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## MAPPING THE SOCIO-ECONOMIC DIVERSITY OF RURAL CANADA

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### HIGHLIGHTS

- ◆ *Labour force and economic attributes* map a major divide between a lower economic performance in the north and east of Canada and a higher economic performance in the south and west of Canada; and
- ◆ The dimension of *Remote and agro-rural attributes* identifies census divisions with lower housing costs, more children, lower wages, lower educational attainment and lower incomes.
- ◆ These two dimensions capture 45 percent of the socio-economic diversity, as measured by 27 common indicators, across Canada's 288 census divisions.
- ◆ The other four dimensions of socio-economic diversity that were identified in this study are named *Demographic and labour force attributes*, *Complex manufacturing versus non-agricultural primary production*, *Traditional manufacturing versus government employment*, and *Demographic dynamics*.
- ◆ There is a multi-dimensional nature of the performance of regions – some census divisions rank high on some attributes and rank low on other attributes.
- ◆ The classification of regional types into predominantly urban, intermediate, rural metro-adjacent, rural non-metro-adjacent and rural northern regions captures the variation of the identified dimensions relatively well, while showing the diversity of socio-economic conditions within each regional type for other dimensions.



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## Introduction

In recent years, the socio-economic performance of small territorial units has increasingly been under scrutiny. There has been increasing recognition that localities have widely different

opportunities and constraints which shape their potential path of development and that the policy process should not overlook this diversity of conditions (OECD, 2001).

At the provincial and federal level, the attention to small territorial units is required to understand how universal policies might affect different areas as well as to assess the potential for tailor-made local policies. The continuous process of decentralization and downloading of responsibility toward municipal and county administrations has also stimulated analysis at a smaller geographic scale. At the municipal and county levels, the management and design of local development policy motivate the growing interest in the comparative conditions and strengths of a given area.

One of the crucial questions associated with this shift in geographical scale is whether and to what extent it is possible to implement development strategies and policies for each type of region. This in turn has raised a number of questions about the structure and characteristics of homogeneous regions and the way in which these should be identified. Many of the socio-economic data that are typically used for this purpose have become relatively easy to access. Given the variety of indicators that are available, it becomes a challenge for researchers and policy-makers to reduce the complexity to a manageable set of indicators that can be used to interpret reality.

This bulletin assesses the degree of spatial diversity across rural and urban Canada in terms of a number of demographic, social and economic indicators. A multivariate statistical method is used to reduce 27 commonly used and understood indicators to six *dimensions*. These dimensions are used to profile and to map the 288 Census Divisions (CDs) of Canada. This analysis investigates the nature of these dimensions, their spatial distribution and their relationship with the prevailing regional classifications. These results can help a variety of stakeholders and decision-makers to more fully understand the regional context in which they operate, in comparison to the rest of the country.

## Six dimensions of territorial diversity

Many of the characteristics of a locality, such as “economic performance” or “social distress”, can be conceptualized as a latent unobservable dimension that can be measured by a number of observable indicators – such as average income per capita, income growth, unemployment rate and so on. Factor analysis is a statistical technique that allows one to estimate these latent dimensions (factors), which are in essence summary variables that account for the variability in groupings of the observed indicators (for more details, see Box 1 and Box 2). Each one of these dimensions is “measured” by a *factor score*, which is the standardized value attributed to this summary variable.

The utility of factor analysis stems from a reduction of the complexity due to the variety of measures and indicators that a researcher often deals with. The procedure, however, implies a loss of information about the variability of each specific indicator. Thus, this approach is beneficial when it produces a simplified but meaningful picture of a complex reality. By analyzing the nature and spatial distribution of the *factor score*, each dimension can reveal a pattern of associations among socio-economic indicators. These dimensions provide a perspective on the relative position of the CD with respect to the dimension identified.

The indicators employed in this research are commonly used demographic, social and economic variables, such as the share of the population by age groups, the share of employment by sectors and the unemployment rate (see Appendix A for a detailed list). As a result of the factor analysis, 27 indicators were reduced to six dimensions (factors), which explain 78 percent of the total variance of the original indicators. Given the wide variability in performance and outcomes across census divisions, our six dimensions provide a good “fit” with the data. For this type of analysis, we

consider we have good results if only 22 percent of variability in the data remains unexplained due to "other" or random effects.

