf{x}_{p(\cdot)})$ using the concentration curve for $\mathbf{x}_{p(\cdot)}$, which is defined by

$$C\left(\frac{r}{q}\right) \equiv \frac{1}{q\overline{\mathbf{x}}_p} \sum_{i=1}^{r} x_{i(\cdot)}, \tag{15}$$

for $r = 1, 2, \ldots, q$, or

$$C\left(\frac{r}{q}\right) \equiv \frac{1}{q\overline{\mathbf{x}}_p} \left(\sum_{s \leq k-1} q_s \overline{\mathbf{x}}_{p(s)} + q_k \overline{\mathbf{x}}_{p(k)} L_k\left(\frac{i}{q_k}\right) \right), \tag{16}$$

where $r = \sum_{s \leq k-1} q_s + i = 1, 2, \ldots, q$ for $k = 1, 2, \ldots, l$ and $i = 1, 2, \ldots, q_k$. The concentration curve defined by equation (15) differs from the Lorenz curve defined by equation (7) in that the former uses $\mathbf{x}_{p(\cdot)}$ given by equation (9) while the latter uses $\mathbf{x}_p$ given by equation (1).

[12] This is the discrete version of equation (11) in Lambert and Aronson (1993).

The between group Lorenz curve [see equation (11)] and concentration curve [see equation (16)] differ in that the former gives the accumulative percentage of poverty gap ratios belonging to $(\frac{r}{q})100\%$ of the poor population if each poor person in a subgroup receives their subgroup's average poverty gap ratio while the latter gives the accumulative percentage of poverty gap ratios actually received by $(\frac{r}{q})100\%$ of the poor population if the poverty gap ratios are sorted block-wise or group-wise. In other words, the between group Lorenz curve disregards the within group inequality and only reveals the between group inequality while the concentration curve reveals the within group inequality under the condition that the between group inequality is given.

The difference between the between group Lorenz curve [see equation (11)] and the concentration curve [see equation (16)] can be found as

$$L_B\left(\frac{r}{q}\right) - C\left(\frac{r}{q}\right) = \frac{q_k \overline{\mathbf{x}}_{p(k)}}{q\overline{\mathbf{x}}_p}\left(\frac{i}{q_k} - L_k\left(\frac{i}{q_k}\right)\right) \tag{17}$$

where $r = \sum_{s\leq k-1} q_s + i = 1, 2, \ldots, q$ for $k = 1, 2, \ldots, l$ and $i = 1, 2, \ldots, q_k$. Multiply both sides of equation (17) by $\frac{2}{q}$ and then find the sum of the left-hand side over $r = 1, 2, \ldots, q$ and the sum of the right-hand side over $k = 1, 2, \ldots, l$ and $i = 1, 2, \ldots, q_k$. Since $r = \sum_{s\leq k-1} q_s + i = 1, 2, \ldots, q$, for $k = 1, 2, \ldots l$, and $i = 1, 2, \ldots, q_k$, the above operations give

$$\frac{2}{q}\sum_{r=1}^{q}\left(L_B\left(\frac{r}{q}\right) - C\left(\frac{r}{q}\right)\right) = \sum_{k=1}^{l}\left(\frac{q_k^2 \overline{\mathbf{x}}_{p(k)}}{q^2\overline{\mathbf{x}}_p}\right)\sum_{i=1}^{q_k}\frac{2}{q_k}\left(\frac{i}{q_k} - L_k\left(\frac{i}{q_k}\right)\right). \tag{18}$$

The right-hand side of equation (18) is the weighted sum of subgroup Gini indices $\sum_{k=1}^{l} b_k G_k(\mathbf{x}_{p(k)})$ in equation (5). Substituting equations (8) and (12) and the left-hand side of equation (18) into equation (5) allows one to see the meaning of R explicitly; that is:

$$R = \frac{2}{n}\sum_{r=1}^{q}\left(C(\frac{r}{q}) - L(\frac{r}{q})\right). \tag{19}$$

The Lorenz curve for the poor population is based on $\mathbf{x}_p$ and the concentration curve for the poor population is based on $\mathbf{x}_{p(\cdot)}$. When the subgroups in $\mathbf{x}_p$ do not overlap

or are completely segregated, $\mathbf{x}_p = \mathbf{x}_{p(\cdot)}$, $C\left(\frac{r}{q}\right) = L\left(\frac{r}{q}\right)$ for all r, and $R = 0$. When the subgroups in $\mathbf{x}_p$ overlap or are not segregated, $\mathbf{x}_p \neq \mathbf{x}_{p(\cdot)}$, $C\left(\frac{r}{q}\right) \neq L\left(\frac{r}{q}\right)$ for all r, $R > 0$. Thus, the residual term R in equation (5) measures the degree of subgroup segregation.

Table 1: The Male and Female Distribution of the Household Heads in the Native Born and Immigrant Populations

	Native Born		Immigrants	
	Male	Female	Male	Female
Year	(percent)	(percent)	(percent)	(percent)
1986	6,339,156 (76.2%)	1,974,918 (23.8%)	1,550,721 (79.6%)	398,128 (20.4%)
1987	6,462,478 (75.7%)	2,073,580 (24.3%)	1,580,634 (79.7%)	403,703 (20.3%)
1988	6,669,322 (76.4%)	2,147,659 (23.6%)	1,519,048 (79.4%)	392,782 (20.5%)
1989	6,331,017 (74.9%)	2,122,367 (25.1%)	1,477,618 (79.2%)	388,755 (20.8%)
1990	6,937,979 (75.3%)	2,271,850 (24.7%)	1,528,108 (79.2%)	401,511 (20.8%)
1991	6,982,208 (75.4%)	2,283,218 (24.6%)	1,606,282 (76.4%)	496,503 (23.6%)
1992	7,033,774 (74.7%)	2,384,006 (25.3%)	1,716,958 (78.8%)	461,832 (21.2%)
1993	7,231,542 (74.8%)	2,441,939 (25.2%)	1,610,076 (75.9%)	511,354 (24.1%)
1994	7,263,060 (75.1%)	2,404,548 (24.9%)	1,782,353 (78.5%)	488,225 (21.5%)
1995	7,367,863 (74.8%)	2,477,194 (25.2%)	1,776,970 (77.8%)	506,370 (22.2%)
1996	7,508,810 (74.6%)	2,556,368 (25.4%)	1,720,522 (78.4%)	475,350 (21.6%)
1997	7,506,610 (74.2%)	2,612,282 (25.8%)	1,875,547 (78.1%)	524,403 (21.9%)

The numbers of household heads are estimated from the Survey of Consumer Finance 1986–1997 based on the sampling weights. The percentages in the parentheses show the distribution between male and female household heads.

