# Male/Female Urban Income Inequality: The Soaring Nineties

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Increases in income inequality, measured at the national level, have occurred in all industrialised countries over the last 15 to 20 years. Gottschalk (1993) was one of the first to document these increases in a number of countries, and other researchers have identified a number of causes for them. In Canada, for example, Baker and Solon (1999), in a 1975-1993 longitudinal study based on income tax returns, find that the increase in annual earnings inequality of males between the ages of 25 and 58 is the result of increases in both long run earnings inequality and in greater earnings instability. Morisette and Bérubé (1996), in another longitudinal study based on tax files, find that young males who experienced spells of low earnings in the 1980s were more likely to earn lower incomes for longer time periods than did their counterparts in the 1970s.

While most studies examine income distributions at the national level, several have established a geographic dimension to these distributions and to changes in them. The Economic Council of Canada found that incomes are typically distributed more unequally in larger cities, in part because of what it terms "high level" services in those cities (Economic Council of Canada 1990). Soroka (1999) develops and tests a model to explain separate male and female urban income distributions in Canadian cities, and finds that, holding all other influences constant, city size contributes to income inequality. Levernier et al (1998), in a study of U. S. counties, find that metropolitan counties have greater income inequality than non-metropolitan counties even after accounting for a series of observable differences between them.

The purpose of this study is to add to the above literature by examining


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changes in male and female urban income distributions from 1980 to 1995. We want to determine if patterns of inequality in Canadian cities have changed over time, and whether there is a cyclical component to changes in male and female income inequality. There is special emphasis on the 1990-1995 period, which marks a significant turning point in past trends for both male and female income distributions, with changes in inequality that are dramatically different from those in the previous decade.

Changes in income inequality, and the extent to which they differ by urban size group, are of concern for a number of reasons. The incidence of low income across cities matters for both local and provincial governments, which are responsible for many assistance programs. It is important for these governments to understand whether changes in income inequality are a purely local phenomenon or whether they are part of a pattern of change across cities of certain sizes. It has also been argued many times that social problems are more likely to arise if a segment of society feels poor relative to its neighbours; the distribution of income in a city may therefore matter as much as, or more than, the national income distribution. It is also important to know whether patterns of male/female income inequality differ by city size, both cyclically and in the long run. In a mobile society, all of these considerations may have implications for migration patterns, both internal and external.

The analysis that follows is based on data for 56 cities in Canada that, in 1985, had populations of at least 25,000 persons. First, the analytic approach is outlined; this is based on gini and polarisation coefficients, the measures of income inequality that are used in the analysis. Then, changes in male and female income levels and average gini and polarisation coefficients across all 56 cities in the sample are analysed. These data are then disaggregated into four city size groups to examine whether there is a city size dimension to changes in income inequality, and whether any influence of city size differs for males and females. This is followed by a summary of results. Finally, some implications of the results are discussed.

## Measuring Inequality

We examine income distributions using two statistics – the gini coefficient and the polarisation coefficient. The gini coefficient, based upon the Lorenz curve, is a familiar measure of the extent to which an income distribution differs from perfect income equality. The polarisation coefficient ($P$) is a statistic recently developed by Wolfson (1997). It measures a feature of income distributions which the gini coefficient does not capture – what Wolfson calls "spreadoutness from the middle", or bi-modality. Put differently, a higher value for $P$ indicates that an income distribution has a more hollowed out middle range. This characteristic of an income distribution may change quite independently of any change in the gini coefficient.

The polarisation coefficient is measured as follows:

$$P = \frac{2(2T - gini)}{mtan}$$

where

| | | |
|---|---|---|
| *mtan* | = | median income level/mean income level, and |
| *T* | = | the difference between 50 % and the income share of the bottom half of the population (Wolfson 1997). |

Gini and polarisation coefficients together provide a clearer picture of changes in income distributions. There are four possible combinations of results. A decline in both the gini and polarisation coefficients indicates an equalising transfer of income from above to below the median income. This transfer of income reduces the gini coefficient; the Lorenz curve becomes flatter, *T* becomes smaller and polarisation declines. Conversely, an increase in both coefficients indicates a non-equalizing income transfer from below to above the median income.

An equalising transfer of income on one side of the median income, e.g. a shift of income from the 30$^{th}$ population percentile to the 20$^{th}$, reduces the gini coefficient and increases the polarisation coefficient. The reverse non–equalising transfer of income, e.g. a shift of income from the 20$^{th}$ population percentile to the 30$^{th}$, is indicated by an increase in the gini coefficient and a reduction in the polarisation coefficient.

As the formula above indicates, the ratio of median to average income is an important variable in the measure of income polarisation. The polarisation coefficient is higher the larger is average income relative to median income, all else equal. As shown below, there are important differences in the rates at which these two income measures have grown, differences which contribute to greater income polarisation both over time and across city size groups.

Ideally, it would be desirable to apply these measures to an annual time series of income distribution data for urban areas. This is not available, as the various annual series do not permit sufficient disaggregation at the urban level. Therefore, data from the Censuses from 1981 to 1996 are used, each of which contains income data for the previous calendar year.

