Eight Canadian Metropolitan Areas: Spatial Patterns of Neighbourhood Change, 1981–2006

A Typology Based on a Combined Statistical Analysis of Census Tract Data

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Executive Summary

This report includes an overview of the background literature and the data and methodology used in developing a typology of neighbourhood change (1981–2006) for eight Canadian CMAs and a typology of neighbourhood change based on a joint analysis of census tract data measuring change, 1981–2006.

The research draws from neighbourhood-based studies in the late 19th and early 20th centuries, followed by social area and factorial ecology studies in the post–Second World War period. The factorial ecology studies were designed to test the assumptions of the social area analysts and generally confirmed the existence of three major dimensions of socio-economic structure in industrialized cities: economic status, family status, and ethnic status. Later studies confirmed the increased complexity of Canada's urban social geography. Following a hiatus in such research from the 1970s to the 1990s, an increased number of studies have focused on methodological refinements and the development of typologies of urban neighbourhoods.

Two methodological refinements are important for this study. One is a joint analysis allowing for the simultaneous inclusion of census tracts from several metropolitan areas in the same analysis. This is a more direct form of comparison than the approach of analyzing each city individually and is the procedure used in this report. The other methodological refinement is the use of a direct measure of change when computing the principal components and cluster analyses. In contrast to a comparison of two or more cross-sectional analyses this procedure allows the determination of important dimensions of change between 1981 and 2006 and identification of neighborhoods that have been impacted by these dimensions.

The present study is based on a study of 1981–2006 census tract data for 2987 tracts in eight CMAs and includes 24 variables related to economic status, age, family and household status, immigrant and ethnic status, migrant status, and housing status. A principal components analysis of these variables resulted in five interpretable components accounting for 71 percent of the variance in the original 24 variables. The components were labelled Family Status Change, Economic Status Change, Movers and Stayers, New East Asian Immigrants, and Increase in South Asian/Caribbean Population.

This is one of the few Canadian studies that include all census tracts simultaneously in a single analysis rather than analyzing each CMA separately. In that respect, the analysis permits a comparison of census tracts and ultimately neighbourhood types between the eight CMAs and provides a sampling frame for comparative neighbourhood studies across CMAs. Careful analysis of the results will highlight areas for future research, particularly focusing on *why* change is taking place rather than *what* is changing. The latter question is the one that the method used in this report is most effective in answering.

Authors

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Jennifer Logan completed her master's degree in Geography at York University in 2010. She was a Research Assistant with the Neighbourhood Change Research Partnership from December 2012 to June 2013. Jennifer has been engaged in a variety of research projects, including the settlement experiences of new immigrants, their evaluation of "home," and the role of housing in immigrant integration

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1. Background, Data, and Methodology

1.1 Introduction

> *"Is there a new spatial order in cities?… No. But there is change, important and visible change, with very significant impacts on the lives of our cities' people." (Marcuse and van Kempen, 2000: 270–71)*

This is the conclusion Marcuse and van Kempen reach after evaluating the essays in their edited collection and other literature on divided cities. Marcuse and van Kempen (2000: 249) articulate three general areas of change:

- "strengthened structural spatial divisions with increased inequality among them.
- new socio-spatial formations within these structural divisions.
- a set of "soft" locations in which change is taking place."

They further suggest that the differentiation of areas within cities has increased, especially under the influence of globalization, and that increasingly, everyday life can be carried out within these structural spatial divisions, thus reducing the need for contact with other parts of the city or beyond. These changes have important implications, especially with respect to "winners and losers," for those living in what Marcuse (1989) refers to as the "quartered city."

Marcuse and van Kempen (2000: 252–57) identify seven "new socio-spatial formations within the divisions." Of these, the following are important for understanding neighbourhood change in Canadian metropolitan areas:

- gentrified neighbourhoods (former working-class areas in or close to inner cities);
- exclusionary enclaves (not new, but those that have expanded in variety and extent and include at one extreme higher-income areas that have benefited from processes of globalization and at the other areas such as public housing projects that have not benefited from globalization);
- ethnic enclaves (new arrivals who locate together in the same area of the city for economic reasons and/or cultural ties);
- edge cities (clusters of residence, business, commerce, and recreation, independent from daily life of the central city).

In addition to "new socio-spatial formations," Marcuse and van Kempen (2000: 257–60) recognize "soft locations" – areas of the city that have been particularly impacted by globalization and economic change. Of these, the following have particular implications for neighbourhood change in the city:

- Waterfronts: the elimination of industrial uses and port facilities makes the waterfront more attractive for upper-income residences combined with offices and luxury service-oriented activities.
- Centrally located manufacturing areas: old industrial buildings that have become obsolete for their original use are transformed into loft residential.
- Brownfield sites (former industrial sites): obsolete manufacturing firms that abandon their existing location and either move to a more favourable location or close completely. Often the abandoned buildings cannot be easily converted to other uses, including residential. Instead, the site is redeveloped, usually into some form of mixed used, including residential.
- Concentrations of social housing: often deteriorated buildings that increasingly house less-well-off families, many of whom are visible minority newcomers.

1.2 Objective

The objective of this research is to develop a typology of neighbourhood change between 1981 and 2006 in Canadian cities by analyzing a set of demographic, socio-economic, and housing data by census tracts and classifying these data for all census tracts in eight Canadian census metropolitan areas (CMAs) simultaneously rather than analyzing each CMA separately. We refer to this as a joint analysis.

A joint analysis has three major advantages over an analysis of each CMA separately.

- It allows a comparison of neighbourhood change over time within and between CMAs. The ultimate outcome is a typology of neighbourhood change for the CMAs.
- It provides a sampling frame for comparative neighbourhood studies across CMAs.
- It highlights possible areas for future comparative research with a focus on the "why" questions. A joint analysis answers "what" questions (pattern) but not "why" questions (process), at least not in detail.

Instead of comparing the results from separate analyses of 1981 and 2006 census tract data, we combine data for the two census years and evaluate neighbourhood change directly.

This report builds on earlier research that developed a neighbourhood typology for the same eight Canadian CMAs for 2006 (Murdie, Logan, and Maaranen, 2013).

1.3 Context

Classification approaches in neighbourhood research date back to the late 19th and early 20th centuries, especially the work of Charles Booth in London (Booth, 1902) and Ernest Burgess in Chicago (Burgess, 1925). Booth, in the course of his social welfare studies, mapped a wide variety of socio-economic indexes for London. Burgess and his colleagues, using Chicago as an

example, undertook a variety of neighbourhood-based analyses. Burgess also developed the first spatial model of socio-economic status in cities, which became known as the concentric zone model.

This work was followed in the 1950s by social area analysis (Shevky and Bell, 1955), a precursor to the multivariate approaches to neighbourhood classification that are common today. Social area analysis is designed to provide a systematic classification of residential areas within cities using census tracts as the basic unit of study. As initially conceived by Shevky and Bell, social area analysis was based on the grouping of a set of census characteristics into three hypothesized indexes: economic status (income, occupation, education); family status (age, type of household, labour force participation by women); and ethnic status (clusterings of people with common cultural backgrounds).

More recently, emphasis has been placed on the empirical testing of social area analysis using multivariate statistical methods, such as factor (principal components) analysis (see, for example, Foggin and Polèse, 1977; Murdie, 1969; Perle, 1982–83). These are often referred to as factorial ecology studies. The general conclusion from these analyses is that the three indexes proposed by Shevky and Bell are necessary but not sufficient to describe the socio-economic differentiation of a city's neighbourhoods.

From the 1970s to the 1990s, interest in factorial ecology research declined, partly because of an emphasis on "why" in addition to "what" questions and a focus on local neighbourhood studies. Beginning in the 1990s, however, there has been a resurgence of interest in classification approaches to neighbourhood research, aided by the enhanced computer power that is necessary to handle large data sets. This growing interest in such studies has led to methodological refinements and increased recognition of the advantages and disadvantages of classification techniques.

One methodological refinement was the development of joint analysis, whereby census tract data for several metropolitan areas can be considered simultaneously. One of the few early studies using this method was a comparative analysis of Canadian CMAs using census tract data from the 1980s (Davies and Murdie, 1991a, 1991b). These studies confirmed the increased complexity of the social dimensions of Canadian CMAs and in some cases mapped the dimensions by census tract, but without extending the analysis to a classification of the census tracts.

More recent research has focused on the formal classification of urban neighbourhoods (e.g., Hanlon, 2009; Mikelbank, 2004, 2011; Vicino, Hanlon, and Short, 2011) and the development of indexes of urban distress (e.g., Institute of Urban Studies, 2008). All are cross-sectional studies undertaken for a single point in time or for two or more points without specifically considering measures of change, what Perle (1982–83, 309) refers to as "a form of comparative statics."

Cross-sectional studies of Canadian cities have found a considerable degree of structural and spatial stability over time. In particular, the structural and spatial patterns of individual dimensions were generally the same between 1951 and 1961 in Toronto and 1971 and 1981 in Montréal, although the spatial patterns were affected by the outward growth of each city (e.g., Guay, 1978; LeBourdais and Beaudry, 1988; Murdie, 1969). In Toronto, for example, existing sectors

of high and low economic status from 1951 remained intact through the decade, but also extended outwards towards the periphery as the city grew. In addition, areas of relatively low family status (fewer children, smaller households) expanded outwards in concert with substantial apartment construction several kilometres from the city centre, often in a tentacular rather than perfectly concentric manner. The two ethnic components, Jewish and Italian, also extended outwards in separate sectoral directions, Italians to the Northwest following a low economic status sector, and Jews to the North as a result of upward economic mobility.

Studies that evaluate change more directly by combining data for two or more census years and analyzing measures of change are less common (Baum et al., 2002; Davies and Murdie, 1991a; Kitchen and Williams, 2009; LeBourdais and Beaudry, 1988; Murdie, 1969; Perle, 1982-3; Sweetser, 1962). These analyses are more challenging than cross-sectional studies, particularly given changes in the numbers and/or boundaries of census tracts over time and a lack of consistency in the availability and definition of variables. Perhaps for these reasons, most of these studies deal with a limited time period, usually 10 years.

Direct analyses of neighbourhood change data first appeared in the 1960s with Sweetser's study of Metropolitan Boston (1950–60) and Murdie's research on Metropolitan Toronto (1951–61) (Sweetser, 1962; Murdie, 1969). Both used census tract data from their respective censuses to calculate measures of change. Although there were substantial differences in the two study areas during the 1950s, especially in growth rates and immigration flows, both studies corroborated the major findings from factorial ecology studies, including the importance of economic and family status dimensions as measures of change.

These two studies were followed several years later by Perle's (1982-3) evaluation of urban social change in Detroit for the 10-year period, 1960–70. Factor analysis of the change data resulted in five interpretable factors: change in nuclear families, neighbourhood turnover, expansion of Black neighbourhoods, change in education and housing quality, and change in income disparity. Perle (1982–83) argues that these changes could not have been inferred easily from separate analyses at two or more points in time.

In contrast, Le Bourdais and Beaudry (1988), in a study of social change in Montréal's social structure, 1971–81, identify six factors that are similar to the domains obtained in separate 1961 and 1971 analyses. These include (1) differentials among newly developed suburbs and those already well-established in 1971, (2) inner-city older municipalities versus suburbs with middle-aged family heads, (3) well-off families in the inner city versus aging middle-class suburbs beyond Montréal Island, (4) neighbourhoods in the western part of Montréal Island experiencing a decrease in persons of British ethnicity versus neighbourhoods in the eastern portion of the Island undergoing a decrease in native French speakers and an increase in immigrant population, and (5) inner-city neighbourhoods with an increase in professional employees versus neighbourhoods with an increase in less well-educated Italians, increasingly displaced from their previous inner-city location.

One of the most recent and extensive studies of neighbourhood social change in a Canadian city is Kitchen and Williams's (2009) study of Saskatoon using census data for 1991, 1996, and 2001. This study was based on a principal components analysis of 12 variables for 58 neighbourhoods over two separate time periods, 1991–96 and 1996–2001. The analysis resulted in

four interpretable components of change in 1991–96 and five in 1996–2001. The differences in component structure between the two time periods reflect the fact that 1991–96 was a difficult period economically, while 1996–2001 was a period of economic recovery. For example, the first component in 1991–96 is labelled "Labour/Low Income" indicating low-income neighbourhoods with falling rates of labour force participation, especially among women, and homeownership. In contrast, the first component in 1996–2001, "Labour/Homeownership," reflects improving rates of labour force participation, particularly among women, and growing rates of homeownership in certain neighbourhoods.

Studies undertaken using direct measures of change underscore the methodological challenges of this research. In addition to choosing suitable statistical measures, these challenges include identifying an appropriate set of variables, a suitable measure of change, and an appropriate time period. Guidelines for selecting an appropriate set of variables will be reviewed in the next section. The guidelines are similar to cross-sectional analyses, except that the same set of variables must be available at the beginning and end points. With respect to an appropriate time period, all studies undertaken to date have been for no more than a decade. In many instances, however, 10 years may not be long enough to show real change.

Studies conducted to date have used one of two measures of change: (1) a relative change quotient (e.g., Sweetser, 1962; Murdie, 1969; Perle, 1982–83) or (2) point change (e.g., Le Bourdais and Beaudry, 1988; Kitchen and Williams, 2009). The relative change quotient is similar to a location quotient and is obtained by dividing the percentage or standardized value of a variable for time period 2 by time period 1. A value of 1.0 indicates no change. Values above 1.0 indicate an increase; values below 1.0 indicate a decrease. Point change is obtained by subtracting the percentage value of a variable for time period 1 from time period 2. A value of zero indicates no change; positive values indicate an increase; negative values indicate a decrease. We consider point change to be a more straightforward and direct measure of change that eases interpretation of the results. Therefore, we have adopted that measure for this study.

As part of the current research, we have undertaken an extensive literature review of neighbourhood typologies, both cross-sectional and change, focusing on more recent research and countries where most of this research has been undertaken (Canada, the United States and Australia/New Zealand). We have compiled a list of approximately 50 items with abstracts (where available) and summarized the most relevant items in more detail. This information will be posted to the Neighbourhood Change Research Partnership web site as a separate document (www.neighbourhoodchange.ca).

1.4 Data

1.4.1 CMAs, Time Period, and Observational Units

The eight CMAs include the original six partners in the Neighbourhood Change Research Partnership (Calgary, Halifax, Montréal, Toronto, Vancouver, and Winnipeg) and two others (Hamilton and Ottawa) where researchers are eager to start analysis. In all cases, we have local researchers who are able to interpret the results. These CMAs represent seven of the largest 10 CMAs in Canada. Halifax was selected to provide representation from the Atlantic Provinces.

Data have been assembled for three other CMAs that might be added to the project at some future date (Edmonton, Oshawa, and Québec City).

The analysis of change is based on a 25-year period, 1981–2006. The selection of 1981 as the initial year was based on three considerations: (1) it is a census year that immediately precedes most of the impacts from post-industrial economic restructuring and shifts in immigrant source countries; (2) it includes a sufficient number of census tracts to compare to 2006; and (3) there are enough comparable variables for each census year.

We use 2006 as the end year because it is the most recent year for which a full set of census data is available at the tract level. It should also be noted that the reliability and comparability of census tract data from the 2011 National Household Survey (NHS), the replacement for the long form census, are in doubt. These issues cannot be resolved until the 2011 NHS tract-level data are fully analyzed.

Table 1: Number of Census Tracts in Each Census Metropolitan Area, Change Analysis, 1981-2006

Census Metropolitan Area	Total Number of Census Tracts*		Number of Exact Matches, Estimates from Parent and Orphans, 2006			Census Tracts Available for Analysis**
	1981	2006	Exact Match	Estimate from Parent	Orphan	1981–2006
Halifax	62	88	51	34	3	85
Montreal	669	878	560	280	38	821
Ottawa	176	251	152	86	13	235
Toronto	608	1003	509	445	49	938
Hamilton	146	178	134	44	0	174
Winnipeg	135	168	124	38	6	158
Calgary	115	203	107	64	32	169
Vancouver	244	410	154	256	0	407
TOTAL	2,155	3,179	1,791	1,247	141	2,987

* Refers to all census tracts in the census boundary files, which is greater than the total included in the Profile Series.

** Includes only census tracts that are in the Profile Series and meet the population and household thresholds noted above. Thus, except for Halifax, the “Number of Census Tracts Available for Analysis” is slightly less than the sum of the “Exact Match” and “Estimate from Parent” categories.

The identification of eligible census tracts proceeded in three stages: (1) identify the exact matches in census tract identifiers in 1981 and 2006; (2) identify and assign 1981 parent census tract identifiers for 2006 census tracts that have been subdivided after 1981; and (3) identify "orphan" census tracts in 2006 (those newly created census tracts with no clear parent in 1981).

All census tracts with more than 150 people and/or more than 50 households are included in the data. Relatively few tracts needed to be dropped from the study due to this restriction. The number of census tracts available for analysis in the change analysis is 2,987 compared to 2,155 tracts in 1981 and 3,179 tracts in 2006 (see Table 1).

The accuracy of the census tract match is best for the Hamilton and Winnipeg CMAs, both of which experienced relatively low population growth between 1981 and 2006. These two CMAs have the highest percentage of tracts with exact matches and the lowest percentage of 2006 tracts estimated from a 1981 parent. In contrast, Vancouver has the highest percentage of 2006 tracts estimated from a 1981 parent. Calgary is a particular problem, because 16 percent of its 2006 tracts were "orphans" in 2006 with no parent in 1981. These tracts are primarily in new growth areas at the edge of the city.

1.4.2 Variable Selection

The first step was to develop hypothesized relationships (sources of variation) based on previous analyses and recent trends (e.g., emergence of a post-industrial society) concerning the social structure of Canadian cities and potential changes or trends in social structure.

Much of the literature is based on some variant of social area analysis (which dates from the 1950s and 1960s) and factorial ecology (starting in the 1970s). The major dimensions and trends that have been identified and examples of potential variables are shown below:

i) Economic status

Trends: changes in the distribution of skills from manual to semi-skilled to skilled white-collar, gentrification, increased long-term poverty

Variables: education, occupation, income, impoverishment, unemployment

ii) Family status

Trends: emergence of empty nesters, older population, childless couples

Variables: early/late family; young adult/pre-family; seniors; non-family; single-parent family

iii) Ethnic status

Trends: concentrations of recently arrived groups

Variables: immigration, ethnicity, "race"

iv) Migrant status

Trends: increased movement – local, national, international

Variables: move in last five years

v) Housing status

Trends: tenure, age, physical structure, core need (affordability, suitability, condition)

Variables: renters, owners, period of construction, single-detached, apartments, paying more than 30 percent of income on housing, number of persons per bedroom, need for major repair

vi) Gender

No clear guidelines. Some studies have included female labour force participation, female unemployment, and female-headed single-parent households. Aside from female-headed single-parent households, none have been particularly effective in identifying dimensions in social area/factorial ecology studies. Most relate modestly to other dimensions. Also, male and female occupation characteristics (e.g., male professional and female professional) tend to correlate highly with each other, meaning that for this analysis, individual labour force figures by gender may be redundant.

The next step is to develop criteria for the selection of variables. In choosing which variables to use, we were guided by the following criteria:

- Include (a) variables that are available for both 1981 and 2006 and (b) a balanced set of variables, not weighted towards a particular dimension.
- Avoid closed numbers (e.g., percent immigrant and percent non-immigrant; choose only one).
- Use simple percentages or ratios rather than more complex derived variables such as location quotients.
- Avoid highly specific variables (e.g., ethnic or visible minority groups that are unique to particular cities) in favour of more general variables (e.g., persons born outside Canada, recent immigrants, ethnic groups that predominate in more than one CMA). More focused studies for individual CMAs can capture the specific variations.
- Use total labour force figures for specific occupations, which may be as effective as gender-specific variables for this kind of multivariate analysis. Many gender specific variables are best analyzed in a separate study where important differences between males and females can be evaluated in detail. These variables include educational achievement, labour force participation and income.
- Limit the number of variables to no more than 40.
- Exclude variables that are not strongly correlated with other variables in the data set. We do this because principal components analysis is a data reduction technique designed to detect structure in a set of interrelated variables. If a variable is not strongly related to any other variable in the data set, it will likely emerge as a single variable component.

Using these considerations, we chose a range of variables for the 1981–2006 analysis. We began with 40 variables and narrowed the selection to 30 for the initial principal components analysis. This was determined empirically by examining the correlations between the 40 variables including (a) the average correlation between the variables and (b) the number of correlations greater than 0.4 or less than -0.4. Ten variables with low average correlations and/or no or only one correlation greater than 0.4 or less than -0.4 were eliminated from the analysis. For exam-

ple, Aboriginal ethnic origin was one of these variables. The correlations between this variable and others in the analysis were very low, perhaps because Aboriginals are not spatially concentrated in most CMAs. Winnipeg, with its large Aboriginal population, is a notable exception.

Subsequently, based on a principal components analysis of the 30 variables, we eliminated six variables with communalities below 0.5. This resulted in a more interpretable solution. Details on the final set of 24 variables are shown in Table 2a. British and French ethnic origins were excluded from the principal components analysis so as not to overly structure the analysis. The relationships between these and the final set of clusters, along with 16 variables not included in the cluster analysis, are shown in Appendix A in Table A.1 (6 group solution) and Tables A.3 and A.4 (17 cluster solution).

1.4.3 Method

The analysis included three major steps.

Step 1: Descriptive Statistics, Including the Correlations Between Variables

Descriptive analysis of the data included the calculation of means, standard deviations, minimum/maximum values, and correlations between variables. The principal components analysis is based on the correlation matrix of the variables.

Step 2: Principal Components Analysis

The primary purpose of principal components analysis is to identify the major interrelated dimensions in the data set. Once the major components have been determined, component scores can be calculated for each census tract for each summary component. The component scores are then used as input to a cluster analysis that is the basis of the neighbourhood change typology.

We do not discuss the computational details of principal components analysis, but there are several decisions to be made. These include the method of analysis, the initial number of components to extract, and which rotation to employ (orthogonal or oblique). We should also mention the distinction between principal components analysis and factor analysis. Technically, principal components analysis is a data reduction technique, while factor analysis is a hypothesis testing method. In practice, the results from the two procedures are usually quite similar. In this research we use principal components analysis because of our interest in data reduction.

The components are extracted in sequence according to the amount of variance they account for. This is measured by a statistic called an eigenvalue and is best exemplified by the scree plot in Figure 1.1. The objective is to find the point in the graph where the decrease in eigenvalues levels off. Another consideration is that only eigenvalues with a value greater than 1.0 should be retained. In addition to relying on the scree plot to determine the optimum number of

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1 Scree is the geological term for loose rocks at the bottom of a cliff. Here it refers to the point beyond which there is only "component scree," components that account for only a small percentage of the variance in the data set and are deemed to be relatively unimportant.

components to extract, we extracted different numbers of components to see which solution yielded the most interpretable result.

Finally, component rotation was based on an oblique solution whereby the components are permitted to correlate with each other. This is a less rigid approach than an orthogonal rotation.

Step 3: Hierarchical Cluster Analysis of the Component Scores

Hierarchical cluster analysis begins with each census tract as a separate cluster. Based on a measure of similarity between the tracts and a statistical algorithm, tracts are combined into successively larger groups until only one group is left that contains all tracts. The objective is to end up with groups containing census tracts that are as similar as possible to each other and as different as possible to tracts in the other groups. As with principal components analysis, decisions must be made in undertaking the analysis. These include the measure of similarity between the tracts and the statistical algorithm used to combine the tracts into larger groups.

In this analysis, squared Euclidean distance was used as the measure of similarity and Ward's method as the statistical algorithm. Squared Euclidean distance is the sum of the squared differences over all the components. Another important decision is selecting the optimum number of clusters or the "best" cluster solution. Evaluation of a dendrogram (a hierarchical tree diagram) or the changes in the coefficients of an agglomeration schedule can be used as a guide. More details are given for the 1981–2006 analysis in Section 2.2.

Table 2a: Variables Included in the Change Analysis, 1981–2006

INDICATORS	VARIABLES	VARIABLE DEFINITION
Education	DEGREE_8106	Change in % Population 15 (1981) and 25 (2006) years and over with a degree
	ELEMENTARY_8106	Change in % Population 15 (1981) and 25 (2006) years and over without a high school certificate
Occupation	MAN_8106	Change in % Labour Force Managerial and Administrative
	PROF_8106	Change in % Labour Force Professional
	MANUF_8106	Change in % Labour Force Manufacturing, Construction & Trades
Income	HIGHINCHH_8106	Change in % High Income Households ($40,900 or more in 1980) ($100,000 in 2006)
	LOWINCOME_8106	Change in % Families below the Low-Income Cut-Off
Age	POPLT15_8106	Change in % Population Less Than 15 Years
	POP2534_8106	Change in % Population 25-34 Years of Age
	POP5064_8106	Change in % Population 50-64 Years of Age
	POP65_8106	Change in % Population 65 years or older
Family & Household	ONEPER_8106	Change in % One Person Households
	SINGLEPAR_8106	Change in % Single-Parent Families
	PPERHH06_8106	Change in Persons per Household
Immigration, Ethnic Status and Language	IMMIG_8106	Change in % Population Immigrant
	RECIMMIG_8106	Change in % Population Recent Immigrant (previous five years)
	SOUTHASIAN_8106	Change in % Population South Asian Origin
	EASTASIAN_8106	Change in % Population East Asian Origin
	LATINCENSACARIB_8106	Change in % Population Latin American and Caribbean Origin
	LANGNEF_8106	Change in % Home Language Neither English nor French
Movers	TOTMOVERS_8106	Change in % Persons (5 years +) who did not live at the same address 5 years ago
Period of Construction	C7181_9606_8106	Change in % Dwellings Constructed in Previous 5 Years
Affordability	AFFORDABLE_8106	Change in % Income Spent on Housing (Owners & Renters)
Suitability	SUITABLE_8106	Change in Persons Per Room

Affordability

Calculation of Housing Cost to Household Income ratio (AFFORDABLE_8106)

1. AVGRRENT x TOTRENTER = RENTWEIGHTED
2. AVGOWNERPAYMENT x TOTOWNER = OWNERWEIGHTED
3. (RENTWEIGHTED +OWNERWEIGHTED) / TOTDWELL = AVGHOUSINGCOST
4. (AVGHOUSINGCOST * 12) / HSLDINCOME = AFFORDABLE_8106 (Housing Cost to Household Income ratio)

The clusters can be identified using the average scores for each component. More realistically, however, the average value of the 24 variables shown in Table 2a for each component can be used to provide a more detailed interpretation. We have done this for these variables as well as the 16 additional variables in Table 2b. These 16 variables were excluded from the principal components analysis for reasons noted in Section 1.4.2, but were important in identifying the clusters. Data for the full set of 40 variables are shown in Appendix A in Tables A.1 through A.6.

Table 2b: Additional Variables Used in Interpreting the Groups and Clusters from the Hierarchical Cluster Analysis, 1981-2006

INDICATORS	VARIABLES	VARIABLE DEFINITION
Occupation	SALESSERV_8106	Change in % Labour Force Sales/Service
	UNEMP_8106	Change in % Labour Force Unemployed
Immigration, Ethnic Status, and Language	SEASIAN_8106	Change in % Population Southeast Asian Origins
	WNEEUROPE_8106	Change in % Population Western, Northern and Eastern European Origins
	SOUTHEUROPE_8106	Change in % Population Southern European Origins
	ARABWASIA_8106	Change in % Population Arab or West Asian Origins
	AFRICAN_8106	Change in % Population African Origins
	ABORIG_8106	Change in % Population Aboriginal Origins
	BRITISH_8106	Change in % Population British Origin
	FRENCH_8106	Change in % Population French Origin
Tenure	RENTED_8106	Change in % Dwellings Rented
Period of Construction	CBEF1946_8106	Change in % Dwellings Constructed before 1946
Housing Type	SINGDET_8106	Change in % Single Detached Dwellings
	LOWRISE_8106	Change in % Low-Rise Apartments
	HIGHRISE_8106	Change in % High-Rise Apartments
Housing Condition	CONDITION_8106	Change in % Dwellings in Need of Major Repair

2. Typology of Neighbourhoods, Change Analysis, 1981–2006

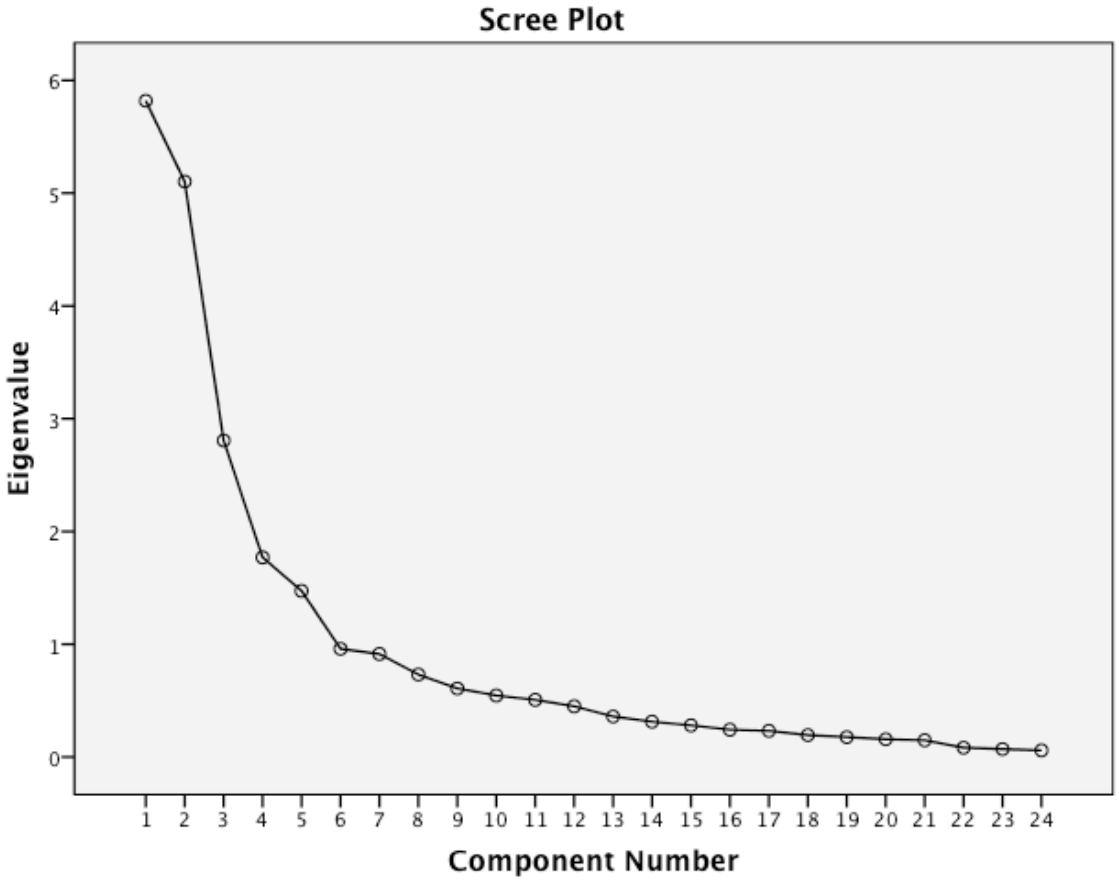
2.1 Principal Components Analysis

The analysis was based on census tract data for the eight CMAs noted earlier (Calgary, Halifax, Hamilton, Montréal, Ottawa, Toronto, Vancouver, and Winnipeg) and included the 24 variables identified in Table 2. All the 1981–2006 census tracts noted in the final column of Table 1 (N=2,987) were included in the joint analysis.