Table 2: The Average Income Sources for the Native Born and Immigrant Households

year	pop.	chtxbn	oasgis	eibenf	sapis	socass	incftx	eqinc
1986	Canada	130.67	1181.57	816.86	478.42	2607.52	28031.57	14864.97
	native-born	135.45	1108.21	871.47	498.99	2614.12	27420.24	14861.42
	immigrants	110.30	1494.51	583.88	390.66	2579.35	30639.57	14880.10
1987	Canada	133.18	1216.51	777.41	455.78	2582.89	29044.70	15555.82
	native-born	134.37	1150.77	824.48	481.28	2590.90	28574.14	15603.60
	immigrants	128.07	1499.31	574.91	346.12	2548.41	31068.91	15350.27
1988	Canada	138.75	1286.32	788.70	490.52	2704.29	30885.10	16582.19
	native-born	141.94	1228.44	837.34	512.53	2720.25	30076.80	16493.62
	immigrants	124.01	1553.23	564.42	389.03	2630.67	34612.83	16990.63
1989	Canada	183.90	1393.35	906.05	451.76	2935.06	33345.14	17667.26
	native-born	183.65	1315.43	964.01	481.89	2980.99	32246.06	17573.49
	immigrants	185.04	1583.18	643.55	315.27	2727.04	38323.21	18091.97
1990	Canada	177.46	1426.83	1023.44	522.33	3150.05	33964.60	18397.86
	native-born	177.67	1375.18	1061.95	537.78	3152.58	33269.61	18401.48
	immigrants	176.46	1673.33	839.63	448.58	3138.00	37281.70	18380.57
1991	Canada	181.19	1523.78	1322.60	662.63	3690.20	34670.40	18829.13
	native-born	180.31	1465.55	1349.88	659.93	3655.66	34195.60	18923.02
	immigrants	185.08	1780.33	1202.41	674.55	3842.36	36762.48	18415.42
1992	Canada	166.73	1563.73	1366.04	762.85	3860.36	35541.65	19405.11
	native-born	163.32	1519.08	1393.04	765.65	3841.09	34962.46	19474.99
	immigrants	181.50	1762.08	1249.34	750.76	3943.68	38045.17	19103.07
1993	Canada	470.80	1616.66	1308.43	904.88	4300.77	35255.71	19262.10
	native-born	473.69	1543.25	1328.27	901.52	4246.73	34761.63	19379.04
	immigrant	457.64	1951.42	1217.98	920.18	4547.23	37508.69	18728.84
1994	Canada	462.10	1613.56	1090.08	936.36	4102.10	35769.71	19521.72
	naive born	449.09	1563.28	1128.55	895.34	4036.27	35173.29	19666.88
	immigrants	517.49	1827.63	926.29	1110.98	4382.39	38309.11	18903.69
1995	Canada	449.40	1611.66	976.55	828.37	3865.96	36473.31	19963.70
	native-born	434.33	1617.84	1012.90	785.99	3851.05	36180.42	20181.18
	immigrants	514.32	1585.01	819.81	1011.11	3930.25	37736.16	19026.01
1996	Canada	472.55	1670.47	912.84	811.42	3867.28	36954.12	20151.80
	native-born	448.26	1631.68	949.32	773.60	3802.87	36568.02	20373.38
	immigrants	583.87	1848.26	745.61	984.73	4162.47	38723.86	19136.14
1997	Canada	487.43	1685.44	743.72	735.15	3651.73	37299.13	20498.41
	native-born	470.31	1675.90	783.45	705.15	3634.82	36832.28	20711.31
	immigrants	559.58	1725.63	576.24	861.61	3723.06	39267.51	19600.78

The amount in current dollar is estimated from the Survey of Consumer Finance 1986–1997 based on the sampling weights. pop. = population, chtxbn = child tax benefit, oasgis = old age security, guaranteed income suplement, eibenf = employment insurance benefit, sapis = social assistance and provincial income supplements, socass = total social assistance = chtxbn + oasgis + eibenf + sapis, incftx = family after tax income, eqinc = individual equivalent after tax income.

Table 3: The Basic Statistics of the Household Characteristics for the Native Born and Immigrant Households 1986-1988

year	pop.	hdage	hdeduc	spage	speduc	numpers	numchd07	numchd7-11	numchd12-15	numchd16-17
1986	Canada	45.51	4.17	42.92	4.12	2.52	0.25	0.17	0.14	0.08
	native-born	44.34	4.12	41.99	4.13	2.46	0.25	0.17	0.13	0.07
	immigrants	50.49	4.36	46.42	4.11	2.76	0.23	0.19	0.18	0.10
1987	Canada	45.61	4.21	43.04	4.18	2.48	0.24	0.17	0.14	0.07
	native-born	44.58	4.16	42.24	4.19	2.42	0.24	0.17	0.13	0.07
	immigrants	50.04	4.44	46.07	4.17	2.74	0.24	0.19	0.16	0.09
1988	Canada	45.88	4.26	43.11	4.23	2.47	0.24	0.17	0.14	0.07
	native-born	44.93	4.20	42.29	4.25	2.41	0.25	0.16	0.13	0.06
	immigrants	50.27	4.53	46.46	4.18	2.73	0.22	0.20	0.17	0.09

Notes: pop. = population, hdage = the age of the household head, hdeduc = the education level of the household head (15-80), spage = the age of the spouse (15-80), speduc = the education level of the spouse, numpers = the number of persons in the household, numchd07 = the number of children under 7 years of age; numchd7-11 = the number of children 7-11 years of age; numchd12-15 = the number of children 12-15; numchd16-17 = the number of children 16-17 years of age. In 1988 or earlier, hdeduc/speduc is used for indicating the level of education: 1 = no schooling or elementary, 2 = 9 or 10 years of elementary and secondary, 3 = 11 years of elementary and secondary, 4 = 12 years of elementary and secondary, 5 = 13 years of elementary and secondary, 6 = some post-secondary, 7 = post-secondary certificate or diploma, 8 = university degree.

Table 4: The Basic Statistics of the Household Characteristics for the Native Born and Immigrant Households 1989-1997

year	pop.	hdage	hdeduc1/ hdeduc2	spage	speduc1/ speduc2	numpers	numchd07	numchd7-11	numchd12-15	numchd16-17
1989	Canada	46.60	2.04/1.40	43.57	2.17/1.23	2.50	0.25	0.17	0.14	0.07
	native-born	45.79	2.02/1.36	42.83	2.18/1.21	2.42	0.25	0.17	0.13	0.06
	immigrants	50.30	2.11/1.61	46.48	2.10/1.30	2.86	0.24	0.20	0.17	0.08
1990	Canada	46.23	2.10/1.43	43.56	2.22/1.25	2.45	0.24	0.17	0.13	0.07
	native-born	45.35	2.09/1.40	42.84	2.25/1.26	2.39	0.25	0.17	0.13	0.06
	immigrants	50.42	2.11/1.60	46.65	2.08/1.22	2.72	0.21	0.18	0.15	0.09
1991	Canada	46.39	2.11/1.45	43.83	2.25/1.29	2.43	0.24	0.17	0.13	0.06
	native-born	45.62	2.10/1.41	43.23	2.27/1.29	2.38	0.24	0.17	0.13	0.06
	immigrants	49.79	2.17/1.63	46.30	2.14/1.30	2.67	0.23	0.17	0.14	0.08
1992	Canada	46.48	2.17/1.52	44.14	2.30/1.41	2.42	0.23	0.17	0.13	0.07
	native-born	45.72	2.15/1.47	43.53	2.32/1.41	2.36	0.24	0.17	0.13	0.06
	immigrants	49.79	2.23/1.74	46.47	2.22/1.41	2.70	0.23	0.17	0.15	0.08
1993	Canada	46.90	2.14/1.58	44.47	2.29/1.48	2.42	0.23	0.16	0.13	0.06
	native-born	46.00	2.13/1.54	43.69	2.31/1.47	2.37	0.24	0.16	0.13	0.06
	immigrant	51.01	2.18/1.78	47.69	2.19/1.52	2.66	0.21	0.16	0.14	0.07
1994	Canada	46.89	2.16/1.59	44.50	2.31/1.55	2.42	0.23	0.16	0.13	0.06
	naive born	46.22	2.14/1.55	43.98	2.33/1.55	2.34	0.23	0.16	0.12	0.06
	immigrants	49.74	2.21/1.79	46.44	2.25/1.56	2.73	0.22	0.18	0.16	0.08
1995	Canada	47.13	2.17/1.64	44.82	2.34/1.57	2.41	0.23	0.16	0.13	0.06
	native-born	46.69	2.15/1.58	44.45	2.34/1.55	2.35	0.22	0.16	0.13	0.06
	immigrants	49.03	2.27/1.92	46.25	2.33/1.64	2.67	0.24	0.18	0.15	0.08
1996	Canada	47.38	2.20/1.72	45.06	2.35/1.67	2.41	0.22	0.16	0.13	0.07
	native-born	46.92	2.19/1.67	44.72	2.38/1.67	2.34	0.22	0.15	0.12	0.06
	immigrants	49.49	2.26/1.94	46.45	2.26/1.70	2.75	0.24	0.19	0.16	0.08
1997	Canada	47.39	2.24/1.73	45.39	2.37/1.66	2.38	0.21	0.16	0.13	0.06
	native-born	46.93	2.23/1.68	45.03	2.39/1.65	2.32	0.21	0.16	0.13	0.06
	immigrants	49.33	2.31/1.94	46.73	2.29/1.68	2.67	0.24	0.17	0.13	0.07