While these data permit analysis of a large number of cities, they do not allow for analysis at consistent points in the business cycle. Nationally, the unemployment rate was at a low in 1980 (7.5%), increasing to a peak in 1983 (11.9%); the rate then declined until 1989 (7.5%), increased to 1992 (11.3%) and declined to 1995 (9.5%). There is, nonetheless, a cyclical element to our data since unemployment rates in 1985 and 1995 were higher than they had been

five years earlier.[1] On this basis, 1980 to 1985 is treated as a period of contraction, as the unemployment rate increased from 7.5% to 10.5%. Similarly, 1990 to 1995 is treated as a second period of contraction, for over those years the unemployment rate rose from 8.2% to 9.5%. The period from 1985 to 1990 is treated as one of expansion because of the reduction in the unemployment rate over those years.

## The 56-City Sample: Income Levels and Distributions

Average and median total individual income levels for males and females, averaged across the sample of 56 cities, are shown in Table 1. Generally, both measures of nominal income increase over time, with one exception; the male median income declines marginally from 1990 to 1995.

It is also apparent that female income levels increase more rapidly than male incomes. In 1980, the average female income is 47.7 % of the male average, increasing to 59.5 % of the male average by 1995. Similarly, the female median income increases from 39.5 % to 54.3 % of the male median income.

The distributions of these incomes change over time. The values for the gini and polirisation coefficients averaged across the sample of 56 cities are shown in Table 2. The average values for male gini coefficients follow a cycle pattern around an increasing trend. They increase during periods of rising unemployment, (1980 to 1985, and 1990 to 1995), and decline (marginally) when unemployment rates fall (1985 to 1990).

The average female gini coefficients, on the other hand, decline from 1980 to 1985, and again from 1985 to 1990; they then increase to 1995. The first of these declines is contrary to cyclical expectations, and we attribute this to the power of the long-term trend of declining female income inequality (Soroka 1999). Because of these changes, average female gini coefficients, which are much higher than those for males in the 1980s, move closer to the male gini coefficients over time.

There are also large changes in polarisation coefficients. Recall that these coefficients are dependant upon the gini coefficients and the ratios of the median to average incomes (Table 1). As a result, the average polarisation coefficients for both males and females follow the same trends and cyclical patterns as do the gini coefficients. Male and female polarisation coefficients thus become more alike over time.

It is apparent that the changes from 1990 to 1995 are very different from those in earlier years (Table 2). The increases in the average male gini and

1. The peaks and troughs did not, however, occur in the same years in all cities in our sample. Thus, the Census years coincide more closely with cycle peaks and troughs in some cities than in others.

polarisation coefficients are far greater than any changes in the 1980s. The declines in the female gini and polarisation coefficients in the 1980s are replaced by large increases from 1990 to 1995. As a result of these changes, both male and female income distributions were very much more unequal in 1995 than in earlier years.

It is important to note that these changes in average coefficients are not the

**TABLE 1 Average and Median Incomes, 56 City Average**

| | 1980 | 1985 | 1990 | 1995 |
|---|---|---|---|---|
| Male | | | | |
| Average Income | $16,994 | $22,768 | $29,474 | $30,436 |
| Median Income | $15,779 | $20,415 | $26,053 | $25,958 |
| Female | | | | |
| Average Income | $8,102 | $11,851 | $16,420 | $18,108 |
| Median Income | $6,225 | $ 9,173 | $12,951 | $14,102 |

**TABLE 2 Male and Female Gini and Polarisation Coefficients, 56 City Average**

| | 1980 | 1985 | 1990 | 1995 |
|---|---|---|---|---|
| Male Gini Coefficient | .3700 | .3837 | .3832 | .4220 |
| Male Polarisation Coefficient | .3685 | .4111 | .3849 | .4289 |
| Female Gini Coefficient | .4280 | .4204 | .4180 | .4334 |
| Female Polarisation Coefficient | .4985 | .4461 | .4292 | .4534 |

**TABLE 3 Number of Cities with Increases in Gini and Polarisation Coefficients, 1980 - 1995**

| | 1980 to 1985 | | 1985 to 1990 | | 1990 to 1995 | |
|---|---|---|---|---|---|---|
| | Male | Female | Male | Female | Male | Female |
| Gini Coefficient | 50 | 12 | 29 | 20 | 55 | 54 |
| Polarisation Coefficient | 43 | 0 | 5 | 11 | 54 | 51 |

result of changes in a few outliers in the sample of cities; they are broadly reflective of the sample. The number of cities in which the coefficients increase over the three time periods is shown in Table 3.

During the two periods of increased unemployment (1980-1985 and 1990-1995), male gini coefficients increase in 50 and 55 of the 56 cities. During the expansion (1985-1990), when the average male gini coefficient declines marginally, the male gini increases in 29 of the 56 cities and declines in the remaining 27 cities. Similarly, the male polarisation coefficients increase in 43 and 54 of the cities during the two contractions and in only five cities during the expansion. Clearly, during periods of higher unemployment the increases in male income inequality are experienced widely across the sample of cities.

