October 14, 2014. DRAFT 1. For Discussion Only. Please do not circulate.

Socio-Spatial Changes in Neighbourhood Income Characteristics in Calgary: An Exploration of the Three Cities Model

Ivan Townshend, Byron Miller, Leslie Evans

Introduction

The publication of the Three Cities of Toronto report by the Cities Centre at the University of Toronto was an influential document that has received widespread academic and press attention. In this report, Hulchanski (2010) documented the changing geography of individual income in Toronto's neighbourhoods between 1970 and 2005. The report illustrated in detail not only the decline of the middle income class, but the growing income polarization and increasing gap between rich and poor. Importantly, as the report illustrates, these changes are not just a matter of income change, since they have resulted in a spatial outcome that has defined a new geography of income in the city and the fractionation of the neighbourhoods into three distinctive "cities": neighbourhoods with rising incomes, neighbourhoods with stable incomes, and neighbourhoods with declining incomes relative to the metropolitan average.

The Toronto findings beg the question of whether or not the Three Cities model is evident in other metropolitan areas. The Neighbourhood Change Research Partnership (NCRP) is examining these ideas, among others, in six metropolitan areas in Canada. Analyses of the Three Cities model in Vancouver and Montreal have identified similar trends to those found in Toronto, even though the spatial patterns may not be as stark in these metropolitan areas. Yet the Three Cities model applied to Halifax did not reveal similarities to the Toronto case, suggesting a possible scale effect or that the findings may not be universal in Canadian metropolitan areas.

This report is an examination of income change and the application of the Three Cities ideas in Calgary. Based on data at the neighborhood scale (Census Tracts), we document the changing character of income distribution and income inequality and polarization in the metropolitan area between 1970 and 2010. We describe the changing geography of income, and examine the social characteristics of those neighbourhoods that that are classified as being in each of the "three cities".

The Changing Character of Neighbourhood Income Distributions in Calgary 1970-2010

Calgary is one of Canada's highest income metropolitan areas, has a high concentration of head offices in the oil and gas sector, and a highly educated labour force. The city has grown rapidly in the last two decades, and expansive development, suburban sprawl, and rapidly rising house prices have been evident.

In this analysis we use income data assembled by the NCRP team for all neighbourhoods in 1970, 1980, 1990, 1995, 2000, 2005 and 2010. Census tracts are essentially the census surrogate for neighborhood, and the measures we use here are *average individual income* at the census tract scale. Data for 1970 to 2005 are derived from census data, while data for 2010 is derived from taxfiler data aggregated to the 2006 census tract boundaries.

We are interested in how the neighbourhoods compare, not only to each other at a single point in time, but through time. For this reason, it is necessary to standardize the neighbourhood income measures. We therefore use *income ratios*, which is the ratio of the neighbourhood average individual income to the metropolitan area average individual income at a given point in time. In other words, a neighbourhood with a ratio of 1.0 is the same as the metropolitan area average for that time point. And a neighbourhood whose ratio changes from 1.5 to 3.0 over time is one whose income was 1.5 times the metro average and has increased to 3 times the metro average.

To ease comparisons, to better understand changes in the neighbourhoods, and to simplify visual display in maps, we have classified neighbourhoods into five income ratio groups:

1 VL (Very Low, 0.00 to 0.59)
2 L (Low, 0.60 to 0.80)
3 M (Middle, 0.81 to 1.19)
4 H (High, 1.20 to 1.40)
5 VH (Very High 1.41 and above)

The distribution of census tracts by these income groups is shown in Figure 1 below.

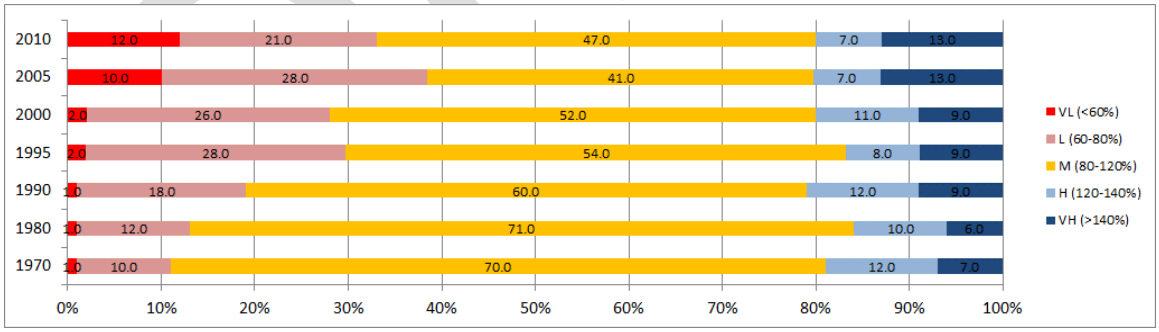

Figure 1: Distribution of Census Tracts in Calgary CMA by Income Ratio Group

Figure 1 shows a pattern similar to that found in other CMAs; namely the erosion of the middle income tracts, and growth in the share of both lower income and higher income tracts. The data for 2010 shows that this pattern of change may be reversing, although it must be remembered that this data was not derived from the census as it was in other years. Nevertheless, Figure 1 reveals a systematic erosion

of the middle class between 1970 and 2006, declining from a majority of neighbourhoods in 1970 (70%) to a minority of neighbourhoods in 2005 (41%) and 2010 (47%). Of the six CMAs being studied by the NCRP, Calgary shows the most pronounced and systematic decline of middle income neighbourhoods since 1970, and only Toronto and Calgary have less than half of their census tracts in the middle income category. The growth in the share of tracts in the low and very low income category has increased remarkably—more than tripling from 11% in 1970 to 38% in 2006, while the share of tracts in the high and very high income tracts has not changed as dramatically (from 19% in 1970 to 20% in 2010).

Because of the income classes used to group the neighbourhoods, Figure 1 masks another important feature of changes in the income characteristics of Calgary's neighborhoods, and in particular the neighbourhoods in the VH category shown in Figure 1. There have been important changes in the magnitude of the most extreme income ratios. Essentially, in a relative context, the wealthiest neighbourhoods have become considerably wealthier through time. This temporal intensification of wealth is evident if we plot the *maximum* value of the census tract income ratios, as shown in Figure 2. In 1970 the wealthiest tract in Calgary had individual incomes 1.88 times the CMA average, and by 2010 the wealthiest neighbourhood had individual incomes 3.56 times the CMA average. Figure 2 also shows the intensification of this trend between 1990 and 2000, with a sharp increase occurring between 1995 and 2000.

