Income Distributions and City Size: Has the Structure Changed?

Adam Mitchell and Lewis Soroka
Department of Economics
Brock University
St. Catharines, ON L2S 3A1

There has been a good deal of research on urban income distributions, but relatively less analysis of changes over time in those distributions. The question of income distribution changes in the 1980s is of special interest, given the widespread view that this decade witnessed significant structural changes in the economy; these changes are often viewed as producing, among other effects, concern over possible increases in income inequality in both Canada and the U.S. The reasons for this have not been clearly established, but they may include the ongoing decline in the manufacturing sector, the growth of low-paying service sector jobs, generally higher unemployment rates and a new phenomenon, as seen in the U.S., whereby tight labour markets fail to lead to wage increases as in the past. (Eberts and Groshen, 1992).

It is not apparent whether these or any other influences on income distributions have different effects on income inequality in cities of different sizes. There are reasons to believe, *a priori*, that there might be such differences. Analyses of urban income distributions have focused on different industrial structures and labour markets in large and small cities, and the kinds of restructuring changes that have become of interest in recent years may be expected to effect these variables and the income distributions that they produce. While data for the full decade are not yet available, some analyses are possible using income data from the 1986 census; these, together with data from the 1971 Census, provide the opportunity to examine change over time. In addition to providing information on the mid-1980s, the analysis offers the opportunity to test whether existing models, which have been widely used in the past, are

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sufficiently robust to maintain their descriptive powers under changing circumstances. We will argue, based on preliminary evidence, that the changing participation of women in the labour force likely accounts for what appears to be a decline in the explanatory power of current models.

The Literature

Views on the effect of urban size on income distributions have changed over time. Early analyses argue that urban size acts to increase the degree of income equality in a city. For example, Duncan and Reiss (1956), in their examination of U.S. urban areas in 1950, conclude that income inequality, as measured by Gini coefficients for personal income, decline with city size; they also point out that average incomes, which typically increase with city size, may be a factor in the observed result. Murray (1969) and Richardson (1973) draw upon the hypothesis of Kuznets (1955) which argues that higher average income levels indicate greater economic development; this brings with it increased diversification, agglomeration benefits and greater efficiency, which serve to reduce income inequality. Murray's study of the fifteen largest U.S. Standard Metropolitan Statistical Areas (SMSAs) is inconclusive, while Richardson's analysis, which relies only on high/low income ratios, supports the Kuznets hypothesis.

Frech and Burns (1971) and Burns (1975) expand the argument beyond economic development to include human capital theory. Their analysis is based upon the hypothesis that the heavier concentration of human capital in larger cities reduces the return to such capital, thereby creating more income equality. This is supported by Frech and Burns' analysis of Gini coefficients in 207 U.S. SMSAs in 1950 and 1960, as well as by Burns' cross-sectional analysis of total family income data from the U.S. and the Netherlands in 1950 and 1966. The Burns analysis, which is typical of many studies, regresses Gini coefficients on variables such as mean family income, percentage of the labour force in manufacturing, population growth rates and the percentage of minority groups in the population; population was initially included, but proved insignificant in the U.S. model and was dropped. As hypothesized, income inequality declines, but at a decreasing rate, as average income level increases.

Later studies suggest that the impact of city size was misunderstood in earlier work. Long, Rasmussen and Haworth (1977) and Haworth, Long and Rasmussen (1978) argue that previous studies fail to adequately distinguish between the effects of population size and average income levels. As did others, they view the latter variable as a proxy for the level of economic development in a city, which may be expected to have an equalizing effect on incomes. Population size, on the other hand, is seen as creating strong demand for certain skilled factors of production, leading to potential monopoly rents to be earned by some. This leads to greater income inequality in larger cities. In a test of this hypothesis, Long et al. use a 1970 sample of U.S. SMSAs with populations