The cyclical effects are initially somewhat different for females. From 1980 to 1985, the female gini coefficients increase in only 12 of the cities, and the

polarisation coefficients decline in every city. From 1985 to 1990, the female gini increases in 20 cities, and the polarisation coefficients in 11; these changes are not unlike those for males. From 1990 to 1995, the changes for females are virtually the same as for males: the female gini coefficient increases in 54 of the 56 cities, and the polarisation coefficients increase in 51 cities. Thus, as was the case for males, changes in the average female coefficients are reflective of a general pattern across cities, and the direction of changes in female gini and polarisation coefficients across cities has become more like those for males over time.

**TABLE 4 Ratios of Female-to-Male Gini and Polarisation Coefficients, 56 City Average**

| | 1980 | 1985 | 1990 | 1995 |
|---|---|---|---|---|
| F/M Gini Coefficients | 1.1613 | 1.0994 | 1.0940 | 1.0290 |
| F/M Polarisation Coefficients | 1.5895 | 1.0931 | 1.1230 | 1.0625 |

These changes make the female and male income distributions more alike (Table 4). This is reflected in the reduction over time in the ratio of female-to-male gini and polarisation coefficients, averaged across the sample of 56 cities. In 1980, the female gini coefficients are, on average, 16.13 % higher than the male gini coefficients; by 1995, they are only, on average, 2.90 % higher than the male gini coefficients.

The ratios of female/male polarisation coefficients follow a similar pattern; they increase from 1985 to 1990, but fall otherwise. These changes are, however, minor in the context of the long run reduction in male/female income polarisation. Over the full 15-year period, the difference between male and female polarisation coefficients declines from 58.9 % to 6.3 %.

Thus, while the 1985-1990 expansion slows the move to more similar male and female gini and polarisation coefficients it does not alter what has become a strong trend towards income distributions that are more alike.

The nature of changes in income inequality are apparent from the combined changes in gini and polarisation coefficients (Table 5). From 1980 to 1985, both the male gini and polarisation coefficients increase in 39 of the 56 cities. The combination of changes indicates that there is a non-equalizing shift of income shares across the median, i.e. from the bottom half to the upper half of the income distribution. In 11 of the cities there are increases in gini coefficients accompanied by declines in polarisation coefficients; these cities experience greater male income inequality created by unequalizing transfers of income on one side of the median income.

For females, it is quite different from 1980 to 1985; in 44 of the cities, both the gini and polarisation coefficients decrease. This indicates an equalizing shift of income shares across the median, i.e. from the upper to lower half of the income distribution.

From 1985 to 1990, a period of expansion, changes in income distributions are more mixed. Income polarisation decreases for males in most cities. In 24

cities, this decrease is accompanied by an increase in the gini coefficient, indicating a non-equalizing income shift within the upper and/or lower halves of the income distribution. In 27 cities, the gini coefficients decrease, indicating an equalizing income shift from individuals in the upper half of the income distribution to those in the lower half. There is a similar split in the changes for female income distributions, but a preponderance of cities (32) show equalizing income shifts across the median.

**TABLE 5 Combined Changes in Gini (dG) and Polarisation (dP) Coefficients**

| | Male | | | Female | | |
|---|---|---|---|---|---|---|
| Number of cities in which | 80-85 | 85-90 | 90-95 | 80-85 | 85-90 | 90-95 |
| dG> 0, dP> 0 | 39 | 5 | 54 | 0 | 7 | 50 |
| dG> 0, dP< 0 | 11 | 24 | 1 | 12 | 13 | 4 |
| dG< 0, dP> 0 | 4 | 0 | 0 | 0 | 4 | 1 |
| dG< 0, dP< 0 | 2 | 27 | 1 | 44 | 32 | 1 |

The directions of changes for males and females are almost identical from 1990 to 1995. In almost all cities, both gini and polarisation coefficients increase, indicating shifts of income shares from the lower to the upper halves of both male and female income distributions. The most dramatic changes are those for the female income distributions, which are quite different from those for males until the 1990-1995 period. Only at that point do the changes become similar.

We now turn to disaggregated data to explore whether there are city-size differences in the direction and magnitude of changes in incomes and in income distributions.

## Results by City-Size Group

City size differences are examined by disaggregating the sample of 56 cities into four groups. The "Small" group consists of cities with populations of 25,000-99,999 people (29 cities); the "Medium" group is 18 cities with populations of 100,000-499,999 people; the "Large" category includes six cities with populations between 500,000-1,000,000 people and the "Metro" cities have populations of over 1,000,000 (3 cities). We begin with a consideration of income levels in these city size groups, and then examine income distributions.

### Income Levels

Average male income generally rises with city size (Table 6). There is a small

decline in 1985 as we move from Large to Metro cities. There is a similar decline in 1995, but with an important difference: in that year average male income in the largest city group falls relative to both its 1990 level and the averages in smaller cities.

Median male income follows a more mixed pattern. In 1980, it falls as we move up from Small to Large city size groups and then increases marginally for the largest city group. In subsequent years, median income follows the opposite pattern, increasing as we move up to the Large cities, and falling as we move to the Metro city size group.