To identify the optimum number of components, reference was made to the scree plot (see Figure 1). The scree plot shows the eigenvalues on the vertical axis and the components on the horizontal axis. As illustrated in Figure 1, component solutions one through five have eigenvalues exceeding 1.0; the eigenvalues for the sixth and seventh components are just below one. Evaluations of the four-, five-, six-, and seven-component solutions were undertaken and on this basis, the five-component solution was deemed the most interpretable. The five-component solution accounted for 71 percent of the total variance in the 24 original variables. This is less than the variance accounted for in the 2006 analysis (71 percent versus 77 percent), but corresponds with findings from similar analyses of change data, because the correlation matrices for change analyses are generally more complex and contain more “random noise” than those for cross-sectional analyses.

The component loadings are shown in Table 3 (Component Pattern Matrix: Rotated Loadings, Change Analysis, 1981–2006). The loadings represent the correlations between the variables and the five components and are used to interpret the components. For ease of interpretation, only loadings with values greater than 0.3 or less than -0.3 are shown in the table. Component loadings are interpreted in the same way as correlation coefficients and like correlation coefficients can range from +1.0 to -1.0.

Figure 1: Scree Plot, Change Analysis, 1981–2006



Referring to the loadings for each component, the components can be interpreted as follows.

1. Family Status Change: increases in smaller older families versus larger younger families.
2. Economic Status Change: contrasts census tracts undergoing increases or decreases in economic status including income, occupation, and education.
3. Movers and Stayers: census tracts with increases in younger recent movers in newer housing compared to those with increases in older stayers.
4. New East Asian Immigrants: identifies areas undergoing increases in immigration, including recent immigrants, primarily of East Asian ethnic origin.
5. Increase in South Asian/Caribbean Population: identifies areas undergoing increases in persons of South Asian and Latin American, Central American, and Caribbean ethnic origins. These are also areas that have experienced an increase in single-parent households and in which households face increased affordability problems.

Table 3: Component Pattern Matrix: Rotated Loadings, Change Analysis, 1981–2006

VARIABLES	COMPONENT				
	1	2	3	4	5
PPERHH_8106	.882				
ONEPER_8106	-.870				
POP65_8106	-.672				
SUITABLE_8106	.528	.331		.339	
MANUF_8106		.814			
ELEMENTARY_8106		.753			
PROF_8106		-.637			
MAN_8106		-.633			
HIGHINCHH_8106	.533	-.598	-.446		
DEGREE_8106		-.463		.361	-.359
POP5064_8106			-.885		
POP2534_8106			.840		
TOTMOVERS_8106			.828		
C7181_9606_8106			.707		
POPLT15_8106	.571		.694		
EASTASIAN_8106				.862	
LANGNEF_8106				.860	
IMMIG_8106				.825	
RECIMMIG_8106				.528	
LOWINCOME_8106		.451		.501	
LATINCENSACARIB_8106					.758
AFFORDABLE_8106				.441	.655
SOUTHASIAN_8106	.321				.598
SINGLEPAR_8106					.573

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
Rotation converged in 18 iterations

As indicated earlier, this is an oblique rotation, therefore the components are allowed to correlate with each other. The correlations between the components in Table 4 are not high, suggesting that each component is making an independent and important contribution towards an understanding of changes in the neighbourhood social geography of these eight CMAs.

Table 4: Component Correlation Matrix, Change Analysis, 1981-2006

COMPONENT	1	2	3	4	5
1	1.000	-.091	.146	.218	-.021
2	-.091	1.000	-.167	.159	.229
3	.146	-.167	1.000	.119	.078
4	.218	.159	.119	1.000	.177
5	-.021	.229	.078	.177	1.000

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

The results are generally similar to the findings from previous social area/factorial ecology analyses of neighbourhood change data for other metropolitan areas, including changes in various aspects of economic status, family status, and ethnic status.

Component scores were also calculated for each census tract for each of the five components. The scores can be mapped for each component, but in this analysis they are used as input to the hierarchical cluster analysis.

2.2 Hierarchical Cluster Analysis

As noted earlier, hierarchical cluster analysis begins with each census tract as a separate cluster, following which the tracts are combined into successively larger groups until only one group is left containing all tracts. Squared Euclidean distance was used as the measure of similarity between tracts and Ward's method as the statistical algorithm. A key consideration in cluster analysis is selecting the optimum number of clusters or the "best" cluster solution.

For analyses with a large number of observations, coefficients from an agglomeration schedule can help. The idea is to stop clustering when the increase in the value of the coefficients between two adjacent steps is large. In this analysis, however, there were no logical breaks and it was difficult to select an optimal number of clusters based on the agglomeration schedule. Therefore we had to rely on other evidence and intuition.

One consideration is to avoid "clumping," or an excessive number of census tracts in one or two clusters. In trying to avoid "clumping," we concluded that 15 to 20 clusters would be sufficient to fully capture the differentiation among 2,987 census tracts. Upon further evaluation of the output from the cluster analysis, 17 clusters seemed like a reasonable compromise. More detailed evidence also suggested that the 17 clusters could be combined into 6 broad groups. The result is shown in the dendrogram in Figure 2. The branching nature of the dendrogram allows the researcher to follow a cluster forward until all 17 clusters are combined into one. To substantiate the validity of the six summary groups, average scores for the five components were computed for the 17 clusters and analysed using cluster analysis.

The identifiers shown on the vertical axis are the groups and clusters as they appear in the tables and maps that follow (U1, U2, U3; V1, V2 etc.). The letters designate the six broad groups

and the numbers identify the 17 clusters. This designation is used consistently in the tables and maps that follow. The letters have been chosen to differentiate these groups from those used in the 2006 neighbourhood typology (Murdie, Logan and Maaranen, 2013) in which the letters A through F were used to differentiate the groups.

The branching nature of the dendrogram, working forwards from the left side of the diagram, allows a higher-order or more generalized summary of the groups. For example, groups U and V are closely linked to each other, as are groups W and X and groups Y and Z. It is also evident that groups Y and Z are most differentiated from groups U, V, X, and Y at the highest level of classification.

The next step is identifying the groups and clusters. Rather than relying on the component scores, we used the original variables to identify the content of the groups and clusters. Brief descriptive names for the six groups and 17 clusters are shown in Table 5. The names are based on the more detailed information in Tables A.1 through A.6 in Appendix A.

The distribution of group and cluster membership by CMA is indicated in Table 6 and Figures 3 and 4. Census tracts representing groups U, V, W, and X are evident in all CMAs except group V in Halifax, the least populated and least socioeconomically complex of the eight CMAs. Groups Y and Z are restricted to Montréal, Ottawa, Toronto, and Vancouver, with the exception of Calgary, which is also represented in group Y. All 17 clusters are represented in Toronto and Vancouver, Montréal has 16, and Ottawa has 15. Calgary and Hamilton follow with 11 clusters, Winnipeg has 10, and Halifax has nine. The difference is primarily by size of city, an indication of the socioeconomic complexity of each CMA.

Table A.1 includes the variable profile for each of the 6 groups. Three separate values are given for each variable for each group: (1) incidence of the variable in 1981 (e.g., DEGREE81); (2) incidence of the variable in 2006 (e.g., DEGREE06); and (3) point change, DEGREE06 – DEGREE81 (e.g., DEGREE _8106). Table A.2 provides the ranks of these values over the six groups. The latter is useful in determining the importance of each variable for the purpose of assigning a name to each group. Tables A.3 through A.6 provide the same information for the 17 clusters.

Figure 2: Dendrogram using Ward Linkage

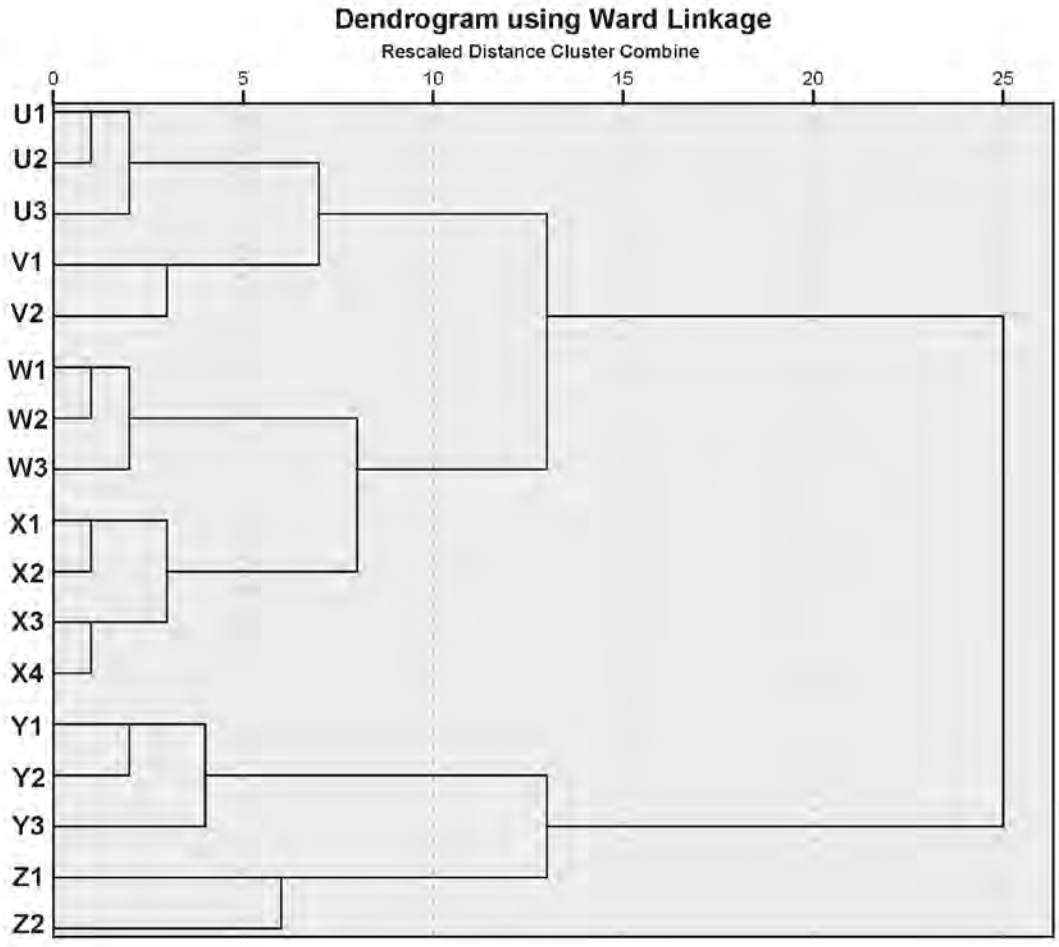


Table 5: Neighbourhood Groups and Clusters: Change Analysis, 1981-2006

(17 Clusters Organized into Six Broad Groups Based on a Hierarchical Cluster Analysis of Five Component Scores Derived from a Principal Components Analysis of 24 Variables at the Census Tract Level)

U: Aging in Place

- U1 Increase in Disadvantaged Adults 65 and Over
- U2 Increase in Disadvantaged Adults 50 and Over
- U3 Increase in Higher Status Older Adults

V: Immigrant Minorities Lagging Behind

- V1 Older Central City Immigrant
- V2 Younger Suburban Immigrant

W: Increased Socioeconomic Status

- W1 Emerging Middle Class
- W2 Emerging Young Professionals
- W3 Emerging New Elite

X: Embedded Economic Status

- X1 Middle Status in the Outer Suburbs
- X2 Middle Status in the Central City
- X3 Central City Elite Reinforcement
- X4 Declining Rental Housing

Y: Increased Asian Presence

- Y1 New Asian High-Rise
- Y2 Asian Diversification
- Y3 East Asian Succession

Z: Increased South Asian Presence

- Z1 Emerging South Asian
- Z2 South Asian Succession

Table 6: Neighbourhood Groups and Clusters: Change Analysis, 1981-2006 Distribution Within Census Metropolitan Areas

Group Cluster	Halifax	Montréal	Ottawa	Toronto	Hamilton	Winnipeg	Calgary	Vancouver	8 CMAs
U 1	23.5%	22.8%	19.6%	5.1%	19.5%	21.5%	24.9%	7.6%	14.8%
U 2	16.5%	8.0%	8.9%	0.7%	5.7%	4.4%	8.3%	2.2%	5.0%
U 3	12.9%	7.3%	14.9%	5.5%	10.9%	15.8%	22.5%	6.1%	8.9%
U Total	52.9%	38.1%	43.4%	11.4%	36.2%	41.8%	55.6%	16.0%	28.6%
V 1	0.0%	7.9%	1.7%	11.9%	4.0%	0.0%	0.0%	1.7%	6.5%
V 2	0.0%	0.4%	0.9%	9.5%	0.0%	0.6%	7.7%	3.4%	4.1%
V Total	0.0%	8.3%	2.6%	21.4%	4.0%	0.6%	7.7%	5.2%	10.6%
W 1	17.6%	7.4%	6.4%	5.8%	10.3%	3.2%	1.2%	2.9%	6.1%
W 2	2.4%	16.1%	4.3%	3.6%	1.1%	1.3%	4.1%	0.7%	6.4%
W 3	3.5%	3.2%	4.7%	3.7%	1.7%	0.0%	1.2%	2.9%	3.1%
W Total	23.5%	26.7%	15.3%	13.1%	13.2%	4.4%	6.5%	6.6%	15.6%
X 1	5.9%	4.1%	9.4%	5.3%	14.9%	7.6%	8.3%	10.1%	6.8%
X 2	9.4%	8.0%	11.1%	2.1%	20.7%	35.4%	7.1%	4.7%	8.1%
X 3	8.2%	5.2%	10.6%	11.3%	5.7%	6.3%	14.2%	13.8%	9.4%
X 4	0.0%	7.4%	2.6%	5.2%	5.2%	3.8%	0.0%	2.9%	4.8%
X Total	23.5%	24.8%	33.6%	24.0%	46.6%	53.2%	29.6%	31.4%	29.2%
Y 1	0.0%	0.7%	2.6%	3.0%	0.0%	0.0%	0.0%	9.8%	2.7%
Y 2	0.0%	0.9%	2.1%	8.7%	0.0%	0.0%	0.6%	21.9%	6.2%
Y 3	0.0%	0.2%	0.0%	5.7%	0.0%	0.0%	0.0%	3.7%	2.3%
Y Total	0.0%	1.8%	4.7%	17.4%	0.0%	0.0%	0.6%	35.4%	11.2%
Z 1	0.0%	0.2%	0.0%	6.4%	0.0%	0.0%	0.0%	2.7%	2.4%
Z 2	0.0%	0.0%	0.4%	6.3%	0.0%	0.0%	0.0%	2.7%	2.4%
Z Total	0.0%	0.2%	0.4%	12.7%	0.0%	0.0%	0.0%	5.4%	4.8%
CMA Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Figure 3: Eight Canadian Metropolitan Areas Based on Six Groups

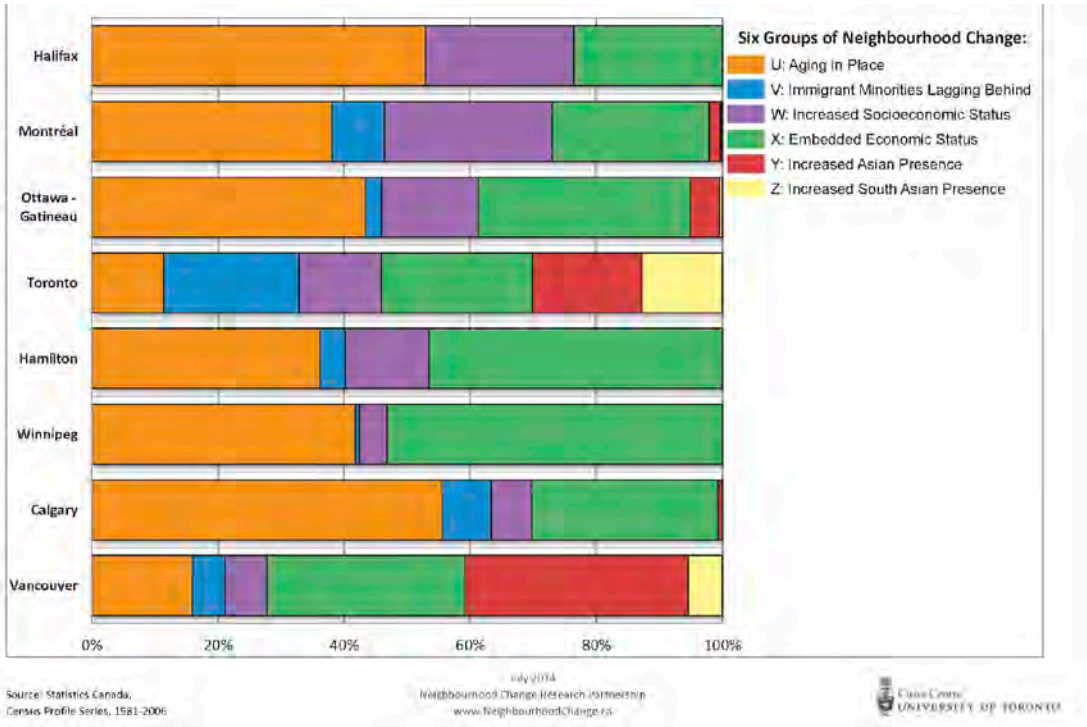
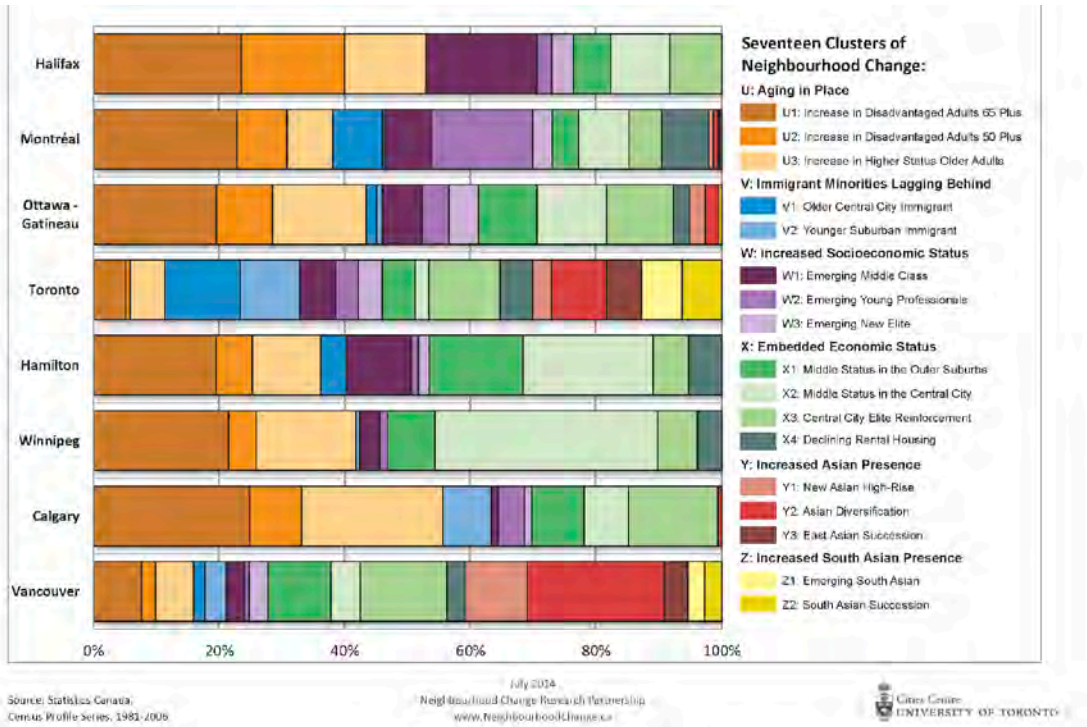


Figure 4: Eight Canadian Metropolitan Areas Based on Seventeen Clusters



Maps for the individual census metropolitan areas showing the six groups (Appendix B) and 17 clusters (Appendix C) appear in alphabetical order at the end of the report. An asterisk indicates clusters not represented on an individual map.

A brief discussion of each group and clusters within groups follows. We have not attempted a detailed interpretation of the spatial representation of the typology for each CMA. We leave that to the researchers in each CMA who are familiar with the local social geography.

2.3 Group and Cluster Identification

2.3.1 Group U: Aging in Place (Clusters U1, U2 and U3)

Group Identification

The Aging in Place group is characterized by an increase in older populations, single-person and single-parent households, persons of European and Aboriginal ethnic origins, and poorer quality housing conditions. Conversely, census tracts in this group experienced a decrease in younger age groups and persons per household as well as reduced levels of residential turnover. Of the six groups, this group had the highest percentage of older adults (aged 50–64) and seniors (aged 65 and over) in 2006 and the greatest increase in these two age groups between 1981 and 2006. These tracts also experienced the greatest increase in single-person households and the greatest decrease in children (less than 15 years) and young adults (age 25–34), as well as persons per household and residential mobility. These indicators are characteristic of an aging population with relatively little residential mobility.

The Aging in Place group includes three clusters distinguished primarily by changes in age structure, economic status, and housing stock. All three clusters are characterized by an increase in the older age groups and a decline in the younger age groups, but with differences that are noted below. Although the three clusters are suburban in orientation, they are differentiated by age and type of housing stock. Cluster U1 has the oldest housing and the lowest percentage of single detached dwellings, whereas cluster U3 has the newest housing and the highest percentage of single detached dwellings. Cluster U2 is in the middle.

Cluster Identification

(1) U1: Increase in Disadvantaged Adults 65 and Over: this cluster is identified by the largest percentage of population 65 and over in 2006 and the greatest change in this age group, increasing from 6.7 percent of the total population in 1981 to 17.7 percent in 2006. The cluster is also distinguished by a decrease in high-income households between 1981 and 2006 and an increase in one-person and single-parent households. In addition, the housing stock changed dramatically, from single detached to both low-rise and high-rise housing. Low-rise housing increased from 17.8 percent to 27.3 percent of the overall housing stock and high-rise housing from 7.5 percent to 10.2 percent between 1981 and 2006. Of the three clusters in this group this cluster had the lowest percentage of single detached and the highest percentage of multi-family dwellings in 2006. Over one-third of the dwelling units were rented in both 1981 and 2006.

(2) U2: Increase in Disadvantaged Adults 50 and Over: this cluster is similar to cluster U1, but with a greater increase in the older adult population (age 50–64) from 9.7 percent of the to-

tal population in 1981 to 21.3 percent in 2006. As noted above, cluster U2 is in the middle of the three clusters in terms of change in the core variables that distinguish group U.

(3) U3: Increase in Higher Status Older Adults: this cluster is distinguished from the other two clusters in this group by higher educational levels and incomes and fewer rental and multiple-unit dwellings. Compared with the other two clusters, it is also identified by a greater decrease in children and young adults and a greater increase in older adults, persons of European origin and single detached housing. The percentage of the population under 15 years of age declined from 29.7 percent to 18.1 percent in 2006 and the percentage of population between 25 and 34 years of age declined from 24.2 percent to 10.2 percent. Conversely, the percentage of population between 50 and 64 years of age increased from 7.6 percent to 21.9 percent. Almost two-thirds of the housing stock dates from the 1970s.

Distribution by CMA

Twenty-nine percent of the census tracts fall into group U, spread over all eight CMAs, but with a higher representation in Calgary, Halifax, Ottawa, and Winnipeg. Toronto and Vancouver, CMAs with a high incidence of recent immigrants, many of whom are in younger age groups, have a much lower representation of tracts in this group.

Of the clusters, U1 has the largest percentage of census tracts (14.8 percent) followed by U3 (8.9 percent) and U2 (5.0 percent). Cluster U1 includes about one-quarter to one-fifth of the census tracts in all CMAs except Toronto and Vancouver. Cluster U2 is strongly represented in Halifax followed by Ottawa, Calgary, and Montréal, while cluster U3 is strongly represented in Calgary, followed by Winnipeg and Ottawa.

Spatial Distribution Within CMAs

The census tracts in cluster U are located in the suburbs of all eight CMAs. This is particularly evident for the four CMAs with the highest incidence of tracts in this cluster. In general, there is a spatial gradation of clusters U1, U2, and U3 outwards from older inner suburbs to newer outer suburbs. The spatial patterning, however, for these and other clusters tends to be clearer for the smaller CMAs. Calgary, with the highest representation of tracts in this group, is a good example. In Toronto, the spatial distribution is not as clear, although parts of Vaughan, Richmond Hill, Whitchurch-Stouffville, Oakville, and Pickering-Ajax (all outer suburbs) are represented.

2.3.2 Group V: Immigrant Minorities Lagging Behind (Clusters V1 and V2)

Group Identification

Similar to group U, this group is characterized by an increase in older adults and a decrease in children (under 15 years) and young adults (aged 25–34). It differs, however, by a higher incidence and increase in immigrant minorities. The latter include Latin Americans/Caribbeans, Africans, South Asians, and Southern Europeans. The group also experienced an increase in sales and service occupations, unemployment, single-parent households, and worsening housing conditions. Housing affordability was a problem for 19.5 percent of households in 1981, but increased to 43.4 percent of households in 2006. In both years, about 40 percent of the cluster's housing units were rented and about 40 percent of the housing units were built in the 1970s.

This group includes two clusters differentiated primarily by central city/suburban location and associated age structure and economic status characteristics. Immigration increased in both clusters, although slightly more in cluster V2.

Cluster Identification

(1) V1: Older Central City Immigrant: Between 1981 and 2006, the percentage of adults 65 and over and one-person and single-parent households increased in these census tracts. Low levels of educational achievement, a high incidence of engagement in manufacturing and sales and service occupations, and lower incomes characterized the population of this cluster in both 1981 and 2006. Unemployment, always high, increased from 6.4 percent in 1981 to 9.1 percent in 2006, the highest incidence of all clusters. Sales and service occupations and single-parent households increased more than any other cluster, from 19.8 percent to 27.2 percent for sales and service occupations and from 14.1 percent to 25.6 percent for single-parent households.

This cluster had the highest representation of Southern Europeans in both 1981 and 2006, a group that almost doubled its percentage representation between these two years from 14.6 percent to 24.3 percent. In both Toronto and Montréal, these are traditional areas of post–Second World War Southern European settlement. During this period, however, the incidence of more recent immigrant groups, especially persons of Latin American/Caribbean and African origins, rose dramatically. For example, persons of Latin American/Caribbean origin increased from 2.3 percent of the cluster's population in 1981 to 13.8 percent in 2006.

(2) V2: Younger Suburban Immigrant: Between 1981 and 2006, census tracts in this cluster exhibited a greater increase in the percentage of adults 50–64 and a greater decline in children (less than 15 years) and young adults (aged 25–34) than the tracts in cluster V1. Regardless, the percentage of children (under 15 years) in 2006 was higher in this cluster than cluster V1 (18.1 percent vs. 15.6 percent), and the percentage of adults 65 and over was considerably less (8.6 percent vs. 14.1 percent). The percentage of one-person households (14.1 percent vs. 26.8 percent) was also substantially less.

Educational achievement is higher in this cluster than in cluster V1, but employment as managers and professionals remained relatively low in 2006. The incidence of persons with a degree and in managerial and professional occupations declined relative to other clusters. While the percentage of high-income households increased somewhat, the percentage of low-income households increased substantially from 9.1 percent to 17.9 percent.

The percentage of immigrants in this cluster increased from about one-third in 1981 to almost one-half in 2006. In contrast to cluster V1, much of this increase was attributable to an inflow of South Asians. Persons of South Asian ethnic origin in this cluster increased from 3 percent in 1981 to 26.4 percent in 2006. At the same time, persons of other ethnic origins also increased, including Southern Europeans from 5.3 percent to 12.9 percent, Latin Americans/Caribbeans from 2.6 percent to 12.4 percent, and Africans from 0.5 percent to 4.5 percent.

Compared to cluster V1, a much lower percentage of dwellings was rented in both 1981 and 2006 and, as expected, in newer housing areas the dwellings were in much better condition.