over 250,000 and estimate regression equations in which Gini coefficients are a function of population size, average income level, labour force shares of both manufacturing and white collar workers, population growth, racial composition and a dummy variable for southern cities. They find that higher average income levels increase equality, while increases in population size lead to reduced income equality. A variation on this finding occurs in Nord (1980a and 1980b). In the first of these studies, Nord uses cross-section 1969 U.S. Census data, with variables similar to those listed above, plus several industrial structure variables as well as the percentage of households with female heads; he finds a "U"-shaped pattern in which both very large and very small population sizes contribute to inequality, with the greatest equality occurring in cities of 10,000 to 50,000 people. He attributes the greater income inequality in small cities to a lack of agglomeration benefits. In larger cities, Nord argues, greater inequality results from influences such as high property incomes and the large city's attractiveness to migrants with both the best and worst skills. He finds similar results in his second study, with some variation in explanatory variables.

In one of the few examinations over time, Kennedy and Nord (1984) examine the effect of city size on inequality in 1950, 1960 and 1970. They develop a regression model similar to those in other studies, but also include the percentage of the population over 65 years of age. They find that population marginally increases the degree of inequality until the city reaches 250,000 people, and that the effect of population declines, but remains significant, over the period 1950-1970.

Yinger and Danziger (1978) use a model with a non-homogeneous labour force to explore more fully the role of skill differentials. They find that if all workers are compensated for the higher living costs in large cities, a larger proportion of high skilled workers contributes to income equality; if the proportion of high skilled workers is positively related to urban size, income equality will increase with city size.

Garofalo and Fogarty (1979) develop a "productivity-agglomeration" hypothesis in which the agglomeration advantages of larger cities lead to greater increases in productivity for skilled labour than for unskilled labour. This increases income inequality. At the same time, higher incomes in larger cities lead to more cultural and other purchased amenities, which attract skilled labour and reduce wage differentials. This "amenity-compensation" effect is limited, however, for it only operates until population grows to the point where market failures and other disamenities require that skilled workers be compensated; as a result, income level produces a non-linear effect on inequality. Using a regression model on 1970 data for 125 U.S. SMSAs, Garofalo and Fogarty confirm that increases in city size lead to greater income inequality, as measured by Gini coefficients, and that average income levels have the hypothesized non-linear effects on these Gini coefficients.

Soroka (1984) also hypothesizes that income level has a non-linear effect on inequality, but for reasons different from those of Garofalo and Fogarty. Soroka argues that higher levels of economic development lead to a greater concentration of incomes in the middle income range; this concentration effect is hypothesized to diminish as median incomes rise. Results using 1971 Canadian Census data for 60 Census Metropolitan Areas (CMAs) and Census Agglomerations (CAs) find that, as in the U.S., the median income level does have the hypothesized "U"-shaped effect on Gini coefficients. Unlike U.S. results, population size does not have a significant effect on Gini coefficients. The lack of a population effect is attributed to differences in the urban systems and the geographical spacing of urban centres. In particular, it is argued that, because of geographical distance, Canadian cities likely play a more important role as regional service centres than do American cities of similar size. Soroka (1987) explores this result in a different way, by examining separate male and female urban income distributions in 1970 and 1980. Over this period, male and female Gini coefficients both declined, and within each group became more alike across city sizes; Gini coefficients for female incomes were, however, significantly higher than for male incomes. The regression model finds that city size contributes to inequality for males and has no significant effect on female Gini coefficients.

Thus, in recent years, some consistency in both method and results seems to have emerged. Most studies utilize regression variables to standardize for inter-city differences in a similar set of labour force and urban characteristics. There appears to be some agreement that after these adjustments are made city size, measured by population, tends to add to income inequality, while higher average city income acts to decrease the degree of income inequality.

Method

Our approach in this study is to utilize a multiple regression model in which a city's income distribution, variously measured, is a function of population, income levels and a set of urban and labour force variables intended to standardize for variations among cities. We use three measures of income distributions as dependent variables -- the Gini coefficient (*GINI*), the proportion of low income earners (*LOWINC*) and the proportion of high income earners (*HIGHINC*) in the city. In all cases, the dependent variables are calculated from total individual incomes.