**TABLE 6 Average and Median Male Incomes by City Size Group**

| | Small | Medium | Large | Metro |
|---|---|---|---|---|
| Average Income | | | | |
| 1980 | $16,689 | $16,690 | $18,573 | $18,598 |
| 1985 | $22,177 | $23.432 | $25,389 | $25,244 |
| 1990 | $28,959 | $30,264 | $31,806 | $32,840 |
| 1995 | $29,908 | $31,339 | $33,165 | $32,757 |
| Median Income | | | | |
| 1980 | $16,236 | $15,449 | $14,933 | $15,017 |
| 1985 | $20,078 | $21,053 | $22,228 | $21,229 |
| 1990 | $25,988 | $26,679 | $27,483 | $27,147 |
| 1995 | $26,033 | $26,687 | $27,506 | $25,175 |

**TABLE 7 Average and Median Female Incomes by City Size Group**

| | Small | Medium | Large | Metro |
|---|---|---|---|---|
| Average Income | | | | |
| 1980 | $7,750 | $8,077 | $ 9,144 | $9,565 |
| 1985 | $11,337 | $12,172 | $13,729 | $14,066 |
| 1990 | $15,688 | $16,974 | $18,628 | $19,772 |
| 1995 | $17,262 | $18,908 | $20,407 | $21,330 |
| Median Income | | | | |
| 1980 | $ 5,857 | $ 6,168 | $ 7,374 | $ 7,728 |
| 1985 | $ 8703 | $ 9,385 | $10,906 | $11,129 |
| 1990 | $12,253 | $13,382 | $15,033 | $15,922 |
| 1995 | $13,450 | $14,723 | $16,001 | $16,313 |

The 1995 pattern of median incomes is striking. In that year, the largest cities have, for the first time, the lowest male median income of all size groups. Moreover, as is the case with average income, the median income in the largest cities actually declines from 1990 to 1995. These declines are not trivial; the average median income in the three Metro cities is 8.5 % lower than in the Large cities and 7.3 % lower than in 1990. These changes, as we will see below,

contribute to increasing male income polarisation in the largest cities both over time and relative to other cities.

Female average and median incomes (Table 7) follow a more consistent pattern; they rise over time in all city size groups, and in each year, both income measures increase with city size. Because of these changes, female average and median incomes move closer to male incomes in cities of all sizes (Table 8). The only minor exception is for median income from 1980 to 1985 in the Large and Metro cities. There is also a clear city-size effect: in any year, female incomes increase relative to male incomes as city size increases. Note also that these changes do not appear to follow any cyclical pattern.

**TABLE 8 Ratio of Average and Median Female/Male Incomes by City Size Group**

| | Small | Medium | Large | Metro |
|---|---|---|---|---|
| Average Income | | | | |
| 1980 | .4684 | .4851 | .4931 | .5151 |
| 1985 | .5153 | .5205 | .5405 | .5572 |
| 1990 | .5444 | .5613 | .5859 | .6018 |
| 1995 | .5798 | .6071 | .6158 | .6509 |
| Median Income | | | | |
| 1980 | .3702 | .4039 | .4953 | .5238 |
| 1985 | .4431 | .4503 | .4908 | .5218 |
| 1990 | .4778 | .5039 | .5470 | .5848 |
| 1995 | .5231 | .5539 | .5802 | .6470 |

**TABLE 9 Average Male Gini and Polarisation Coefficients, by City Size Group**

| | Small | Medium | Large | Metro |
|---|---|---|---|---|
| MGINI 1980 | 0.3661 | 0.3738 | 0.3714 | 0.3822 |
| MGINI 1985 | 0.3787 | 0.3873 | 0.3882 | 0.4006 |
| MGINI 1990 | 0.3753 | 0.3883 | 0.3938 | 0.4064 |
| MGINI 1995 | 0.4130 | 0.4258 | 0.4332 | 0.4639 |
| | | | | |
| MPOL 1980 | 0.3525 | 0.3673 | 0.4349 | 0.3955 |
| MPOL 1985 | 0.4004 | 0.4131 | 0.4354 | 0.4543 |
| MPOL 1990 | 0.3735 | 0.3888 | 0.4072 | 0.4275 |
| MPOL 1995 | 0.4173 | 0.4340 | 0.4401 | 0.4887 |

## Income Distributions

Male gini (MGINI) and polarisation (MPOL) coefficients, averaged across the cities in each size class, are shown in Table 9. The male gini coefficients generally increase over time in all size groups. In addition to this upward trend, there are cyclical patterns in all size classes: ginis rise from 1980 to 1985, they remain

relatively stable from 1985 to 1990, and they increase considerably from 1990 to 1995. There is a clear city-size effect, for with only one exception (Large cities in 1980), the average male gini coefficient increases with city size.

The male polarisation coefficients follow the same patterns as do the male gini coefficients, with cyclical variations around an increasing trend. The decline in polarisation coefficients is, however, stronger than the relative steadiness of the ginis during the upturn from 1985 to 1990. Finally, we note that the polarisation coefficients generally rise with city size group, as was the case with gini coefficients. The only exception is Metro cities in 1980.