Distribution by CMA

Almost 11 percent of the census tracts are included in group V, 6.5 percent in cluster V1 and 4.1 percent in cluster V2. Toronto has the largest percentage (21.4 percent), followed by Montréal (8.3 percent), Calgary (7.7 percent), and Vancouver (5.2 percent). Toronto (11.9 percent) and Montréal (7.9 percent) have the largest percentage in cluster V1 and Toronto (9.5 percent) and Calgary (7.7 percent) in cluster V2. The importance of Toronto in this cluster reflects its significance as a leading immigrant reception area for a wide variety of ethnic groups, initially in the older areas of the city, especially the northwest corridor, and more recently in the outer suburbs.

Spatial Distribution within CMAs

As indicated above, cluster V1 is found primarily in older parts of the CMAs and cluster V2 in newer parts. Toronto, with the largest incidence of census tracts in both V1 and V2, is a good example. Cluster V1 encompasses much of the northwest corridor of the city, from Bloor Street to Steeles Ave. and west from the Spadina Expressway to north-central Etobicoke. This is Toronto's traditional immigrant reception area, beginning with Southern Europeans in the 1960s and 1970s, and a diversity of non-European countries after the 1970s following changes in Canadian immigration policy that put more emphasis on immigrants from developing countries. In addition to the northwest corridor, census tracts in this cluster are evident in many areas of Scarborough south of Highway 401 and in parts of Mississauga and Brampton.

With some exceptions, census tracts in cluster V2 are located in the outer suburbs, including western parts of Mississauga, Brampton east and west of Highway 410, Vaughan north of Steeles and east of Highway 400, and in northeast Scarborough. These are newer areas of the CMA that attract a younger immigrant population and more persons of South Asian background, especially in Brampton and Mississauga. Census tracts in Vaughan and northeast Scarborough may also be areas of second-generation immigrant settlement attracting the children of immigrants especially Southern Europeans, who initially lived in tracts associated with cluster V1.

2.3.3 Group W: Increased Socioeconomic Status (Clusters W1, W2, W3)

Group Identification

As indicated by the title this group experienced a considerable increase in socioeconomic status between 1981 and 2006. The percentage of degree-holders increased substantially from 7 percent to 34.9 percent, more than any other group, and there was a corresponding decrease in persons with only an elementary education from 59.3 percent to 17.8 percent. Persons engaged in managerial and professional occupations also increased more than any other group and there was a corresponding decrease in persons in manufacturing occupations. This group also experienced the largest increase in high-income households, from 10.8 percent to 20.8 percent, and was the only group to show a decline in low-income persons. It was also only one of two groups to show a decline in unemployment. More generally, the census tracts in this group went from bottom ranked in socio-economic status in 1981 to mid-level rank in 2006.

Concerning family status, this group is characterized by a wide spectrum of age groups and little change in age structure between 1981 and 2006. There was, however, a considerable increase in single-person households between the two years.

Immigration was not an important element of change for this group. Persons of British ethnic background decreased less than any other group and those for whom home language is neither English nor French increased very marginally. In contrast, however, persons of French background decreased dramatically, more than any other group, from 42 percent to 21.3 percent.

This group includes three clusters, all of which are characterized by an increase in managerial and professional occupations as well as high-income households and a decline in manufacturing occupations and low-income families. They are differentiated, however, by change in educational achievement and age of dwellings. The latter contrasts inner-city/suburban locations.

Cluster Identification

(1) W1: Emerging Middle Class: This cluster shifted from predominantly lower-status "blue-collar" in 1981 to a mix of "blue-collar" and middle class in 2006. The cluster increased in educational, occupational, and income status, thereby mimicking the group as a whole, while lower-status groups declined proportionately but were still in evidence. These neighbourhoods are clearly in transition. The percentage of adults aged 50–64 and 65 and older increased, as did single-person households. The cluster includes relatively few recent immigrants, but persons of British, Southern European, and more recently arrived origins, such as Caribbean and African, increased, contributing to the mix of ethnic origins in this cluster. Concerning residential development, these are areas principally of single detached dwellings, many dating from the 1970s.

(2) W2: Emerging Young Professionals: This cluster is characterized by an increase in highly educated young professionals, young adults (aged 25–34) and single-person households. Young adults and single-person households, as well as single-parent families, are more strongly associated with this cluster than the other two clusters in group W. Compared with the other two clusters, there has also been a modest increase in immigrants and a decline in persons of European origin, especially French origin. The areas occupied by this cluster are also identified by an increase in recently constructed multi-family housing, both low-rise and high-rise. An older housing stock and a much lower percentage of single-family residences than the other two clusters further characterize this cluster.

(3) W3: Emerging New Elite: This cluster is identified by a greater increase in persons with a university degree and managerial occupations, persons of European origins, and high-income households than the other two clusters. In contrast to the other two clusters, there was a substantial increase in new residential construction in the decade prior to the 2006 census.

Distribution by CMA

This group accounts for 15.6 percent of the census tracts in the analysis: 6.1 percent in cluster W1, 6.4 percent in cluster W2, and 3.1 percent in cluster W3. There is considerable differentiation by CMA. About one-quarter of the tracts in Halifax and Montréal, one-fifth in Ottawa, Hamilton, and Toronto, but only about 5 percent of the tracts in Winnipeg, Calgary, and Vancouver are included in this group. Thus there is a difference from east to west across Canada, perhaps attributable to age of CMA and renewed interest by younger professionals for living in either older central areas or newer suburbs of eastern cities.

Clusters W1 (Emerging Middle Class) and W2 (Emerging Young Professionals) are highly differentiated by CMA. Almost 20 percent of Halifax's tracts are located in cluster W1 and more than 15 percent of Montréal's tracts in cluster W2. The census tracts in cluster W3 (Emerging New Elite) are more evenly spread across seven CMAs. Winnipeg does not have any tracts in cluster W3.

Spatial Distribution within CMAs

Census tracts from cluster W1 are primarily located in the outer suburbs of the Halifax, Hamilton, Montréal, and Ottawa CMAs. Although there has been new construction, these areas of the city were developed primarily in the 1970s. The original occupants of the houses, largely "blue-collar," may be selling their property and moving on, and are being replaced by a new middle class that finds these houses more affordable and spacious than other areas of the CMA. Also, the original occupants and their children who are still there may have increased their economic status over the years.

Halifax and Toronto, however, are exceptions to the dominant suburban location of these clusters in the other CMAs. In Toronto, for example, a number of census tracts north and south of the Danforth and east of the Don Valley fall in this cluster. These areas of relatively affordable housing, often smaller bungalows with basement living quarters, were initially occupied by Southern European immigrants, predominantly Greeks, but are increasingly home to persons of higher economic status and diverse ethnic backgrounds seeking a central city location. In the meantime, the original Southern European families have moved to newer housing in the eastern suburbs.

In Montréal and Toronto, the census tracts in cluster W2 are primarily located in the central cities of both CMAs; in Montréal immediately east of Montréal's downtown core from Boulevard St. Laurent to Parc Maisonneuve, south of Boulevard Rosemont, and in Toronto west of the city's core south of Bloor Street from Bathurst Street to the Junction. In Toronto, this area corresponds to neighbourhoods occupied in the early post–Second World War period by newly arrived immigrants, especially Italians and Portuguese, many of whom have moved to more suburban locations. Younger urban professionals are often attracted to areas such as these that have not been fully gentrified and therefore have relatively affordable, primarily semi-detached housing, and easy access to the downtown core. Closer to the waterfront, these are areas of new high-rise condominium development that Marcuse and van Kempen (2000: 257–60) refer to as "soft locations" – areas of previous industrial and port facilities that are being developed as upper-income residential.

In contrast to cluster W2, the census tracts in cluster W3 are located primarily in the suburbs. This corresponds to the changing characteristics of these census tracts – newer housing and a greater increase in economic status compared with the other two clusters in this group. This cluster is also characterized by a substantial increase in high-income households of European ethnic origin. In Toronto, the census tracts in this cluster are located in the outer suburbs (northeast Vaughan, northern Richmond Hill, large parts of Whitchurch-Stouffville, and parts of Oakville and Pickering-Ajax). It can be hypothesized that second-generation European immigrants whose families first located in central Toronto moved to Etobicoke, North York, and Scarborough as their economic circumstances improved, before moving "upwards and outwards" to much newer and larger housing in the outer suburban fringe.

2.3.4 Group X: Embedded Economic Status (Clusters X1, X2, X3, X4)

Group Identification

This group consists of four somewhat diverse clusters. The essential characteristic of this group, however, as indicated by the aggregate data, is its high economic status in 1981 continuing through 2006. This is especially evident for educational achievement and occupational status. In both years, this group was the highest ranked of all groups for persons with a university degree and employment in managerial and professional occupations. Income, while not the highest of the groups, increased relatively between 1981 and 2006.

However, as will be noted in the more detailed analysis of each of the four clusters that make up Group X, the aggregate data do not reveal the true picture. Taking high-income households as an example, and comparing clusters X1 and X3 with clusters X2 and X4, the first two clusters had much higher incomes in 2006 and increased their share of high-income households quite considerably between 1981 and 2006.

Concerning age structure, the residents of group X tended to be older in both years. In both 1981 and 2006, this group had the highest percentage of persons of British and Western European origins of all groups, and the greatest increase in persons of Western and Southern European origins. As noted below, however, there are differences between clusters, especially cluster X4 versus the other clusters in the group. Housing characteristics, including type of housing stock, changed relatively little over the 25 year period. The housing stock remained a mix of single-detached, low-rise, and high-rise. Affordability issues increased less than any other group.

Cluster Identification

(X1): Middle Status in the Outer Suburbs: Except for an increase in the percentage of high-income households, the major characteristics of this cluster are its continued middle economic status between 1981 and 2006 and its location in the outer suburbs of most CMAs. Variables such as university degree, elementary education, and managerial and professional occupations were close to the eight-CMA mean in both 1981 and 2006. In contrast to educational achievement and occupational status, however, the percentage of high-income households increased substantially from 18.5 percent in 1981 to 35.4 percent in 2006.

With respect to ethnic composition, the percentage of persons of European origin increased considerably, from 5.2 percent in 1981 to 31.6 percent in 2006 for Western, Northern, and Eastern Europeans and from 2.4 percent in 1981 to 13.2 percent in 2006 for Southern Europeans. The percentage of recent immigrants, however, is quite low, indicating that these groups were already established in their respective CMA and likely moved from more central locations to newer single detached housing in the outer suburbs, especially housing built in the 1970s and beyond.

(X2): Middle Status in the Central City: Most of the economic status variables for this cluster are close to the average values for 1981 and 2006 and for change between 1981 and 2006. Two ethnic origin variables stand out: a substantial increase in the Aboriginal population and in persons of Western, Northern, or Eastern European ethnic origin. The Aboriginal population increased from 0.1 percent in 1981 to 6.5 percent in 2006. Similar to clusters X1 and X3, the West-

ern, Northern, and Eastern European population also increased substantially during this period. The percent population over 65 years of age was considerably above the mean in both years.

(X3): Central City Elite Reinforcement: This cluster is characterized primarily by individuals with a high educational achievement employed in managerial or professional occupations and earning relatively high incomes. In comparison to the other clusters, this cluster had the largest percentage of persons with a university degree and the lowest percentage of persons with only an elementary education in both 1981 and 2006. It also had the highest percentage of persons employed in professional occupations and the lowest percentage of persons employed in manufacturing occupations in both years. The age distribution was mixed in both years and like most of the other clusters in group X the percentage of Western, Northern and Eastern Europeans increased between 1981 and 2006.

(X4): Declining Rental Housing: This cluster consists primarily of pockets of high- and low-rise rental housing. While the built form of these areas remained constant between 1981 and 2006, their economic and ethnic composition changed dramatically. High-rise housing accounted for about 40 percent of the stock in both years and low-rise housing accounted for about 26 percent in 1981, rising to almost 30 percent in 2006. These areas were redeveloped as apartment clusters in the 1960s and 1970s and were initially attractive to young well-educated Canadian-born adults who were just starting out on their own. However, the condition of the housing stock declined between 1981 and 2006.

There were also substantial changes in both the economic status of the residents, especially income, and their ethnic backgrounds. The residents of these census tracts had a relatively high educational attainment in both 1981 and 2006, but a decline in incomes between these two years. Although a relatively high percentage of the labour force in both years was employed in managerial and professional jobs, occupational status became more varied between 1981 and 2006, with an increased percentage of the labour force engaged in sales and service occupations. The unemployment rate in 2006 was the second-highest of all clusters.

Immigration in these areas increased from 1981 to 2006, almost comparable to the flow of new immigrants to census tracts in newer outer suburban areas identified in groups Y and Z. The increase included a diversity of ethnic groups, particularly persons of Arab/West Asian, Southeast Asian, African, Latin, South and Central American, and Caribbean origin. Persons of Arab/West Asian origins increased considerably more than any other cluster, from 1.7 percent of the total population in 1981 to 11.2 percent in 2006.

These high- and low-rise developments are the new foci of recently arrived lower-income immigrants in major Canadian cities. The newcomers have replaced Canadian-born residents of British and French origins who lived here when many of the developments were relatively new, but after marriage and starting a family were able to move fairly quickly to homeownership. This was particularly the case for residents of private rental developments. A major issue is whether the current residents of these high-rise buildings will be able to achieve the same level of upward residential mobility as their predecessors.

Distribution by CMA

This group accounts for 29.2 percent of all tracts in the analysis. Winnipeg (53.2 percent) and Hamilton (46.6 percent) are considerably overrepresented. Cluster X1 accounts for 6.8 percent of the census tracts, with representation in all CMAs but notably in Hamilton (14.9 percent), Vancouver (10.1 percent), Ottawa (9.4 percent), Calgary (8.3 percent), and Winnipeg (7.6 percent). Aside from Vancouver, these are all CMAs that experienced a considerable amount of European migration in the early post–Second World War period.

Cluster X2 includes 8.1 percent of all the tracts in the analysis distributed across all eight CMAs. Two CMAs stand out. Over one-third of Winnipeg's census tracts are in this cluster and about one-fifth of Hamilton's tracts are represented. A strong European population characterizes both CMAs. Winnipeg, in particular, has a substantial Aboriginal population.

Cluster X3 accounts for 9.4 percent of all tracts in the analysis distributed across the CMAs. Calgary (14.2 percent), Vancouver (13.8 percent), Toronto (11.3 percent), and Ottawa (10.6 percent) had the largest representation. These CMAs are characterized by skilled employment opportunities in both the private and public sectors.

Cluster X4 accounts for 4.8 percent of all census tracts in the analysis. All CMAs except Halifax and Calgary are represented. Montréal dominates, with 7.4 percent of the tracts in that city followed by 5.2 percent of the tracts in each of Hamilton and Toronto. These are older eastern CMAs that experienced considerable rental housing development in the 1960s and 1970s, principally as a result of urban renewal programs.

Spatial Distribution within CMAs

The tracts in cluster X1 are located primarily in the outer suburbs. In Winnipeg, for example, these tracts ring the city (except for the south) and include Headingly, Old Kildonan, West St. Paul, East St. Paul, and Springfield. Even in Toronto, with a lower representation overall in this cluster, there is a clear representation of tracts in outer suburban locations such as Caledon, King, East Gwillimbury, and North Pickering. In contrast, census tracts from cluster X2, especially Winnipeg and Hamilton, are located entirely in the broad central areas of both CMAs.

Census tracts in cluster X3 are located in the central areas of most CMAs. In Toronto, for example, the majority of these tracts are in the long-standing high-status areas of North Toronto, High Park, and Central Etobicoke; in Vancouver, Point Grey, the West End, North Vancouver, and parts of West Vancouver; in Ottawa, the Glebe and Rockcliffe Park.

In Toronto, the tracts in cluster X4 are associated with areas of high-rise rental housing developed in the 1960s and 1970s. Both private and public housing areas are represented. Examples include South Parkdale, St. Jamestown, and Thorncliffe Park, all of which have become important areas of recent immigrant settlement, especially housing newcomers with relatively low economic status from a variety of countries. There are exceptions, however. Lawrence Heights, for example, is an area of primarily low-rise public housing increasingly occupied by recent immigrants. The private rental apartment clusters in the Yonge-Eglinton-Davisville area were also built during this period, but are more desirable than the others, partly because of their good subway connection to downtown.

2.3.5 Group Y: Increased Asian Presence (Clusters Y1, Y2, Y3)

Group Identification

Although the residents of group Y have a relatively high level of educational achievement, their occupational status, aside from managerial employees and incomes, do not match their educational levels. The change in income between 1981 and 2006 is particularly striking. This group was the only one with a decline (albeit slight) in high-income households between the two years and the percentage of low-income households increased substantially compared to the other groups. The unemployment rate also increased more than the other five groups, and by 2006 was second highest. Thus, the residents in this group seem to be experiencing increased disadvantage.

The age and other demographic characteristics remained relatively the same between the two years. In both 1981 and 2006, this group had the highest percentage of immigrants and recent immigrants, as well as the highest percentage of East Asian, Southeast Asian, and Arab/West Asian immigrants. Between 1981 and 2006, this group also experienced the largest increase in these Asian groups as well as non-English/French speakers. Not surprisingly, the percentage of persons of British origin declined dramatically. The percentage of persons of French origin also declined but, in contrast to British origin, the percentage is relatively small. Concerning housing stock, the percentage of single-family housing decreased dramatically, while the percentage of high-rise housing increased more than any other group, with the result that high-rise housing accounts for a higher percentage of housing in this group than in any other, largely due to new construction.

Cluster Identification

(Y1): New Asian High-Rise: This cluster is primarily characterized by a substantial increase in immigrant population and corresponding changes in ethnic status, particularly increases in East Asian and Arab/West Asian groups. As a result, residential mobility was quite high. Conversely, there was a decrease in the percentage of persons of British, European, and other non-Asian origins. The number of persons per household also increased. Educational status increased, as did persons employed in professional occupations. However, the percentage of low-income persons increased more than any other cluster and at 28.1 percent in 2006, this cluster had the highest percentage of low-income persons. The percentage of high-income households remained about the same in 2006 and 1981, suggesting that a relatively large number of low-income employees were contributing to overall household income.

The housing stock changed dramatically between 1981 and 2006. Slightly more than one-third of the units were built in the decade between 1996 and 2006. The percentage of single detached dwellings declined from 50 percent to slightly less than 30 percent and the percentage of high-rise units increased from about 20 percent to 30 percent. During the same period, the percentage of rental units declined from 50 percent to fewer than 40 percent, suggesting that many of the newly built units were high-rise condominiums.

(Y2): Asian Diversification and (Y3) East Asian Succession

These two clusters are characterized by a substantial increase in Asian immigrants between 1981 and 2006. They differ, however, in terms of the source regions of their immigrant population. Although East Asians are the largest Asian group in both clusters, they are much more prominent in cluster Y3. East Asians increased from 5.2 percent to 23.6 percent of the population in cluster Y2, but from 7 percent to 44.1 percent in cluster Y3. There was an 18.4 percent increase in East Asian population between the two years in cluster Y2 compared with 37 percent in cluster Y3. The result was a greater diversity of ethnic origin groups in cluster Y2, including persons of South Asian, Southeast Asian, European, and Latin American and Caribbean origins, all of which increased their representation in this cluster. The British origin group declined substantially in both clusters.

Both clusters were slightly higher than average in educational achievement and similar to average in occupational status. Although cluster Y3 had a higher percentage of high-income households than cluster Y2 in 2006, the decline from 1981 in high-income households was sharper than that for cluster Y2. The percentage of high-income households remained about the same in cluster Y2, while in cluster Y3, average household incomes declined from 30.4 percent to 26.2 percent. Both clusters had a higher than average percentage of low-income persons with a considerably higher-than-average increase in low-income earners between 1981 and 2006, especially in cluster Y3. The unemployment rate also increased considerably more than average in both clusters.

Both clusters had an average percentage of residents in all age groups in 2006, but cluster Y3 had a considerably younger age structure in 1981 and its older age groups increased substantially between 1981 and 2006. As well, the percentage of one-person households and single-parent families increased considerably in cluster Y3, with the result that it approximately equalled these percentages in cluster Y2 by 2006.

Concerning housing structure, about 40 percent of the dwelling units in cluster Y2 were rented, compared with approximately 20 percent in cluster Y3 in both 1981 and 2006. Slightly more than half of the units in both clusters were in single detached units in 1981, but the percentage of this housing stock declined from 55.1 percent to 34.5 percent in cluster Y2 and from 52.1 percent to 45.1 percent in cluster Y3. The housing structure in cluster Y2 is also considerably older than cluster Y3.

Distribution by CMA

This group accounts for 11.2 percent of the census tracts in the analysis, primarily in Vancouver (35.4 percent) and Toronto (17.4 percent), the two major centres of recent Asian immigration to Canada.

Cluster Y1 accounts for 2.7 percent of the census tracts with Vancouver accounting for the largest percentage (9.8 percent), followed by Toronto (3.0 percent) and Ottawa (2.6 percent). Cluster Y2 (Asian Diversification) includes 6.3 percent of the census tracts in the analysis and cluster Y3 (East Asian Succession) includes 2.3 percent of the tracts. Most of the tracts are located in Vancouver and Toronto although there is a difference between the two CMAs. Almost one-fifth of Vancouver's tracts are in cluster Y2 compared with 8.7 percent of Toronto's tracts.

In contrast, 5.7 percent of Toronto's tracts are in cluster Y3, but only 3.7 percent of Vancouver's tracts are in this cluster.

Spatial Distribution within CMAs

In Vancouver, the tracts in cluster Y1 are located in the City of Vancouver from Cambia to Dunbar Streets, south of 16th Avenue, and in Richmond west of Highway 99, but excluding parts of Steveston in southwest Richmond. In Toronto, the majority of tracts are located at the termini of the Yonge/Spadina and Sheppard subways and the Scarborough LRT. These are areas of new condominium construction, especially centred on the Sheppard and Finch stations on the Yonge subway line, and in all cases located close to large areas of recent Asian residential settlement. Beyond the City of Toronto, there are pockets of this cluster in Vaughan, Richmond Hill, and Markham.

In Vancouver, cluster Y2 (Asian Diversification) includes much of Burnaby and the eastern portion of Richmond. Cluster Y3 comprises various areas of Surrey and southwest Richmond. In Toronto, cluster Y2 includes older parts of Scarborough (especially south of Highway 401) and North York (north of Highway 401). Cluster Y3 includes newer areas of Scarborough and North York (north of Highway 401) and parts of Markham and Richmond Hill.

2.3.6 Group Z: Increased South Asian Presence (Clusters Z1, Z2)

Group Identification

The census tracts in this group changed dramatically in ethnic composition between 1981 and 2006. In 1981, these tracts housed primarily persons of British and Western/Eastern European origin, but by 2006, South Asians had become the dominant ethnic group. In 1981, South Asians accounted for only 1.8 percent of the group's population while by 2006 South Asians comprised more than one-third of the population. A variety of other non-European groups also increased substantially, including persons of Southeast Asian, East Asian, Latin American and Caribbean, Arab/West Asian, and African origins. As expected, the number of immigrants and recent immigrants increased substantially, more than the other five groups, and the level of household mobility was higher than the other groups. Not surprisingly, the percentage of persons of British origin declined dramatically, from 52.1 percent in 1981 to 14.5 percent in 2006.

Regarding age and household composition, the percentage of population less than 15 years increased slightly, whereas the percentage in this age group declined in all the other groups. Conversely, the percentage of persons 65 years and older and the percentage of single-person households declined, whereas these two variables increased in the other five groups. Persons per household increased markedly compared to the other groups. Educational attainment is in the mid-range of the groups, as is occupational status, but household incomes are relatively high, presumably due to the comparatively large number of employed persons in the household.

Cluster Identification

(1) Z1: Emerging South Asian and (2) Z2: South Asian Succession: These two clusters are best discussed comparatively. They both experienced a substantial increase in South Asian immigrant population between 1981 and 2006, but the South Asian population increased by 45

percentage points in cluster Z2 compared with an increase of 21 percentage points in cluster Z1. The flow of recent immigrants was also higher in cluster Z2 than in any of the other 16 clusters. In 2006, cluster Z2's population was 47 percent South Asian compared with 22 percent in cluster Z1. In contrast to cluster Z2, cluster Z1 also experienced a comparative increase in East Asian and European populations. Therefore, cluster Z1 has become more diverse ethnically than cluster Z2. Population of British ethnicity declined dramatically in both clusters between 1981 and 2006.

The two clusters also differ in economic status. Cluster Z1 improved considerably in economic status between 1981 and 2006 compared with cluster Z2. Consequently, the residents of cluster Z1 have higher levels of educational attainment, occupational status, and income than cluster Z2. In terms of housing characteristics, cluster Z1 is much more a homeownership population and an area of single detached housing than cluster Z2. It is also an area of newer housing. The residents of both clusters experience more affordability problems than the other 15 clusters, increasing from less than 20 percent of households in 1981 to 49.5 percent for Z1 and 57.7 percent for Z2 in 2006.

Distribution by CMA

This group accounts for 4.8 percent of the census tracts in the analysis. Most of Canada's South Asians live in Toronto or Vancouver, therefore it is not surprising that these two CMAs have the largest representation of census tracts in this group (12.7 percent of Toronto's tracts and 5.4 percent of Vancouver's tracts). In each CMA, the percentage of these census tracts is evenly split between clusters Z1 and Z2.

Spatial Distribution Within CMAs

In both Toronto and Vancouver, these census tracts are located primarily in the outer suburbs. In Toronto, the main areas include Mississauga north of Highway 407 and suburban Brampton, both of which are near Pearson International Airport, and Ajax to the east, as well as isolated pockets in the City of Toronto such as Rexdale, Weston, Crescent Town, and concentrations of high-rise housing in Scarborough. In Vancouver, the major concentrations are in parts of Surrey, the traditional area of South Asian (especially Punjabi) settlement.

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3. Conclusion

The present study is based on a study of 1981–2006 census tract data for 2987 tracts in eight CMAs and includes 24 variables related to economic status, age, family and household status, immigrant and ethnic status, migrant status, and housing status. A principal components analysis of these variables resulted in five interpretable components accounting for 71 percent of the variance in the original 24 variables. The components were labelled Family Status Change, Economic Status Change, Movers and Stayers, New East Asian Immigrants, and Increase in South Asian/Caribbean Population.

A cluster analysis was undertaken using the component scores from the five components. This resulted in two levels of clusters: 17 clusters organized into six summary groups. Average values for the groups and clusters on the 24 variables shown in Table 2a and the 16 variables in Table 2b were used to more clearly identify the groups. The six groups were identified as: Aging in Place, Immigrant Minorities Lagging Behind, Increased Socioeconomic Status, Embedded Economic Status, Increased Asian Presence, and Increased South Asian Presence. Separate clusters further differentiate the individual groups. Toronto and Vancouver contain all 17 clusters while Montréal and Ottawa with 16 and 15 clusters respectively are not far behind. Halifax has only nine. Calgary and Hamilton with 11 clusters and Winnipeg with 10 are between these CMAs. Larger and more socially complex cities exhibit the largest number of clusters.

The clusters were mapped for each CMA. Although not all clusters appear in every CMA, there is a degree of commonality to the location of the clusters. Of the six broad groups, groups U (Aging in Place) and V (immigrant Minorities Lagging Behind) are closely linked to each other, as are groups W (Increased Socioeonomic Status) and X (Embedded Economic Status) and groups Y (Increased Asian) and Z (Increased South Asian). Based on the dendrogram (Figure 2) groups Y and Z are most differentiated from groups U, V, W and X at the highest level of classification, given the importance of these two groups as large areas of recent Asian settlement in both Toronto and Vancouver.

Group U (Aging in Place) is found in the suburbs of all eight CMAs, but especially smaller CMAs such as Calgary, Halifax, Ottawa, and Winnipeg. In general there is a spatial gradation by age of residents, from inner to outer and older to newer suburbs. The two clusters in group V (Immigrant Minorities Lagging Behind) are also differentiated by inner city and outer suburban location, the traditional central city immigrant reception areas that continue to receive newcomers and newer areas of the CMAs that attract a younger immigrant population and second-generation immi-

grants. Census tracts in group W (Increased Socioeconomic Status) experienced a dramatic increase in educational attainment, occupational status, and income between 1981 and 2006. As with group V, there is differentiation in the location of the three clusters in this group, but in many cases they correspond with older central city areas where immigrant families are being replaced by young urban professionals or outer suburban areas where second-generation relatively high-income families of European background are relocating. The socio-economic structure of group X (Embedded Economic Status) remained relatively stable between 1981 and 2006. Finally, as noted earlier, groups Y and Z are strongly differentiated from the previous four groups by substantial increase in immigrants from various Asian countries.

The groups and clusters identified in this analysis mirror Marcuse and van Kempen's (2000: 249) three general areas of change and more particularly the "new socio-spatial formations within the divisions." For Canadian CMAs, we identified four new socio-spatial formations that are particularly important in understanding change in the social structure of these CMAs. These include (1) gentrification, whereby former central city working class areas are upgraded physically and socio-economically, (2) exclusionary enclaves, both elite areas that have benefited from processes of globalization and low-income areas that have not benefited from these processes, (3) the formation of new ethnic enclaves and (4) edge cities, newly developed areas that are not strongly linked to the daily life of the central city.