Notes: pop. = population, hdage = the age of the household head, hdeduc = the education level of the household head (15-80), spage = the age of the spouse (15-80), speduc = the education level of the spouse, numpers = the number of persons in the household, numchd07 = the number of children under 7 years of age; numchd7-11 = the number of children 7-11 years of age; numchd12-15 = the number of children 12-15; numchd16-17 = the number of children 16-17 years of age. The education level was measured differently after 1988. In 1988 onwards, the education levels are indicated by two indicators: For the first indicator (hdeduc1/speduc1), 0 = grade 8 or lower, 1 = grade 9-10, 2 = grade 11-13, did not graduate from high school, 3 = grade 11-13, graduated from high school. For the second indicator (hdeduc2/ speduc2) , 0= no other education, 1 = some post-secondary education, no degree, certificate or diploma, 2 = trades certificate or diploma from a vocational school or apprenticeship training, 3 = non-university certificate or diploma from a community college, CEGEP, school of nursing, etc., 4 = university certificate below bachelor's level, 5 = bachelor's degree, 6 = university degree or certificate above bachelor's level.

Table 5: Average Individual Incomes Across Immigrant Cohorts 1986–1990

Year	1986	1987	1988	1989	1990	1991
Native-Bron	14861	15604	16494	17715	18401	18923
	(10015)	(9847)	(10421)	(10735)	(12561)	(11467)
Immigrants	14880	15350	16991	18120	18381	18415
	(8749)	(9938)	(10436)	(11043)	(11096)	(11618)
Arrivals						
before 1946	13349	13863	14734	16867	17737	19599
	(8335)	(8075)	(9505)	(11536)	(10956)	(14611)
1946-55	16748	17367	19821	20109	20384	19810
	(8616)	(9989)	(12390)	(11782)	(10336)	(10010)
1956-65	16446	16674	18796	20272	20744	21245
	(9099)	(8875)	(9606)	(10096)	(11556)	(11495)
1966-70	15397	17106	18632	19122	20487	21931
	(8369)	(11575)	(9918)	(10723)	(11382)	(12874)
1971-75	14692	15285	17669	17004	18352	18520
	(7791)	(11582)	(10196)	(8680)	(9876)	(10796)
1976-80	12985	14013	14536	18466	16083	17274
	(8525)	(9965)	(8671)	(11089)	(10646)	(11146)
1981-85	11065	11172	13113	17828	16356	14215
	(8840)	(7621)	(7784)	(13893)	(10939)	(8489)
1986-	NA	NA	10439	11491	13135	13033
	NA	NA	(9154)	(7917)	(10252)	(9185)

Note: The numbers listed are the average individual equivalent incomes in current dollars and their standard deviations (in parentheses).

Table 6: Average Individual Incomes Across Immigrant Cohorts 1991–1997

Year	1992	1993	1994	1995	1996	1997
Native-Bron	19475	19379	19667	20181	20373	20711
	(13470)	(12657)	(11789)	(12702)	(12678)	(13350)
Immigrants	19103	18729	18904	19026	19136	19601
	(13377)	(12986)	(11855)	(14925)	(13631)	(12736)
Arrivals						
before 1946	18087	18216	16952	19846	19811	20162
	(10788)	(12261)	(6890)	(20091)	(10012)	(11971)
1946-55	21505	21756	20891	21551	21965	22564
	(21079)	(17660)	(11634)	(11974)	(12813)	(13607)
1956-65	21819	21068	21794	23058	23449	22172
	(12239)	(10993)	(11767)	(25141)	(19559)	(13238)
1966-70	19424	21498	20846	22566	23412	22845
	(10544)	(10924)	(11351)	(13466)	(14061)	(11681)
1971-75	19424	20864	20481	19213	20484	21892
	(10544)	(14402)	(11039)	(11439)	(10964)	(11694)
1976-80	18507	19194	18058	18316	18904	20781
	(11325)	(13607)	(15720)	(104501)	(11453)	(13693)
1981-85	16954	15465	17695	17311	18102	19219
	(10184)	(9606)	(10956)	(9510)	(14276)	(12193)
1986-	13485	12306	14905	14779	14066	15012
	(9206)	(7659)	(10996)	(9774)	(9476)	(11420)

Note: The numbers listed are the average individual equivalent incomes in current dollars and their standard deviations (in parentheses).

Table 7: Poverty in Canada, 1986

Subgroup (1)	**Rate (2)**	**Weight for (2)**	**Gap (3)**	**Weight for (3)**	**Gini Index (4)**	**Weight for (4)**	**Sen Index (5)**
Population	0.11267	1.00000	0.29024	1.00000	0.44186	1.00000	0.04715
Native-Born	0.11864	0.79130	0.28128	0.83322	0.43371	0.67282	0.04784
Arrivals							
before 1946	0.05320	0.02100	0.20830	0.00992	0.42991	0.00007	0.01585
1946–55	0.05993	0.03951	0.18944	0.02102	0.43465	0.00029	0.01629
1956–65	0.05394	0.04655	0.29987	0.02229	0.43293	0.00051	0.02318
1966–70	0.06642	0.03237	0.26988	0.01908	0.42343	0.00034	0.02552
1971–75	0.09775	0.03054	0.29965	0.02649	0.41220	0.00072	0.04136
1976–80	0.13142	0.02046	0.27396	0.02386	0.45274	0.00054	0.05230
1981–85	0.27209	0.01827	0.53295	0.04412	0.38051	0.00357	0.20019
Between	**Group**	**Gini Index**	0.04934		**R Term**	0.09829	

Note: The first column of the table gives the Canadian population and its subgroups—native-born and immigrants who arrived in Canada in different periods. The following columns list the poverty rates and their weights, the poverty gaps and their weights, the Gini indices and their weights and the Sen indices. At the bottom of the table, the subgroup Gini index and R term are provided.