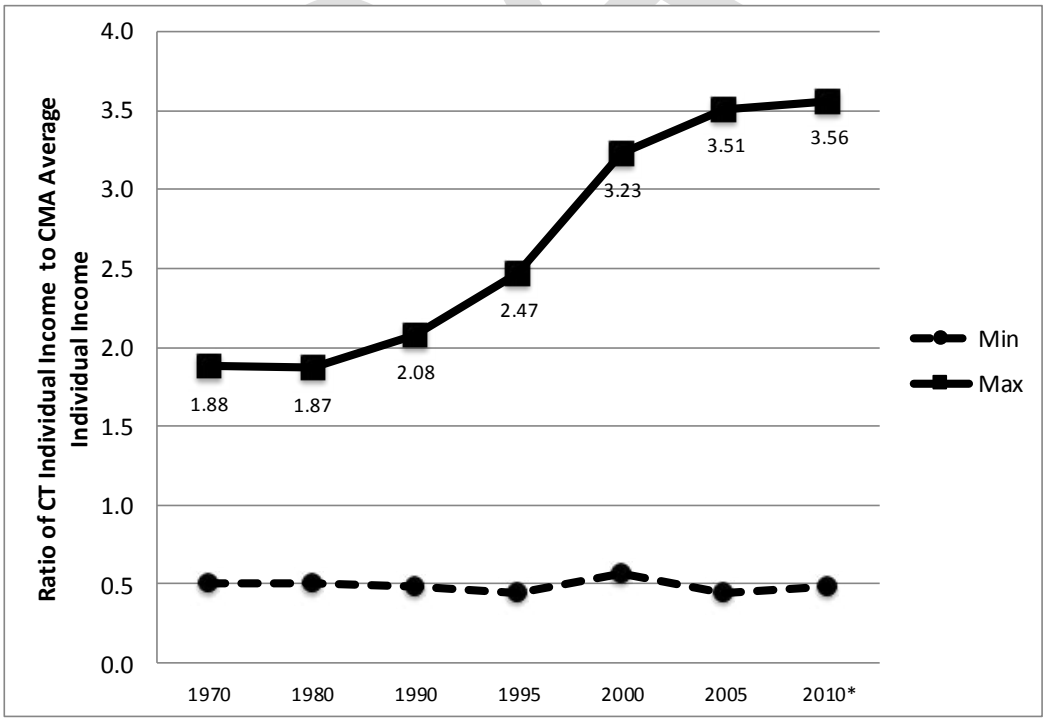

Figure 2: Minimum and Maximum Census Tract Income Ratios, 1970-2010

Figure 1 and Figure 2 point to increasing shares of low income tracts, but also increasing intensification of wealth in a stable share of tracts at the upper end of the income ratio distribution. In other words, the overall distribution is flattening (because of the loss of the middle), but is also becoming more positively skewed by a few very high income outliers. This is illustrated in the 1970, 1995 and 2010 histograms of Calgary census tracts by income ratios shown in Figure 3 below.

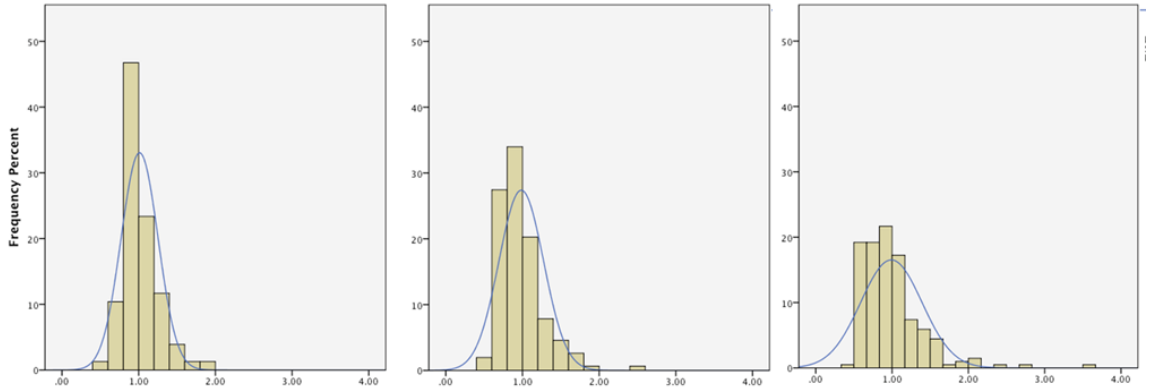

Figure 3: Histograms of Percent of Tracts by Income Ratio, 1970, 1995, 2010.

Figures 1 through 3 tangentially illustrate the well-documented trend towards increasing income inequality and income polarization in Canadian society and between Canadian neighbourhoods over the past 40 years (Walks xxx). Income inequality is a measure of the unevenness in an income distribution, whereas polarization is a measure of the extent to which the income distribution is being concentrated at the lower and upper ends of the distribution. Walks (xxx) has provided comparative data on both measures: The Gini Index to measure income inequality, and the Coefficient of Polarization to measure income polarization. These values are summarized for Calgary in Figure 4.

Figure 4 complements Figures 1 through 3 by showing a more precise measure of the level of inequality and polarization. With the exception of 2005 to 2010, it also shows a systematic increase in both inequality and polarization between 1970 and 2005. In 1970, Calgary's Gini Index was ranked the 6th of the 11 CMAs surveyed by Walks (xxx). By 2005 and 2006 it was ranked second, with only Toronto exhibiting higher levels of income inequality. In terms of neighbourhood income characteristics, Calgary is one of the most divided metropolitan areas in Canada.

In summary, the analysis of income ratios through time reveals the unmistakable evidence of a systematic erosion in the share of middle income neighburhoods, the increasing inequality and polarization of income at the neighbourhood scale, and an increasingly skewed distribution. In Calgary, the declining share of the middle has mostly been accounted for by the three-fold rise in the share of low and very income neighbourhoods. The share of high and very high income neighbourhoods has not increased systematically through time, but in the case of Calgary, the degree of income concentration in these tracts has intensified, with maximum income ratio values more than doubling over the past 40 years. In short, relatively more

neighbourhoods have become low or very low income, but at worst with income ratios not much lower than they were in the past, while an unchanged share of relatively few neighbourhoods have remained very high income and intensified the extremes of income concentration within them.

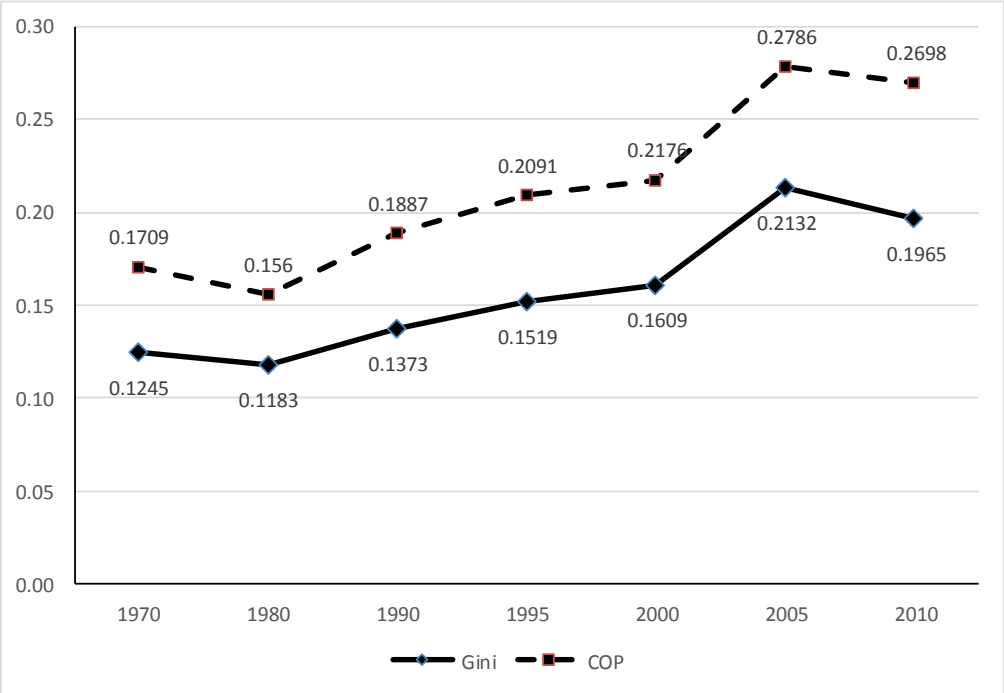

Figure 4: Income Inequality (Gini) and
Income Polarization (COP), Calgary 1970-2010

The Geography of Income, 1970 vs 2010.