In this analysis, clusters such as W1 (Emerging Middle Class, especially in east end Toronto) and W2 (Emerging Young Professionals) reflect a change in socio-economic characteristics associated with early stages of gentrification. Exclusionary enclaves are most clearly suggested by cluster X3 (Central City Elite Reinforcement), contrasted with cluster X4 (Declining Rental Housing). Given the inflow of immigrants to Canadian CMAs in the post–Second World War period, there are numerous examples of ethnic enclaves. The most recent examples are clusters Y1 (New Asian High Rise), Y2 (Asian Diversification), Y3 (East Asian Succession), Z1 (Emerging South Asian), and Z2 (South Asian Succession). In Toronto and Vancouver, the census tracts in these clusters are all located in the inner and outer suburbs. Finally, clusters such as Z1 (Emerging South Asian) and W3 (Emerging New Elite) are areas of new-build construction in the outer suburbs that have tenuous links to the central city.

More generally, these new socio-spatial formations reflect at least three general areas of change: (1) strengthened structural spatial divisions with increased inequality among them; (2) new socio-spatial formations within these structural divisions; and (3) a set of "soft" locations in which change is taking place (e.g., condominium developments in waterfront locations). As Marcuse and van Kempen (2000:249) indicate these divisions and other changes that have become increasingly sharper over time have important implications with respect to "winners" and "losers" within contemporary urban areas.

This typology of neighbourhood change is an important portrayal of the increasingly complex social geography of Canada's CMAs. To paraphrase Marcuse and van Kempen (2000), there is not a new spatial order in Canadian cities, but there have been important visible changes that impact the lives of eight of Canada's largest and most important CMAs.

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Appendix A: Tables

Table A.1: Detailed Census Profile 1981-2006 of the Six Groups

(Values in bold are the point difference between 1981 and 2006 percentages)

Variable	8-CMA Mean	U	V	W	X	Y	Z
DEGREE81	12.2	11.8	7.3	7.0	17.4	13.2	7.5
DEGREE06	33.4	27.1	22.2	34.9	40.5	40.0	33.0
DEGREE_8106	**21.2**	**15.3**	**14.9**	**27.9**	**23.0**	**26.8**	**25.5**
ELEMENTARY81	47.8	44.1	55.3	59.3	42.6	45.7	52.2
ELEMENTARY06	17.2	18.1	25.5	17.8	13.4	15.5	18.1
ELEMENTARY_8106	**-30.6**	**-26.1**	**-29.8**	**-41.4**	**-29.1**	**-30.2**	**-34.0**
MAN81	10.6	12.2	8.1	6.7	12.2	11.2	8.8
MAN06	17.6	17.2	12.0	17.8	20.1	18.1	15.9
MAN_8106	**7.0**	**5.1**	**3.9**	**11.1**	**7.8**	**6.9**	**7.1**
PROF81	14.4	15.1	10.1	10.8	17.9	14.3	10.3
PROF06	22.4	21.5	16.1	24.3	25.3	23.0	17.4
PROF_8106	**8.0**	**6.4**	**6.0**	**13.6**	**7.4**	**8.7**	**7.1**
SALESSERV81	20.7	20.7	19.1	21.7	21.0	21.1	18.7
SALESSERV06	23.8	24.4	26.0	22.7	22.5	25.3	22.5
SALESSERV_8106	**3.1**	**3.7**	**6.9**	**1.0**	**1.5**	**4.2**	**3.9**
MANUF81	26.5	25.4	34.5	33.1	21.1	24.1	32.7
MANUF06	17.4	18.1	27.1	14.6	13.8	16.0	26.4
MANUF_8106	**-9.1**	**-7.3**	**-7.3**	**-18.5**	**-7.3**	**-8.1**	**-6.3**
HIGHINCHH81	18.3	21.0	15.5	10.8	18.9	22.8	19.6
HIGHINCHH06	23.3	23.7	17.0	20.8	26.2	21.7	28.6
HIGHINCHH_8106	**5.0**	**2.7**	**1.5**	**10.0**	**7.3**	**-1.1**	**9.0**
LOWINCOME81	12.8	10.0	14.3	19.6	12.2	11.2	10.6
LOWINCOME06	16.1	11.3	22.0	16.3	15.1	23.4	19.0
LOWINCIME_8106	**3.3**	**1.3**	**7.7**	**-3.3**	**2.9**	**12.2**	**8.4**
UNEMP81	5.9	5.8	5.4	8.4	5.6	4.5	4.5
UNEMP06	6.5	5.6	8.4	6.4	6.2	7.6	7.4
UNEMP_8106	**0.6**	**-0.2**	**3.0**	**-1.9**	**0.6**	**3.2**	**3.0**
POPLT1581	20.9	25.1	24.3	19.6	16.5	20.1	21.2
POPLT1506	16.9	16.5	19.4	15.7	16.2	16.3	22.9
POPLT15_8106	**-4.0**	**-8.6**	**-4.9**	**-3.8**	**-0.4**	**-3.8**	**1.7**

Table A.1: Continued

Variable	8-CMA Mean	U	V	W	X	Y	Z
POP253481	18.6	19.5	19.4	17.4	18.8	17.8	16.9
POP253406	14.0	11.4	14.0	17.9	14.3	14.1	14.4
POP2534_8106	**-4.6**	**-8.1**	**-5.4**	**0.5**	**-4.5**	**-3.7**	**-2.5**
POP506481	14.2	11.4	12.5	15.8	16.2	15.2	14.6
POP506406	18.3	20.5	16.9	17.0	18.2	17.8	15.1
POP5064_8106	**4.2**	**9.0**	**4.4**	**1.3**	**2.0**	**2.7**	**0.5**
POP6581	9.1	5.2	6.1	9.8	13.3	9.4	9.2
POP6506	13.2	14.8	12.0	11.4	13.9	13.4	7.8
POP65_8106	**4.1**	**9.6**	**5.8**	**1.6**	**0.6**	**4.0**	**-1.4**
ONEPERS81	19.2	11.3	13.8	21.9	28.2	18.6	16.0
ONEPERS06	26.3	23.8	21.9	32.1	31.5	21.6	11.4
ONEPERS_8106	**7.1**	**12.5**	**8.1**	**10.2**	**3.3**	**3.0**	**-4.7**
SINGLEPAR81	11.9	10.0	12.4	14.7	12.4	12.0	9.9
SINGLEPAR06	17.7	17.0	23.5	18.5	16.4	17.0	16.0
SINGLEPAR_8106	**5.8**	**7.0**	**11.1**	**3.8**	**4.0**	**5.0**	**6.0**
PPERHH81	2.9	3.2	3.1	2.8	2.5	2.9	3.1
PPERHH06	2.6	2.6	2.9	2.4	2.5	2.9	3.6
PPERHH_8106	**-0.3**	**-0.6**	**-0.2**	**-0.5**	**-0.1**	**0.0**	**0.5**
IMMIG81	24.1	17.0	33.3	20.8	24.9	33.7	29.2
IMMIG06	30.8	20.1	46.0	23.1	26.5	55.9	54.5
IMMIG_8106	**6.8**	**3.2**	**12.7**	**2.3**	**1.6**	**22.2**	**25.3**
RECIMMIG81	3.7	2.5	4.8	3.4	3.8	6.0	4.1
RECIMMIG06	6.0	2.9	8.6	4.2	5.4	12.7	12.4
RECIMMIG_8106	**2.2**	**0.4**	**3.8**	**0.8**	**1.5**	**6.7**	**8.3**
SOUTHASIAN81	1.1	0.8	1.9	0.5	0.8	2.6	1.8
SOUTHASIAN06	6.8	2.6	15.5	2.7	3.4	11.8	34.2
SOUTHASIAN_8106	**5.6**	**1.8**	**13.6**	**2.2**	**2.6**	**9.2**	**32.4**
SEASIAN81	0.7	0.4	0.9	0.6	0.9	1.4	0.6
SEASIAN06	2.8	1.5	4.5	1.4	3.0	5.3	4.2
SEASIAN_8106	**2.0**	**1.1**	**3.6**	**0.8**	**2.1**	**3.9**	**3.6**

Table A.1: Continued

Variable	8-CMA Mean	U	V	W	X	Y	Z
EASTASIAN81	1.8	1.0	1.4	1.8	1.5	5.2	0.7
EASTASIAN06	8.0	3.8	5.4	5.3	5.1	31.7	10.0
EASTASIAN_8106	**6.2**	**2.9**	**3.9**	**3.5**	**3.6**	**26.5**	**9.3**
WNEEUROPE81	4.9	3.6	4.4	3.9	6.0	5.8	6.9
WNEEUROPE06	21.9	23.5	12.8	17.9	30.0	15.8	11.0
WNEEUROPE_8106	**17.1**	**19.9**	**8.4**	**14.0**	**24.0**	**10.0**	**4.1**
SOUTHEUROPE81	4.6	2.8	11.0	7.0	2.9	3.9	6.2
SOUTHEUROPE06	13.0	11.6	19.9	14.7	12.2	9.8	13.2
SOUTHEUROPE_8106	**8.4**	**8.8**	**8.9**	**7.7**	**9.3**	**5.8**	**7.0**
LATINCENSACARIB81	1.0	0.6	2.3	1.0	0.8	1.5	1.2
LATINCENSACARIB06	5.2	3.3	13.8	4.9	3.6	4.3	10.8
LATINCENSACARIB_8106	**4.2**	**2.7**	**11.4**	**3.9**	**2.8**	**2.8**	**9.6**
ARABWASIA81	0.5	0.4	0.7	0.3	0.7	0.8	0.5
ARABWASIA06	4.4	3.7	4.6	3.4	4.8	5.8	4.9
ARABWASIA_8106	**3.8**	**3.2**	**4.0**	**3.2**	**4.2**	**5.1**	**4.4**
AFRICAN81	0.2	0.1	0.4	0.1	0.2	0.4	0.3
AFRICAN06	2.2	1.4	4.9	2.0	2.0	2.1	4.1
AFRICAN_8106	**2.0**	**1.2**	**4.5**	**1.9**	**1.8**	**1.7**	**3.8**
ABORIG81	0.1	0.0	0.2	0.1	0.1	0.1	0.4
ABORIG06	2.9	3.4	1.9	3.2	3.7	1.2	0.9
ABORIG_8106	**2.8**	**3.4**	**1.7**	**3.1**	**3.6**	**1.0**	**0.6**
BRITISH81	37.6	34.2	37.1	25.5	42.5	44.8	52.1
BRITISH06	28.4	31.8	18.2	25.5	36.8	17.9	14.5
BRITISH_8106	**-9.2**	**-2.4**	**-18.9**	**-0.1**	**-5.7**	**-26.9**	**-37.6**
FRENCH81	23.5	34.2	15.9	42.0	16.5	4.8	3.4
FRENCH06	14.1	18.6	7.2	21.3	13.9	4.1	2.9
FRENCH_8106	**-9.5**	**-15.5**	**-8.7**	**-20.8**	**-2.6**	**-0.7**	**-0.5**
LANGNEF81	9.6	5.8	16.7	11.8	8.2	12.6	10.5
LANGNEF06	17.9	10.0	28.7	12.5	13.0	40.6	36.2
LANGNEF_8106	**8.4**	**4.2**	**12.1**	**0.7**	**4.8**	**27.9**	**25.7**

Table A.1: Continued

Variable	8-CMA Mean	U	V	W	X	Y	Z
TOTMOVERS81	53.0	55.4	56.9	47.9	52.0	54.3	49.0
TOTMOVERS06	43.0	36.6	42.6	46.9	44.2	47.9	51.4
TOTMOVERS_8106	**-10.0**	**-18.9**	**-14.3**	**-1.0**	**-7.8**	**-6.4**	**2.4**
RENTED81	40.4	29.9	39.9	49.4	47.4	38.4	38.2
RENTED06	35.6	27.9	40.8	42.0	40.0	34.9	24.7
RENTED_8106	**-4.8**	**-1.9**	**0.9**	**-7.4**	**-7.4**	**-3.4**	**-13.5**
CBEF194681	19.0	5.6	11.4	41.4	26.2	11.1	16.5
CBEF194606	12.6	3.5	7.7	27.5	20.1	5.1	1.7
CBEF1946_8106	**-6.3**	**-2.1**	**-3.7**	**-13.8**	**-6.1**	**-6.0**	**-14.8**
C718181	35.4	52.4	39.6	19.4	24.8	38.3	34.5
C960606	13.4	9.0	8.6	18.0	11.2	18.1	37.2
C7181_9606_8106	**-22.0**	**-43.4**	**-31.0**	**-1.3**	**-13.6**	**-20.2**	**2.7**
SINGDET81	50.1	58.6	40.9	40.1	46.8	53.3	64.8
SINGDET06	42.8	53.1	32.5	33.1	43.7	35.4	48.0
SINGDET_8106	**-7.2**	**-5.5**	**-8.3**	**-6.9**	**-3.1**	**-17.9**	**-16.8**
LOWRISE81	17.5	13.1	16.8	29.1	19.9	12.3	4.5
LOWRISE06	22.8	19.9	24.7	38.5	22.0	15.8	6.2
LOWRISE_8106	**5.3**	**6.8**	**7.9**	**9.4**	**2.1**	**3.5**	**1.7**
HIGHRISE81	12.3	5.4	12.8	5.4	18.9	18.6	20.2
HIGHRISE06	13.7	7.1	13.9	7.7	18.8	23.7	17.1
HIGHRISE_8106	**1.4**	**1.7**	**1.1**	**2.3**	**-0.1**	**5.1**	**-3.1**
SUITABLE81	0.5	0.5	0.6	0.5	0.5	0.5	0.5
SUITABLE06	0.4	0.4	0.5	0.4	0.4	0.5	0.5
SUITABLE_8106	**-0.1**	**-0.1**	**-0.1**	**-0.1**	**-0.1**	**0.0**	**0.0**
CONDITION81	5.5	3.7	5.0	8.8	5.8	4.3	6.6
CONDITION06	7.0	5.9	7.6	8.5	7.9	6.2	4.0
CONDITION_8106	**1.6**	**2.2**	**2.7**	**-0.3**	**2.1**	**1.9**	**-2.6**
AFFORDABLE81	18.6	18.5	19.5	19.0	18.6	18.0	17.6
AFFORDABLE06	35.1	31.4	43.4	33.0	30.5	43.3	53.6
AFFORDABLE_8106	**16.5**	**13.0**	**23.9**	**14.0**	**12.0**	**25.3**	**36.0**

Table A.2: Variable Rankings 1981-2006 of the Six Groups

(Values in bold are ranks of the point difference between 1981 and 2006 percentages)

Variable	U	V	W	X	Y	Z
DEGREE81	3	5	6	1	2	4
DEGREE06	5	6	3	1	2	4
DEGREE_8106	**5**	**6**	**1**	**4**	**2**	**3**
ELEMENTARY81	5	2	1	6	4	3
ELEMENTARY06	3	1	4	6	5	2
ELEMENTARY_8106	**1**	**3**	**6**	**2**	**4**	**5**
MAN81	2	5	6	1	3	4
MAN06	4	6	3	1	2	5
MAN_8106	**5**	**6**	**1**	**2**	**4**	**3**
PROF81	2	6	4	1	3	5
PROF06	4	6	2	1	3	5
PROF_8106	**5**	**6**	**1**	**3**	**2**	**4**
SALESSERV81	4	5	1	3	2	6
SALESSERV06	3	1	4	6	2	5
SALESSERV_8106	**4**	**1**	**6**	**5**	**2**	**3**
MANUF81	4	1	2	6	5	3
MANUF06	3	1	5	6	4	2
MANUF_8106	**2**	**4**	**6**	**3**	**5**	**1**
HIGHINCHH81	2	5	6	4	1	3
HIGHINCHH06	3	6	5	2	4	1
HIGHINCHH_8106	**4**	**5**	**1**	**3**	**6**	**2**
LOWINCOME81	6	2	1	3	4	5
LOWINCOME06	6	2	4	5	1	3
LOWINCIME_8106	**5**	**3**	**6**	**4**	**1**	**2**
UNEMP81	2	4	1	3	5	5
UNEMP06	6	1	4	5	2	3
UNEMP_8106	**5**	**2**	**6**	**4**	**1**	**2**
POPLT1581	1	2	5	6	4	3
POPLT1506	3	2	6	5	4	1
POPLT15_8106	**6**	**5**	**4**	**2**	**3**	**1**

Variable	U	V	W	X	Y	Z
POP253481	1	2	5	3	4	6
POP253406	6	5	1	3	4	2
POP2534_8106	**6**	**5**	**1**	**4**	**3**	**2**
POP506481	6	5	2	1	3	4
POP506406	1	5	4	2	3	6
POP5064_8106	**1**	**2**	**5**	**4**	**3**	**6**
POP6581	6	5	2	1	3	4
POP6506	1	4	5	2	3	6
POP65_8106	**1**	**2**	**4**	**5**	**3**	**6**
ONEPERS81	6	5	2	1	3	4
ONEPERS06	3	4	1	2	5	6
ONEPERS_8106	**1**	**3**	**2**	**4**	**5**	**6**
SINGLEPAR81	5	3	1	2	4	6
SINGLEPAR06	3	1	2	5	4	6
SINGLEPAR_8106	**2**	**1**	**6**	**5**	**4**	**3**
PPERHH81	1	2	5	6	4	3
PPERHH06	4	2	6	5	3	1
PPERHH_8106	**6**	**4**	**5**	**3**	**2**	**1**
IMMIG81	6	2	5	4	1	3
IMMIG06	6	3	5	4	1	2
IMMIG_8106	**4**	**3**	**5**	**6**	**2**	**1**
RECIMMIG81	6	2	5	4	1	3
RECIMMIG06	6	3	5	4	1	2
RECIMMIG_8106	**6**	**3**	**5**	**4**	**2**	**1**
SOUTHASIAN81	4	2	6	5	1	3
SOUTHASIAN06	6	2	5	4	3	1
SOUTHASIAN_8106	**6**	**2**	**5**	**4**	**3**	**1**
SEASIAN81	6	2	4	3	1	4
SEASIAN06	5	2	6	4	1	3
SEASIAN_8106	**5**	**3**	**6**	**4**	**1**	**2**

Table A.2: Continued

Variable	U	V	W	X	Y	Z
EASTASIAN81	5	4	2	3	1	6
EASTASIAN06	6	3	4	5	1	2
EASTASIAN_8106	**6**	**3**	**5**	**4**	**1**	**2**
WNEEUROPE81	6	4	5	2	3	1
WNEEUROPE06	2	5	3	1	4	6
WNEEUROPE_8106	**2**	**5**	**3**	**1**	**4**	**6**
SOUTHEUROPE81	6	1	2	5	4	3
SOUTHEUROPE06	5	1	2	4	6	3
SOUTHEUROPE_8106	**3**	**2**	**4**	**1**	**6**	**5**
LATINCENSACARIB81	6	1	4	5	2	3
LATINCENSACARIB06	6	1	3	5	4	2
LATINCENSACARIB_8106	**6**	**1**	**3**	**5**	**4**	**2**
ARABWASIA81	5	2	6	3	1	4
ARABWASIA06	5	4	6	3	1	2
ARABWASIA_8106	**5**	**4**	**6**	**3**	**1**	**2**
AFRICAN81	5	1	6	4	2	3
AFRICAN06	6	1	4	5	3	2
AFRICAN_8106	**6**	**1**	**3**	**4**	**5**	**2**
ABORIG81	6	2	4	5	3	1
ABORIG06	2	4	3	1	5	6
ABORIG_8106	**2**	**4**	**3**	**1**	**5**	**6**
BRITISH81	5	4	6	3	2	1
BRITISH06	2	4	3	1	5	6
BRITISH_8106	**2**	**4**	**1**	**3**	**5**	**6**
FRENCH81	2	4	1	3	5	6
FRENCH06	2	4	1	3	5	6
FRENCH_8106	**5**	**4**	**6**	**3**	**2**	**1**
LANGNEF81	6	1	3	5	2	4
LANGNEF06	6	3	5	4	1	2
LANGNEF_8106	**5**	**3**	**6**	**4**	**1**	**2**

Variable	U	V	W	X	Y	Z
TOTMOVERS81	2	1	6	4	3	5
TOTMOVERS06	6	5	3	4	2	1
TOTMOVERS_8106	**6**	**5**	**2**	**4**	**3**	**1**
RENTED81	6	3	1	2	4	5
RENTED06	5	2	1	3	4	6
RENTED_8106	**2**	**1**	**4**	**5**	**3**	**6**
CBEF194681	6	4	1	2	5	3
CBEF194606	5	3	1	2	4	6
CBEF1946_8106	**1**	**2**	**5**	**4**	**3**	**6**
C718181	1	2	6	5	3	4
C960606	5	6	3	4	2	1
C7181_9606_8106	**6**	**5**	**2**	**3**	**4**	**1**
SINGDET81	2	5	6	4	3	1
SINGDET06	1	6	5	3	4	2
SINGDET_8106	**2**	**4**	**3**	**1**	**6**	**5**
LOWRISE81	4	3	1	2	5	6
LOWRISE06	4	2	1	3	5	6
LOWRISE_8106	**3**	**2**	**1**	**5**	**4**	**6**
HIGHRISE81	5	4	5	2	3	1
HIGHRISE06	6	4	5	2	1	3
HIGHRISE_8106	**3**	**4**	**2**	**5**	**1**	**6**
SUITABLEV281	2	1	2	6	5	4
SUITABLEV206	6	2	4	4	3	1
SUITABLE_8106	**6**	**4**	**5**	**3**	**2**	**1**
CONDITION81	6	4	1	3	5	2
CONDITION06	5	3	1	2	4	6
CONDITION_8106	**2**	**1**	**5**	**3**	**4**	**6**
AFFORDABLE81	4	1	2	3	5	6
AFFORDABLE06	5	2	4	6	3	1
AFFORDABLE_8106	**5**	**3**	**4**	**6**	**2**	**1**

Table A.3: Detailed Census Profile 1981-2006 of Clusters in U, V, W

(Values in bold are the point difference between 1981 and 2006 percentages)

Variable	8-CMA Mean	U 1	U 2	U 3	V 1	V 2	W 1	W 2	W 3
DEGREE81	12.2	11.1	8.8	14.7	4.9	11.3	6.5	6.1	9.6
DEGREE06	33.4	25.7	22.2	32.1	19.9	25.7	27.2	36.3	47.1
DEGREE_8106	**21.2**	**14.6**	**13.4**	**17.5**	**15.1**	**14.5**	**20.7**	**30.1**	**37.5**
ELEMENTARY81	47.8	46.7	47.7	38.0	62.6	43.7	58.1	62.6	54.6
ELEMENTARY06	17.2	20.2	20.4	13.2	28.9	20.2	19.1	20.3	10.2
ELEMENTARY_8106	**-30.6**	**-26.5**	**-27.3**	**-24.8**	**-33.7**	**-23.4**	**-39.0**	**-42.4**	**-44.4**
MAN81	10.6	11.4	10.4	14.3	6.0	11.6	7.4	5.4	8.0
MAN06	17.6	15.9	16.1	20.0	11.1	13.4	17.4	15.0	24.7
MAN_8106	**7.0**	**4.5**	**5.7**	**5.7**	**5.2**	**1.8**	**10.0**	**9.6**	**16.6**
PROF81	14.4	14.6	13.3	16.9	8.4	12.7	10.6	10.5	11.6
PROF06	22.4	21.2	20.1	22.8	16.1	16.1	21.4	26.0	26.7
PROF_8106	**8.0**	**6.6**	**6.8**	**5.9**	**7.7**	**3.4**	**10.8**	**15.5**	**15.1**
SALESSERV81	20.7	21.3	21.1	19.4	19.8	17.9	20.6	22.4	22.2
SALESSERV06	23.8	25.1	24.8	22.9	27.2	24.0	23.3	23.4	20.2
SALESSERV_8106	3.1	3.9	3.8	3.5	7.4	6.1	2.7	0.9	-2.1
MANUF81	26.5	25.6	28.3	23.5	37.7	29.4	34.2	33.7	29.6
MANUF06	17.4	19.0	19.7	15.9	26.8	27.7	18.5	13.5	9.5
MANUF_8106	**-9.1**	**-6.6**	**-8.6**	**-7.6**	**-10.9**	**-1.7**	**-15.7**	**-20.3**	**-20.1**
HIGHINCHH81	18.3	20.5	17.4	23.7	12.2	20.7	12.5	7.3	14.8
HIGHINCHH06	23.3	17.6	20.1	35.7	12.5	24.2	22.8	11.7	36.0
HIGHINCHH_8106	**5.0**	**-2.9**	**2.7**	**12.1**	**0.3**	**3.5**	**10.4**	**4.4**	**21.1**
LOWINCOME81	12.8	11.3	11.4	7.2	17.6	9.1	15.2	24.7	17.9
LOWINCOME06	16.1	14.1	10.1	7.4	24.6	17.9	12.7	21.7	11.9
LOWINCIME_8106	**3.3**	**2.8**	**-1.4**	**0.1**	**7.0**	**8.8**	**-2.5**	**-2.9**	**-5.9**
UNEMP81	5.9	6.3	6.9	4.4	6.4	3.8	7.0	10.1	7.5
UNEMP06	6.5	6.3	5.3	4.8	9.1	7.3	5.6	7.8	5.1
UNEMP_8106	**0.6**	**0.0**	**-1.6**	**0.4**	**2.7**	**3.4**	**-1.4**	**-2.3**	**-2.3**
POPLT1581	20.9	21.8	27.1	29.7	21.2	29.4	23.3	16.3	19.1
POPLT1506	16.9	15.6	16.3	18.1	18.3	21.2	17.7	12.6	18.5
POPLT15_8106	-4.0	-6.1	-10.8	-11.6	-2.9	-8.2	-5.6	-3.7	-0.6

Table A.3: Continued

Variable	8-CMA Mean	U 1	U 2	U 3	V 1	V 2	W 1	W 2	W 3
POP253481	18.6	16.6	19.5	24.2	16.2	24.6	17.9	16.6	18.0
POP253406	14.0	12.2	11.4	10.2	14.1	13.9	13.9	22.5	16.3
POP2534_8106	**-4.6**	**-4.4**	**-8.2**	**-14.1**	**-2.1**	**-10.7**	**-4.0**	**5.9**	**-1.7**
POP506481	14.2	14.3	9.7	7.6	15.7	7.4	13.2	18.2	15.7
POP506406	18.3	19.3	21.3	21.9	16.7	17.2	18.1	16.1	16.8
POP5064_8106	**4.2**	**4.9**	**11.6**	**14.4**	**1.0**	**9.8**	**4.9**	**-2.1**	**1.1**
POP6581	9.1	6.7	4.4	3.3	8.0	3.2	7.9	11.6	9.9
POP6506	13.2	17.7	14.6	10.0	14.1	8.6	12.0	12.1	8.7
POP65_8106	**4.1**	**11.1**	**10.2**	**6.8**	**6.1**	**5.4**	**4.1**	**0.5**	**-1.2**
ONEPERS81	19.2	14.0	9.7	7.6	17.3	8.3	15.2	28.0	22.5
ONEPERS06	26.3	29.0	24.6	14.8	26.8	14.1	25.1	42.3	24.8
ONEPERS_8106	**7.1**	**15.0**	**14.8**	**7.2**	**9.5**	**5.8**	**9.9**	**14.3**	**2.3**
SINGLEPAR81	11.9	11.6	9.9	7.4	14.1	9.6	11.8	18.2	13.2
SINGLEPAR06	17.7	19.1	17.2	13.3	25.6	20.1	17.5	22.1	13.1
SINGLEPAR_8106	**5.8**	**7.6**	**7.3**	**5.9**	**11.5**	**10.5**	**5.7**	**3.9**	**0.0**
PPERHH81	2.9	3.0	3.3	3.3	3.0	3.3	3.1	2.6	2.9
PPERHH06	2.6	2.4	2.5	3.0	2.7	3.3	2.6	2.1	2.7
PPERHH_8106	**-0.3**	**-0.6**	**-0.8**	**-0.4**	**-0.4**	**-0.1**	**-0.5**	**-0.5**	**-0.2**
IMMIG81	24.1	17.3	11.6	19.5	33.3	33.3	20.1	18.9	26.1
IMMIG06	30.8	21.7	12.4	21.8	44.2	48.9	21.2	23.0	26.9
IMMIG_8106	**6.8**	**4.5**	**0.7**	**2.3**	**10.9**	**15.6**	**1.1**	**4.1**	**0.8**
RECIMMIG81	3.7	2.1	1.8	3.6	4.1	5.9	2.7	3.6	4.4
RECIMMIG06	6.0	3.5	1.5	2.6	7.9	9.9	2.9	5.2	4.4
RECIMMIG_8106	**2.2**	**1.5**	**-0.3**	**-0.9**	**3.8**	**3.9**	**0.2**	**1.7**	**0.0**
SOUTHASIAN81	1.1	0.6	0.5	1.4	1.2	3.0	0.5	0.3	0.8
SOUTHASIAN06	6.8	2.2	1.1	4.1	8.7	26.4	2.8	1.8	4.3
SOUTHASIAN_8106	**5.6**	**1.6**	**0.6**	**2.7**	**7.5**	**23.4**	**2.2**	**1.6**	**3.6**
SEASIAN81	0.7	0.4	0.3	0.6	0.6	1.4	0.4	0.6	0.8
SEASIAN06	2.8	1.4	0.8	2.1	4.0	5.2	1.4	1.2	1.7
SEASIAN_8106	**2.0**	**1.1**	**0.5**	**1.5**	**3.5**	**3.8**	**1.0**	**0.5**	**0.9**