Table 8: Poverty in Canada, 1987

Subgroup (1)	**Rate (2)**	**Weight for (2)**	**Gap (3)**	**Weight for (3)**	**Gini Index (4)**	**Weight for (4)**	**Sen Index (5)**
Population	0.11228	1.00000	0.28591	1.00000	0.43336	1.00000	0.04601
Native-Born	0.11229	0.79160	0.27318	0.79167	0.43363	0.59884	0.04398
Arrivals							
before 1946	0.04958	0.01709	0.33881	0.00755	0.39821	0.00007	0.02349
1946–55	0.06247	0.03515	0.26718	0.01956	0.41008	0.00036	0.02354
1956–65	0.05766	0.04343	0.27010	0.02230	0.39114	0.00047	0.02167
1966–70	0.07485	0.03301	0.35893	0.02200	0.37477	0.00061	0.03694
1971–75	0.10995	0.03006	0.25036	0.02944	0.47242	0.00076	0.04053
1976–80	0.18332	0.02315	0.29907	0.03779	0.41633	0.00149	0.07765
1981–85	0.29506	0.02652	0.41991	0.06969	0.38206	0.00713	0.17123
Between	**Group**	**Gini Index**	0.04569		**R Term**	0.12370	

Note: The first column of the table gives the Canadian population and its subgroups—native-born and immigrants who arrived in Canada in different periods. The following columns list the poverty rates and their weights, the poverty gaps and their weights, the Gini indices and their weights and the Sen indices. At the bottom of the table, the subgroup Gini index and R term are provided.

Table 9: Poverty in Canada, 1988

Subgroup (1)	**Rate (2)**	**Weight for (2)**	**Gap (3)**	**Weight for (3)**	**Gini Index (4)**	**Weight for (4)**	**Sen Index (5)**
Population	0.10467	1.00000	0.28248	1.00000	0.43350	1.00000	0.04239
Native-Born	0.10847	0.80248	0.27774	0.83164	0.42464	0.68000	0.04292
Arrivals							
before 1946	0.03437	0.01521	0.15293	0.00499	0.45838	0.00001	0.00766
1946–55	0.05394	0.03533	0.26641	0.01820	0.39708	0.00031	0.02007
1956–65	0.03940	0.04116	0.23976	0.01549	0.44041	0.00020	0.01361
1966–70	0.04106	0.03082	0.23793	0.01209	0.40546	0.00012	0.01373
1971–75	0.07600	0.02808	0.20988	0.02039	0.54010	0.00031	0.02457
1976–80	0.18714	0.02116	0.23947	0.03783	0.39685	0.00121	0.06260
1981–85	0.17298	0.01433	0.21961	0.02368	0.55387	0.00044	0.05903
1986–88	0.32672	0.01143	0.58184	0.03569	0.28577	0.00262	0.24442
Between	**Group**	**Gini Index**	0.05651		**R Term**	0.08633	

Note: The first column of the table gives the Canadian population and its subgroups—native-born and immigrants who arrived in Canada in different periods. The following columns list the poverty rates and their weights, the poverty gaps and their weights, the Gini indices and their weights and the Sen indices. At the bottom of the table, the subgroup Gini index and R term are provided.

Table 10: Poverty in Canada, 1989

Subgroup (1)	**Rate (2)**	**Weight for (2)**	**Gap (3)**	**Weight for (3)**	**Gini Index (4)**	**Weight for (4)**	**Sen Index (5)**
Population	0.09929	1.00000	0.28270	1.00000	0.43046	1.00000	0.04015
Native-Born	0.10144	0.79881	0.27227	0.81612	0.42928	0.64148	0.03948
Arrivals							
before 1946	0.02916	0.01180	0.27127	0.00347	0.36529	0.00001	0.01080
1946–55	0.04982	0.03242	0.26448	0.01627	0.47526	0.00025	0.01944
1956–65	0.03379	0.03894	0.28684	0.01325	0.40860	0.00018	0.01365
1966–70	0.04709	0.03199	0.24885	0.01517	0.40557	0.00020	0.01647
1971–75	0.12906	0.03023	0.32283	0.03930	0.39351	0.00176	0.05806
1976–80	0.09596	0.01908	0.26590	0.01844	0.44648	0.00032	0.03691
1981–85	0.11915	0.01741	0.26594	0.02089	0.37601	0.00041	0.04360
1986–89	0.29344	0.01932	0.42964	0.05710	0.39498	0.00496	0.17587
Between	**Group**	**Gini Index**	0.03893		**R Term**	0.11293	

Note: The first column of the table gives the Canadian population and its subgroups—native-born and immigrants who arrived in Canada in different periods. The following columns list the poverty rates and their weights, the poverty gaps and their weights, the Gini indices and their weights and the Sen indices. At the bottom of the table, the subgroup Gini index and R term are provided.

Table 11: Poverty in Canada, 1990

Subgroup (1)	**Rate (2)**	**Weight for (2)**	**Gap (3)**	**Weight for (3)**	**Gini Index (4)**	**Weight for (4)**	**Sen Index (5)**
Population	0.10580	1.00000	0.29461	1.00000	0.42891	1.00000	0.04454
Native-Born	0.10323	0.80722	0.27835	0.78762	0.42919	0.58612	0.04107
Arrivals							
before 1946	0.03800	0.01106	0.24994	0.00397	0.41139	0.00001	0.01340
1946–55	0.03360	0.02938	0.23094	0.00933	0.43129	0.00007	0.01111
1956–65	0.06259	0.03995	0.30820	0.02364	0.38061	0.00058	0.02663
1966–70	0.05442	0.02608	0.28952	0.01341	0.41591	0.00018	0.02231
1971–75	0.13297	0.02628	0.31876	0.03303	0.32525	0.00118	0.05617
1976–80	0.17801	0.01935	0.27545	0.03255	0.41580	0.00099	0.06942
1981–85	0.16772	0.01594	0.30650	0.02526	0.33268	0.00066	0.06851
1986–90	0.30449	0.02473	0.47510	0.07118	0.38655	0.00817	0.20058
Between	**Group**	**Gini Index**	0.05397		**R Term**	0.11888	

Note: The first column of the table gives the Canadian population and its subgroups—native-born and immigrants who arrived in Canada in different periods. The following columns list the poverty rates and their weights, the poverty gaps and their weights, the Gini indices and their weights and the Sen indices. At the bottom of the table, the subgroup Gini index and R term are provided.

Table 12: Poverty in Canada, 1991

Subgroup (1)	**Rate (2)**	**Weight for (2)**	**Gap (3)**	**Weight for (3)**	**Gini Index (4)**	**Weight for (4)**	**Sen Index (5)**
Population	0.11040	1.00000	0.28427	1.00000	0.43501	1.00000	0.04503
Native-Born	0.10489	0.79728	0.27974	0.75751	0.43927	0.56469	0.04223
Arrivals							
before 1946	0.02119	0.01269	0.29427	0.00244	0.33218	0.00001	0.00831
1946–55	0.03981	0.02721	0.25477	0.00981	0.37360	0.00009	0.01393
1956–65	0.06442	0.03447	0.19791	0.02011	0.46264	0.00028	0.01865
1966–70	0.05931	0.02989	0.31708	0.01606	0.27927	0.00029	0.02406
1971–75	0.16239	0.03096	0.22344	0.04553	0.38694	0.00163	0.05032
1976–80	0.20773	0.01846	0.27325	0.03474	0.40380	0.00116	0.07968
1981–85	0.23497	0.01560	0.31158	0.03321	0.36537	0.00121	0.09996
1986–91	0.26603	0.03344	0.37297	0.08059	0.42775	0.00852	0.14166
Between	**Group**	**Gini Index**	0.04431		**R Term**	0.13722	

Note: The first column of the table gives the Canadian population and its subgroups—native-born and immigrants who arrived in Canada in different periods. The following columns list the poverty rates and their weights, the poverty gaps and their weights, the Gini indices and their weights and the Sen indices. At the bottom of the table, the subgroup Gini index and R term are provided.