What are the spatial patterns of income groups in Calgary and how has the geography of income changed through time? Maps showing the spatial patterns of income for 1970 and 2010 are shown in Figures 5 and 6. In 1970, there is a distinctive inner city and older mature suburb concentration of low incomes, and especially on the eastern edge of the downtown in the "downtown east" area, as well as areas to the east of this in community districts such as Inglewood and Ramsay and Victoria Park adjacent to the Stampede grounds. In addition, on the western edge of the city, the lower income concentrations in the former town of Bowness (annexed 1963) and nearby Montgomery area is evident. The vast majority of the neighbourhoods, whether established or new suburban, are middle income communities. Two distinctive sectors of high income are evident; one in the northwest along the Crowchild Trail corridor, but primarily comprised of communities developed since the 1960s. The second sector, of very high incomes runs from the elite inner city communities of Upper Mount Royal, Rideau, Roxboro, and Elbow Park, and runs southwest through elite communities surrounding the Glenmore Reservoir, and then fades to a series of high income new suburban districts on the southern edge of the city.

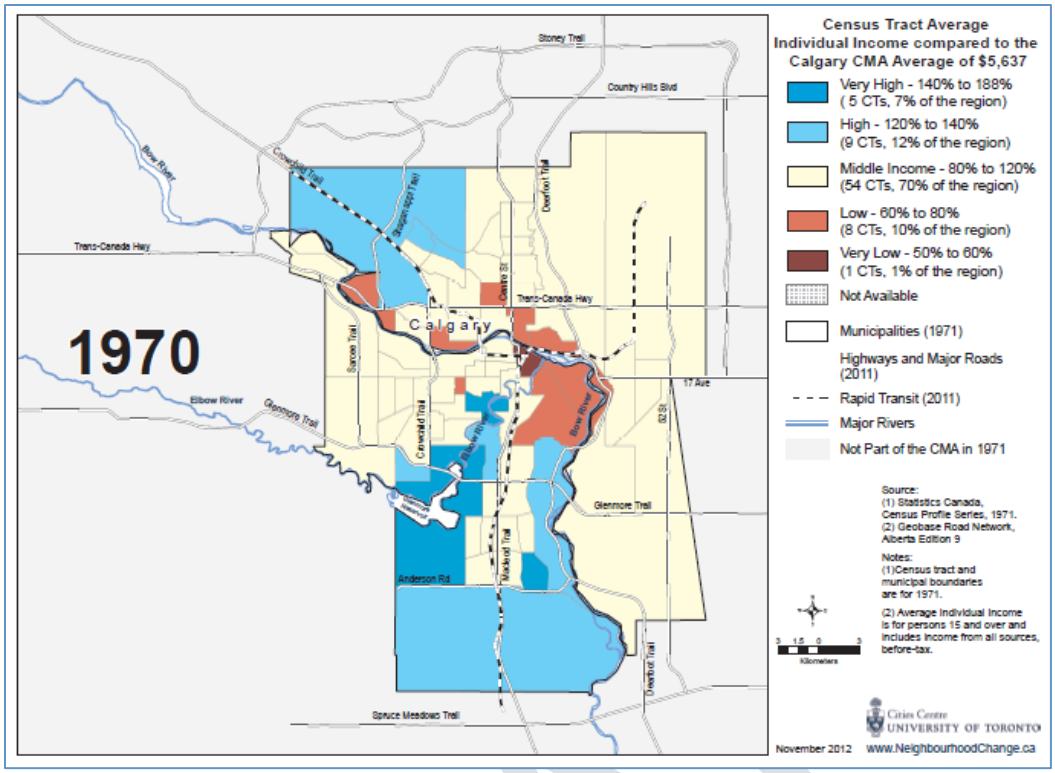

Figure 5: Income 1970

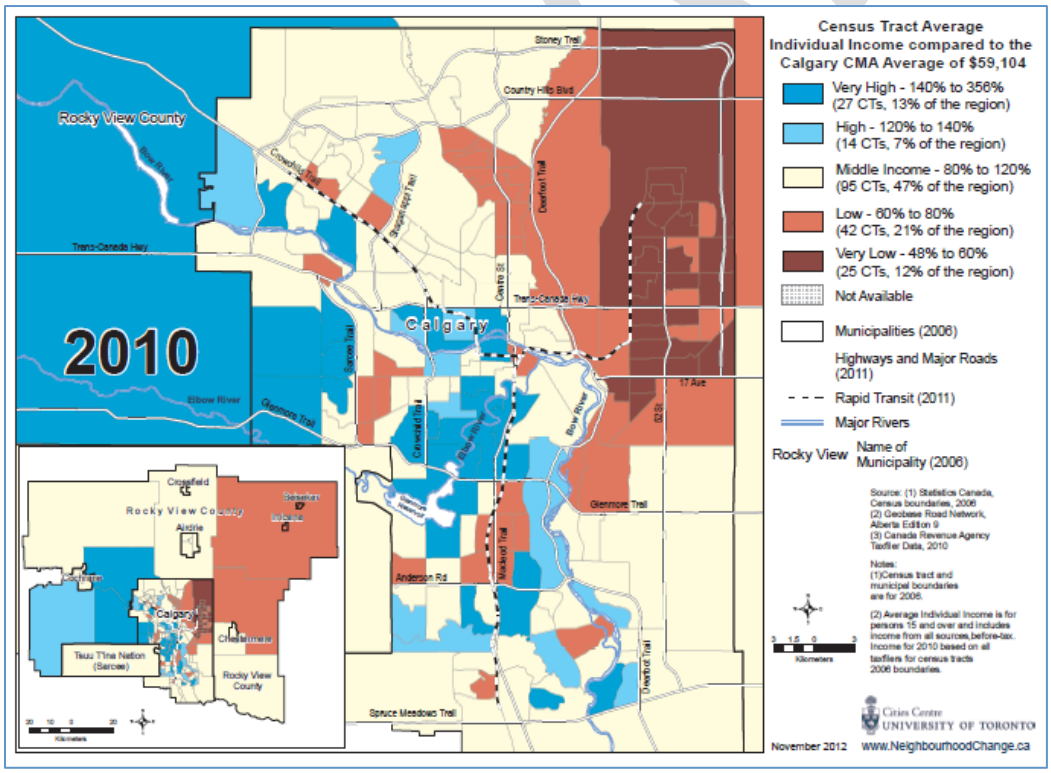

Figure 6: Income 2010

By 2010 the CMA includes surrounding rural residential areas within the MD of Rockyview as well as distinctive municipalities and other dormitory communities such as Cochrane, Airdrie, and Chestermere. In 2010 a starkly different geography of income is evident. Three important features of the 2010 map should be noted. First, there is a distinctively new geography of low income, in which inner city concentrations of poverty have given way to a vast region of low and very low income in the northeast sector of the city—many of these neighbourhoods with very high concentrations of post 1980s visible minority immigrants. Many of the former low and very low income inner city communities of 1970 have seen extensive gentrification and condominium development, and are now part of large above average income inner city region surrounding the CBD. The 2010 map reveals a much sharper east-west divide in the geography of income, with a spatial polarization towards poverty to the east and wealth to the west.