Table A.3: Continued

Variable	8-CMA Mean	U 1	U 2	U 3	V 1	V 2	W 1	W 2	W 3
EASTASIAN81	1.8	0.8	0.7	1.4	1.0	2.2	1.3	1.3	3.7
EASTASIAN06	8.0	3.4	1.7	5.7	4.7	6.4	3.8	5.5	7.7
EASTASIAN_8106	**6.2**	**2.6**	**1.0**	**4.3**	**3.8**	**4.2**	**2.6**	**4.2**	**4.0**
WNEEUROPE81	4.9	3.7	2.6	4.0	4.3	4.5	4.3	2.6	6.0
WNEEUROPE06	21.9	22.2	19.7	27.9	11.1	15.4	19.7	13.1	24.5
WNEEUROPE_8106	**17.1**	**18.5**	**17.0**	**23.8**	**6.8**	**10.9**	**15.4**	**10.5**	**18.5**
SOUTHEUROPE81	4.6	3.4	1.6	2.5	14.6	5.3	6.1	8.5	5.8
SOUTHEUROPE06	13.0	12.2	8.4	12.3	24.3	12.9	15.1	14.0	15.6
SOUTHEUROPE_8106	**8.4**	**8.9**	**6.9**	**9.9**	**9.7**	**7.6**	**9.0**	**5.5**	**9.8**
LATINCENSACARIB81	1.0	0.6	0.4	0.8	2.1	2.6	0.8	1.3	0.9
LATINCENSACARIB06	5.2	3.9	2.4	2.9	14.6	12.4	4.6	5.5	4.1
LATINCENSACARIB_8106	**4.2**	**3.3**	**2.0**	**2.1**	**12.5**	**9.8**	**3.8**	**4.3**	**3.2**
ARABWASIA81	0.5	0.6	0.3	0.4	0.7	0.6	0.2	0.3	0.4
ARABWASIA06	4.4	4.7	2.2	2.8	5.1	3.8	2.3	4.0	4.6
ARABWASIA_8106	**3.8**	**4.2**	**1.9**	**2.4**	**4.4**	**3.2**	**2.1**	**3.6**	**4.2**
AFRICAN81	0.2	0.1	0.1	0.2	0.4	0.5	0.1	0.1	0.1
AFRICAN06	2.2	1.6	1.1	1.2	5.1	4.5	1.9	2.3	1.8
AFRICAN_8106	**2.0**	**1.4**	**1.0**	**1.0**	**4.8**	**4.0**	**1.7**	**2.2**	**1.7**
ABORIG81	0.1	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1
ABORIG06	2.9	3.5	3.9	3.1	1.9	1.9	3.2	3.5	2.3
ABORIG_8106	**2.8**	**3.5**	**3.9**	**3.0**	**1.8**	**1.7**	**3.1**	**3.5**	**2.2**
BRITISH81	37.6	32.5	28.6	40.2	30.6	47.6	31.9	15.2	34.5
BRITISH06	28.4	29.6	29.7	36.8	16.7	20.6	29.9	18.0	32.5
BRITISH_8106	**-9.2**	**-2.9**	**1.2**	**-3.4**	**-13.9**	**-27.0**	**-2.0**	**2.7**	**-2.0**
FRENCH81	23.5	35.5	48.9	23.7	22.5	5.5	35.3	57.0	24.1
FRENCH06	14.1	18.2	23.4	16.8	8.5	5.0	18.2	26.2	16.9
FRENCH_8106	**-9.5**	**-17.3**	**-25.5**	**-7.0**	**-13.9**	**-0.5**	**-17.1**	**-30.8**	**-7.2**
LANGNEF81	9.6	6.6	3.6	5.6	20.3	10.8	10.1	12.9	12.7
LANGNEF06	17.9	11.5	5.1	10.2	28.6	28.9	10.9	13.3	13.8
LANGNEF_8106	**8.4**	**4.9**	**1.5**	**4.6**	**8.3**	**18.1**	**0.8**	**0.4**	**1.1**

Table A.3: Continued

Variable	8-CMA Mean	U 1	U 2	U 3	V 1	V 2	W 1	W 2	W 3
TOTMOVERS81	53.0	48.6	52.4	68.6	45.5	75.0	45.9	48.3	50.8
TOTMOVERS06	43.0	39.7	36.3	31.4	41.1	45.0	40.7	51.3	50.2
TOTMOVERS_8106	**-10.0**	**-8.9**	**-16.1**	**-37.1**	**-4.4**	**-30.0**	**-5.2**	**3.0**	**-0.6**
RENTED81	40.4	37.7	26.8	18.4	48.0	27.0	31.6	67.7	46.4
RENTED06	35.6	37.6	27.3	12.1	49.2	27.3	28.6	61.6	27.6
RENTED_8106	**-4.8**	**-0.1**	**0.5**	**-6.3**	**1.3**	**0.3**	**-3.1**	**-6.1**	**-18.8**
CBEF194681	19.0	6.4	6.1	4.0	17.4	1.9	27.1	55.0	41.0
CBEF194606	12.6	4.7	3.2	1.8	12.0	0.9	18.8	37.9	23.2
CBEF1946_8106	**-6.3**	**-1.7**	**-2.9**	**-2.2**	**-5.4**	**-1.0**	**-8.4**	**-17.1**	**-17.8**
C718181	35.4	35.6	56.8	77.8	15.7	77.8	30.8	7.3	21.9
C960606	13.4	7.5	10.1	10.8	6.2	12.4	17.3	10.9	34.4
C7181_9606_8106	**-22.0**	**-28.2**	**-46.6**	**-67.0**	**-9.5**	**-65.4**	**-13.6**	**3.7**	**12.5**
SINGDET81	50.1	52.0	62.4	67.4	35.2	49.9	59.1	16.7	51.3
SINGDET06	42.8	42.4	52.6	71.1	27.0	41.3	51.4	10.1	45.2
SINGDET_8106	**-7.2**	**-9.6**	**-9.8**	**3.7**	**-8.2**	**-8.6**	**-7.7**	**-6.6**	**-6.1**
LOWRISE81	17.5	17.8	12.5	5.5	24.1	5.2	11.9	48.5	22.6
LOWRISE06	22.8	27.3	21.6	6.5	33.3	11.0	20.6	61.2	26.3
LOWRISE_8106	**5.3**	**9.5**	**9.1**	**0.9**	**9.2**	**5.7**	**8.7**	**12.7**	**3.7**
HIGHRISE81	12.3	7.5	3.8	2.8	12.9	12.8	5.8	4.2	7.1
HIGHRISE06	13.7	10.2	5.5	2.9	14.4	13.1	6.6	7.7	9.6
HIGHRISE_8106	**1.4**	**2.7**	**1.7**	**0.1**	**1.6**	**0.4**	**0.9**	**3.5**	**2.5**
SUITABLE81	0.5	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.5
SUITABLE06	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4
SUITABLE_8106	**-0.1**	**-0.1**	**-0.2**	**-0.1**	**-0.1**	**0.0**	**-0.1**	**-0.1**	**-0.1**
CONDITION81	5.5	4.2	4.0	2.7	6.4	2.7	7.0	10.7	8.4
CONDITION06	7.0	6.6	6.0	4.5	9.0	5.5	7.3	10.8	6.1
CONDITION_8106	**1.6**	**2.4**	**2.1**	**1.8**	**2.6**	**2.8**	**0.3**	**0.1**	**-2.3**
AFFORDABLE81	18.6	17.3	18.6	20.4	18.0	22.0	18.3	18.9	20.4
AFFORDABLE06	35.1	31.6	30.2	31.9	40.8	47.6	33.5	32.4	33.0
AFFORDABLE_8106	**16.5**	**14.3**	**11.6**	**11.5**	**22.8**	**25.7**	**15.3**	**13.5**	**12.7**

Table A.4: Detailed Census Profile 1981-2006 of Clusters in X, Y, Z

(Values in bold are the point difference between 1981 and 2006 percentages)

Variable	8-CMA Mean	X 1	X 2	X 3	X 4	Y 1	Y 2	Y 3	Z 1	Z 2
DEGREE81	12.2	11.5	14.6	22.6	20.6	13.8	11.5	16.8	6.9	8.1
DEGREE06	33.4	31.8	33.2	51.9	42.7	48.4	36.2	40.3	37.1	28.8
DEGREE_8106	**21.2**	**20.3**	**18.7**	**29.3**	**22.1**	**34.6**	**24.7**	**23.5**	**30.2**	**20.7**
ELEMENTARY81	47.8	45.3	48.0	38.1	38.2	43.8	49.2	38.7	52.4	51.9
ELEMENTARY06	17.2	13.4	18.2	8.9	14.3	11.4	17.0	16.2	14.0	22.4
ELEMENTARY_8106	**-30.6**	**-31.9**	**-29.7**	**-29.2**	**-23.9**	**-32.4**	**-32.2**	**-22.6**	**-38.5**	**-29.5**
MAN81	10.6	11.1	10.9	13.5	13.7	11.1	9.7	15.3	8.1	9.5
MAN06	17.6	20.6	16.5	24.3	17.1	20.8	16.6	18.9	20.4	11.3
MAN_8106	**7.0**	**9.6**	**5.6**	**10.8**	**3.4**	**9.7**	**6.9**	**3.6**	**12.3**	**1.8**
PROF81	14.4	14.6	16.7	20.7	19.3	15.2	13.0	16.6	10.6	9.9
PROF06	22.4	21.6	24.1	29.0	25.3	26.5	21.5	22.9	20.6	14.0
PROF_8106	**8.0**	**7.0**	**7.4**	**8.3**	**6.0**	**11.3**	**8.5**	**6.3**	**10.1**	**4.0**
SALESSERV81	20.7	20.6	21.7	20.7	20.7	21.5	21.6	19.5	19.0	18.3
SALESSERV06	23.8	22.4	24.4	20.1	24.2	24.4	26.3	23.7	21.9	23.2
SALESSERV_8106	**3.1**	**1.8**	**2.7**	**-0.7**	**3.6**	**2.9**	**4.7**	**4.2**	**2.9**	**4.9**
MANUF81	26.5	26.2	23.5	17.0	17.7	21.6	26.8	19.9	33.9	31.4
MANUF06	17.4	17.0	16.6	8.4	15.2	11.5	17.9	16.2	19.0	34.0
MANUF_8106	**-9.1**	**-9.3**	**-6.8**	**-8.6**	**-2.5**	**-10.1**	**-8.9**	**-3.7**	**-15.0**	**2.6**
HIGHINCHH81	18.3	18.5	17.8	21.3	16.5	19.9	21.1	30.4	19.8	19.3
HIGHINCHH06	23.3	35.4	18.5	32.2	14.5	20.1	20.7	26.2	38.5	18.4
HIGHINCHH_8106	**5.0**	**16.9**	**0.7**	**10.9**	**-2.1**	**0.2**	**-0.4**	**-4.3**	**18.7**	**-1.0**
LOWINCOME81	12.8	9.6	13.8	11.7	14.1	11.8	12.7	6.6	10.0	11.2
LOWINCOME06	16.1	8.5	17.4	12.1	26.7	28.1	22.5	20.4	13.0	25.1
LOWINCIME_8106	**3.3**	**-1.1**	**3.6**	**0.4**	**12.6**	**16.4**	**9.8**	**13.9**	**3.0**	**13.9**
UNEMP81	5.9	4.8	6.3	5.3	5.8	4.8	4.8	3.3	4.6	4.3
UNEMP06	6.5	4.7	6.9	5.4	8.8	7.6	7.6	7.6	6.2	8.7
UNEMP_8106	**0.6**	**-0.1**	**0.6**	**0.1**	**3.0**	**2.9**	**2.9**	**4.3**	**1.5**	**4.4**
POPLT1581	20.9	23.7	15.8	13.8	12.9	15.7	19.5	26.7	20.0	22.6
POPLT1506	16.9	19.6	15.6	14.6	15.3	15.4	17.2	15.0	21.8	24.0
POPLT15_8106	**-4.0**	**-4.1**	**-0.2**	**0.8**	**2.4**	**-0.3**	**-2.3**	**-11.7**	**1.9**	**1.5**

Table A.4: Continued

Variable	8-CMA Mean	X 1	X 2	X 3	X 4	Y 1	Y 2	Y 3	Z 1	Z 2
POP253481	18.6	19.9	15.6	20.1	19.9	17.2	17.1	20.2	15.7	18.2
POP253406	14.0	10.9	13.4	16.3	16.9	16.5	13.8	12.1	12.5	16.4
POP2534_8106	**-4.6**	**-9.0**	**-2.2**	**-3.8**	**-3.0**	**-0.7**	**-3.3**	**-8.1**	**-3.2**	**-1.8**
POP506481	14.2	12.4	18.8	16.1	17.5	17.3	16.1	10.2	15.9	13.3
POP506406	18.3	19.2	18.3	18.6	16.2	16.4	17.4	20.6	16.5	13.7
POP5064_8106	**4.2**	**6.8**	**-0.6**	**2.5**	**-1.3**	**-0.9**	**1.3**	**10.4**	**0.7**	**0.4**
POP6581	9.1	7.5	14.5	15.5	15.3	14.1	9.3	4.4	10.9	7.4
POP6506	13.2	10.0	17.1	13.3	15.3	12.6	13.4	14.3	7.2	8.4
POP65_8106	**4.1**	**2.5**	**2.5**	**-2.1**	**-0.1**	**-1.5**	**4.1**	**9.9**	**-3.7**	**1.0**
ONEPERS81	19.2	14.6	26.8	34.3	37.9	27.4	19.1	7.4	17.2	14.8
ONEPERS06	26.3	17.6	34.8	35.2	38.3	26.3	22.4	14.4	8.9	13.9
ONEPERS_8106	**7.1**	**3.0**	**8.0**	**0.9**	**0.4**	**-1.1**	**3.3**	**7.0**	**-8.3**	**-0.9**
SINGLEPAR81	11.9	9.1	13.6	12.7	14.3	12.0	13.2	8.8	9.4	10.5
SINGLEPAR06	17.7	13.1	20.4	13.5	20.0	15.4	18.1	15.7	13.4	18.6
SINGLEPAR_8106	**5.8**	**4.0**	**6.8**	**0.8**	**5.7**	**3.4**	**4.9**	**6.9**	**4.0**	**8.1**
PPERHH81	2.9	3.0	2.5	2.3	2.2	2.5	2.9	3.4	3.0	3.1
PPERHH06	2.6	2.9	2.3	2.3	2.3	2.7	2.8	3.2	3.6	3.6
PPERHH_8106	**-0.3**	**-0.1**	**-0.2**	**0.0**	**0.1**	**0.1**	**0.0**	**-0.2**	**0.6**	**0.4**
IMMIG81	24.1	20.2	22.6	26.5	32.4	29.9	33.5	38.4	25.7	32.8
IMMIG06	30.8	21.2	22.9	24.8	43.5	58.8	52.1	62.5	49.0	60.0
IMMIG_8106	**6.8**	**1.0**	**0.3**	**-1.7**	**11.1**	**28.9**	**18.6**	**24.2**	**23.4**	**27.2**
RECIMMIG81	3.7	3.1	3.2	4.1	5.7	4.8	6.4	6.4	3.5	4.7
RECIMMIG06	6.0	2.5	4.5	4.4	12.7	16.0	11.8	11.5	7.3	17.6
RECIMMIG_8106	**2.2**	**-0.6**	**1.3**	**0.4**	**7.1**	**11.2**	**5.4**	**5.0**	**3.8**	**12.9**
SOUTHASIAN81	1.1	1.0	0.5	0.7	1.2	1.9	2.7	3.1	1.1	2.5
SOUTHASIAN06	6.8	4.2	1.8	2.8	6.2	7.5	13.9	11.0	21.6	47.2
SOUTHASIAN_8106	**5.6**	**3.3**	**1.3**	**2.1**	**5.0**	**5.6**	**11.2**	**7.9**	**20.6**	**44.6**
SEASIAN81	0.7	0.6	0.9	0.7	1.4	1.0	1.5	1.7	0.3	0.9
SEASIAN06	2.8	2.0	3.1	2.2	5.8	4.4	6.2	3.8	4.8	3.5
SEASIAN_8106	**2.0**	**1.5**	**2.1**	**1.4**	**4.5**	**3.4**	**4.8**	**2.1**	**4.6**	**2.7**

Table A.4: Continued

Variable	8-CMA Mean	X 1	X 2	X 3	X 4	Y 1	Y 2	Y 3	Z 1	Z 2
EASTASIAN81	1.8	1.4	1.0	1.9	1.5	3.6	5.2	7.0	0.2	1.2
EASTASIAN06	8.0	3.9	3.5	6.4	7.0	39.7	23.6	44.1	14.5	5.3
EASTASIAN_8106	**6.2**	**2.5**	**2.5**	**4.4**	**5.6**	**36.1**	**18.4**	**37.0**	**14.3**	**4.1**
WNEEUROPE81	4.9	5.2	6.0	6.8	6.0	6.2	6.1	4.7	7.7	6.1
WNEEUROPE06	21.9	31.6	30.2	32.7	22.3	14.4	18.0	11.7	14.8	7.1
WNEEUROPE_8106	**17.1**	**26.4**	**24.2**	**25.9**	**16.3**	**8.3**	**11.9**	**6.9**	**7.1**	**1.0**
SOUTHEUROPE81	4.6	2.4	3.3	2.5	3.7	2.6	4.3	4.5	4.3	8.3
SOUTHEUROPE06	13.0	13.2	11.2	12.0	13.0	7.9	10.8	9.1	16.7	9.6
SOUTHEUROPE_8106	**8.4**	**10.9**	**7.9**	**9.5**	**9.4**	**5.3**	**6.5**	**4.6**	**12.5**	**1.3**
LATINCENSACARIB81	1.0	0.6	0.6	0.8	1.6	0.8	1.4	2.3	0.6	1.8
LATINCENSACARIB06	5.2	2.7	3.4	2.9	6.4	3.0	5.0	4.0	9.1	12.5
LATINCENSACARIB_8106	**4.2**	**2.1**	**2.8**	**2.2**	**4.8**	**2.1**	**3.6**	**1.7**	**8.6**	**10.7**
ARABWASIA81	0.5	0.3	0.5	0.5	1.7	0.6	0.7	1.2	0.4	0.6
ARABWASIA06	4.4	2.7	4.3	3.6	11.2	7.0	5.5	5.5	5.3	4.4
ARABWASIA_8106	**3.8**	**2.5**	**3.7**	**3.1**	**9.5**	**6.4**	**4.8**	**4.4**	**4.9**	**3.8**
AFRICAN81	0.2	0.1	0.1	0.2	0.4	0.2	0.3	0.6	0.2	0.4
AFRICAN06	2.2	1.2	1.9	1.6	4.0	1.6	2.5	1.4	2.9	5.4
AFRICAN_8106	**2.0**	**1.0**	**1.7**	**1.3**	**3.7**	**1.4**	**2.2**	**0.8**	**2.7**	**5.0**
ABORIG81	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.3
ABORIG06	2.9	3.0	6.5	2.6	2.2	1.0	1.5	0.5	1.0	0.9
ABORIG_8106	**2.8**	**3.0**	**6.4**	**2.5**	**2.1**	**0.9**	**1.3**	**0.3**	**0.6**	**0.6**
BRITISH81	37.6	45.0	40.1	46.3	35.5	50.3	44.1	40.5	55.2	48.9
BRITISH06	28.4	40.0	36.8	42.3	21.2	16.7	20.1	13.7	18.8	10.1
BRITISH_8106	**-9.2**	**-5.0**	**-3.3**	**-4.0**	**-14.4**	**-33.6**	**-24.0**	**-26.8**	**-36.4**	**-38.9**
FRENCH81	23.5	17.6	19.1	13.1	17.1	5.7	4.8	3.6	4.1	2.7
FRENCH06	14.1	14.5	16.1	13.6	10.0	4.6	4.5	2.5	3.9	2.0
FRENCH_8106	**-9.5**	**-3.1**	**-2.9**	**0.5**	**-7.1**	**-1.1**	**-0.3**	**-1.1**	**-0.3**	**-0.7**
LANGNEF81	9.6	5.9	8.7	8.1	10.8	8.8	14.1	13.2	8.0	13.0
LANGNEF06	17.9	9.2	11.3	10.4	26.5	45.0	36.2	47.1	28.5	44.1
LANGNEF_8106	**8.4**	**3.3**	**2.6**	**2.3**	**15.7**	**36.2**	**22.1**	**33.9**	**20.4**	**31.1**

Table A.4: Continued

Variable	8-CMA Mean	X 1	X 2	X 3	X 4	Y 1	Y 2	Y 3	Z 1	Z 2
TOTMOVERS81	53.0	55.3	45.8	52.7	56.6	52.6	50.7	65.7	43.9	54.2
TOTMOVERS06	43.0	36.7	43.0	47.4	50.4	59.1	46.7	38.4	45.1	57.8
TOTMOVERS_8106	**-10.0**	**-18.6**	**-2.8**	**-5.3**	**-6.2**	**6.5**	**-3.9**	**-27.4**	**1.2**	**3.6**
RENTED81	40.4	27.8	46.1	51.4	69.4	49.8	40.8	19.0	35.4	41.0
RENTED06	35.6	17.5	43.3	41.0	64.2	38.6	39.6	18.6	11.5	38.3
RENTED_8106	**-4.8**	**-10.3**	**-2.8**	**-10.4**	**-5.2**	**-11.2**	**-1.2**	**-0.4**	**-23.9**	**-2.7**
CBEF194681	19.0	15.2	26.3	39.1	16.7	16.6	12.4	1.7	23.2	9.7
CBEF194606	12.6	7.7	22.1	30.4	14.3	5.4	6.6	0.7	1.7	1.8
CBEF1946_8106	**-6.3**	**-7.4**	**-4.2**	**-8.7**	**-2.4**	**-11.2**	**-5.7**	**-1.0**	**-21.5**	**-7.9**
C718181	35.4	45.9	15.4	18.2	23.7	28.9	28.0	76.2	28.1	41.1
C960606	13.4	18.6	5.4	13.3	6.2	34.8	14.4	8.8	43.1	31.1
C7181_9606_8106	**-22.0**	**-27.3**	**-10.0**	**-4.9**	**-17.5**	**6.0**	**-13.7**	**-67.4**	**15.0**	**-10.0**
SINGDET81	50.1	67.5	49.4	43.3	19.8	50.3	55.1	52.1	74.5	54.8
SINGDET06	42.8	69.1	45.4	37.4	17.0	29.0	34.5	45.1	64.4	31.0
SINGDET_8106	**-7.2**	**1.6**	**-4.0**	**-5.8**	**-2.7**	**-21.3**	**-20.6**	**-7.0**	**-10.1**	**-23.8**
LOWRISE81	17.5	9.7	21.6	22.9	25.8	21.6	11.7	3.4	5.5	3.5
LOWRISE06	22.8	9.9	24.1	25.3	29.5	21.3	15.9	9.2	3.4	9.0
LOWRISE_8106	**5.3**	**0.2**	**2.6**	**2.4**	**3.7**	**-0.3**	**4.3**	**5.8**	**-2.1**	**5.5**
HIGHRISE81	12.3	6.4	15.2	19.8	41.2	19.9	20.7	11.8	12.5	28.1
HIGHRISE06	13.7	4.4	15.8	20.7	40.3	29.8	22.9	18.9	4.3	30.2
HIGHRISE_8106	**1.4**	**-1.9**	**0.7**	**0.9**	**-0.9**	**9.9**	**2.2**	**7.2**	**-8.2**	**2.1**
SUITABLE81	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5
SUITABLE06	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6
SUITABLE_8106	**-0.1**	**-0.1**	**-0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**
CONDITION81	5.5	5.0	6.0	6.4	5.6	4.6	4.9	2.4	7.6	5.6
CONDITION06	7.0	5.4	9.8	7.4	9.3	5.8	6.9	4.7	2.8	5.3
CONDITION_8106	**1.6**	**0.4**	**3.8**	**1.0**	**3.7**	**1.2**	**2.0**	**2.3**	**-4.9**	**-0.3**
AFFORDABLE81	18.6	19.2	17.1	19.2	18.8	18.8	17.2	19.1	16.9	18.3
AFFORDABLE06	35.1	33.1	29.5	27.7	34.3	43.8	42.2	45.7	49.5	57.7
AFFORDABLE_8106	**16.5**	**13.9**	**12.4**	**8.4**	**15.5**	**25.0**	**24.9**	**26.6**	**32.6**	**39.4**

Table A.5: Variable Ranking 1981-2006 of Clusters in U, V, W (Values in bold are ranks of the point difference between 1981 and 2006 percentages)

Variable	U 1	U 2	U 3	V 1	V 2	W 1	W 2	W 3
DEGREE81	10	12	4	17	9	15	16	11
DEGREE06	15	16	10	17	14	13	7	3
DEGREE_8106	**15**	**17**	**13**	**14**	**16**	**10**	**4**	**1**
ELEMENTARY81	10	9	17	2	13	3	1	4
ELEMENTARY06	6	3	14	1	5	7	4	16
ELEMENTARY_8106	**5**	**6**	**4**	**13**	**2**	**15**	**16**	**17**
MAN81	6	10	2	16	5	15	17	14
MAN06	13	12	6	17	15	8	14	1
MAN_8106	**13**	**10**	**9**	**12**	**17**	**4**	**6**	**1**
PROF81	7	9	3	17	11	13	15	12
PROF06	12	14	8	16	15	11	4	2
PROF_8106	**12**	**11**	**15**	**8**	**17**	**4**	**1**	**2**
SALESSERV81	6	7	14	12	17	10	1	2
SALESSERV06	3	4	13	1	8	11	10	16
SALESSERV_8106	**6**	**7**	**9**	**1**	**2**	**12**	**15**	**17**
MANUF81	11	8	12	1	7	2	4	6
MANUF06	5	4	12	3	2	7	14	16
MANUF_8106	**5**	**8**	**7**	**13**	**2**	**15**	**17**	**16**
HIGHINCHH81	6	12	2	16	5	15	17	14
HIGHINCHH06	14	10	3	16	7	8	17	2
HIGHINCHH_8106	**16**	**9**	**4**	**11**	**8**	**6**	**7**	**1**
LOWINCOME81	11	10	16	3	15	4	1	2
LOWINCOME06	10	15	17	4	8	12	6	14
LOWINCIME_8106	**10**	**14**	**12**	**7**	**6**	**15**	**16**	**17**
UNEMP81	7	4	14	5	16	3	1	2
UNEMP06	10	14	16	1	8	12	4	15
UNEMP_8106	**12**	**15**	**10**	**7**	**3**	**14**	**16**	**17**
POPLT1581	8	3	1	9	2	6	13	12
POPLT1506	12	10	7	6	3	8	17	5
POPLT15_8106	**13**	**15**	**16**	**9**	**14**	**12**	**10**	**7**

Table A.5: Continued

Variable	U 1	U 2	U 3	V 1	V 2	W 1	W 2	W 3
POP253481	13	7	2	15	1	10	14	9
POP253406	13	15	17	7	9	8	1	5
POP2534_8106	**12**	**14**	**17**	**5**	**16**	**11**	**1**	**3**
POP506481	10	15	16	9	17	12	2	8
POP506406	4	2	1	12	10	8	16	11
POP5064_8106	**6**	**2**	**1**	**11**	**4**	**7**	**17**	**10**
POP6581	13	15	16	9	17	10	5	7
POP6506	1	4	12	6	15	11	10	14
POP65_8106	**1**	**2**	**4**	**5**	**6**	**8**	**12**	**14**
ONEPERS81	13	14	16	8	15	10	3	6
ONEPERS06	5	10	13	6	15	8	1	9
ONEPERS_8106	**1**	**2**	**7**	**5**	**9**	**4**	**3**	**12**
SINGLEPAR81	10	12	17	3	13	9	1	6
SINGLEPAR06	6	10	15	1	4	9	2	16
SINGLEPAR_8106	**4**	**5**	**8**	**1**	**2**	**9**	**14**	**17**
PPERHH81	7	4	3	8	2	6	13	12
PPERHH06	13	12	5	9	3	11	17	8
PPERHH_8106	**16**	**17**	**12**	**13**	**7**	**14**	**15**	**9**
IMMIG81	16	17	14	4	3	13	15	9
IMMIG06	14	17	13	7	6	15	11	9
IMMIG_8106	**9**	**15**	**11**	**8**	**6**	**12**	**10**	**14**
RECIMMIG81	16	17	11	8	3	15	10	7
RECIMMIG06	13	17	15	7	6	14	9	12
RECIMMIG_8106	**10**	**15**	**17**	**8**	**6**	**13**	**9**	**14**
SOUTHASIAN81	13	16	6	8	2	14	17	11
SOUTHASIAN06	14	17	11	6	2	13	15	9
SOUTHASIAN_8106	**14**	**17**	**11**	**6**	**2**	**12**	**15**	**9**
SEASIAN81	15	16	10	12	3	14	11	8
SEASIAN06	15	17	11	6	3	14	16	13
SEASIAN_8106	**13**	**17**	**10**	**5**	**4**	**14**	**16**	**15**

Table A.5: Continued

Variable	U 1	U 2	U 3	V 1	V 2	W 1	W 2	W 3
EASTASIAN81	15	16	9	14	5	11	10	3
EASTASIAN06	16	17	9	12	7	14	10	5
EASTASIAN_8106	**13**	**17**	**7**	**12**	**8**	**14**	**9**	**11**
WNEEUROPE81	15	16	14	12	11	13	17	6
WNEEUROPE06	7	9	4	16	11	8	14	5
WNEEUROPE_8106	**6**	**7**	**4**	**16**	**11**	**9**	**12**	**5**
SOUTHEUROPE81	11	17	14	1	6	4	2	5
SOUTHEUROPE06	10	16	9	1	8	4	5	3
SOUTHEUROPE_8106	**9**	**12**	**3**	**5**	**11**	**8**	**14**	**4**
LATINCENSACARIB81	14	17	12	3	1	9	7	8
LATINCENSACARIB06	11	17	15	1	3	8	6	9
LATINCENSACARIB_8106	**9**	**16**	**14**	**1**	**3**	**7**	**6**	**10**
ARABWASIA81	8	16	12	3	5	17	14	13
ARABWASIA06	7	17	14	6	12	16	11	8
ARABWASIA_8106	**8**	**17**	**15**	**5**	**12**	**16**	**11**	**7**
AFRICAN81	13	16	7	5	2	13	16	15
AFRICAN06	12	17	15	2	3	9	7	10
AFRICAN_8106	**11**	**15**	**16**	**2**	**3**	**8**	**7**	**10**
ABORIG81	14	16	14	7	3	9	9	9
ABORIG06	4	2	6	12	11	5	3	9
ABORIG_8106	**3**	**2**	**6**	**11**	**12**	**5**	**4**	**9**
BRITISH81	13	16	9	15	4	14	17	12
BRITISH06	8	7	3	14	10	6	13	5
BRITISH_8106	**5**	**2**	**7**	**10**	**14**	**4**	**1**	**3**
FRENCH81	3	2	6	7	13	4	1	5
FRENCH06	4	2	6	11	12	3	1	5
FRENCH_8106	**15**	**16**	**10**	**13**	**4**	**14**	**17**	**12**
LANGNEF81	14	17	16	1	8	9	5	6
LANGNEF06	11	17	15	6	5	13	10	9
LANGNEF_8106	**9**	**14**	**10**	**8**	**6**	**16**	**17**	**15**