Each dimension is strongly associated with a grouping of variables (either in a negative or positive manner) and these groupings are used to characterise and to name the dimension itself. The names attributed to the six dimensions are as follows (in brackets is the percent of variance explained by the factor):

- *First dimension: labour force and economic attributes* (26.3 percent) map a major divide between a lower economic performance in the north and east of Canada and a higher economic performance in the south and west of Canada;
- *Second dimension: remote and agro-rural attributes* (18.7 percent) identifies census divisions with lower housing costs, more children, lower wages, lower educational attainment and lower incomes;
- *Third dimension: demographic and labour force attributes* (14.7 percent) differentiates the census divisions with an aging population from census divisions where the workforce is younger;
- *Fourth dimension: employment attributes - complex manufacturing versus non-agricultural primary production* (7.4 percent) summarizes the differences between census divisions in southern Québec and Ontario with a relatively high share of employment in complex manufacturing and census divisions in the hinterland with a larger dependency on primary production;
- *Fifth dimension: employment attributes - traditional manufacturing versus government employment attributes* (5.8 percent) shows the difference between census divisions dependent upon processing of primary products (e.g., fish, wood, agriculture and metals) and census divisions with capital cities; and
- *Sixth dimension: demographic dynamics attributes* (5.0 percent) shows the difference between growing areas with a higher share of youth and higher housing costs compared to areas that are not growing.



## Box 1. Technical notes

### Data: Census of Population, 1996

All the data used in this study are obtained from the 1996 Census of Population. Unfortunately, data from the 2001 Census of Population were not available when this analysis was undertaken. However, we would expect the 2001 patterns to be essentially the same.

All the data are aggregated at the census division (CD) level. The CDs selected for this study are all 288 CDs of Canada existing in 1996. Appendix Table A.1 lists the 27 variables used in this study and they are grouped under four major headings: demographic indicators; social indicators; housing characteristics; and economic and labour market indicators. Details about the definition of each indicator are provided in Appendix B. Most of the variables selected are indicators commonly used and understood by professionals and the general public.

### Method: Exploratory factor analysis

Attempts to develop regional or rural typologies have generally relied on multivariate statistical techniques and used population census or census-type data for this purpose. Factor analysis is a statistical technique that helps to answer questions such as “Can a small number of unobservable factors explain the variability in many observable variables?” For instance, conceptual constructs such as economic health or social distress are not directly observable. Nor can they be measured directly. What a researcher can do is to measure a number of outcome indicators, as for instance the income level, the unemployment rate, the number of low-income families, and so on. Starting with a large set of variables, the factor analysis allows one to estimate a restricted number of factors (called *dimensions* in this bulletin), which are correlated with observed variables and which summarizes their values. The value of each factor, for each CD, is measured by a *factor score*, which is in essence a summary variable, with standardized values, usually ranging from about -3 to +3. Hence, this value is used to gain an understanding of the relative performance on the particular dimension identified by the factor and to summarize the behaviour of a group of observable variables associated with it. The factor analysis applied here is “exploratory” (as opposed to confirmatory) because the data are explored in an attempt to identify non-random patterns of associations between variables, instead of imposing a model defined *a priori*. A detailed explanation is in Alasia (2004).

### Caveats

This research identifies socio-economic dimensions for general descriptive purposes and portrays the overall patterns of spatial variation. The use and interpretation of the results of this study cannot be stretched beyond the scope of the research itself. The utility of factor analysis stems from a reduction of the complexity of socio-economic conditions that can be observed. On the other hand, the factors constitute summary variables and thus the procedure itself leads to a loss of information. The results of the factor analysis, then, clearly depend on the nature of the variables used in the computation. Many attributes that give quality of life for individuals and families are not captured by the data on which this analysis is based. Variation in access to and satisfaction with primary health care, similar issues regarding primary and secondary education for children, or the available levels of support services for elderly are just a few examples of attributes that are not available from the census. With regard to the nature of the statistical technique applied in this study, it should be remembered that the set of variables used in the analysis captures both causes and effects of certain phenomena. This research did not discern between the two aspects. Finally, the focus of the analysis is on the condition prevailing in 1996. Hence, the study provides a static description of regional conditions.

### *First dimension: Labour force and economic attributes*

This factor captures a broad range of economic attributes that describe the overall performance and economic strength of the CD. Nine variables<sup>1</sup> are strongly associated with this factor, six with a positive association (the value of these variables tends to be high when the factor score is high) and three with a negative association (the value of these variables tends to be low when the factor score is high).