The second key feature of the 2010 map and contemporary geography of income in Calgary is the high concentrations of wealth in rural residential or acreage developments on the western and northwestern periphery of the city, but also the continued concentrations of wealth in the established southwest sector of established elite communities. In fact the characteristics of this established region has also changed to show an increased spatial concentration of high income. In 1970 no tracts in this region had an income ratio of 2.0 or more. By 2010, four tracts in the established southwest sector of the city, which includes community areas such as Lower Mount Royal, Upper Mount Royal, Rideau, Roxboro, Elbow Park, Britannia, Elboya, Windsor Park, Belaire , Mayfair, Meadowlark, Eagle Ridge Kelvin Grove, and Chinook, did have income ratios of 2.0 or higher, with values in 2010 almost 4 times the CMA average.

The third feature of the 2010 map is the relative decline in incomes in many of the suburban neighborhoods that had either middle or high incomes prior to the 1990s. This is particularly evident in the decline of the 1970s northwest high income sector, and the relative decline in the 1970s high income district on the southern part of the city in 1970. Similarly, the large declines in suburban relative income from middle to either low or very low income is particularly evident in the northeast suburbs that now represent a large contiguous region of low income. This increasing relative impoverishment of the suburbs, and simultaneous rise of the inner city is not unique to Calgary.

Applying the Three Cities Model to Calgary.

The Three Cities model is a model in which neighbourhoods are classified, not according to income levels at a fixed point in time, but according to *change* in their income ratio through time. The Three Cities model is therefore about neighborhood income stability or transition relative to the metropolitan average.

To identify such a change typology requires neighbourhood income levels observed at a consistent geography at two time points. The NCRP data team has established a consistent framework for each CMA, where income (and other) data has been

assembled for 1980 and 2010, and both have been spatially referenced to the 1981 census tract geography. The 1981 census tract boundaries essentially define the "joint geography" within which we measure change in income ratios between 1980 and 2010. The Three Cities (i.e. groups of census tracts) are defined by the following:

City 1. Difference in income ratio of +0.1 or more (*increasing* income of 10% of more relative to CMA average)
City 2. Difference in income ratio between -0.1 and +0.1 (*stable* income within 10% above or 10% below CMA average)
City 3. Difference in income ratio of -0.1 or less (*decreasing* income of 10% or more relative to the CMA average).

In Calgary, 115 of the 1981 census tracts are used to define this joint geography and the classification of neighbourhoods into City1, City2, or City 3. It is important to note that because this typology is based on areas common to 1981 and 2006, it essentially does not include those newer areas of Calgary that were developed since the 1980s. The resulting map of the Three Cities, with residential community district boundaries (i.e. official neighbourhood boundaries) superimposed, is shown in Figure 7.

The spatial pattern of the three cities is consistent with the findings from Toronto. City 1 is comprised of 34 (29.6%) of the 115 tracts. This area of increasing relative income is marked by a distinctive inner city and older established mature suburban concentration, although it also includes selected newer (post 1980s) neighborhoods, particularly those on the western edge of the city (e.g. Signal Hill, Strathcona, Coach Hill) and a few newer residential areas in the southeast of the city (e.g. the New Urbanist community of McKenzie Towne and Copperfield).

City 2 is comprised of 24 (20.9%) of the 115 tracts with income levels that have not changed more than 10% of the mean. With the exception of one or two tracts in newly established areas of the city, the pattern of City 2 is distinctively concentrated in mature established residential areas that were typically built out between the 1950s and 1980s.

City 3, with 57 (49.6%) of the 115 tracts, reveals a remarkable pattern of income decline in almost all suburban communities in Calgary, although the zone is broken by the northwest sector of stability and the southeast sector of income growth. It is noteworthy the pattern of income decline has occurred in almost all suburban areas, including those that were formerly high income and those that were formerly low income.

Figure 8 below provides a more nuanced view of the income changes that lie behind the classification of the Three Cities. The spatial pattern of income change in Calgary is clear, with income growth in the core and decline in the suburban periphery.