Table A.5: Continued

Variable	U 1	U 2	U 3	V 1	V 2	W 1	W 2	W 3
TOTMOVERS81	12	9	2	16	1	14	13	10
TOTMOVERS06	13	16	17	11	9	12	3	5
TOTMOVERS_8106	**12**	**13**	**17**	**8**	**16**	**9**	**3**	**5**
RENTED81	10	15	17	5	14	12	2	6
RENTED06	9	12	16	3	13	10	2	11
RENTED_8106	**4**	**2**	**12**	**1**	**3**	**9**	**11**	**16**
CBEF194681	13	14	15	7	16	4	1	2
CBEF194606	11	12	14	7	16	5	1	3
CBEF1946_8106	**3**	**6**	**4**	**8**	**2**	**12**	**15**	**16**
C718181	7	4	1	15	2	8	17	13
C960606	14	12	11	16	9	6	10	3
C7181_9606_8106	**13**	**14**	**16**	**6**	**15**	**9**	**4**	**2**
SINGDET81	9	4	3	15	12	5	17	10
SINGDET06	9	4	1	15	10	5	17	7
SINGDET_8106	**12**	**13**	**1**	**10**	**11**	**9**	**7**	**6**
LOWRISE81	8	9	13	3	15	10	1	5
LOWRISE06	4	8	16	2	12	10	1	5
LOWRISE_8106	**2**	**4**	**14**	**3**	**7**	**5**	**1**	**10**
HIGHRISE81	11	16	17	7	8	14	15	12
HIGHRISE06	10	14	17	8	9	13	12	11
HIGHRISE_8106	**4**	**8**	**14**	**9**	**13**	**11**	**3**	**5**
SUITABLE81	5	1	8	1	4	3	5	9
SUITABLE06	12	14	14	3	2	10	9	10
SUITABLE_8106	**14**	**17**	**14**	**10**	**7**	**16**	**12**	**11**
CONDITION81	13	14	16	5	15	4	1	2
CONDITION06	8	10	16	4	12	6	1	9
CONDITION_8106	**5**	**7**	**9**	**4**	**3**	**13**	**14**	**16**
AFFORDABLE81	14	10	2	13	1	11	7	3
AFFORDABLE06	14	15	13	7	3	9	12	11
AFFORDABLE_8106	**10**	**15**	**16**	**7**	**4**	**9**	**12**	**13**

Table A.6: Variable Rankings 1981-2006 of Clusters in X, Y, Z

(Values in bold are ranks of the point difference between 1981 and 2006 percentages)

Variable	X 1	X 2	X 3	X 4	Y 1	Y 2	Y 3	Z 1	Z 2
DEGREE81	7	5	1	2	6	7	3	14	13
DEGREE06	11	9	1	4	2	8	5	6	12
DEGREE_8106	**11**	**12**	**5**	**8**	**2**	**6**	**7**	**3**	**9**
ELEMENTARY81	11	8	16	15	12	7	14	5	6
ELEMENTARY06	13	8	17	11	15	9	10	12	2
ELEMENTARY_8106	**10**	**9**	**7**	**3**	**12**	**11**	**1**	**14**	**8**
MAN81	8	9	4	3	7	11	1	13	12
MAN06	4	11	2	9	3	10	7	5	16
MAN_8106	**7**	**11**	**3**	**15**	**5**	**8**	**14**	**2**	**16**
PROF81	8	4	1	2	6	10	5	14	16
PROF06	9	6	1	5	3	10	7	13	17
PROF_8106	**10**	**9**	**7**	**14**	**3**	**6**	**13**	**5**	**16**
SALESSERV81	10	3	8	9	5	4	13	15	16
SALESSERV06	14	6	17	7	5	2	9	15	12
SALESSERV_8106	**14**	**13**	**16**	**8**	**11**	**4**	**5**	**10**	**3**
MANUF81	10	13	17	16	14	9	15	3	5
MANUF06	9	10	17	13	15	8	11	5	1
MANUF_8106	**11**	**6**	**9**	**3**	**12**	**10**	**4**	**14**	**1**
HIGHINCHH81	10	11	3	13	7	4	1	8	9
HIGHINCHH06	4	12	5	15	11	9	6	1	13
HIGHINCHH_8106	**3**	**10**	**5**	**15**	**12**	**13**	**17**	**2**	**14**
LOWINCOME81	14	6	9	5	8	7	17	13	12
LOWINCOME06	16	9	13	2	1	5	7	11	3
LOWINCIME_8106	**13**	**8**	**11**	**4**	**1**	**5**	**2**	**9**	**2**
UNEMP81	10	6	9	8	12	11	17	13	15
UNEMP06	17	9	13	2	6	5	7	11	3
UNEMP_8106	**13**	**9**	**11**	**4**	**5**	**6**	**2**	**8**	**1**
POPLT1581	5	14	16	17	15	11	4	10	7
POPLT1506	4	11	16	14	13	9	15	2	1
POPLT15_8106	**11**	**5**	**4**	**1**	**6**	**8**	**17**	**2**	**3**

Table A.6: Continued

Variable	X 1	X 2	X 3	X 4	Y 1	Y 2	Y 3	Z 1	Z 2
POP253481	6	17	4	5	11	12	3	16	8
POP253406	16	11	5	2	3	10	14	12	4
POP2534_8106	**15**	**6**	**10**	**7**	**2**	**9**	**13**	**8**	**4**
POP506481	13	1	6	3	4	5	14	7	11
POP506406	5	7	6	15	14	9	3	13	17
POP5064_8106	**5**	**14**	**8**	**16**	**15**	**9**	**3**	**12**	**13**
POP6581	11	3	1	2	4	8	14	6	12
POP6506	13	2	8	3	9	7	5	17	16
POP65_8106	**10**	**9**	**16**	**13**	**15**	**7**	**3**	**17**	**11**
ONEPERS81	12	5	2	1	4	7	17	9	11
ONEPERS06	12	4	3	2	7	11	14	17	16
ONEPERS_8106	**11**	**6**	**13**	**14**	**16**	**10**	**8**	**17**	**15**
SINGLEPAR81	15	4	7	2	8	5	16	14	11
SINGLEPAR06	17	3	13	5	12	8	11	14	7
SINGLEPAR_8106	**13**	**7**	**16**	**9**	**15**	**11**	**6**	**12**	**3**
PPERHH81	9	15	16	17	14	11	1	10	5
PPERHH06	6	15	14	16	9	7	4	2	1
PPERHH_8106	**8**	**10**	**5**	**4**	**3**	**6**	**11**	**1**	**2**
IMMIG81	12	11	8	6	7	2	1	10	5
IMMIG06	15	12	10	8	3	4	1	5	2
IMMIG_8106	**13**	**16**	**17**	**7**	**1**	**5**	**3**	**4**	**2**
RECIMMIG81	14	13	9	4	5	2	1	12	6
RECIMMIG06	16	10	11	3	2	4	5	8	1
RECIMMIG_8106	**16**	**11**	**12**	**3**	**2**	**4**	**5**	**7**	**1**
SOUTHASIAN81	10	15	12	7	5	3	1	9	4
SOUTHASIAN06	10	16	12	8	7	4	5	3	1
SOUTHASIAN_8106	**10**	**16**	**13**	**8**	**7**	**4**	**5**	**3**	**1**
SEASIAN81	13	6	9	4	5	2	1	17	7
SEASIAN06	12	9	10	2	5	1	7	4	8
SEASIAN_8106	**10**	**8**	**12**	**3**	**6**	**1**	**8**	**2**	**7**

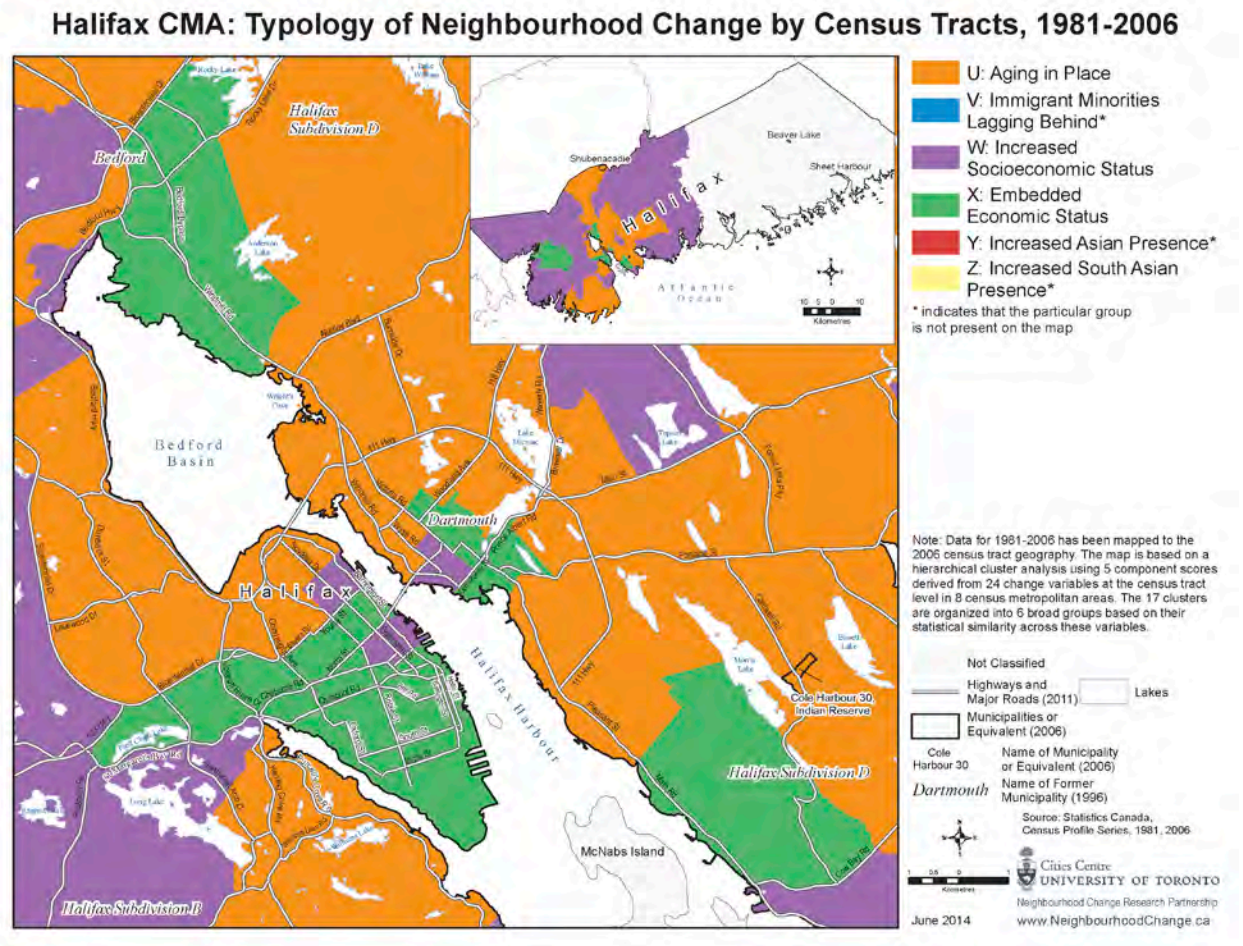
Table A.6: Continued

Variable	X 1	X 2	X 3	X 4	Y 1	Y 2	Y 3	Z 1	Z 2
EASTASIAN81	8	13	6	7	4	2	1	17	12
EASTASIAN06	13	15	8	6	2	3	1	4	11
EASTASIAN_8106	**15**	**16**	**6**	**5**	**2**	**3**	**1**	**4**	**10**
WNEEUROPE81	9	6	2	8	3	5	10	1	4
WNEEUROPE06	2	3	1	6	13	10	15	12	17
WNEEUROPE_8106	**1**	**3**	**2**	**8**	**13**	**10**	**15**	**14**	**17**
SOUTHEUROPE81	16	12	14	10	13	8	7	9	3
SOUTHEUROPE06	6	12	11	7	17	13	15	2	14
SOUTHEUROPE_8106	**2**	**10**	**6**	**7**	**15**	**13**	**16**	**1**	**17**
LATINCENSACARIB81	14	13	11	5	9	6	2	16	4
LATINCENSACARIB06	16	12	14	5	13	7	10	4	2
LATINCENSACARIB_8106	**15**	**11**	**12**	**5**	**13**	**8**	**17**	**4**	**2**
ARABWASIA81	15	9	10	1	6	4	2	11	7
ARABWASIA06	15	10	13	1	2	4	3	5	9
ARABWASIA_8106	**14**	**10**	**13**	**1**	**2**	**4**	**6**	**3**	**9**
AFRICAN81	11	11	7	4	7	6	1	10	3
AFRICAN06	16	8	12	4	11	6	14	5	1
AFRICAN_8106	**14**	**9**	**13**	**4**	**12**	**6**	**17**	**5**	**1**
ABORIG81	17	13	12	6	8	5	4	1	2
ABORIG06	7	1	8	10	14	13	17	15	16
ABORIG_8106	**7**	**1**	**8**	**10**	**14**	**13**	**17**	**16**	**15**
BRITISH81	6	10	5	11	2	7	8	1	3
BRITISH06	2	3	1	9	15	11	16	12	17
BRITISH_8106	**9**	**6**	**8**	**11**	**15**	**12**	**13**	**16**	**17**
FRENCH81	9	8	11	10	12	14	16	15	17
FRENCH06	8	7	9	10	13	14	16	15	17
FRENCH_8106	**9**	**8**	**1**	**11**	**7**	**3**	**6**	**2**	**5**
LANGNEF81	15	11	12	7	10	2	3	13	4
LANGNEF06	16	12	14	8	2	4	1	7	3
LANGNEF_8106	**11**	**12**	**13**	**7**	**1**	**4**	**2**	**5**	**3**

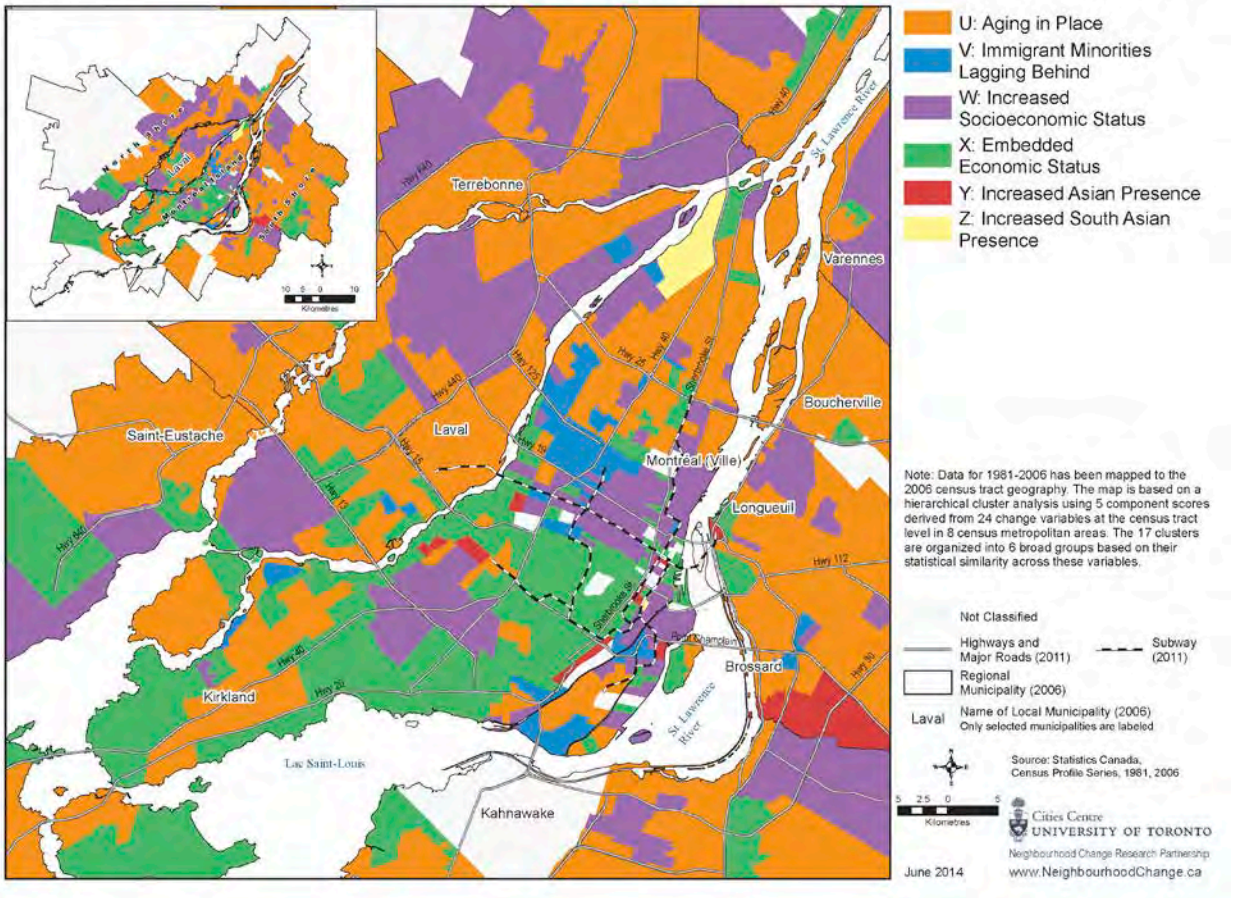
Table A.6: Continued

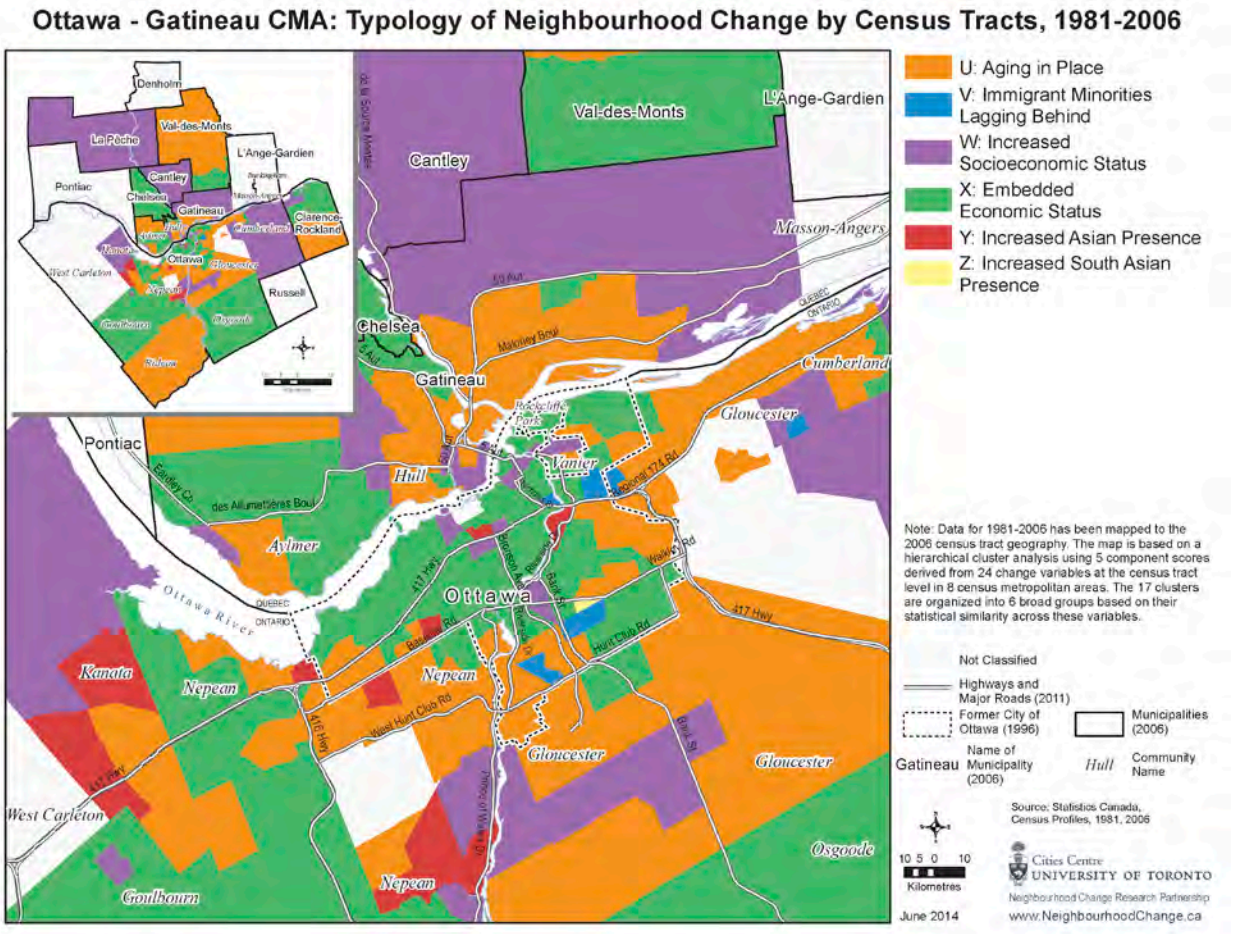
Variable	X 1	X 2	X 3	X 4	Y 1	Y 2	Y 3	Z 1	Z 2
TOTMOVERS81	5	15	7	4	8	11	3	17	6
TOTMOVERS06	15	10	6	4	1	7	14	8	2
TOTMOVERS_8106	**14**	**6**	**10**	**11**	**1**	**7**	**15**	**4**	**2**
RENTED81	13	7	3	1	4	9	16	11	8
RENTED06	15	4	5	1	7	6	14	17	8
RENTED_8106	**13**	**8**	**14**	**10**	**15**	**6**	**5**	**17**	**7**
CBEF194681	10	5	3	8	9	11	17	6	12
CBEF194606	8	4	2	6	10	9	17	15	13
CBEF1946_8106	**10**	**7**	**13**	**5**	**14**	**9**	**1**	**17**	**11**
C718181	5	16	14	12	9	11	3	10	6
C960606	5	17	8	15	2	7	13	1	4
C7181_9606_8106	**12**	**7**	**5**	**11**	**3**	**10**	**17**	**1**	**8**
SINGDET81	2	13	14	16	11	6	8	1	7
SINGDET06	2	6	11	16	14	12	8	3	13
SINGDET_8106	**2**	**4**	**5**	**3**	**16**	**15**	**8**	**14**	**17**
LOWRISE81	12	7	4	2	6	11	17	14	16
LOWRISE06	13	7	6	3	9	11	14	17	15
LOWRISE_8106	**15**	**12**	**13**	**11**	**16**	**9**	**6**	**17**	**8**
HIGHRISE81	13	6	5	1	4	3	10	9	2
HIGHRISE06	15	7	5	1	3	4	6	16	2
HIGHRISE_8106	**16**	**12**	**10**	**15**	**1**	**6**	**2**	**17**	**7**
SUITABLE81	13	15	17	14	15	9	9	9	5
SUITABLE06	14	12	14	3	3	6	6	8	1
SUITABLE_8106	**12**	**9**	**8**	**3**	**2**	**4**	**4**	**4**	**1**
CONDITION81	10	7	6	9	12	11	17	3	8
CONDITION06	13	2	5	3	11	7	15	17	14
CONDITION_8106	**12**	**1**	**11**	**2**	**10**	**8**	**6**	**17**	**15**
AFFORDABLE81	4	16	5	8	9	15	6	17	11
AFFORDABLE06	10	16	17	8	5	6	4	2	1
AFFORDABLE_8106	**11**	**14**	**17**	**8**	**5**	**6**	**3**	**2**	**1**

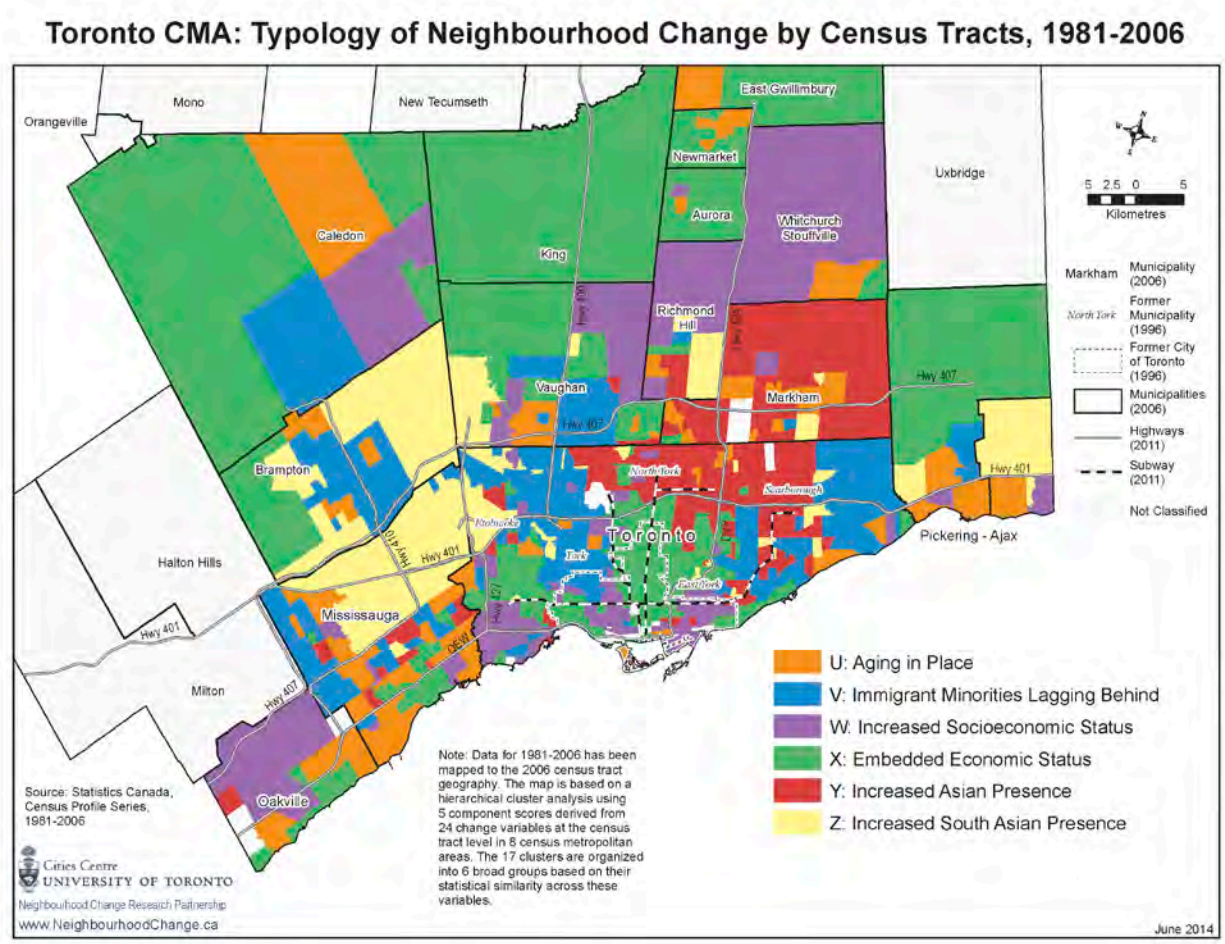
Appendix B: Maps Showing the Six Groups by CMA