We begin with independent variables that are based upon the studies and hypotheses discussed above. The variable of prime interest is population (*POP*). As in the literature, we expect population size to contribute to greater income inequality. We also include the change in the city's population over the preceding five years (*POPCHG*). There have been several explanations for the importance of this variable. Burns argues that the in-migration of skilled workers that accompanies growth reduces high incomes and contributes to greater

equality. Farbman (1975) argues for greater inequality with growth, due to the in-migration of workers with both the highest and lowest skill levels. The correct growth rate effect is clearly an empirical issue, which we test.

Income level is a proxy for the degree of economic and capital market development in the city, and, based on the Kuznets hypothesis, we expect it to be negatively related to income inequality. We use a quadratic form for income; the variables are average income (*AVINC*) and average income squared (*AVGSQR*). This allows inequality to decline as average income increases, but at a decreasing rate.

We include two labour market variables. A high unemployment rate (*UNEMP*) is likely to have greatest impact at low income levels, although our use of total income means that unemployment does not reduce individual income to zero. We nevertheless expect higher unemployment levels to add to income inequality. The percentage of the labour force employed in manufacturing (*MANU*) is introduced to reflect the higher incomes that often accompany employment in this heavily unionized sector; we expect it to contribute to greater income equality. [1]

The education levels of workers are reflected in two variables: the percentage of the labour force with less than grade nine education (*GR9*) and the percentage with university education (*UNIV*). The first of these is likely to indicate the availability of good employment for low-skilled workers, and higher levels will thus add to income equality. The latter is a proxy for higher income opportunities for educated workers and we expect it to contribute to income inequality in a city.

Thus, the final estimating equations are:

$$DIST = \alpha_0 + \alpha_1 AVGINC + \alpha_2 AVGSQR + \alpha_3 POP + \alpha_4 POPCHG + \alpha_5 UNEMP + \alpha_6 MANU + \alpha_7 GR9 + \alpha_8 UNIV + \epsilon$$

where;

DIST	=	*GINI, LOWINC* or *HIGHINC*;
AVGINC	=	mean total income;
AVGSQR	=	mean total income squared;
POP	=	CA or CMA population;
POPCHG	=	percentage change in CA or CMA population over the preceding five years;

1. An alternative is to include variables to reflect what appear to be significant changes in service sector employment. We choose to use the manufacturing variable for several reasons. It is the variable which has been the focus of attention in much of the urban literature, and comparability is enhanced by using it here. Nor is it clear that changing to service sector variables would enhance the model to the extent that the growth of the service sector mirrors reductions in manufacturing employment.

UNEMP = percentage of the labour force unemployed;
MANU = percentage of the labour force employed in manufacturing industries;
GR9 = percentage of the labour force with less than nine years of education;
UNIV = percentage of the labour force with university education;
ϵ = random error term.

Data needs restrict us to Census years. Since our focus is on relatively recent changes over time, we estimate equations for the three dependent variables for 1971 and for 1986. We also examine changes over the fifteen year time span, with one equation which estimates the percentage change in the Gini coefficient from 1971 to 1986 as a function of 1971-1986 percentage changes in each of the independent variables, with the exception of *AVGSQR*. The inclusion of this equation allows us to examine whether those variables which influence cross-section differences in urban Gini coefficients provide similar effects on changes in Gini coefficients over time.

The sample consists of 59 CMAs and CAs. The data are from the twenty percent sample portion of the 1971 and 1986 Censuses, as published by Statistics Canada. Gini coefficients are calculated from the published total income distributions. *LOWINC* is, for 1971, the percentage of individuals with total incomes below $1,000; for 1986, this figure is adjusted upwards by the increase in the national Consumer Price Index (CPI) to $3,140. Since this income level does not correspond to a published income bracket in 1986, the numbers of individuals with such incomes are estimated by interpolation. *HIGHINC* for 1986 is $35,000, and is adjusted by the CPI to a level of $11,144 for 1971; the numbers of individuals in this 1971 group are similarly calculated by interpolation from published data. In 1986, income distributions are published separately for males and females; we calculate our income distribution data from an amalgamation of these separate male and female income distributions.