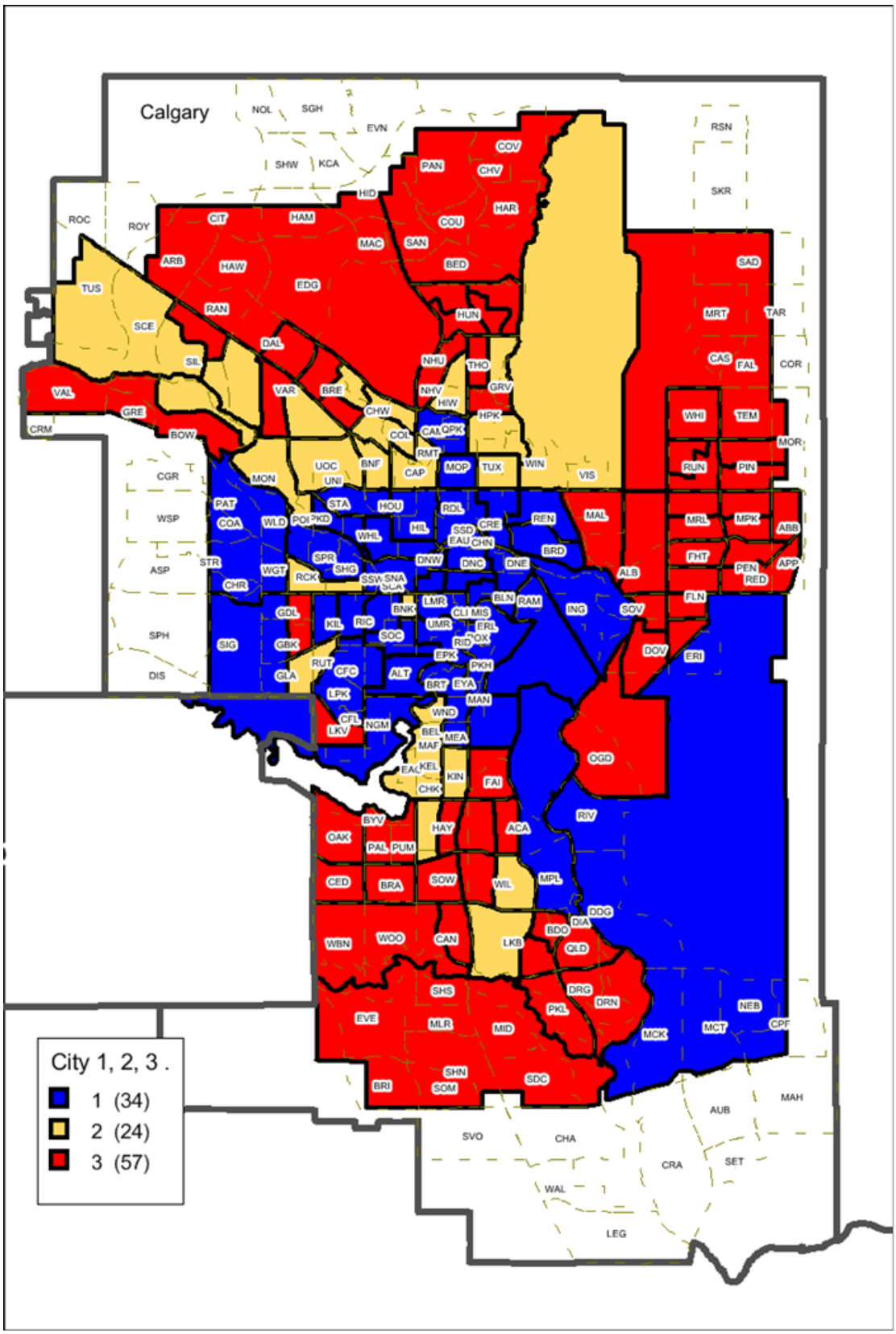

Figure 7: The Three Cities of Calgary (community district codes superimposed)

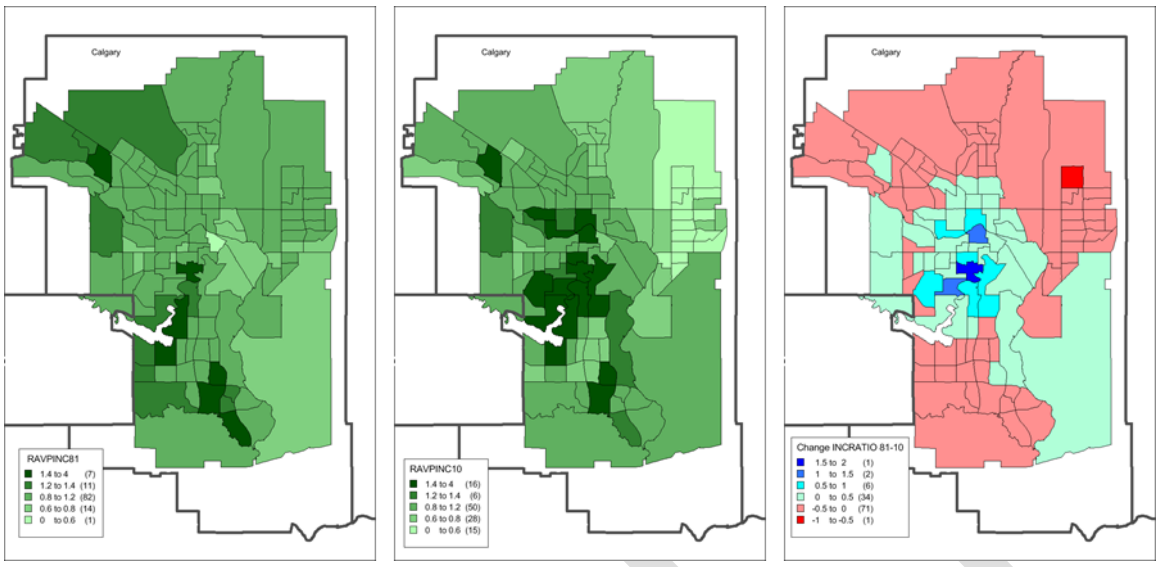

Figure 8: Income Ratios 1980 and 2010 and Change in Income Ratio 1980-2010

Income Characteristics of the Three Cities.

Although the Figure 8 above gives an indication of the spatial patterns of change with respect to changes in the income ratio, a greater understanding of the income changes can be determined by exploring the income group distributions *within* the three cities. Descriptive statistics for the income ratios for the three cities are shown in Table 1 below.

Table 1. Income Ratio Characteristics in the Three Cities.

	City 1 (n=34)		City 2 (n=24)		City 3 (n=57)	
	1980	2010	1980	2010	1980	2010
Min	0.50	0.60	0.75	0.66	0.73	0.48
Max	1.81	3.56	1.88	1.98	1.68	1.52
Mean	0.92	1.34	1.04	1.02	1.01	0.76
STDev	0.23	0.54	0.31	0.33	0.20	0.21

On average City 1 (increasing incomes) has the highest income ratios, so income increase in Calgary is most associated with the wealthier neighbourhoods. It is also noteworthy that the maximum income ratio in this group of tracts has almost doubled from 1.88 to 3.56 over the thirty year period, while the minimum value has increased marginally. All indicators point to an improvement of income conditions in City 1.

City 2, the relatively income stable tracts, have maintained average income profiles through time, although it is evident that the maximum value in this group has increased marginally, and that the minimum income ratio has decreased marginally, suggesting these neighbourhoods are a little more diverse in 2010 than in 1980.

City 3 has, on average, seen declines in income ratios, but also the lowest incomes have declined, as have the maximum incomes through time. In other words the poorest of these tracts in 2010 is worse than the poorest tract in 1980, and the wealthiest tract in 2010 is poorer than the wealthiest tract in 1980. All indicators point to a worsening of income conditions in City 3.

Shifting Shares of Income Classes in the Three Cities

It is also useful to explore how the characteristics of the three cities have changed with respect to the five income groups described above. Table 2 shows how the classification of census tracts according to these five income groups has changed within each of the three cities.

In the current City 1 only 2.9% of tracts are low or very low income in 2010, although in 1980 almost a third of these tracts (29.5%) were low income. Almost half of all tracts in City 1 were considered high or very high income in 2010, whereas 30 years previously only about 12% were very high income. The shares and change data in Table 2 show that 30 years ago City 1 was predominantly a middle and lower income set of neighbourhoods, but is now a middle and higher income set of tracts.

City 2 is the small group of relatively income stable communities. There has been little change in the overall shares of income classes in these tracts. In 1980, the majority (62.5%) were middle income tracts, whereas by 2010 this had increased to 70.8%. City 2 has seen small declines in the shares of both low and high income tracts, but these have been offset by the increases to the middle income shares. In essence, Table 2 suggests that City 2 is a temporal consolidation of the middle class into this relatively small group of tracts in the city.

City 3, with declining incomes and deepening impoverishment in some cases, has seen significant transformation in the income class of these tracts. Table 2 reveals that City 3 is primarily the declining incomes and impoverishment of former middle income neighbourhoods. In 1980, 79% of the tracts in this region were considered middle income, but by 2010 only 26.3% of these tracts were middle income. Table 2 shows that this change has been offset by the growth of low and very low income tracts in City 3, changing from 5.3% of the region in 1980 to 68.4% of the region's tracts in 2010.

Table 2: Number and Shares of Tracts by
Income Group in the Three Cities, 1980 and 2010.