Table 13: Poverty in Canada, 1992

Subgroup (1)	**Rate (2)**	**Weight for (2)**	**Gap (3)**	**Weight for (3)**	**Gini Index (4)**	**Weight for (4)**	**Sen Index (5)**
Population	0.10970	1.00000	0.28705	1.00000	0.44912	1.00000	0.04563
Native-Born	0.10641	0.79101	0.27487	0.76727	0.45244	0.56372	0.04248
Arrivals							
before 1946	0.02437	0.01062	0.29878	0.00236	0.33417	0.00001	0.00972
1946–55	0.04172	0.02873	0.25664	0.01093	0.43448	0.00011	0.01536
1956–65	0.05634	0.03888	0.17505	0.01997	0.49134	0.00024	0.01471
1966–70	0.07249	0.02910	0.32044	0.01923	0.39381	0.00041	0.03238
1971–75	0.10368	0.02841	0.34154	0.02685	0.37297	0.00086	0.04862
1976–80	0.14894	0.01954	0.31127	0.02653	0.39173	0.00076	0.06452
1981–85	0.17624	0.01721	0.27524	0.02765	0.43903	0.00073	0.06980
1986–92	0.29820	0.03650	0.38247	0.09921	0.41685	0.01312	0.16160
Between	**Group**	**Gini Index**	0.05047		**R Term**	0.13686	

Note: The first column of the table gives the Canadian population and its subgroups—native-born and immigrants who arrived in Canada in different periods. The following columns list the poverty rates and their weights, the poverty gaps and their weights, the Gini indices and their weights and the Sen indices. At the bottom of the table, the subgroup Gini index and R term are provided.

Table 14: Poverty in Canada, 1993

Subgroup (1)	**Rate (2)**	**Weight for (2)**	**Gap (3)**	**Weight for (3)**	**Gini Index (4)**	**Weight for (4)**	**Sen Index (5)**
Population	0.10783	1.00000	0.28427	1.00000	0.44481	1.00000	0.04429
Native-Born	0.10207	0.80235	0.28182	0.75949	0.44186	0.57186	0.04148
Arrivals							
before 1946	0.04690	0.00843	0.13449	0.00367	0.39719	0.00001	0.00881
1946–55	0.05740	0.02849	0.19860	0.01517	0.45174	0.00016	0.01655
1956–65	0.06124	0.03585	0.23895	0.02036	0.42211	0.00035	0.02081
1966–70	0.07060	0.02906	0.25146	0.01903	0.46814	0.00032	0.02606
1971–75	0.08462	0.02289	0.26733	0.01796	0.52179	0.00030	0.03442
1976–80	0.10244	0.01696	0.22592	0.01611	0.35693	0.00021	0.03141
1981–85	0.17388	0.01385	0.26109	0.02234	0.41407	0.00046	0.06420
1986–93	0.32230	0.04212	0.33999	0.12588	0.43264	0.01895	0.15699
Between	**Group**	**Gini Index**	0.038382		**R Term**	0.14475	

Note: The first column of the table gives the Canadian population and its subgroups—native-born and immigrants who arrived in Canada in different periods. The following columns list the poverty rates and their weights, the poverty gaps and their weights, the Gini indices and their weights and the Sen indices. At the bottom of the table, the subgroup Gini index and R term are provided.

Table 15: Poverty in Canada, 1994

Subgroup (1)	**Rate (2)**	**Weight for (2)**	**Gap (3)**	**Weight for (3)**	**Gini Index (4)**	**Weight for (4)**	**Sen Index (5)**
Population	0.10817	1.00000	0.28169	1.00000	0.44018	1.00000	0.04388
Native-Born	0.10054	0.78504	0.26708	0.72969	0.43949	0.50483	0.03865
Arrivals							
before 1946	0.02079	0.00707	0.23397	0.00136	0.57021	0.00000	0.00764
1946–55	0.04746	0.02546	0.29051	0.01117	0.37875	0.00013	0.01901
1956–65	0.05213	0.03245	0.30346	0.01564	0.43892	0.00026	0.02276
1966–70	0.08611	0.03050	0.27794	0.02428	0.42269	0.00058	0.03405
1971–75	0.07332	0.02844	0.25544	0.01928	0.43072	0.00034	0.02680
1976–80	0.12632	0.02131	0.24759	0.02488	0.44620	0.00054	0.04523
1981–85	0.16155	0.01774	0.26629	0.02649	0.39390	0.00066	0.05996
1986–94	0.30620	0.05200	0.36416	0.14721	0.42618	0.02802	0.15902
Between	**Group**	**Gini Index**	0.02802		**R Term**	0.17729	

Note: The first column of the table gives the Canadian population and its subgroups—native-born and immigrants who arrived in Canada in different periods. The following columns list the poverty rates and their weights, the poverty gaps and their weights, the Gini indices and their weights and the Sen indices. At the bottom of the table, the subgroup Gini index and R term are provided.

Table 16: Poverty in Canada, 1995

Subgroup (1)	**Rate (2)**	**Weight for (2)**	**Gap (3)**	**Weight for (3)**	**Gini Index (4)**	**Weight for (4)**	**Sen Index (5)**
Population	0.11259	1.00000	0.28934	1.00000	0.43061	1.00000	0.04661
Native-Born	0.10196	0.79135	0.27899	0.71664	0.43288	0.49521	0.04076
Arrivals							
before 1946	0.03223	0.00719	0.32401	0.00206	0.37426	0.00000	0.01435
1946–55	0.03752	0.02257	0.27440	0.00752	0.46052	0.00005	0.01504
1956–65	0.05198	0.02964	0.31494	0.01368	0.44251	0.00020	0.02361
1966–70	0.09640	0.02567	0.26798	0.02198	0.34695	0.00045	0.03480
1971–75	0.11792	0.02300	0.30539	0.02409	0.40211	0.00061	0.05049
1976–80	0.13440	0.02102	0.30185	0.02509	0.40381	0.00066	0.05695
1981–85	0.14567	0.01813	0.21694	0.02345	0.41012	0.00041	0.04456
1986–95	0.30327	0.06144	0.34112	0.16550	0.42051	0.03229	0.14696
Between	**Group**	**Gini Index**	0.03924		**R Term**	0.16248	

Note: The first column of the table gives the Canadian population and its subgroups—native-born and immigrants who arrived in Canada in different periods. The following columns list the poverty rates and their weights, the poverty gaps and their weights, the Gini indices and their weights and the Sen indices. At the bottom of the table, the subgroup Gini index and R term are provided.

Table 17: Poverty in Canada, 1996

Subgroup (1)	**Rate (2)**	**Weight for (2)**	**Gap (3)**	**Weight for (3)**	**Gini Index (4)**	**Weight for (4)**	**Sen Index (5)**
Population	0.11396	1.00000	0.30109	1.00000	0.42834	1.00000	0.04901
Native-Born	0.10344	0.79580	0.28427	0.72236	0.42505	0.49265	0.04190
Arrivals							
before 1946	0.00508	0.00474	0.36634	0.00021	0.02632	0.00000	0.00191
1946–55	0.03640	0.01999	0.32200	0.00638	0.45484	0.00004	0.01705
1956–65	0.04695	0.03047	0.28832	0.01255	0.34697	0.00015	0.01823
1966–70	0.04951	0.02339	0.27264	0.01016	0.41153	0.00009	0.01905
1971–75	0.09407	0.02321	0.28740	0.01916	0.36681	0.00035	0.03695
1976–80	0.15021	0.01962	0.28345	0.02587	0.40956	0.00063	0.06001
1981–85	0.16146	0.01645	0.29140	0.02331	0.39512	0.00053	0.06564
1986–96	0.30924	0.06633	0.37554	0.17999	0.42885	0.04041	0.16594
Between	**Group**	**Gini Index**	0.046277		**R Term**	0.15463	

Note: The first column of the table gives the Canadian population and its subgroups—native-born and immigrants who arrived in Canada in different periods. The following columns list the poverty rates and their weights, the poverty gaps and their weights, the Gini indices and their weights and the Sen indices. At the bottom of the table, the subgroup Gini index and R term are provided.