CDs falling in the highest septile of the factor score have, on average, a labour force

participation rate of 73 percent and about 60 percent of the families have two or more members in the labour force (Table 1) (For an explanation on how to read the tables, see Box 2). The average income per person is about \$19,000, only 11 percent of which is government transfer income, the total unemployment rate is 7 percent and 12 percent of the individuals are in low-income families. The population tends also to have a higher educational level (13 years of schooling on average) and both dynamic services employment and non-agricultural self-employment are more

#### **Box 2. How to interpret the results**

For each factor, the results are summarized in two tables and a map. Below is an explanation about how to interpret the data reported in these tables and the maps.

The first table is the *Average values by factor score septile*. We use the term “septile” because the CDs are ranked and grouped into 7 groups with an equal number of CDs in each group. A given CD is assigned to a column based on the size of the factor score for that CD. The rows in the table show the average value of the given variable for CDs assigned to each column. Each column of this table provides a profile of a grouping of CDs (based on the factor score values) with respect to the variables that are associated with the factor itself. Note that the septile categories are the same as those used in the map (Maps 1 to 6). The factor score captures the total variability of an indicator only to a certain degree. To gain an appreciation of how much of the variability of each variable is captured by the factor, it is also possible to compare the average values reported in this table with the average by the variable’s septiles reported in Appendix Table A.2. For analogous septile categories, the closer are the values of the two tables, the better the factor captures the variability of the indicator.

The second table is the *Percent distribution of CDs by size of factor score within each type of region*. The regional type used here are those defined by Statistics Canada (du Plessis *et al.*, 2002). Each row of the table sums to 100 percent. This table indicates whether the distribution of CDs according to their factor scores shows any association with the prevailing definition of rural types. Generally, if this was the case, one would expect to find a higher frequency of observations along the diagonal of the table or, alternatively, a high concentration of observations in a few cells for each regional type.

Finally, for each factor, the factor scores are mapped. The map uses the same groupings (septiles) that are employed for the tables. The map allows an assessment of spatial patterns, regardless of any predefined regional type and provides an understanding of the broad regional distribution of the factor scores (and consequently, of the values of the indicators associated with the factor).

A detailed discussion is provided in Alasia (2004).

<sup>1</sup> A detailed definition of each variable is provided in Appendix B.

relevant than for the other grouping of CDs. At the opposite end, the first column of the table presents a rather contrasting profile. CDs with a low factor score have a participation rate of only 54 percent and only 34 percent of families have two or more members in the labour force. The average income is only \$12,800, of which 28 percent is government transfers. About 24 percent of the individuals live in low-income families and the unemployment rate is 22 percent, while the educational level is also lower (11 years of schooling on average).

Predominantly urban CDs are more likely to record higher factor score values (Table 2). For the other regional types, the distribution of CDs is spread across septile groups indicating a greater diversity of performance. However, for intermediate and rural metro-adjacent CDs, most are concentrated in the upper part of the distribution (between the 3<sup>rd</sup> and 6<sup>th</sup> septile); while for rural non-metro-adjacent CDs, the lower half of the distribution is considerably heavier (1<sup>st</sup> to 4<sup>th</sup> septile). Rural northern CDs present two peaks at the opposite ends of the distribution. Over 17 percent of the rural northern CDs fall into the first septile, which means poor economic performance and labour force attributes, while at the opposite end about 26 percent of the rural northern CDs show a higher than average economic performance. Hence, remoteness does not necessarily imply a lower economic performance.

When viewed on a map, we see a number of clusters of CDs with high positive scores (Map 1). The map uses the same septile breakdown as presented in Table 1. In the eastern part of Canada, where CD boundaries permit a more detailed spatial representation, the clusters tend to aggregate around major urban cores, but the urban centre does not necessarily present the highest score in the neighbourhood. Examples are Québec City, Montréal and Toronto. In southern Ontario, a continuous cluster of high score CDs is found in the area surrounding Toronto and stretching south-west to Lambton and Essex County.

High scores (i.e., high labour force and economic attributes) are also characteristics of a cluster of CDs surrounding Winnipeg and the southern fringe of Saskatchewan, while they cover a large part of Alberta and British Columbia. In contrast, low factor scores are concentrated in the Atlantic Provinces, particularly in Newfoundland and Labrador and the northern part of New Brunswick. They also characterize many CDs in Québec outside the urban fringe of Montréal and Québec City. Also the CDs located in the north of Manitoba and Saskatchewan and CDs within the territories that do not contain a capital city share a similar low performance on this economic dimension.