Table 1 contains means and standard deviations for variables used in the equations. The average for urban Gini coefficients declined from 1971 to 1986, as did the standard deviation. Average income levels, unemployment rates and populations all increased, as expected; the relatively high standard deviation for population highlights the large range of this variable, which varies from 25,253 to 2,743,200 in 1971 and from 26,135 to 3,427,200 in 1986.

The average population growth rate in 1986 was about one-third its earlier value, although the standard deviation was still about one-half its 1971 level. The average percentage of the population with less than Grade 9 education declined significantly, while the average percentage with university education fell marginally; this latter decline may be unexpected, but it is quite possible given that the figures are unweighted inter-urban averages which may not be representative of the national labour force.

TABLE 1 Means and Standard Deviations

	------ 1971 ------		------ 1986 ------	
	Mean	Standard Deviation	Mean	Standard Deviation
GINI	0.4534	0.01755	0.4377	0.0101
AVINC	5,065	563	17,679	1,826
POP	232,680	501,130	291,550	600,550
POPCHG	9.04	8.76	3.04	4.43
UNEMP	6.78	1.72	11.92	3.82
MANU	21.38	11.16	12.92	6.62
GR9	26.84	7.79	13.19	4.65
UNIV	7.03	2.35	6.69	2.64
FEM	n.a.	n.a.	47.86	1.90
INCRAT	n.a.	n.a.	0.5224	0.0435

Source: calculated from Statistics Canada, *Census of Canada*, 1971 and 1986.

Results

Table 2 contains the results from the regression equations, and they suggest that there has been a significant loss of predictive power for city size and most other urban variables.[2] In summary, the model fits the 1971 data for all three income distribution variables, with values for the adjusted R^2 ranging from 0.6596 to 0.9572. In 1986, the adjusted R^2 remains high (0.9484) for *HIGHINC*, but it declines to 0.4415 for *LOWINC* and to 0.1846 for *GINI*. We now proceed to a more detailed discussion of the results.

The population variable produces the expected effects in 1971. It contributes to more unequal income distributions; it also tends to reduce the number of income earners in the low income group, and has no significant effect on the high income group. In 1986, the population variable becomes insignificant for *GINI* and *LOWINC*, but becomes significant and negative for *HIGHINC*. Population size would seem to matter less in recent years, except insofar as it contributed to a reduction in the proportion of high income earners.

2. As part of the estimation procedure, several structural tests were performed on the equations. All equations were tested for heteroscedasticity, including the Gleijer and the Breusch-Pagan-Godfrey tests; in all cases we do not reject the hypothesis of homoscedasticity at a 5 percent level. We also use a sequential CHOW test to test for stability of residuals, with the data ordered by city size (*POP*); at 5 percent, we do not reject the hypothesis of stability.