ALL Census Tracts Classified by Joint 1981 and 2006 Geography (n=115)

Income Ratio Categories

	1980		2010		Change in % of Tracts
Income Group	N	% of Tracts	N	% of Tracts	Difference (2010-1980)
1 (0.00 to 0.59)	1	0.9	15	13.0	12.2
2 (0.60 to 0.80)	15	13.0	28	24.3	11.3
3 (0.81 to 1.19)	81	70.4	49	42.6	-27.8
4 (1.20 to 1.40)	11	9.6	8	7.0	-2.6
5 (1.41 to 4.00)	7	6.1	15	13.0	7.0
Total	115	100.0	115	100.0	0.0

City 1 Tracts (n=34)

Income Ratio Categories

	1980		2010		Change in % of Tracts
Income Group	N	% of Tracts	N	% of Tracts	Difference (2010-1980)
1 (0.00 to 0.59)	1	2.9	0	0.0	-2.9
2 (0.60 to 0.80)	8	23.5	1	2.9	-20.6
3 (0.81 to 1.19)	21	61.8	17	50.0	-11.8
4 (1.20 to 1.40)	3	8.8	6	17.6	8.8
5 (1.41 to 4.00)	1	2.9	10	29.4	26.5
Total	34	100.0	34	100.0	0.0

City 2 Tracts (n=24)

Income Ratio Categories

	1980		2010		Change in % of Tracts
Income Group	N	% of Tracts	N	% of Tracts	Difference (2010-1980)
1 (0.00 to 0.59)	0	0.0	0	0.0	0.0
2 (0.60 to 0.80)	4	16.7	3	12.5	-4.2
3 (0.81 to 1.19)	15	62.5	17	70.8	8.3
4 (1.20 to 1.40)	1	4.2	0	0.0	-4.2
5 (1.41 to 4.00)	4	16.7	4	16.7	0.0
Total	24	100.0	24	100.0	0.0

City 3 Tracts (n=57)

Income Ratio Categories

	1980		2010		Change in % of Tracts
Income Group	N	% of Tracts	N	% of Tracts	Difference (2010-1980)
1 (0.00 to 0.59)	0	0.0	15	26.3	26.3
2 (0.60 to 0.80)	3	5.3	24	42.1	36.8
3 (0.81 to 1.19)	45	78.9	15	26.3	-52.6
4 (1.20 to 1.40)	7	12.3	2	3.5	-8.8
5 (1.41 to 4.00)	2	3.5	1	1.8	-1.8
Total	57	100.0	57	100.0	0.0

Size, Population, and Density of the Three Cities.

The overall area of the 115 neighbourhoods (1981 census tracts) used to the three cities is 504.5 square kilometers. City 2 (stable incomes) is the smallest share of this at 94.9 square kilometres (18.8%), and City 3 (declining incomes) is the largest share at 234.7 square kilometres (46.5%). City 1 (increasing incomes) is 174.9 square kilometres (34.7% of the area). In 2006 the Calgary CMA was home to 1,099,310 people in 202 census tracts. Some 182 of these 202 census tracts are associated with the Three Cities areas defined above, with an aggregate area of 676.7 square kilometres and a population of 948,479 (86.3% of the CMA population). Estimates from how these 2006 data intersect with the 1981 geography show the following:

In 2006 City 1 (increasing incomes) was home to 27.2% of the population and 32.0% of the three cities area. The City 1 region contains a high proportion of smaller inner city census tracts, with average population densities of 2,832 people per square kilometre.

City 2 (stable incomes) is the smallest of the three cities and in 2006 was home to 13.0% of the population in 14.5% of the area. Many of these areas are in mature suburbs built between the 1950s and 1970ss, and with average CT population densities of 2,329 people per square kilometre, City 2is the least dense of the three cities.

City 3 (declining incomes) is the largest of the three cities, and in 2006 contained an estimated 59.8% of the three cities population and occupied 53.6% of the three cities areas. Given that City 3 is predominantly defined by the declining post-1970s suburbs, it is not surprising that this city region had relatively low population densities, averaging at 2,704 people per square kilometre.

Social Differences in the Three Cities in 2006.

In this section we explore a few key indicators of who lives in the three distinctive city regions. In some cases, our descriptive data is based on aggregate data (i.e. the totals for all people in the area), and in other cases the descriptions are based on average characteristics of census tracts within each of the cities. Most of these indicators are derived from data assembled by the NCRP data analyst, and these indicators have been used to establish a typology of neighborhood change between 1981 and 2010 (Murdie et al. xxx). However, rather than detailed analysis of change through time in these indicators, this document focuses on 2006 social characteristics. Although a little dated, similar indicators from the voluntary 2011 National Household Survey (not a census) were deemed potentially unreliable. The 2006 characteristics are shown in Table 3 below, which includes results from Analysis of Variance post-hoc tests (details not shown) to determine which of these social attributes exhibit significant differences between the three cities. The latter analysis simply helps to understand and identify what makes neighbourhoods in each of the three cities different from the other two cities.

Table 3: Means of Census Tract Social Characteristics by Three Cities Type

	Means				
2006 Characteristics	City 1	City 2	City 3	Total	ANOVA Sig Differences (p<0.05)
Education					
% Population 25 years and over with a degree	43.8	39.1	24.8	33.5	1-3, 2-3
% Population 25 years and over without high school certificate	10.8	12.3	19.7	15.5	1-3, 2-3
Labour Force					
% Labour Force Managerial	21.5	18.4	14.9	17.6	1-3, 2-3
% Labour Force Professional	28.0	27.4	19.2	23.6	1-3, 2-3
% Labour Force Sales and Service	20.6	21.8	24.9	23.0	1-3, 2-3
% Labour Force Manufacturing (trades, transport and manufacturing)	12.6	15.1	23.2	18.3	1-3, 2-3
Unemployment Rate, Persons 15 and Over	4.0	4.4	4.6	4.4	none
Income					
Income Ratio 2010	1.3	1.0	0.8	1.0	1-2,1-3, 2-3
% High Income Households	26.4	26.7	23.1	24.8	none
% Economic Famlies Prevalence of Low Income in 2005	12.6	11.0	12.1	12.0	none
Age					
%Population Less Than 15 Years	12.1	13.6	16.8	14.7	1-3, 2-3
% Population 25-34 Years of Age	20.9	15.7	13.4	16.1	1-2, 1-3
% Population 50-64 Years of Age	16.1	17.2	18.5	17.5	1-3
% Population 65 Years and Over	12.4	15.0	12.0	12.7	2-3
Households					
% One Person Households	40.5	30.3	22.6	29.6	1-2,1-3, 2-3
% Single Parent Households	14.7	15.8	19.2	17.1	1-3, 2-3
Persons Per Household	2.1	2.3	2.6	2.4	1-2,1-3, 2-3
Immigrant and Ethnicity					
% Visible Minority	16.0	13.9	26.7	21.8	1-3, 2-3
% Population Immigrant	19.8	18.5	23.3	21.2	1-3, 2-3
% Population Recent Immigrant (previous five years)	5.0	4.3	5.1	4.9	none
% Population South Asian	2.3	2.1	4.1	3.1	none
% Population Southeast Asian	2.0	1.4	2.7	2.2	2-3
% Population East Asian (Chinese and Japanese)	6.7	6.4	7.0	6.8	none
% Population Western, Northern and Eastern European	47.5	50.4	44.3	46.6	2-3
% Population Southern European	7.0	6.6	6.3	6.6	none
% Population Latin, Central and South American, and Caribbean	2.1	1.8	2.7	2.3	none
% Population Arab and West Asian	1.8	1.6	3.4	2.5	1-3, 2-3
% Population African (not including North Africa)	1.8	1.6	1.8	1.7	none
% Population Aboriginal	3.7	4.1	4.9	4.4	1-3
% Population British	50.5	51.9	44.9	48.1	1-3, 2-3
% Population French	10.5	10.8	10.0	10.3	none
% Home Language Neither English nor French	9.0	8.1	13.0	10.8	1-3, 2-3
Mobility					
% Persons (5 years +) who did not live at the same address 5 years ago	58.0	47.3	43.2	48.5	1-2, 1-3
Housing					
% Private Dwellings Rented	43.1	36.8	28.1	34.4	1-3
% Dwellings Constructed Before 1946	12.9	3.6	1.0	5.1	1-2, 1-3
% Dwellings Constructed 1996-2006	15.9	5.9	4.8	8.3	1-2, 1-3
% Dwellings Single Detached	39.5	53.2	59.1	52.0	1-3
% Dwellings Apartment Under 5 Stories	25.1	19.2	14.0	18.4	1-3
% Dwellings Apartment 5+ Stories	17.2	4.3	1.8	6.9	1-2, 1-3
Total Persons Per BEDROOM	1.0	0.8	0.9	0.9	1-2, 1-3
Average Number of Persons Per ROOM	0.4	0.4	0.4	0.4	none
% Dwellings Needing Major Repairs	6.8	6.8	6.1	6.4	none
Renters plus owners (avg housing cost) / household income	23.2	26.1	32.5	28.4	1-3, 2-3