Table 1. Labour force and economic attributes: Average values by factor score septiles

Variable	Factor score septile							CDs Average
	1 <sup>st</sup> Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup> Middle	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup> Highest	
Participation rate (percent)	54	58	61	64	65	69	73	64
Percent of families with two or more members in the labour force	34	42	47	50	51	55	60	48
Social transfer income as a percent of total income	28	23	21	17	16	14	11	18
Average income per person reporting some income	12,852	14,259	14,875	16,167	17,086	17,743	19,053	16,005
Percent of persons in low-income economic families	24	19	17	17	15	15	12	17
Total unemployment rate	22	16	12	11	10	9	7	12
Average years of schooling for population 25 to 54 years of age	11.4	11.9	12.2	12.5	12.8	13.0	13.1	12.4
Percent self-employed (non-agricultural)	7	8	9	9	10	10	11	9
Dynamic services employment (percent)	7	7	7	9	8	10	11	8

Source: Statistics Canada. Census of Population, 1996, author's computation.

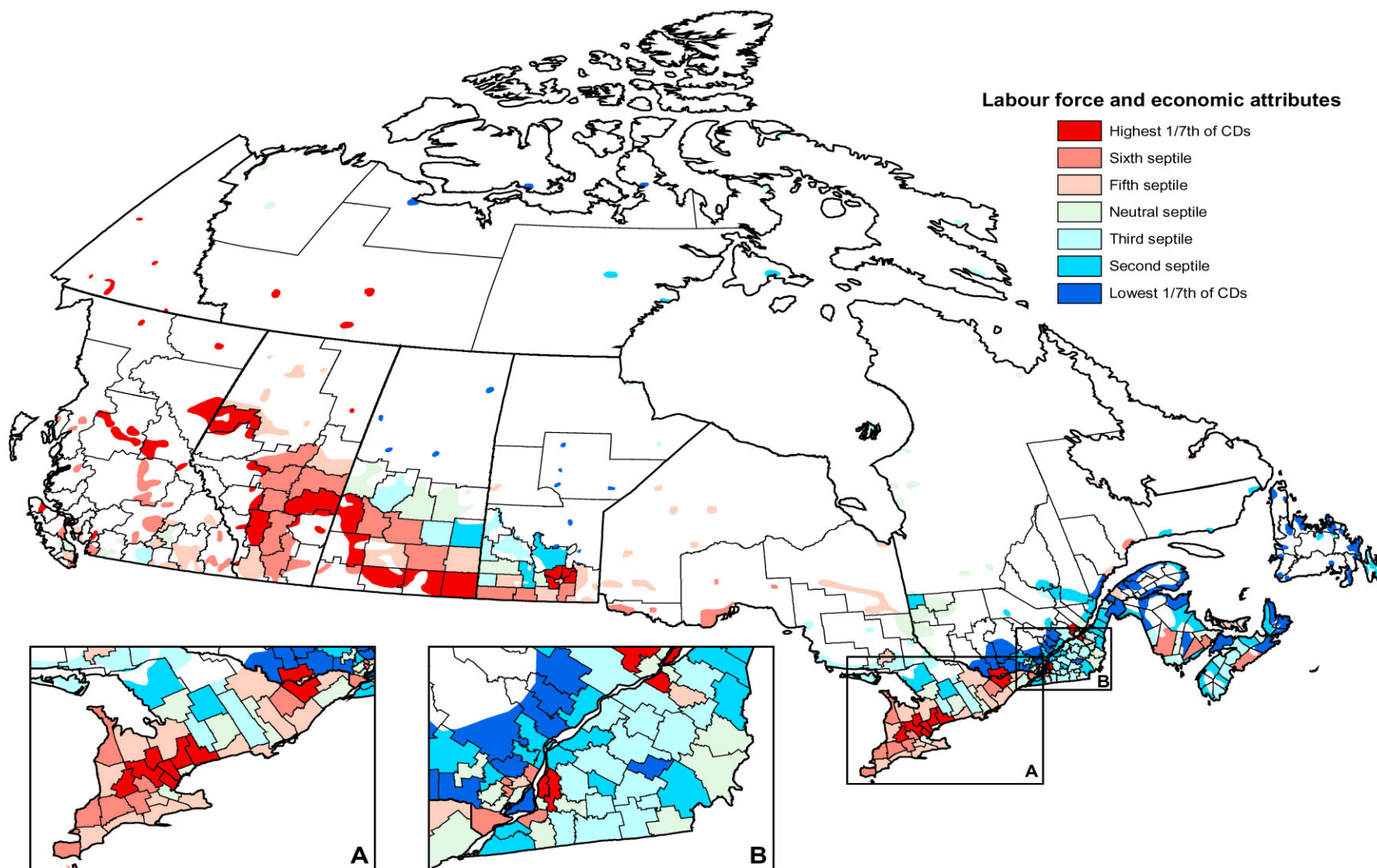
Table 2. Labour force and economic attributes: Percent distribution of CDs by septile class of factor scores within each type of region