Table 18: Poverty in Canada, 1997

Subgroup (1)	**Rate (2)**	**Weight for (2)**	**Gap (3)**	**Weight for (3)**	**Gini Index (4)**	**Weight for (4)**	**Sen Index (5)**
Population	0.11653	1.00000	0.30398	1.00000	0.43837	1.00000	0.05095
Native-Born	0.10587	0.78509	0.27788	0.71330	0.42677	0.46512	0.04198
Arrivals							
before 1946	0.02929	0.00539	0.24178	0.00136	0.50670	0.00000	0.01067
1946–55	0.04882	0.02145	0.32918	0.00899	0.43393	0.00009	0.02304
1956–65	0.06610	0.02926	0.23662	0.01659	0.44983	0.00021	0.02267
1966–70	0.05244	0.02417	0.31870	0.01088	0.34862	0.00012	0.02254
1971–75	0.08223	0.02510	0.30699	0.01771	0.38911	0.00032	0.03507
1976–80	0.09498	0.01959	0.23881	0.01597	0.49480	0.00020	0.03391
1981–85	0.20695	0.01838	0.23780	0.03264	0.40752	0.00083	0.06927
1986–97	0.29723	0.07157	0.42765	0.18256	0.41892	0.04689	0.18036
Between	**Group**	**Gini Index**	0.08454		**R Term**	0.13496	

Note: The first column of the table gives the Canadian population and its subgroups—native-born and immigrants who arrived in Canada in different periods. The following columns list the poverty rates and their weights, the poverty gaps and their weights, the Gini indices and their weights and the Sen indices. At the bottom of the table, the subgroup Gini index and R term are provided.

Figure 1: Advantages of Measuring Poverty in the Conditional Income Distributions over Measure Mean Incomes

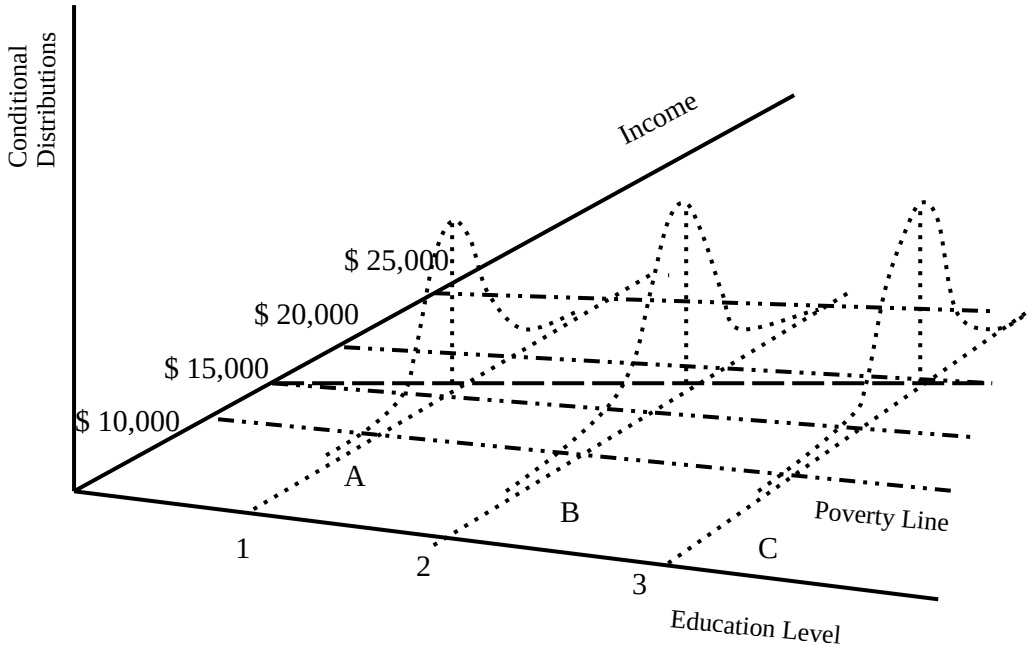


Figure 2: An Illustration of Multiplicative and Subgroup Decomposition of the Sen Index for Subgroups 1, 2 and 3