Note : ANOVA differences are based on Post-Hoc tests with Tukey's HSD method. Details not shown here.

1. Education

Although Calgary is one of the most highly educated CMAs in Canada, because education is such a strong correlate of income and income change, it is not surprising to see educational attainment as a feature that differentiates the three cities. Not surprisingly, City 1 with increasing incomes has the highest share of people aged 25 and over with at least one university degree and City 3, the declining suburbs with deepening impoverishment, has the lowest. City 1 and City 2 are not significantly different, so in Calgary high levels of education are a trait of both increasing and stable income communities.

Table 3 shows that poor levels of education tell the same story from the reverse angle. City 3 has the highest share of residents without a high school diploma (almost 1 in 5), with City 1 exhibiting the lowest share of uneducated population. Again, City 1 and City 2 are not statistically different on these characteristics, but City 3 is different to both City 1 and City 2.

In summary, City 3 is uniquely characterized by lower levels of university educated people and significantly higher shares of people without high school education. Education is clearly a correlate of City 3 status.

2. Labour Force.

Labour force and occupational characteristics area well established correlates of socioeconomic status, which is one of the most important dimensions of social difference in Canada. Table 3 shows that in terms of unemployment rates, the three cities in Calgary do not differ much. But it also shows that on a variety of labour force indicators, City 3 is unique from City 1 and City 2. Managerial and professional occupations are typically white collar occupations associated with high income and socioeconomic status. Not surprisingly, City 1 has the highest share of local residents in these occupations, although the average in City 2 neighbourhoods is not much lower, and is not significantly different to City 1. Rather, City 3 stands out as significantly lower, averaging only 15% in managerial and 19% in professional occupations accordingly.

Sales and service, as well as manufacturing trades, have been shown to be the opposite kinds of indicators to managerial and professional occupations and are often used as surrogate indicators for lower socioeconomic status because they are associated with lower incomes. Table 3 shows that these two indicators reveal that City 3 must be considered unique from the other two cities. In City 3, there is a significantly higher incidence of people employed in the sales and service sector and in the manufacturing sector compared to City 1 or City 2.

In summary, neighbourhoods in City 3 exhibit a uniquely different labour force than both City 1 and City 2, which do not differ from each other. Therefore, managerial and professional labour force is high in both income-gaining and income-stable regions, whereas low incidence of professional and magerial and a high incidence of

sales and manufacturing labour force is an important trait of income-declining communities. This is a feature of the post-industrial knowledge economy that has been well documented (xxx).

3. Income Levels

It is important to remember that the Three Cities typology is defined by income *change* characteristics (ratios) between 1980 and 2010. How do income *levels* and other characteristics differ in these three cities? The means of 2006 census tract average household incomes for the three cities reveals high incomes in City 1 (mean of $106,319), lower incomes in City 2 (mean of $99,608), and lowest incomes in City 3 (mean of $88,181). Table 3 shows each of the three cities is significantly different to each other in terms of 2010 average individual income ratios. City 1 is the wealthiest with above average ratios, City 2 has average incomes, and City 3 has below average income ratios. Interestingly, the indicators in Table 3 show that on other income indicators the three cities do not differ. The prevalence of high income households, as well as the prevalence of families living in poverty (below the low income cutoff) are not traits that sufficiently differentiate these three city regions. It also means that understanding the geography of high household incomes, as well as the geography of low income families, will require a spatial frame of reference that is different to the broad regionalization of the Three Cities model.

4. Age

There are some complex differences in age structure of the three cities. There is no meaningful difference in the incidence of children in City 1 and City 2, but in terms of children aged 0-14, City 3 is different to both City 1 and City 2, with significantly higher shares (mean 16.8%) of children in these neighbourhoods. This is not surprising, given the predominant suburban location of City 3, middle urban location of City 2, and inner/central city location of City 1.

Young adults, aged 25-34, in contrast, are a significantly more important characteristic of City 1 and a feature that differentiates it from both City 2 and City 3. Again, this is no surprise, as this demographic is the leading the preference for inner and central city living, particularly so in gentrifying areas and in areas experiencing a condominium boom.

It is interesting to note that late middle age (age 50-64), which is often associated with empty-nester status and established inner suburbs, is significantly highest in the suburban City 3. In Calgary, neighbourhoods in City 3 are not necessarily new suburbs; many are well established neighbourhoods developed 30 years ago, and so the prevalence of people aged 50-64 may not be surprising. City 3 is significantly higher than City 1 in this regard.

Classic models of the age and family structure of the North American city are based on a high incidence of the elderly and late middle age in inner city and inner suburban communities, reflecting in large part a process of in situ aging. There is increasing evidence that these spatial patterns are changing, and Table 3 supports

this idea in Calgary. The highest average incidence of seniors (aged 65+) is found in City 2—those income stable communities that are for the most part situated in well-established middle suburbs. The elderly are now a feature of the middle suburbs, either from in situ aging of the suburbs, or displacement from the central city (e.g. City 1) by young adults. In Calgary, City 2 and City 3 are significantly different in terms of the prevalence of seniors.

5. Households and Families

Linked to a variety of demographic and lifestyle changes, one of the most important trends in Canadian cities over the past 30 years has been the rapid rise in the share of small (one or two person) households and declining average household sizes. Each of the three cities in Calgary is statistically different from the other in terms of the share of one person households and in terms of the average number of persons per household. A substantial share (average of 40.5%) of households in City 1 neighbourhoods are one person households, compared to 30.3% and 22.6% in City 3. Given the age structure characteristics described above, these findings are intuitive. Similarly, City 1, predominantly central and inner city locations with high concentrations of professional and managerial workers, has the smallest household sizes, averaging 2.1 persons, compared to City 2 at 2.3 and City 3 at 2.6.

The rise of lone parent families is another important change in family composition in Canada, and while there is not necessarily a direct correspondence, there is strong relationship between the residential geography of lone parent families and low income or poverty. Table 3 supports this linkage, even at a coarse regionalization such as the Three Cities model. City 3 stands out as unique from City 1 and City 2 by having a significantly higher incidence (average 19.2%) of single parent households. The income-increasing and income-stable communities of City 1 and City 2 do not have the same concentrations of lone parent families.