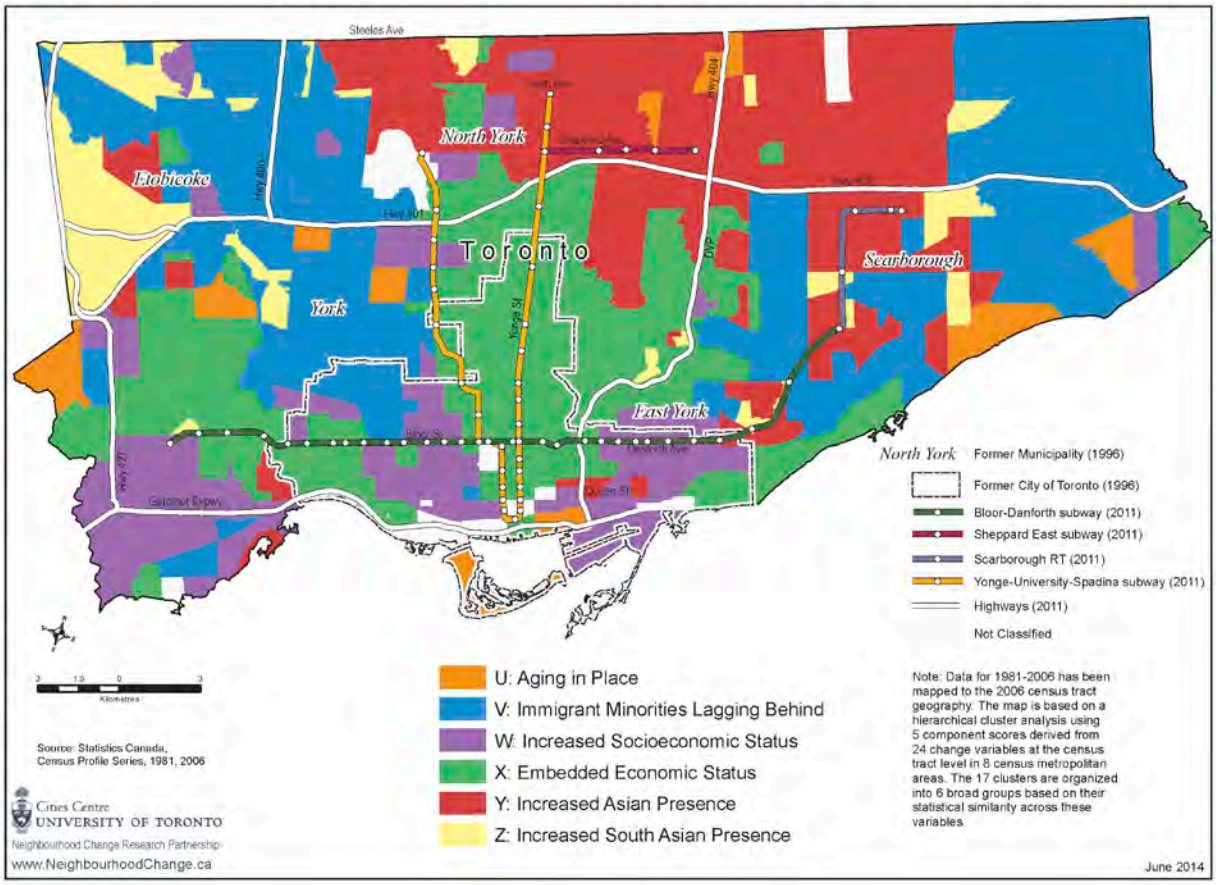
Montréal CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006

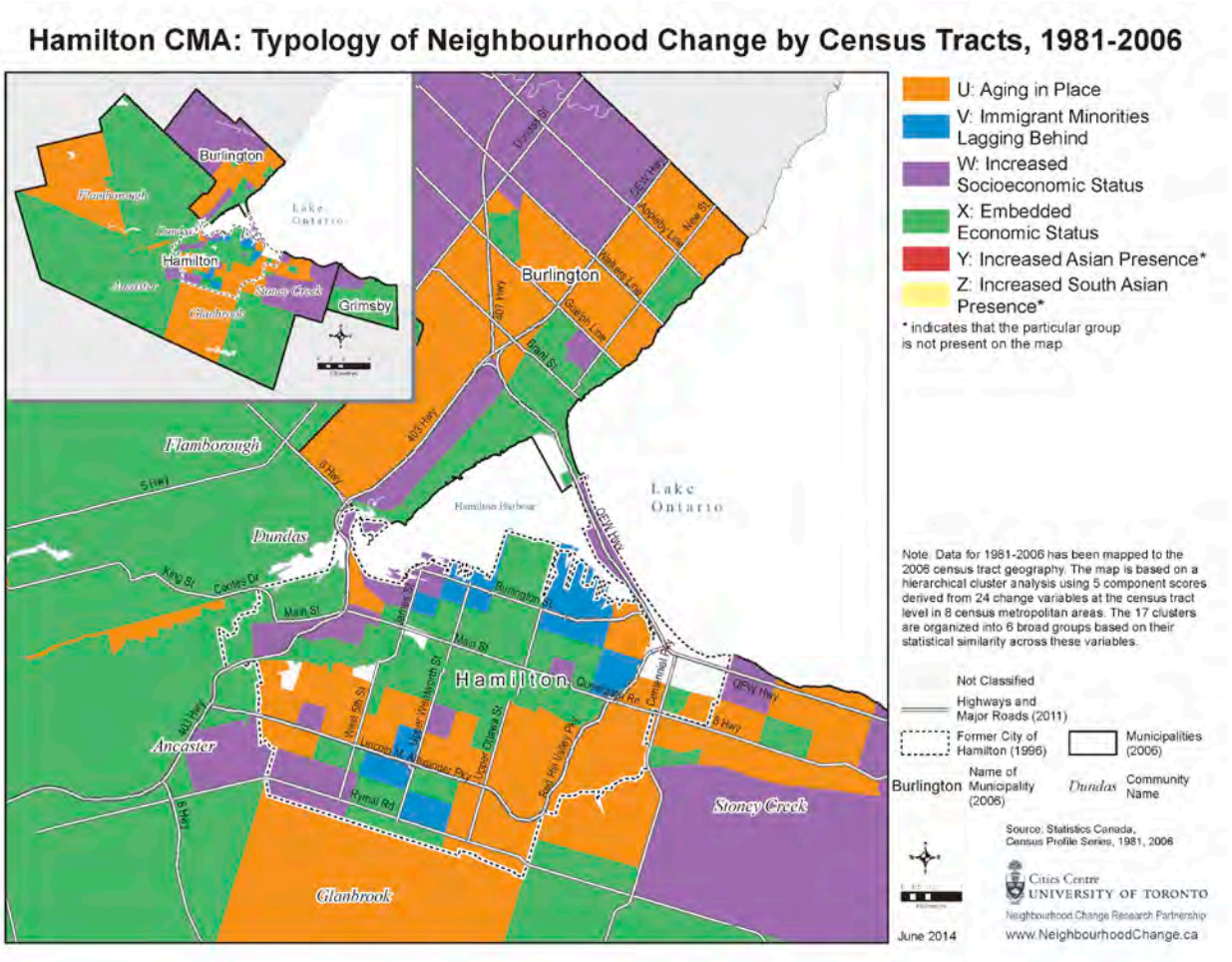


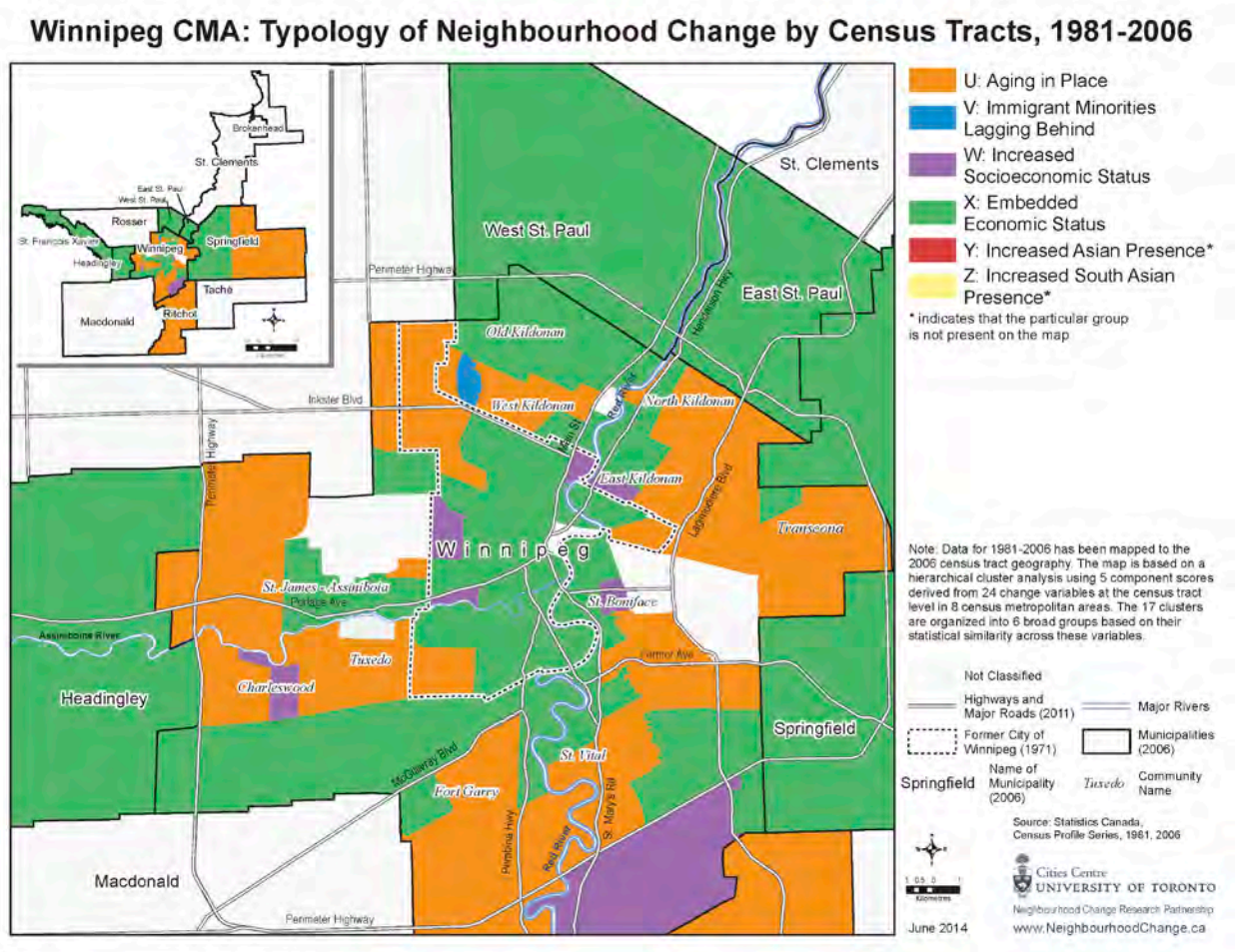

Ottawa - Gatineau CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006
U: Aging in Place
V: Immigrant Minorities Lagging Behind
W: Increased Socioeconomic Status
X: Embedded Economic Status
Y: Increased Asian Presence
Z: Increased South Asian Presence
Note: Data for 1981-2006 has been mapped to the 2006 census tract geography. The map is based on a hierarchical cluster analysis using 5 component scores derived from 24 change variables at the census tract level in 8 census metropolitan areas. The 17 clusters are organized into 6 broad groups based on their statistical similarity across these variables.
Not Classified
Highways and Major Roads (2011)
Former City of Ottawa (1996)
Municipalities (2006)
Gatineau Name of Municipality (2006)
Hull Community Name
Source: Statistics Canada, Census Profiles, 1981, 2006
10 5 0 10
Kilometres
June 2014
Cities Centre
UNIVERSITY OF TORONTO
Neighbourhood Change Research Partnership
www.NeighbourhoodChange.ca
Denholm
Val-des-Monts
L'Ange-Gardien
Cantley
Pontiac
Chelsea
Gatineau
Clarence-Rockland
Russell
Masson-Angers
Cumberland
Gloucester
Vanier
Hull
Aylmer
Ottawa
Kanata
Nepean
West Carleton
Goulbourn
Osgoode
Ottawa River
417 Hwy
QUEBEC
ONTARIO

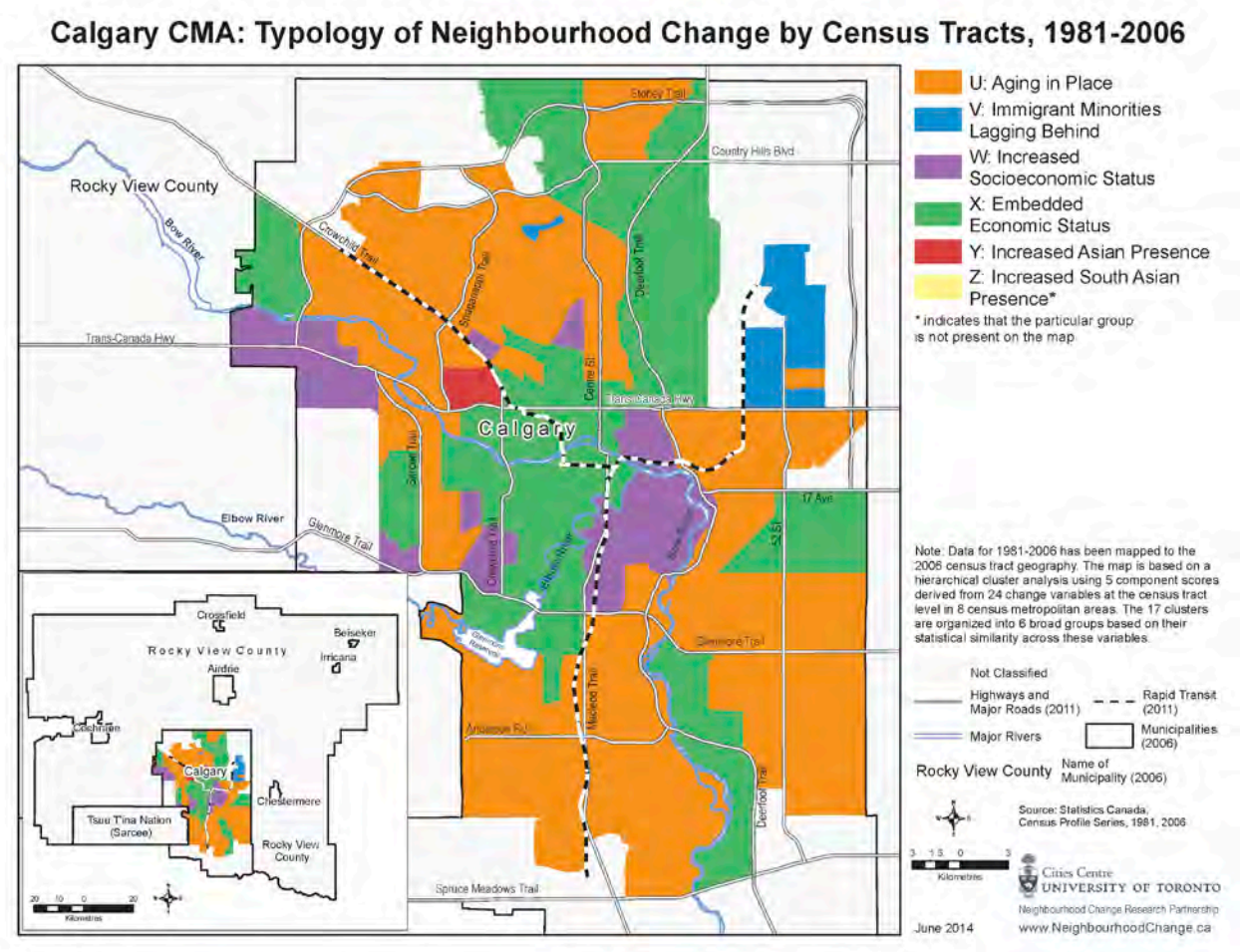

Toronto CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006
Orangeville
Mono
New Tecumseth
East Gwillimbury
Newmarket
Aurora
Whitchurch Stouffville
Uxbridge
Caledon
King
Richmond Hill
Vaughan
Markham
Brampton
Halton Hills
Mississauga
Milton
Oakville
Toronto
Pickering - Ajax
Hwy 407
Hwy 401
Hwy 410
Hwy 427
QEW
North York
Scarborough
Etobicoke
York
East York
5 2.5 0 5
Kilometres
Markham Municipality (2006)
North York Former Municipality (1996)
Former City of Toronto (1996)
Municipalities (2006)
Highways (2011)
Subway (2011)
Not Classified
U: Aging in Place
V: Immigrant Minorities Lagging Behind
W: Increased Socioeconomic Status
X: Embedded Economic Status
Y: Increased Asian Presence
Z: Increased South Asian Presence
Note: Data for 1981-2006 has been mapped to the 2006 census tract geography. The map is based on a hierarchical cluster analysis using 5 component scores derived from 24 change variables at the census tract level in 8 census metropolitan areas. The 17 clusters are organized into 6 broad groups based on their statistical similarity across these variables.
Source: Statistics Canada, Census Profile Series, 1981-2006
Cities Centre
UNIVERSITY OF TORONTO
Neighbourhood Change Research Partnership
www.NeighbourhoodChange.ca
June 2014

City of Toronto: Typology of Neighbourhood Change by Census Tracts, 1981-2006

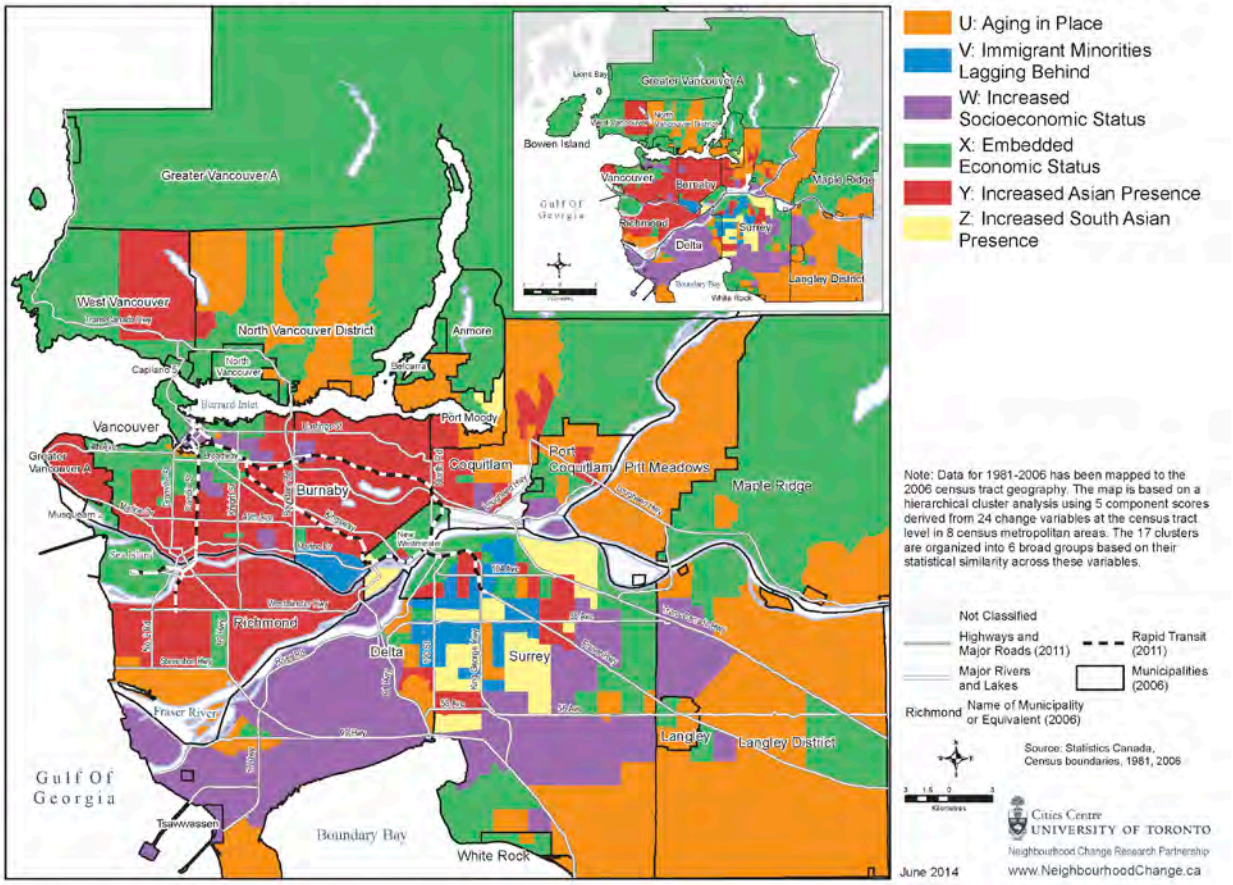



Hamilton CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006
U: Aging in Place
V: Immigrant Minorities Lagging Behind
W: Increased Socioeconomic Status
X: Embedded Economic Status
Y: Increased Asian Presence*
Z: Increased South Asian Presence*
* indicates that the particular group is not present on the map
Burlington
Hamilton
Grimsby
Flamborough
Dundas
Ancaster
Stoney Creek
Glanbrook
Lake Ontario
Note: Data for 1981-2006 has been mapped to the 2006 census tract geography. The map is based on a hierarchical cluster analysis using 5 component scores derived from 24 change variables at the census tract level in 8 census metropolitan areas. The 17 clusters are organized into 6 broad groups based on their statistical similarity across these variables.
Not Classified
Highways and Major Roads (2011)
Former City of Hamilton (1996)
Municipalities (2006)
Burlington Name of Municipality (2006)
Dundas Community Name
Source: Statistics Canada, Census Profile Series, 1981, 2006
Cities Centre UNIVERSITY OF TORONTO
Neighbourhood Change Research Partnership
www.NeighbourhoodChange.ca
June 2014

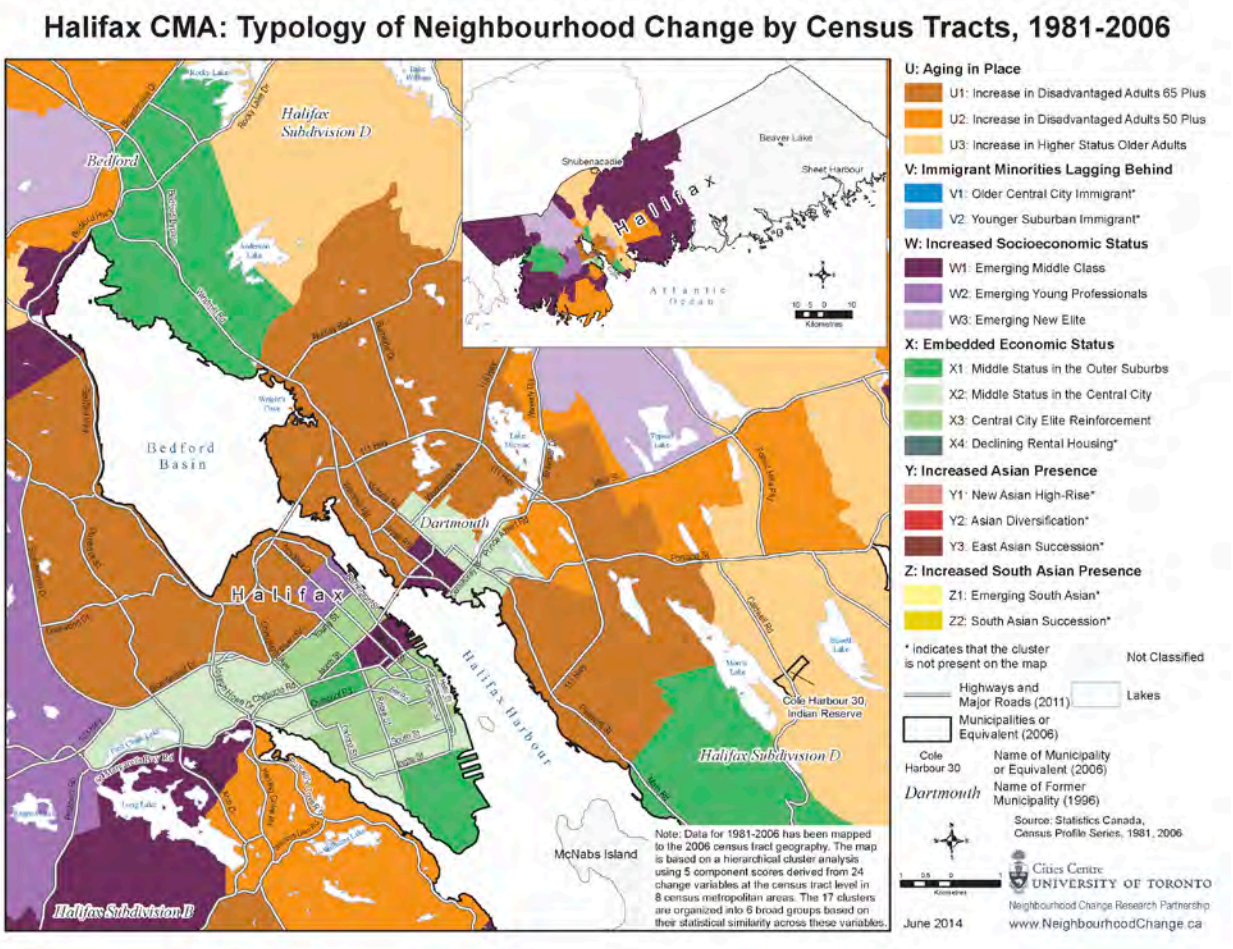

Winnipeg CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006
U: Aging in Place
V: Immigrant Minorities Lagging Behind
W: Increased Socioeconomic Status
X: Embedded Economic Status
Y: Increased Asian Presence*
Z: Increased South Asian Presence*
* indicates that the particular group is not present on the map
Note: Data for 1981-2006 has been mapped to the 2006 census tract geography. The map is based on a hierarchical cluster analysis using 5 component scores derived from 24 change variables at the census tract level in 8 census metropolitan areas. The 17 clusters are organized into 6 broad groups based on their statistical similarity across these variables.
Not Classified
Highways and Major Roads (2011)
Major Rivers
Former City of Winnipeg (1971)
Municipalities (2006)
Springfield Name of Municipality (2006)
Tuxedo Community Name
Source: Statistics Canada, Census Profile Series, 1981, 2006
Cities Centre UNIVERSITY OF TORONTO
Neighbourhood Change Research Partnership
www.NeighbourhoodChange.ca
June 2014
St. Clements
West St. Paul
East St. Paul
Old Kildonan
West Kildonan
North Kildonan
East Kildonan
Transcona
Winnipeg
St. James - Assiniboia
St. Boniface
Tuxedo
Charleswood
Headingley
Springfield
St. Vital
Fort Garry
Macdonald
Perimeter Highway
Inkster Blvd
Assiniboine River
Portage Ave
Fermor Ave
McGillivray Blvd
Pembina Hwy
Red River
St. Marys Rd
Henderson Hwy
Lagimodiere Blvd
Brokenhead
Rosser
Winnipeg
Springfield
Tache
Ritchot
Macdonald


Calgary CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006
U: Aging in Place
V: Immigrant Minorities Lagging Behind
W: Increased Socioeconomic Status
X: Embedded Economic Status
Y: Increased Asian Presence
Z: Increased South Asian Presence*
* indicates that the particular group is not present on the map
Note: Data for 1981-2006 has been mapped to the 2006 census tract geography. The map is based on a hierarchical cluster analysis using 5 component scores derived from 24 change variables at the census tract level in 8 census metropolitan areas. The 17 clusters are organized into 6 broad groups based on their statistical similarity across these variables.
Not Classified
Highways and Major Roads (2011)
Rapid Transit (2011)
Major Rivers
Municipalities (2006)
Rocky View County Name of Municipality (2006)
Source: Statistics Canada, Census Profile Series, 1981, 2006
Kilometres
Cities Centre
UNIVERSITY OF TORONTO
Neighbourhood Change Research Partnership
June 2014
www.NeighbourhoodChange.ca
Rocky View County
Bow River
Crowchild Trail
Stoney Trail
Country Hills Blvd
Deerfoot Trail
Trans-Canada Hwy
Calgary
Elbow River
Glenmore Trail
17 Ave
52 St
Macleod Trail
Spruce Meadows Trail
Crossfield
Beiseker
Irricana
Airdrie
Cochrane
Chestermere
Tsuu T'ina Nation (Sarcee)

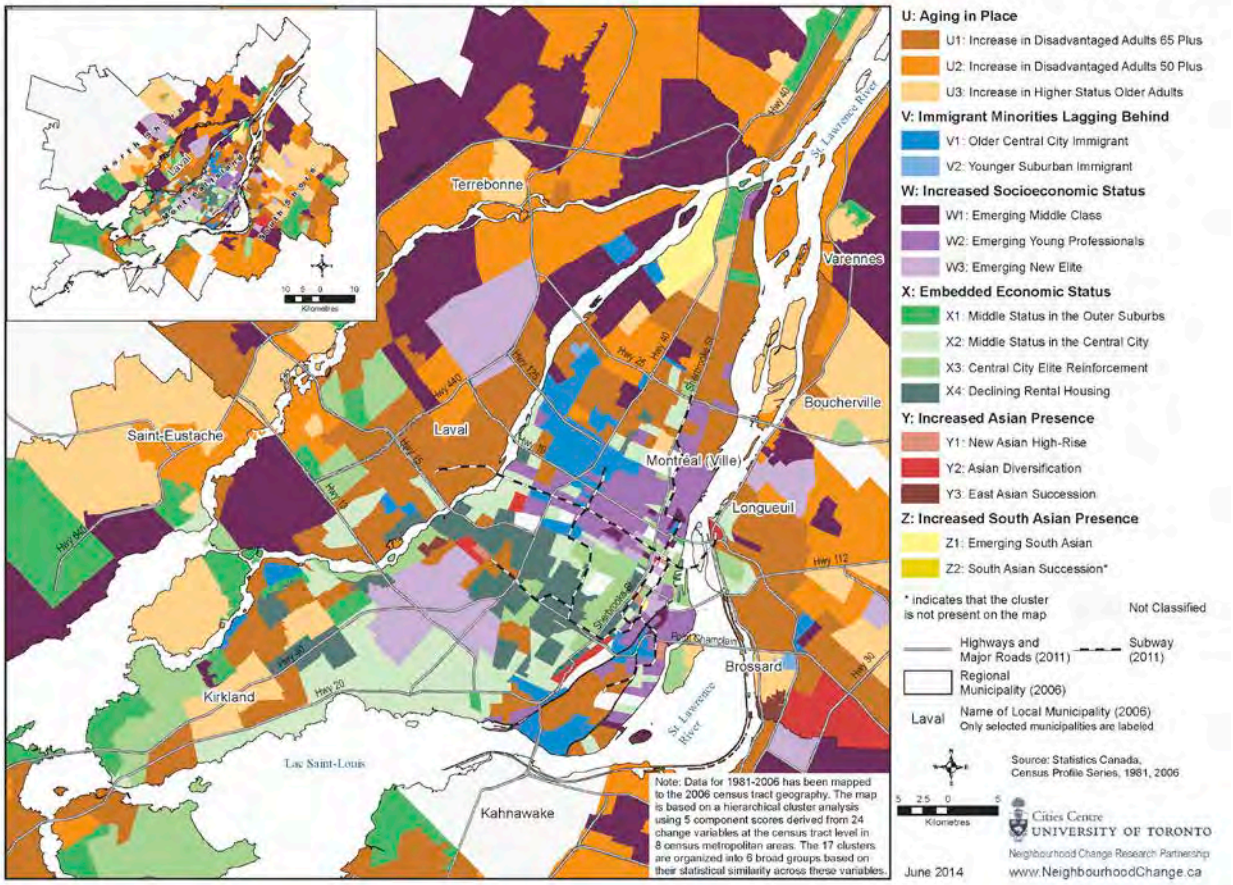
Vancouver CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006