The female gini coefficients (Table 10) follow less consistent patterns across city sizes. In 1980, the average female gini declines as city size increases. In

**TABLE 10 Average Female Gini and Polarisation Coefficients, by City Size Group**

| | Small | Medium | Large | Metro |
|---|---|---|---|---|
| FGINI 1980 | 0.4316 | 0.4294 | 0.4161 | 0.4087 |
| FGINI 1985 | 0.4204 | 0.4234 | 0.4159 | 0.4116 |
| FGINI 1990 | 0.4178 | 0.4200 | 0.4146 | 0.4144 |
| FGINI 1995 | 0.4319 | 0.4331 | 0.4351 | 0.4457 |
| | | | | |
| FPOL 1980 | 0.4957 | 0.5027 | 0.5029 | 0.4926 |
| FPOL 1985 | 0.4434 | 0.4536 | 0.4437 | 0.4321 |
| FPOL 1990 | 0.4231 | 0.4351 | 0.4403 | 0.4312 |
| FPOL 1995 | 0.4504 | 0.4513 | 0.4632 | 0.4751 |

1985 and 1990, the average gini coefficient increases from Small to Medium cities, and then declines. In 1995, female ginis increase with city size, as do the male gini coefficients.

The female gini coefficients show different patterns of change over time for different size groups. In the Small, Medium and Large cities the female gini coefficients decline to 1990, and then increase in 1995. The gini coefficients in the Metro cities, on the other hand, increase consistently over time, but with by far the largest increase from 1990 to 1995. Thus, the 1990-1995 period marks the first time that the female gini coefficients increased in all city size groups, and 1995 is the first year in which the average female gini coefficient is highest in the largest cities. It is also the first year in which both male and female gini coefficients increase with city size.

Changes over time in female polarisation coefficients are similar to those for gini coefficients; they decrease in all city size groups until 1990, and they then increase to 1995. As was the case with female gini coefficients, there are mixed results by city size group until 1995, when the female polarisation coefficients increase steadily across city size groups. Nineteen ninety-five is therefore the first year in which both female and male polarisation coefficients (and gini coefficients) increase with city size.

We now consider the sizes of the changes in gini and polarisation coefficients, for these changes also show clear trends (Table 11). Whether we measure from year to year or from the beginning of the period to the end (1980 to 1995), with very few exceptions the increases in male gini coefficients are greater as city size increases. As a result, the differences between the size classes increase over time; the ratio of male ginis in Metro cities to Small cities is 1.0440 in 1980, 1.058 in 1985, 1.083 in 1990 and 1.1235 in 1995.

The changes in polarisation coefficients over time show less clear patterns across city size groups. From 1980 to 1995, the male polarisation coefficient is almost unchanged in Large cities, while it increases by over 23 % in Metro cities. Over the same years, polarisation in both the Small and Medium cities increases by about 18 %. As a result, the ratio of male polarisation coefficients for Metro cities relative to Small cities is 1.1248 in 1980, increasing to 1.1711 in 1995.

**TABLE 11 Changes over Time in Male Gini and Polarisation Coefficients**

| | Small | Medium | Large | Metro |
|---|---|---|---|---|
| MGINI 1985/1980 | 1.0344 | 1.0361 | 1.0452 | 1.0480 |
| MGINI 1990/1985 | 0.9900 | 1.0026 | 1.0144 | 1.0145 |
| MGINI 1995/1990 | 1.1005 | 1.0956 | 1.1001 | 1.1415 |
| MGINI 1995/1980 | 1.1280 | 1.1390 | 1.1664 | 1.2138 |
| | | | | |
| MPOL 1985/1980 | 1.1359 | 1.1247 | 1.0011 | 1.1458 |
| MPOL 1990/1985 | 0.9328 | 0.9412 | 0.9352 | 0.9410 |
| MPOL 1995/1990 | 1.1173 | 1.1163 | 1.0808 | 1.1432 |
| MPOL 1995/1980 | 1.1838 | 1.1806 | 1.0120 | 1.2325 |

**TABLE 12 Changes Over Time in Female Gini and Polarisation Coefficients**

| | Small | Medium | Large | Metro |
|---|---|---|---|---|
| FGINI 1985/1980 | 0.9741 | 0.9850 | 0.9995 | 1.0071 |
| FGINI 1990/1985 | 0.9938 | 0.9920 | 0.9959 | 1.0069 |
| FGINI 1995/1990 | 1.0337 | 1.0312 | 1.0494 | 1.0755 |
| FGINI 1995/1980 | 1.0010 | 1.0090 | 1.0457 | 1.0905 |
| | | | | |
| FPOL 1985/1980 | 0.8945 | 0.9023 | 0.8823 | 0.8772 |
| FPOL 1990/1985 | 0.9542 | 0.9592 | 0.9923 | 0.9979 |
| FPOL 1995/1990 | 1.0645 | 1.0372 | 1.0520 | 1.1018 |
| FPOL 1995/1980 | 0.9085 | 0.8978 | 0.9211 | 0.9545 |

As is the case for males, with very few exceptions the increases in female gini coefficients are greater (or the decreases smaller) as city size increases (Table 12) Indeed, over the period 1980 to 1995 there is virtually no increase in the female gini coefficients in the Small and Medium cities. As a result, the

differences between the size classes increases over time. The ratio of female ginis in Metro cities to Small cities is 0.9469 in 1980, 0.9790 in 1985, 0.9909 in 1990 and 1.0320 in 1995.

The changes in female polarisation coefficients over time show less clear patterns across city size groups, as was the case for males. Female polarisation coefficients decrease least in Metro cities, and, by a small margin, they decrease most in Medium cities. As is the case with gini coefficients, the result is an increase in polarisation in Metro cities relative to Small cities. The ratio of coefficients was 0.9807 in 1980, and 1.0615 in 1995.