TABLE 2 Regression Coefficients

	1971			1986				
	GINI	*LOWINC*	*HIGHINC*	*GINI*	*LOWINC*	*HIGHINC*	*GINI* % CHANGE 1971-1986	*GINI* 1986
AVINC	-0.3396	-87.328[a]	-86.206[a]	0.0980	-14.297	31.741[a]	-0.0618[a]	-0.0485
	(-0.92)	(-2.68)	(-4.12)	(0.81)	(-1.23)	(2.92)	(-3.45)	(-0.42)
AVGSQR	0.1657	71.165[b]	121.41[a]	-0.0320	3.2483	-2.7134		0.0039
	(0.47)	(2.27)	(6.03)	(-0.96)	(1.01)	(-0.91)		(0.13)
POP	0.0067[a]	-0.6020[a]	-0.0385	0.0021	-0.3766	-0.5484[a]	-0.0464[a]	0.0046[b]
	(2.53)	(-2.58)	(-0.26)	(0.84)	(-1.61)	(-2.50)	(-3.46)	(2.03)
POPCHG	-0.00004	-0.0216	0.0092	-0.0010[a]	-0.1455[a]	-0.0840[b]	-0.0027[b]	-0.0004
	(-0.17)	(-1.35)	(0.89)	(-2.46)	(-3.67)	(-2.26)	(-1.94)	(-0.98)
UNEMP	0.0029[a]	0.2133[a]	0.1305[b]	0.000004	-0.0041	0.1401[a]	0.0089[b]	0.0003
	(3.03)	(2.51)	(2.40)	(0.01)	(-0.08)	(3.06)	(1.68)	(0.54)
MANU	-0.00008	0.0081	0.0011	-0.000006	0.0226	0.0280	-0.0183	-0.0005[b]
	(-0.64)	(0.69)	(0.15)	(-0.02)	(1.05)	(1.22)	(-1.24)	(-1.93)
GR9	-0.0017[a]	-0.1320[a]	-0.0625[a]	-0.0014[a]	-0.1401[a]	-0.0309	-0.2187[b]	-0.0010[a]
	(-7.06)	(-6.30)	(-4.65)	(-3.23)	(-3.44)	(-0.81)	(-2.36)	(-2.57)
UNIV	0.0016[b]	-0.0685	0.1020[a]	0.0006	-0.0329	-0.1847[a]	-0.0541[b]	0.0012
	(2.34)	(-1.11)	(2.58)	(0.69)	(-0.41)	(-2.46)	(-2.20)	(1.44)
FEM								0.0024[b]
								(2.27)
INCRAT								-0.2296[a]
								(-4.51)
CONSTANT	0.5967[a]	44.490[a]	19.598[a]	0.3823[a]	30.365[a]	-35.220[a]	0.4077	0.5237[a]
	(6.24)	(5.25)	(3.60)	(3.34)	(2.76)	(-3.42)	(0.06)	(3.76)
R^2 (Adj.)	0.7341	0.6596	0.9572	0.1846	0.4415	0.9484	0.5075	0.4118

a. Significant at 1% level. b. Significant at 5% level.

The population growth variable, on the other hand, is insignificant in all three equations in 1971, but becomes significant for all three measures of the income distribution in 1986. Population growth in that year contributes to overall equality, and, consistent with this, to declines in the proportion of individuals in both low and high income groups. Similarly, the fifteen year equation, testing changes from 1971 to 1986, indicates that the long run percent change in population has a negative impact on the long run percent change in the Gini coefficient.

The effects of these two variables, population and changes in population, may be summarized as follows. First, there are the cross-section effects:

1. larger cities have higher Gini coefficients in 1971, but there is no significant population effect in 1986. Thus, since 1971, income inequality has increased in small cities relative to large cities;
2. recent population growth (*POPCHG*) has no effect on Gini coefficients in 1971, but produces greater equality (lower Gini coefficients) in 1986. We may think of this as a short run growth effect.

Long run changes over the fifteen years from 1971 to 1986 are similar to the short run effects:

3. greater population growth is associated with an increase in income equality, for it has a negative impact on the percent change in the Gini coefficient. This is a long run population growth effect;
4. an acceleration of the population growth rate (the percentage change in *POPCHG*) is associated with greater income equality, for there is an increased reduction in the Gini coefficient.

These results, taken together, present a consistent picture of the effects of population size and growth, both short run and long run. Population size contributes to inequality in 1971; population growth since then contributes to greater income equality, whether we measure this on a cross-section basis or over time. This result agrees with Burns' view of the effects of growth. The link between population and income equality has, perhaps as a result, become less clear. We will return to this later.