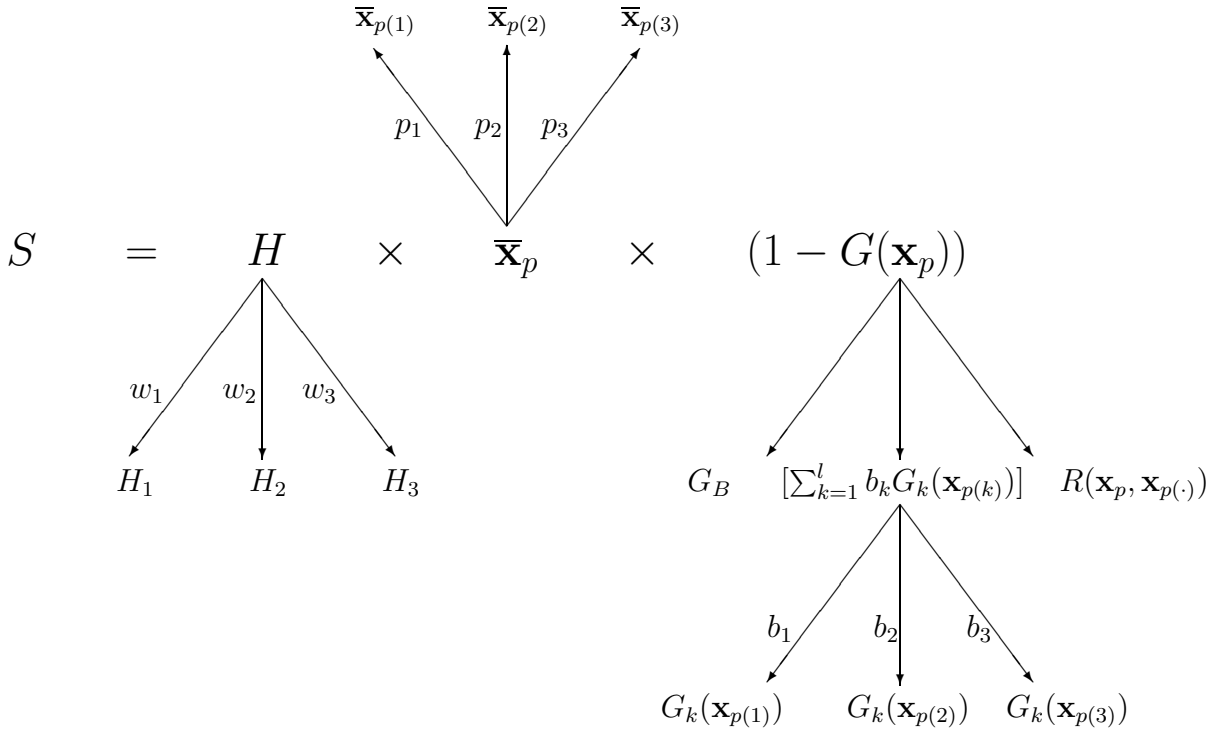
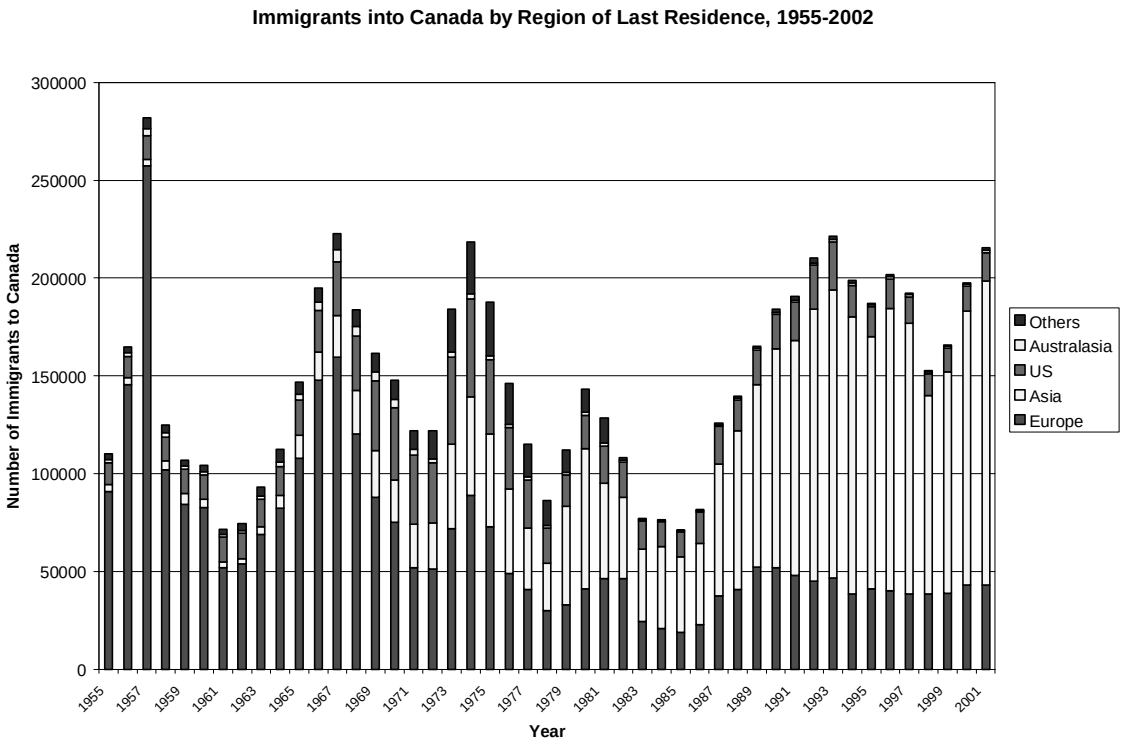


Figure 3: Sources of Canadian Immigrants



Source: Kuan Xu, Department of Economics, Dalhousie University, Halifax, Canada; Original Data from Statistics Canada