These changes have a consistent impact on the ratio of female-to-male gini coefficients (Table 13). The ratio declines over time, with only one minor exception (Small cities from 1985 to 1990). It is noteworthy that the ratio declines even

**TABLE 13 Ratio of Female-to-Male Gini and Polarisation Coefficients, by City Size Group**

| | Small | Medium | Large | Metro |
|---|---|---|---|---|
| F/M GINI 1980 | 1.1846 | 1.1522 | 1.1221 | 1.0697 |
| F/M GINI 1985 | 1.1143 | 1.0954 | 1.0723 | 1.0275 |
| F/M GINI 1990 | 1.1164 | 1.0838 | 1.0534 | 1.0197 |
| F/M GINI 1995 | 1.0478 | 1.0187 | 1.0048 | 0.9508 |
| F/M POL 1980 | 1.6051 | 1.7529 | 1.1977 | 1.2433 |
| F/M POL 1985 | 1.1150 | 1.1036 | 1.0256 | 0.9529 |
| F/M POL 1990 | 1.1416 | 1.1247 | 1.0851 | 1.0090 |
| F/M POL 1995 | 1.0857 | 1.0431 | 1.0537 | 0.9724 |

**TABLE 14 Values of the GP Index**

| | dG> 1 | dG< 1 |
|---|---|---|
| dP> 1 | 1 | 3 |
| dP< 1 | 2 | 4 |

in 1995, when the female gini coefficients reverse their downward trends and increase for the first time; this emphasizes the extent to which the male gini coefficients increase from 1990 to 1995. The size effect is also consistent, for in every year the ratio declines with city size. Thus, female gini coefficients are more like male gini coefficients as city size increases, and the similarity has grown over time. Because of these patterns, in 1995 the female gini coefficient in the Metro cities is, for the first time, lower than the corresponding male gini.

The ratio of female to male polarisation coefficients also declines as city size increases, with the exception of a more mixed pattern in 1980 and a small increase in 1995 as we move from Medium to Large cities. Over time, the ratio

follows a cyclical pattern in all city size groups. The ratio declines from 1980 to 1985, increases from 1985 to 1990 and declines from 1990 to 1995.

Changes in gini and polarisation coefficients, either over time or across city size groups, provide more complete information when they are examined together. We begin with the former; changes over time in the two coefficients are summarised with a Gini/Polarisation Index (GPI). The GPI may assume one of four possible values, based on the changes in the two coefficients. The pattern of assigned values is to increase the GPI as the income distribution becomes more equal (Table 14). Thus, for example, a value of one is assigned to a city where both the gini and polarisation coefficients increase over time, and a value of four if both coefficients decline.

On this basis, GPI values are assigned to each city for each time period, based on that city's changes in male and female gini and polarisation coefficients. Table 15 shows the average values of these GPIs in each city size group.

**TABLE 15 Average Values of GP Index**

| | City Size Group | | | |
|---|---|---|---|---|
| Male | Small | Medium | Large | Metro |
| 1980-85 | 1.4483 | 1.4444 | 1.6667 | 1.0000 |
| 1985-90 | 3.1034 | 2.8333 | 2.3333 | 2.0000 |
| 1990-95 | 1.1379 | 1.0000 | 1.0000 | 1.0000 |
| Female | | | | |
| 1980-85 | 3.7241 | 3.6667 | 3.0000 | 2.6667 |
| 1985-90 | 3.2759 | 3.0556 | 2.6667 | 2.3333 |
| 1990-95 | 1.1724 | 1.2222 | 1.0000 | 1.0000 |

There are consistent patterns to these changes over time. The low values for the male GPIs for 1980-1985 indicate increases in inequality, with a tendency for unequalizing shifts from below to above the median income. All the GPIs are higher in the 1985-1990 period of expansion; the GPI values indicate increases in either a city's gini or polarisation coefficient. During the 1990-1995 period, however, the average GPIs all decline to their lowest levels; they are equal to one in all but the Small cities, signifying increases in both the gini and polarisation coefficients in every city in the size group. These GPI increases indicate increases in inequality with income shifts from below to above the median income.

The female GPIs follow a different pattern. They start higher than the male GPIs for 1980-1985, and, although they decline, they remain higher in 1985-1990. By the 1990-1995 period, however, they are very similar to the low male GPIs and indicate that the earlier equalizing changes in the female income distributions have clearly reversed themselves. The differences between these changes in female GPIs and those for males highlight the growing similarity between male and female income inequality, especially in the two largest city

groups.

The GPIs in Table 15 also show that city size influences the changes over time in income inequality. For any given time period, the GPI declines with increases in city size; there is only one exception for each gender group. This indicates that as city size increases there is a greater tendency for both male and female income inequality to increase over time, with shifts of income from below to above the median income. The only significant gender difference is the starting point of high GPIs for females in the 1980-1985 period.

It is also helpful to summarize the changes in gini and polarisation coefficients that occur as we move up the city size scale in any one year. We cannot use GPIs for this, as the sample of cities is obviously different in different size groups. Instead, Table 16, drawing on the information in Tables 9 and 10, shows the direction of change in the average gini coefficients (G) and polarisation coefficients (P) as city size increases.