Average income levels have, with minor variations, the hypothesized effects. While the coefficients of the average income variables appear insignificant, the quadratic form produces a high level of multicollinearity and downward bias to the resulting t-statistics.[3] The effect of the quadratic in 1971

3. To test more appropriately for the significance of income, the regressions were run with a combined income variable, where $INCOME = \alpha_1 AVINC + \alpha_2 AVGSQR$. The coefficients α_1 and α_2 are taken from the results of the original regressions. The coefficients of the combined

is for rising average income initially to reduce, and then to increase the Gini coefficient and the proportions of income in the two extremes. The turning point for the Gini coefficient occurs at an average city income of $10,247, an income level that no city reached; the turning point is $6,136 for *LOWINC* (only two cities were above this level) and $3,550 for *HIGHINC* (all cities were above this level). Thus, within our sample range, the effect of higher average income levels is to lower both *GINI* and *LOWINC*, and to raise *HIGHINC*. A higher level of economic development, as indicated by higher income levels, would appear to produce a more equal income distribution in 1971.

The results for 1986 are generally similar, even though, in two equations, the signs on the income coefficients are reversed. Thus, increases in average city income initially raise the Gini coefficient, and then lower it; the turning point is at an income of $15,312. Since all but five cities exceed this income level, the general effect is for the Gini coefficient to decline with rising income levels. This is the same as the income effect in 1971, although the shape of the function is different.

In 1986, the effect of income level on *LOWINC* is similar to the effect in 1971, with a turning point of $22,007. All cities were below this. *HIGHINC* increases and then falls with increases in city income; since, however, the turning point is at an average city income of $58,489, *HIGHINC* effectively increases, but at a declining rate, as a city's average income increases. This too is similar to the effect in 1971, although the shape of the function is again different.

The remaining variables generally behave as expected in 1971. The unemployment rate is positively related to income inequality, and to the two extreme income shares. The positive correlation with the high income group suggests that this group is less likely than others to suffer income losses where unemployment rates are high. The education variables produce the expected signs for *GINI* as well as for *LOWINC* and *HIGHINC*, although the coefficient for *UNIV* in the *LOWINC* equation is not significant. *MANU* has the hypothesized signs, although the coefficients are not significant.

Few of these variables change in significance from 1971 to 1986. *UNEMP* becomes insignificant for *GINI* and *LOWINC*, and *GR9* becomes insignificant for *HIGHINC*. The university variable remains significant only for *HIGHINC*, and the sign is now negative; this indicates that cities with proportionately more university graduates have lower income shares for the top income group. Growth in the number of university graduates in the labour force, combined with their relative concentration in larger cities, would appear to have reduced the return for the highest income group.

Finally, we note that the effects of these variables in the 1971-1986 percentage change equation are essentially the same as in the cross-section

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INCOME variable were significant at 5% in all six equations.

equations.

Some Further Explorations

The apparent decline in the population effect over the fifteen year period examined calls for some explanation. One possibility that merits exploration is that the changing role of women in the labour force has resulted in significant shifts in income distributions as well as in the relationship between these distributions and city size. This implies that changes in female income levels and distributions have not occurred evenly across cities of different sizes. Certainly, the two distributions are very different, as discussed in Soroka (1987). Female income in 1986 ranges from a city average of $9,770 to an average of $15,674; the corresponding male range is $17,607 to $28,455. There is also considerable variation in the proportion of females among all income recipients; the range, in our sample of cities, is from 41.7 percent to 50.7 percent. These differences in both income levels and male-female weightings can produce very different overall income distributions.

Census publications for 1986 provide separate male and female income data, allowing us to explore this more fully by re-estimating our equations with two additional variables. We include average female income as a percentage of average male income (*INCRAT*), to capture differences in male-female income levels; a higher value for this variable should reduce the degree of income inequality. To account for different male-female weightings among the cities' income recipients, we include the percentage of income recipients who are female (*FEM*); because of generally lower female incomes we expect a higher proportion of female income recipients to contribute to greater inequality. We note from Table 1 that, in our sample, 47.9 percent of income recipients were female, and their average income was 52 percent of average male income.