In summary, City 1 with increasing incomes has greater shares of small households and high income ratios. The income-declining parts of Calgary, in City 3, has the lowest income ratios, larger households and significantly higher incidence of lone parent families. In very broad terms, then, larger households and single parents are a significant feature of income decline and impoverishment in the three cities of Calgary.

6. Ethnicity, Immigrant, and Visible Minority Populations.

In aggregate, 73.4% of all visible minorities in the three cities reside in City 3, while only 18.9% and 7.6% respectively reside in City and City 2. Moreover, City 3 is uniquely different from City 1 and City 2 because it includes significantly higher shares of visible minorities in its constituent neighbourhoods (Table 3) than the other cities. In fact the average for City 3 neighbourhoods (26.7%) is almost twice as high as that found in City 2, and in City 3 the tracts range from 5.6% visible to 82.0% visible minority.

Table 3 shows that City 3 is unique from City 1 or City 2 because of significantly higher shares of immigrants (all immigrants) in these neighbourhoods. On average 23.3% of the City 3 tract populations are immigrants, compared to 19.8 and 18.5% in City 1 and City 2. Interestingly, however, it is not the prevalence of recent immigrants that underlies this difference. City 3 is home to almost two thirds (66.3%) of recent immigrants, while 24.1% of recent immigrants reside in City 1. Within each of the cities, however, the percentage of recent immigrants in the census tracts varies a great deal, from less than 1.0% to almost 18% of the local tract population. Generally, however, the three cities are rather similar in terms of the average shares of recent immigrants in the tracts (between 4% and 5%)(Table 3), and the prevalence of recent immigrants is not a significant feature to differentiate the three cities. This means that even though City 3 has the largest share of all recent immigrants, they are not clustering in extremely high concentrations in a selected few tracts in City3, but are dispersed throughout the neighbourhoods of City 3 (which is 49.5% of all tracts), perhaps indicating a trend towards suburban dispersal rather than residential segregation.

Although Table 3 shows that the three cities are not much different on many ethnic traits, it also points to a few ethnic and language factors that differentiate the three cities. City 3 has significantly higher shares of Southeast Asian population in its neighbourhoods than does City 2. It also differs from City 2 in that it has significantly lower shares of Western, Northern, and Eastern European ethnic minorities, since these groups are found in City 2 in higher proportions. Although averaging only 3.4% of City 3 tract populations, City 3 nevertheless has significantly higher shares of Arab and West Asian ethnic groups—almost twice the shares of City 1 or City 2. A defining ethnic trait of City 3 is the lower shares of British ethnicity in the neighbourhoods, although averaging 44.9% this group is still an important presence in these communities.

Perhaps not surprisingly, given the visible minority, immigrant and ethnic differences described above, City 3 has, on average, a significantly higher share (13%) of people whose home language is neither official language in Canada.

In summary, in terms of ethnic, immigrant, visible minority, and language issues, the important findings here are that there are no meaningful differences between income-rising City 1 and income-stable City 2. The key differences in these social attributes are the ways in which City 3, with declining incomes and deepening impoverishment, is different from the other two cities. City 3 is unique because of some but not all of the ethnic traits, but nevertheless there are important connections between immigrant status, selected immigrant groups, and language issues, and the geography of income decline that defines City 3.

7. Mobility.

There is great interest in how the return to the city centre, inner city gentrification, and the condominium boom is transforming urban landscapes in Canada. Of all recent movers in 2006 (within the last 5 years), 30.3% resided in City 1, whereas

57.1% resided in City 3, so the declining pre-1980s suburbs are still claiming the larger share of mobility in the three cities.

Average neighbourhood levels of recent (5 year) mobility are high in all three cities, averaging 43.2% in City 3 and 58.0% in City 1. Indeed, City 1 should be considered distinctive from City 2 and City 3, with significantly higher shares of recent movers in these neighbourhoods. Table 3 supports that idea that recent movement into City 1 is an important trend. This finding in Calgary reinforces the generalized trend occurring elsewhere, where inner city redevelopment and a condominium boom is encouraging a return to central city living.

8. Housing Characteristics

There are a variety of housing features that differentiate the three cities. Not surprisingly, the suburban dominated areas of City 3 have significantly lower rates (28.1%) of rented dwellings than City 1 which averages 43.1% in City 1 tracts. Interestingly, City 1 is also unique with respect to the age of the housing stock—it is characterized by *simultaneously* high rates of older pre-war housing as well as high rates of new housing constructed in the last decade, and significantly more so than either City 2 or City 3. City 1 is therefore the old and the new juxtaposed, a reflection of the central city gentrification, redevelopment, and housing and condo boom of recent years—and the significantly higher share of both low-rise (25.1%) and high-rise (17.2%) apartment buildings than the other two cities, whereas the suburban areas of City 3 are defined by considerably higher shares (59.1%) of single detached dwellings.

In terms of the condition of the housing stock, all areas of the city have diverse conditions. Substandardness, often measured by the percentage of dwelling units needing major repairs, averages 6.8% in City 1 and City 2, and is marginally lower in City 3 at 6.1%. Housing substandardness according to this measure is not a trait that significantly differentiates the three cities.

Conclusion.

This report has documented the changing character of neighbourhood incomes in Calgary over the past 40 years, and examined the degree of income inequality and polarization that has taken place over this time period. The findings showed consistent and systematic increases in income inequality and polarization, causing Calgary to become the second most unequal city in Canada based on neighbourhood income inequality characteristics. Within the context of income classes (incomes relative to the CMA average), Calgary has seen a dramatic loss of middle income neighbourhoods—neighbourhoods that have predominantly transitioned to become low or very low income over time. The share of high and very high income neighbourhoods has not changed dramatically, but *within* these select communities, predominantly in established areas of the central city, the levels of personal income has risen dramatically. In other words, many more neighbourhoods ate becoming poorer, and a select few neighbourhoods are becoming extremely wealthy.

The report has also explored the applicability of the Three Cities model to Calgary. In general, this model is applicable to Calgary, and the geographical pattern of the three city types is consistent with what has been found in Toronto and other metropolitan areas. These patterns reveal an income-increasing region within a small sector of the central city and established inner suburbs; a relatively smaller set of income-stable in typically middle suburban and middle income neighborhoods; and a rapidly growing set of predominantly middle income suburban neighbourhoods that are income-declining. So the findings reinforce the trends towards the growing wealth and appeal of the central city, and the increasing trend towards the suburbanization of poverty.

Within the context of the Three Cities, selected social indicators were examined to explore some of the key social attributes that may or may not differentiate the three Cities. Apart from income, household size, housing types, and period of dwelling construction, City 1 and City 2 are not much different to each other on most social indicators. City 3, the income-declining part of Calgary, stands out as having unique social attributes on many indicators. In fact on educational, labour force, income, age, household, immigrant and ethnicity, language, mobility, and housing variables, City 3 standard in contrast to the other cities. Given that so many social and housing attributes are associated with a large region of declining incomes is disturbing. Yet it maybe provide timely indicators of how policy intervention may alleviate the disparities that are giving rise to the spatial evolution and manifestation of the Three Cities.