For males the city size effect is clear after 1980: both the gini and polarisation coefficients increase with city size, indicating non-equalising shifts from

**TABLE 16 Changes in Gini and Polarisation Coefficients As City Size Increases**

| Male | Small to Medium | Medium to Large | Large to Metro |
|---|---|---|---|
| 1980 | G⇑P⇑ | G⇓ P⇑ | G⇑P⇓ |
| 1985 | G⇑P⇑ | G⇑P⇑ | G⇑P⇑ |
| 1990 | G⇑P⇑ | G⇑P⇑ | G⇑P⇑ |
| 1995 | G⇑P⇑ | G⇑P⇑ | G⇑P⇑ |
| Female | | | |
| 1980 | G⇓P⇑ | G⇓ P⇑ | G⇓ P⇓ |
| 1985 | G⇑P⇑ | G⇓ P⇓ | G⇓ P⇓ |
| 1990 | G⇑P⇑ | G⇓ P⇑ | G⇓ P⇓ |
| 1995 | G⇑P⇑ | G⇑P⇑ | G⇑P⇑ |

below to above the median income as we move up to larger cities. For females the pattern is more mixed in 1980, 1985 and 1990, although in the latter two years gini and polarisation coefficients increase as we move from Small to Medium cities and then decline as we move to Large and Metro cities. By 1995, however, city size has the same effect on the female income distribution as on the male distribution, with income inequality rising with city size as a result of income shifts from the bottom to the top half of the income distribution.

## Summary

The 1990-1995 period represents a clear break with past patterns of inequality, especially for females. Over those years there are, for the first time, across-the-

board increases in both male and female urban income inequality, increases that are characterised by shifts of income from the bottom to the top half of the income distributions in cities of all sizes.

The 1990-1995 period also shows the largest 5-year increases in male and female income inequality, with bigger increases occurring in larger cities. These size-related increases in inequality add to an existing pattern of greater male income inequality in larger cities. They also result, for the first time, in female income inequality increasing with city size.

Over the period from 1980 to 1995, male and female gini and polarisation coefficients grow more alike and, with very few exceptions, their similarity increases as city size increases. Indeed, in the largest cities in 1995 the female gini and polarisation coefficients are, for the first time, marginally lower than are those for males.

In addition to an upward trend in income inequality, male income distributions follow a cyclical pattern in which income inequality increases when unemployment rates increase. There is no apparent cyclical pattern to female income inequality, which generally declines until 1990.

The 1990-1995 period also produces major changes in relative income levels. From 1985 on, median income levels are lower in the Metro cities than in the Large cities and, from 1990 on, average male incomes are also lower in Metro cities. In 1995, however, for the first time the median male incomes in the Metro cities are lower than in any other city size group, and in that year both average and median male incomes in the Metro cities are lower than they are in 1990.

Female average and median incomes move closer to male incomes over time. Despite their relatively rapid growth, female average and median incomes are still well below those of males. Again, there are city size differences, for in all years the female average and median incomes increase with city size and therefore move closer to male incomes in larger cities. At the same time, by 1995 female incomes are, like male incomes, more polarised and distributed more unequally in larger cities. As has long been the case for males, the income benefits of urban size are now conferred more upon a subgroup of females.

In conclusion, the changes in income levels and income inequality in the early 1990s are significant and notable for several reasons:

- the large size of the increases in male income inequality, with income shifts from below to above the median income
- for the first time, increases in female income inequality, with income shifts from below to above the median income
- the much greater similarity between male and female measures of income inequality
- an increase in the level of inequality associated with city size
- the absolute declines in average and median income levels in the largest cities.

## Implications

Gini and polarisation coefficients are dimensionless, and changes in their values do not specify actual gains and losses of income. It is helpful, therefore, to consider whether changes in gini coefficients, such as those discussed above, indicate substantial differences in individual income levels. As a simple case, consider the city of Halifax. It has male gini coefficients of 0.3821 and 0.4269 in 1990 and 1995 respectively, coefficients that are very close to the 56-city averages of 0.3832 and 0.4220. Assume, for the sake of simplicity, that equalizing the income share of the bottom 50 % of recipients in the two years would equalize the gini coefficients in the two years. The income share of the bottom half of recipients was 22.52 % in 1990 and 19.76 % in 1995. It would therefore require a shift of 2.76 % of total income in 1995 to restore the income share of the bottom 50 % of recipients. This shift is the equivalent of a 13.97 % increase in income for those recipients, or an increase of $1,730 on their average 1995 income of $12,388. While this is only one example, it indicates that changes in gini coefficients that are typical of those in the analysis indicate changes in incomes that are not trivial.