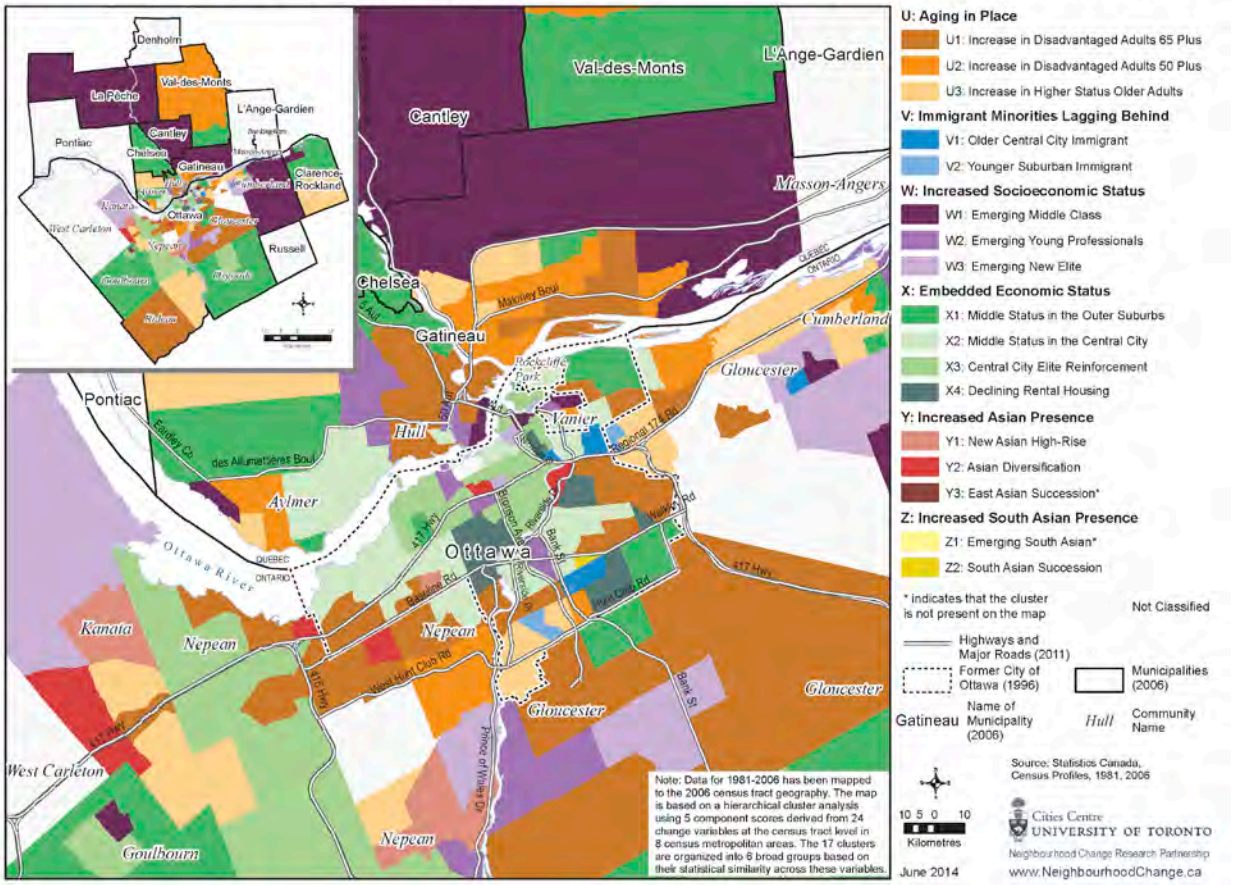
Appendix C: Maps Showing the 17 Clusters by CMA

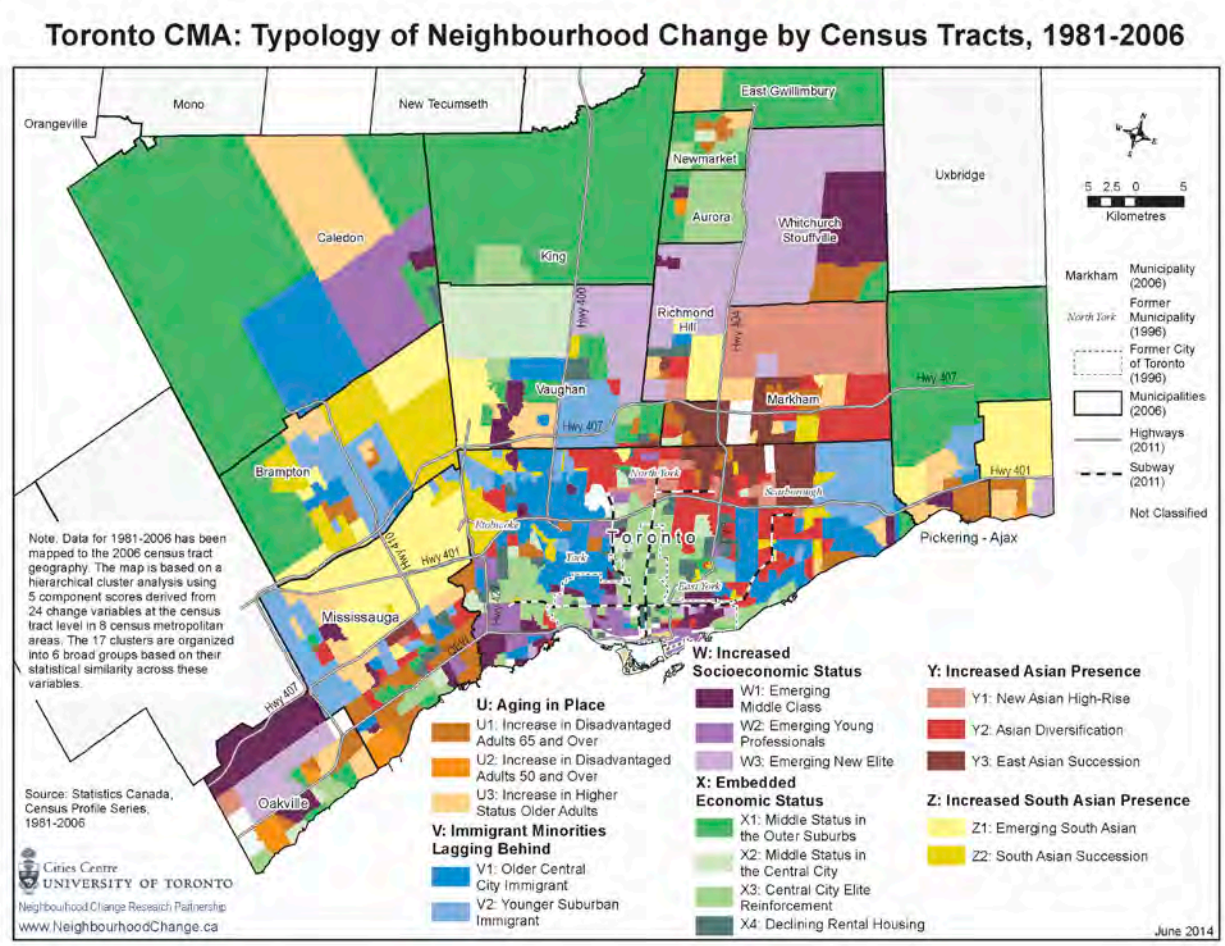


Montréal CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006

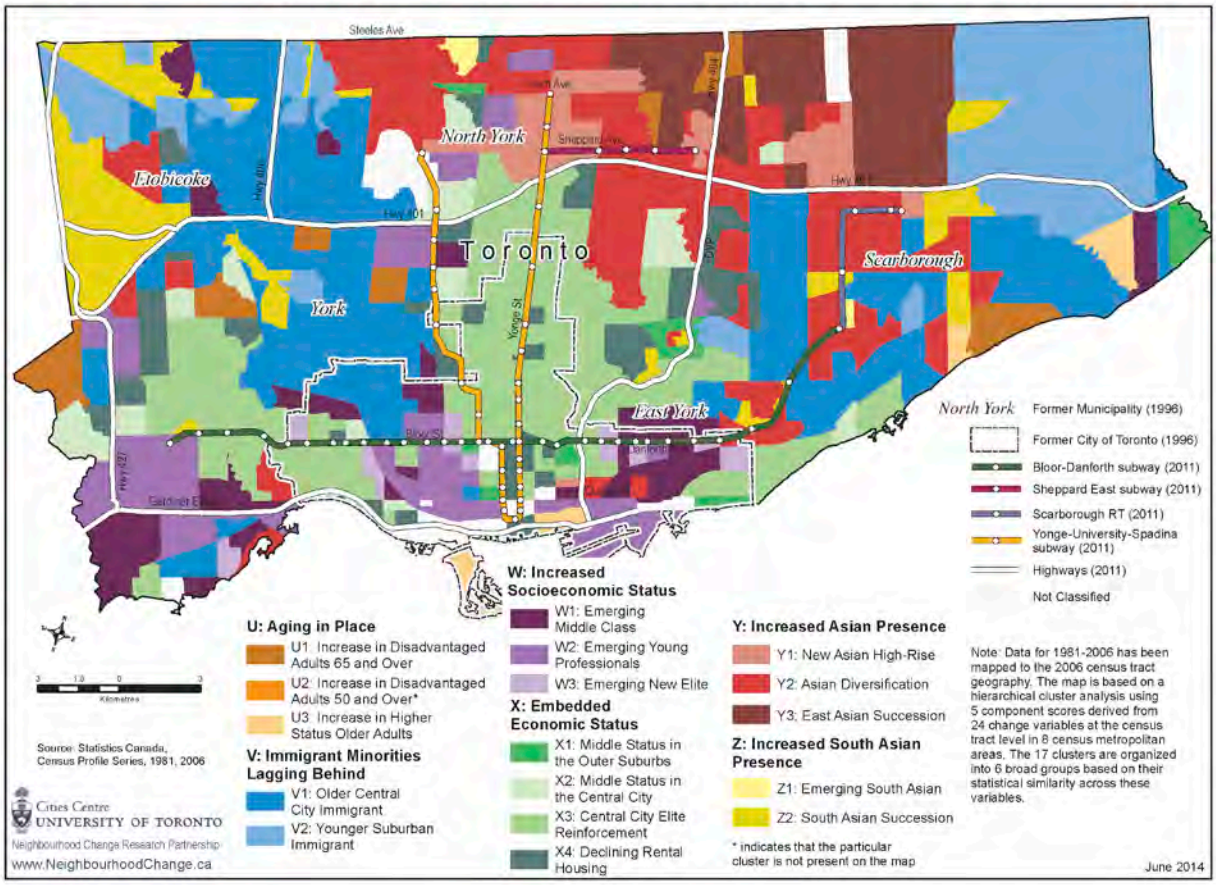


Ottawa - Gatineau CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006

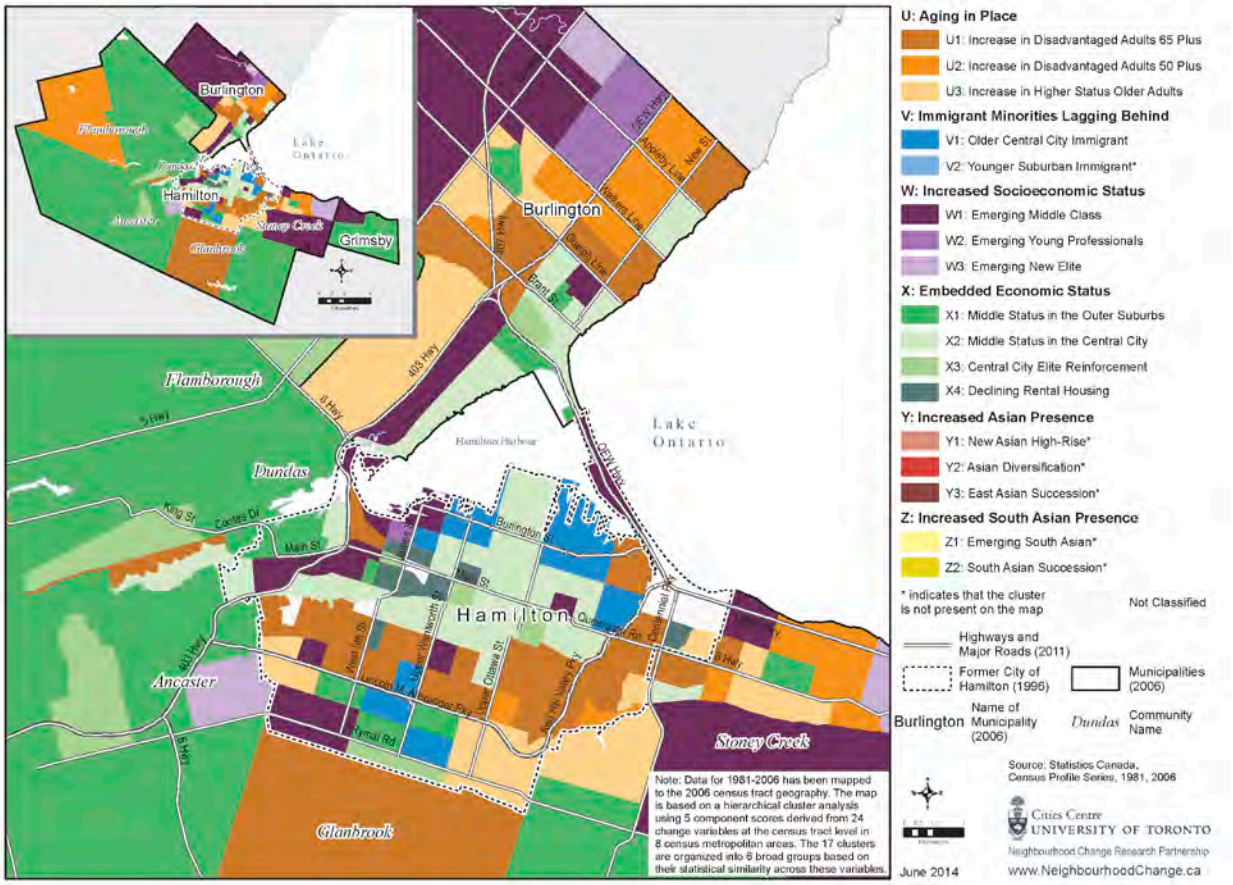



Toronto CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006
Mono
New Tecumseth
East Gwillimbury
Orangeville
Newmarket
Uxbridge
Aurora
Whitchurch Stouffville
Caledon
King
Richmond Hill
Vaughan
Markham
Brampton
Pickering - Ajax
Toronto
Mississauga
Oakville
Hwy 407
Hwy 401
Hwy 400
Hwy 404
Hwy 410
5 2.5 0 5
Kilometres
Markham Municipality (2006)
North York Former Municipality (1996)
Former City of Toronto (1996)
Municipalities (2006)
Highways (2011)
Subway (2011)
Not Classified
Note: Data for 1981-2006 has been mapped to the 2006 census tract geography. The map is based on a hierarchical cluster analysis using 5 component scores derived from 24 change variables at the census tract level in 8 census metropolitan areas. The 17 clusters are organized into 6 broad groups based on their statistical similarity across these variables.
Source: Statistics Canada, Census Profile Series, 1981-2006
U: Aging in Place
U1: Increase in Disadvantaged Adults 65 and Over
U2: Increase in Disadvantaged Adults 50 and Over
U3: Increase in Higher Status Older Adults
V: Immigrant Minorities Lagging Behind
V1: Older Central City Immigrant
V2: Younger Suburban Immigrant
W: Increased Socioeconomic Status
W1: Emerging Middle Class
W2: Emerging Young Professionals
W3: Emerging New Elite
X: Embedded Economic Status
X1: Middle Status in the Outer Suburbs
X2: Middle Status in the Central City
X3: Central City Elite Reinforcement
X4: Declining Rental Housing
Y: Increased Asian Presence
Y1: New Asian High-Rise
Y2: Asian Diversification
Y3: East Asian Succession
Z: Increased South Asian Presence
Z1: Emerging South Asian
Z2: South Asian Succession
Cities Centre
UNIVERSITY OF TORONTO
Neighbourhood Change Research Partnership
www.NeighbourhoodChange.ca
June 2014

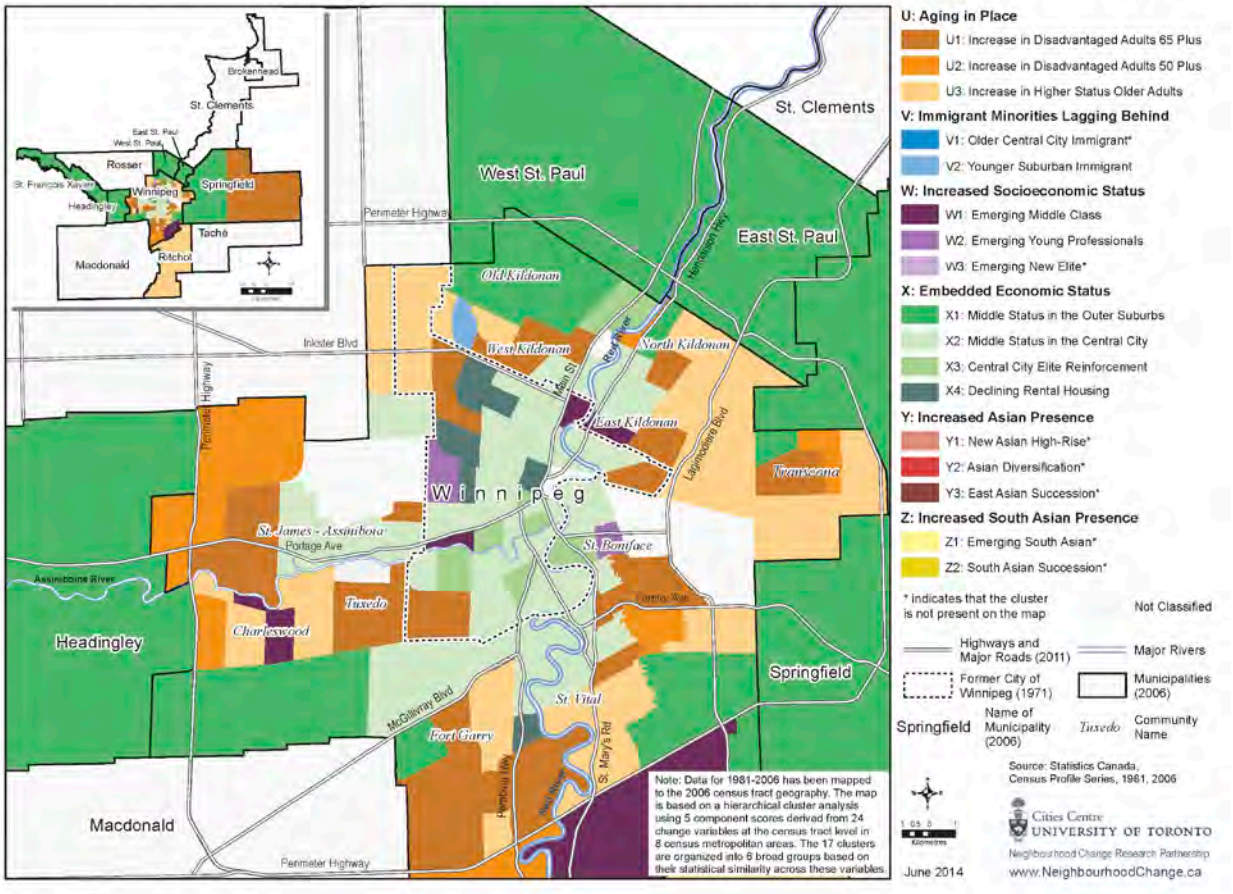
City of Toronto: Typology of Neighbourhood Change by Census Tracts, 1981-2006

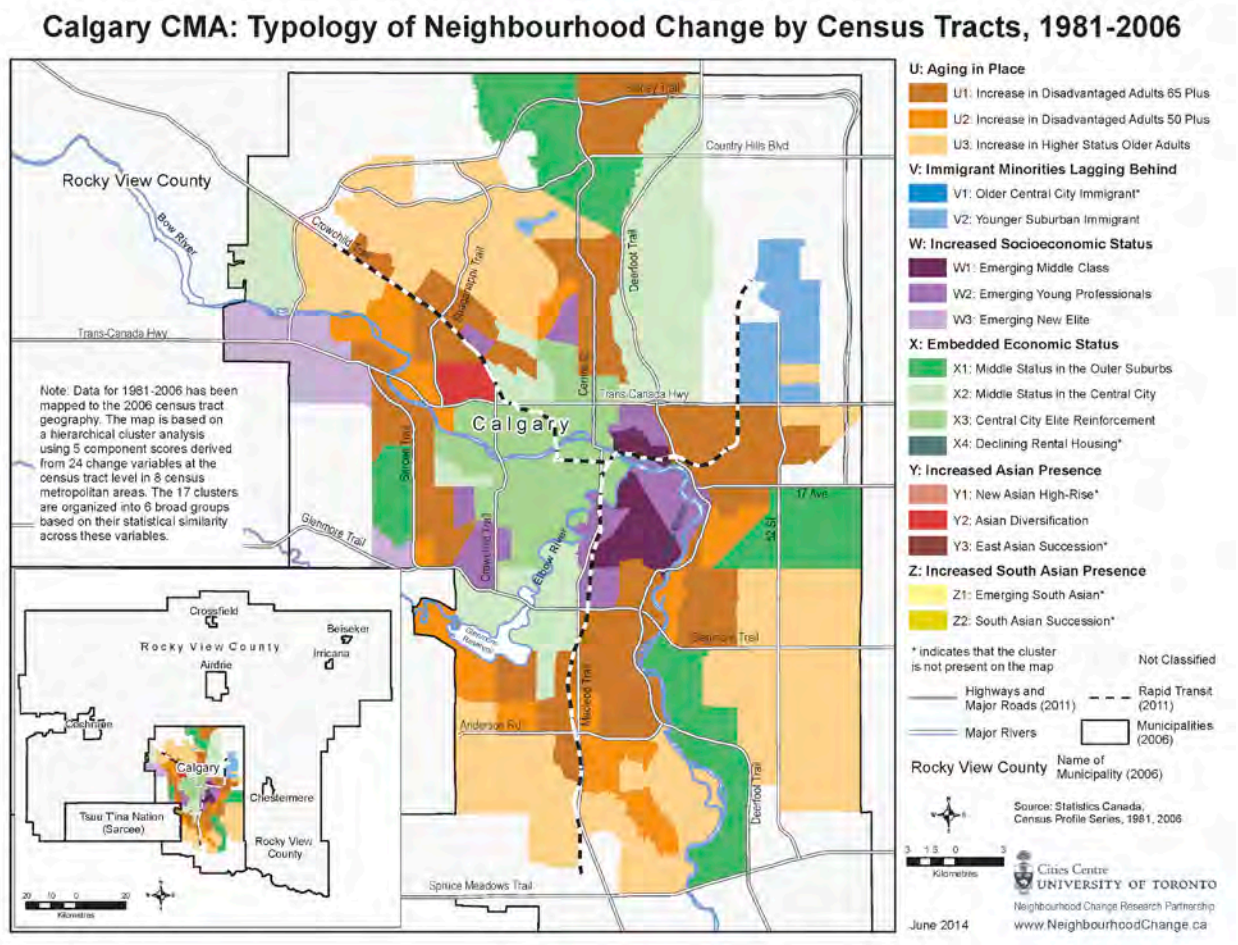


Hamilton CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006



Winnipeg CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006




Calgary CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006
Rocky View County
Bow River
Trans-Canada Hwy
Country Hills Blvd
Deerfoot Trail
Calgary
17 Ave
Glenmore Trail
Elbow River
Stoney Trail
Anderson Rd
Spruce Meadows Trail
Note: Data for 1981-2006 has been mapped to the 2006 census tract geography. The map is based on a hierarchical cluster analysis using 5 component scores derived from 24 change variables at the census tract level in 8 census metropolitan areas. The 17 clusters are organized into 6 broad groups based on their statistical similarity across these variables.
Crossfield
Beiseker
Irricana
Airdrie
Cochrane
Chestermere
Tsuu T'ina Nation (Sarcee)
Rocky View County
U: Aging in Place
U1: Increase in Disadvantaged Adults 65 Plus
U2: Increase in Disadvantaged Adults 50 Plus
U3: Increase in Higher Status Older Adults
V: Immigrant Minorities Lagging Behind
V1: Older Central City Immigrant*
V2: Younger Suburban Immigrant
W: Increased Socioeconomic Status
W1: Emerging Middle Class
W2: Emerging Young Professionals
W3: Emerging New Elite
X: Embedded Economic Status
X1: Middle Status in the Outer Suburbs
X2: Middle Status in the Central City
X3: Central City Elite Reinforcement
X4: Declining Rental Housing*
Y: Increased Asian Presence
Y1: New Asian High-Rise*
Y2: Asian Diversification
Y3: East Asian Succession*
Z: Increased South Asian Presence
Z1: Emerging South Asian*
Z2: South Asian Succession*
* indicates that the cluster is not present on the map
Not Classified
Highways and Major Roads (2011)
Rapid Transit (2011)
Major Rivers
Municipalities (2006)
Rocky View County
Name of Municipality (2006)
Source: Statistics Canada, Census Profile Series, 1981, 2006
Kilometres
Cities Centre
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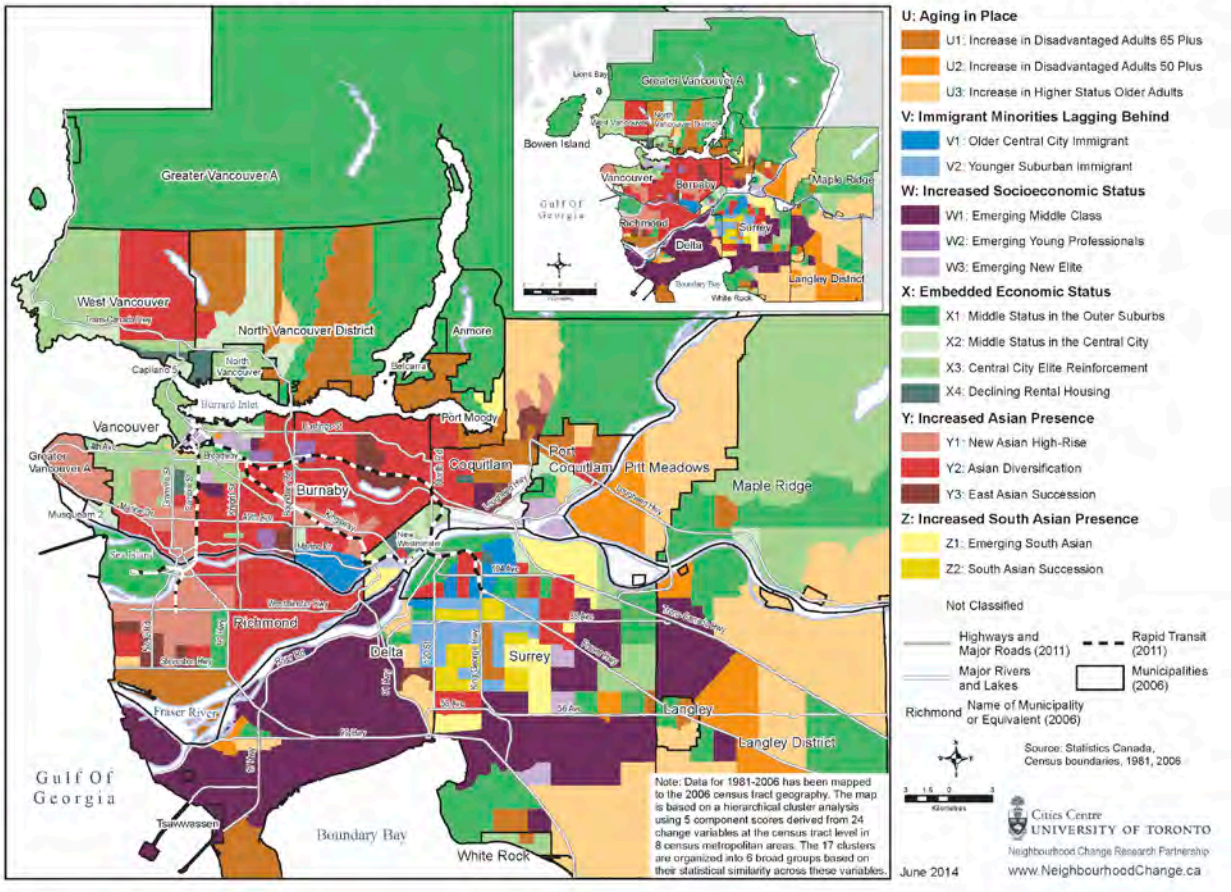
Neighbourhood Change Research Partnership
June 2014
www.NeighbourhoodChange.ca

Vancouver CMA: Typology of Neighbourhood Change by Census Tracts, 1981-2006