Figure 4: Poverty in Canadian Population, 1986–1997

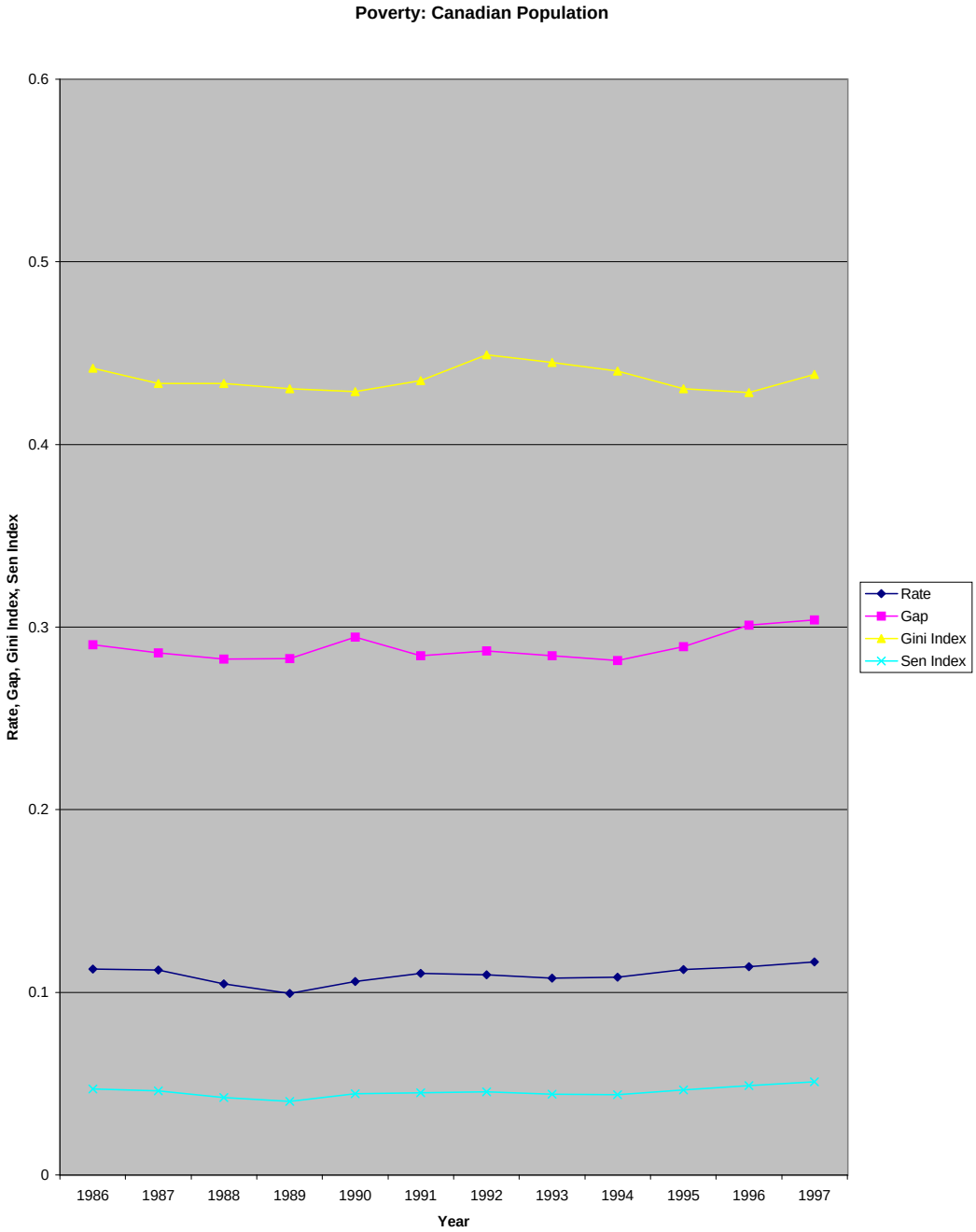


Figure 5: Poverty in Native-Born Population, 1986–1997

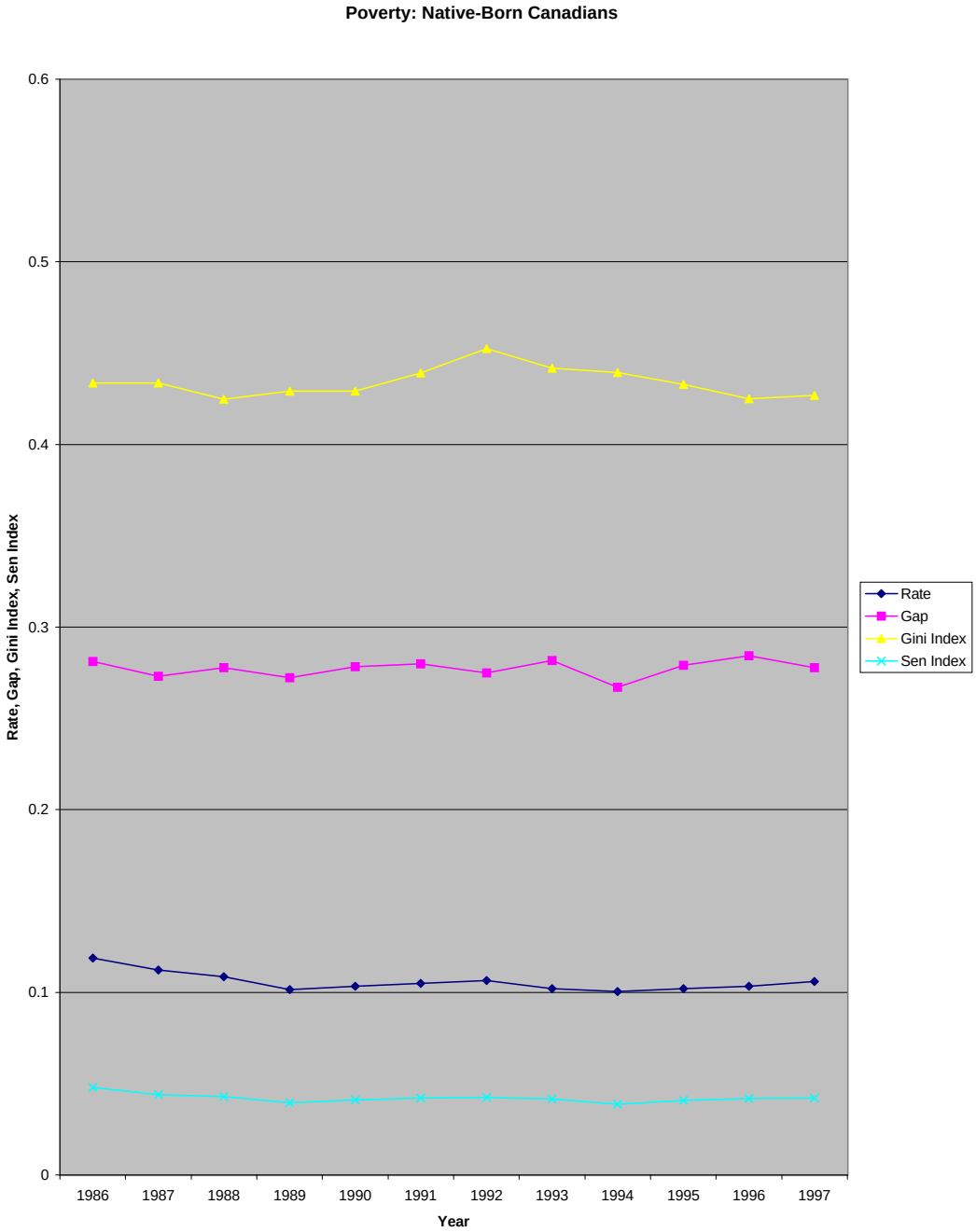


Figure 6: Poverty in 1981-1985 Immigrant Cohort, 1986–1997

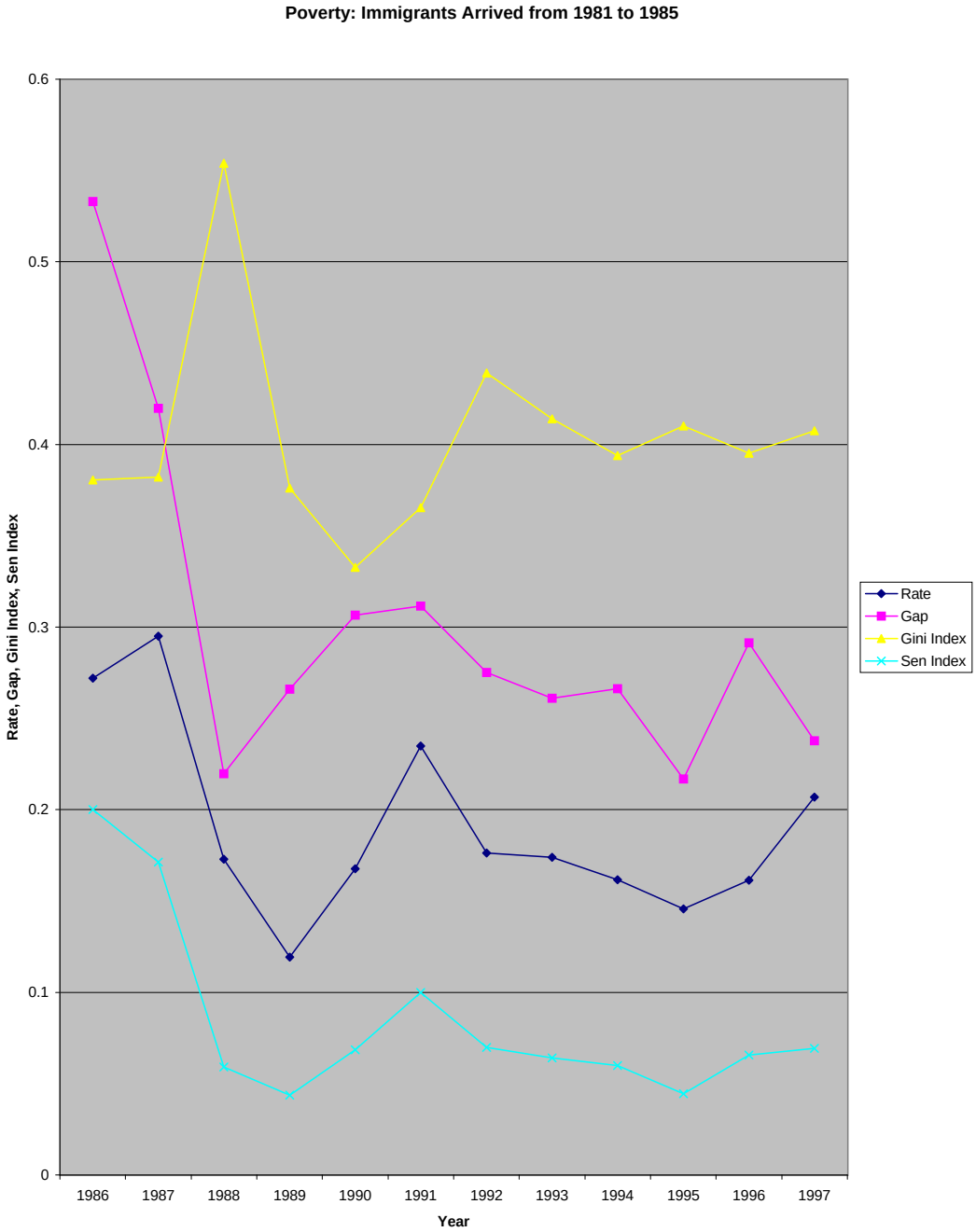


Figure 7: Poverty in 1986-1997 Immigrant Cohort, 1986–1997