It is important to consider the extent to which these large changes in inequality are caused by cyclical as opposed to long run structural influences. While it is too soon to be able to sort out these influences with any certainty, there is some suggestive evidence. Possible structural explanations include the free trade agreement with the U.S., which, in 1989, began a ten-year process of reducing trade barriers. There is also a widespread perception that there has been an acceleration in the introduction of new technologies affecting both the manufacturing and service sectors of the economy. Certainly, technological innovation has contributed to a long-term decline in the share of employment in manufacturing industries, which typically provide many middle level incomes. There is, however, nothing exceptional about the decline in the 1990s. In 1980, 19.6 % of the labour force was employed in manufacturing industries; this declines to 17.1 % in 1985, 15.9 % in 1990 and 14.7 % in 1995. (Statistics Canada 1999) The decline from 1990 to 1995 (1.2 %) is the same as from 1985 to 1990, and less than half the decline which occurred from 1980 to 1985. It is hard to see how this could create the dramatic changes in urban income distributions in the 1990s.

Apart from structural changes, there are powerful cyclical influences in the early 1990s. The highest unemployment rates since the 1930s are likely to have influenced the rapid growth in male and female income inequality. Unfortunately, we cannot directly examine the effect of unemployment across our full sample of cities because the monthly Labour Force Survey does not cover all the

cities used in this study.[2] Unemployment rates are, however, available for all of the Large and Metro cities, as well as for 16 of the 18 Medium cities. These data show that from 1990 to 1995 the average unemployment rate increases by 15 % in the 16 Medium cities, 22 % in the Large cities and 24 % in the Metro cities. Nationally, the unemployment rate grows by 16 % over those years. The Large and Metro cities therefore experience greater than average increases in unemployment, and this may contribute to the relatively large increases in inequality in those cities. It is also important to note, however, that even after these increases the Large and Metro groups have average unemployment rates below the national rate: the national unemployment rate is 9.5 % in 1995, while the average rates in the Medium, Large and Metro city groups are 9.6, 8.7 and 9.4 % respectively.

In addition, a static measure such as the unemployment rate may not fully capture the dynamics of the labour market. As noted above, Baker and Solon (1999) and Morisette and Bérubé (1996) find that, even with a constant unemployment rate, increases in earnings instability and in the duration of periods of unemployment contribute to greater male earnings inequality. It has yet to be determined whether these factors vary across city size groups, and thus whether they contribute to the larger increases in male income inequality in larger cities.

It is interesting to consider the effect that immigration may have had on our results. The three Metro cities – Montreal, Toronto and Vancouver –are home to the majority of new immigrants, who may be one cause of the decline in average male income levels in 1995 in the those cities. Low incomes for new arrivals may also increase income inequality in the Metro cities. However, the increased inequality in those cities was only part of a pattern of changes in inequality both across city size groups and over time, and it is unlikely that immigration could be responsible for that entire pattern.

Whatever the reasons, the relatively large growth in income inequality in larger cities is consistent with the public perception that these cities may have special problems. (e.g. Sarick 1999). This may create new policy challenges at the municipal level. Municipal governments, large and small, are constrained in their policy options by provincial governments, which control their activities and, increasingly, their revenues; along with greater income inequality, some cities now must also operate under fiscally conservative regimes at the provincial level. In addition, in some cases, provincial services have been downloaded to the municipal level. One example is the City of Toronto, which has been made responsible for public housing, formerly a provincial responsibility. It may therefore prove problematic if cities, particularly large ones, have to deal with both greater income inequality and provincial funding restraints.

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2. Census data cannot be used, since the Census does not record income and labour force status for the same time period. The 1996 Census, for example, records earnings for 1995 and labour force status for the week prior to the Census, i.e. early June, 1996.

It remains to be seen whether cities, especially large cities, are able to persuade their provincial masters that special assistance may be required. Given the environment in which policy now operates, any aid for larger cities may come through redistribution of resources at the expense of smaller cities. It is therefore important to note that, while the growth in inequality is positively related to city size, there have been unusually large increases in income inequality across the full range of city sizes. This creates policy challenges for all levels of government.

## References

Baker, M. and G. Solon. 1999. *Earnings Dynamics and Inequality among Canadian Men, 1976-1992: Evidence from Longitudinal Income Tax Records.* Working Paper no. 130. Ottawa: Statistics Canada.

Economic Council of Canada. 1990. *Good Jobs, Bad Jobs: Employment in the Service Economy".* Ottawa: Economic Council of Canada.

Gottschalk, P. 1993. "Changes in Inequality of Family Income in Seven Industrialized Countries". *Papers and Proceedings of the American Economics Association*, 136-142.

Levernier, W., M.D. Partridge and D.S. Rickman. 1998. "Differences in Metropolitan and Nonmetropolitan U.S. Family Income Inequality: A Cross-County Comparison". *Journal of Urban Ecconomics*, 44: 272-290.

Morisette, R. and C. Bérubé. 1996. "Longitudinal Aspects of Earnings Inequality in Canada". Working Paper no. 94. Ottawa: Statistics Canada.

Sarick, L. 1999. "Tennis Domes May Shelter Homeless, Mayor Says". *The Globe and Mail*, June 8: A14.

Soroka, L. 1999. "Male-Female Income Distributions in Canada: The Service Sector in a Dependency Model". *Urban Studies*, 36: 563-574.

Statistics Canada. 1999. CANSIM database, Matrix 3451. Ottawa: Statistics Canada..

_____. 1980, 1985, 1990 and 1995. *Census of Canada.* Ottawa: Statistics Canada..

Wolfson. M.C. 1997. "Divergent Inequalities: Theory and Empirical Results". *Review of Income and Wealth,* 43: 401-421.