The re-estimated equations for the two income extremes, *HIGHINC* and *LOWINC*, are very similar to the earlier equations for these variables, and are therefore not shown here. There are, however, important changes in the results for the 1986 *GINI* equation, which is shown in the final column of Table 2. This equation is, in general, an improvement over the earlier 1986 *GINI* equation. There is a large change in the adjusted R^2, which increases from 0.1846 to 0.4118. The signs on the quadratic income variables are reversed from the other 1986 equation, and are now the same as in 1971. The turning point for the Gini coefficient is $62,179, well above any city's average income; thus, the effect of higher average income is to reduce, at a diminishing rate, a city's Gini coefficient. This, too, is the same as our result for 1971. The signs on the remaining variables are the same as in 1971 and, with minor changes, the same variables are significant.

The two new male-female variables are themselves significant, and have the expected signs; more female income recipients increase the Gini coefficient, while relatively higher average female income reduces it. Perhaps more important for our purposes, the population coefficient becomes significant with the hypothesized positive sign; it would appear that once we account for the changing role of women in the labour market the earlier relationship between population and city size returns. The value of the population coefficient is about two-thirds of its value in 1971, suggesting that the population effect, while still significant, is perhaps more moderate than it has been in earlier years.

Conclusion

There has been a clear change in the effect of population size on income distributions, in that overall urban income distributions have become more homogeneous across city size classes. At least until the early 1970s, a larger city population contributed to a more unequal income distribution. More recently, there is no evidence of any population effect on overall city income distributions. There is still a population effect once we include variables to distinguish the participation and income levels of women in the labour force; once we standardize across cities for different dimensions of male-female income earning patterns the hypothesized unequalizing effect of population size on income distributions is restored; the effect is, however, more moderate in 1986 than it was in 1971.

Our results also suggest interesting links among population growth rates, income distributions and male-female variables. In more recent years, a higher population growth rate leads to a more equal overall distribution of income, whether we measure that effect cross-sectionally or through time. Once we include more male-female variables, the growth rate effect becomes insignificant. This is likely a consequence of the relatively high correlation coefficient between urban population growth rates and average female incomes, which in our sample is 0.63. The implication we would suggest is that more female participation, at higher wage rates, is one consequence of a higher growth rate in a city. This is consistent with Burns' (1975) hypothesis. In Burns' view, above average population growth leads to an increase in the supply of more highly skilled workers by encouraging their in-migration, most likely from other urban areas. We would add that this is more likely with a relatively slack national labour market, a condition that characterized much of the period under examination here. At the same time, rapid growth is likely to provide improved income earning opportunities for those at the lower end of the income distribution. Both of these outcomes contribute to a more equal urban income distribution. Our results suggest a modification of Burns' explanation, to include the improved opportunities for women in the labour force that come from growth. In particular, we anticipate that more women will enter the labour force where growth creates better opportunities, and we expect women to be a significant proportion of the numbers of relatively low-paid workers

who benefit from higher growth rates. Our preliminary results suggest that this is an area that deserves further analysis.

A less central but interesting aspect of the results is the changing market situation for university graduates. In 1971, a heavier concentration of graduates in a city leads to both a greater proportion of individuals in the upper income brackets and a higher Gini coefficient. By 1986, the percentage of university graduates produces a reversal of the earlier effect on income distributions: a higher proportion of university graduates in 1986 leads to a reduced concentration of individuals in the upper income brackets and has no significant effect on the Gini coefficient. These results for 1986 are also consistent with the view that the demand for higher skilled workers in a city is satisfied by in-migration from other urban areas, thus avoiding large accompanying wage increases; this is in contrast to increased demand for low-skilled workers, which is met in large part from existing stocks in the city. These different responses combine to produce more income equality as a result of greater growth.

While we have suggested some alternatives, there is at present insufficient evidence to establish clear reasons for the changes which have occurred in urban income distributions. Ongoing labour market adjustments, which would include both any industrial restructuring in the 1980s and the changing role of women in the labour force, may be responsible. More simply, it may be the case that cities of all sizes have become more homogeneous with regard to income distributions. Given the many differences between the economic structures of large and small cities, the latter seems unlikely. Further analysis will be helpful, as more recent data become available.

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