Regional type (CD units)	Factor score septile							Total
	1 <sup>st</sup> Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup> Middle	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup> Highest	
Predominantly urban regions (25)	4.0	4.0	0.0	24.0	12.0	32.0	24.0	100
Intermediate regions (37)	2.7	18.9	21.6	8.1	16.2	21.6	10.8	100
Rural metro-adjacent regions (86)	10.5	7.0	17.4	16.3	17.4	16.3	15.1	100
Rural non-metro-adj. regions (117)	22.2	20.5	13.7	14.5	11.1	7.7	10.3	100
Rural northern regions (23)	17.4	13.0	8.7	8.7	17.4	8.7	26.1	100

Source: Statistics Canada. Census of Population, 1996, author's computation.



Map 1. Labour force and economic attributes



Source: Author's computation based on Census of Population, 1996.  
Map produced by Spatial Analysis and Geomatics Applications (SAGA), Agriculture Division, Statistics Canada, 2003.

### *Second dimension: Remote and agro-rural attributes*

This factor captures a combination of demographic, housing, employment and income characteristics that prevail in a large part of what is commonly considered rural Canada. Nine variables are strongly associated with this factor, five of which have a positive association and the other four vary in the opposite direction. The highest septile (Table 3 and dark red in Map 2) includes CDs with a fertility rate of 1.9 (ratio between persons below the age of 19 and women between 25 and 54 years of age) and a high share (35 percent) of population below 20 years of age. On average, agricultural employment is 20 percent of total employment. Only 25 percent of households renting or owning a house with housing costs higher than 30 percent of their income. Income is low (on average about \$14,200), there are on average 40 percent of income earners who earn less than \$10 per hour and educational levels are low. Nevertheless, average income growth between 1991 and 1996 has been higher than average, growing about 14 percent in nominal terms. CDs without strong remote and agro-rural attributes are shown in the first column of Tables 3 and 4 and in dark blue in Map 2.

The nature of “*remote and agro-rural attributes*”, and the reason why the factor was named in this way, can be seen in the distribution of the CDs by factor scores within each type of region (Table 4). A gradient is clearly evident. All predominantly urban CDs are in the first two septiles. There is no predominantly urban CD beyond the second septile of factor score. Intermediate CDs are also largely concentrated in the lower half of the distribution. In contrast, as one moves from rural metro-adjacent to rural non-metro-adjacent to rural northern CDs, the distribution shifts steadily toward the highest septiles, i.e. those that denote a prevalence of remote and agricultural attributes.

In all of central Canada and a large part of Alberta, the only CDs that fall in the bottom septiles (i.e., a lack of remote and agro-rural

attributes) are the urban CDs (Map 2). The northern part of B.C. presents similar characteristics. A second major cluster of CDs with a high factor score is located in south-east Québec, between the St. Lawrence River and the U.S. border. While in Ontario, the only CDs with high scores are located in the agricultural heartland of the province, surrounding Huron County. In contrast, it is worth noting that a lack of these attributes (areas that are in blue shades) characterize most of the CDs in the Atlantic Provinces, the CDs located immediately north of the St. Lawrence River in Québec and a cluster of CDs in southern B.C. It should be stressed that this does not mean that these CDs are in any way “less rural”, but rather points to the fact that they share different characteristics of what seems to be a prevailing type of rural across Canada, which is captured by this dimension.

The factor also seems to capture a different spatial variation of income than that associated with the previous factor. The first dimension was mainly defined along the boundaries of macro-regions, which to some extent overlap with the provinces – on the one hand, a major divide between the eastern and the northern parts of central Canada, and on the other hand, southern Ontario and Western Canada. This second dimension is more clearly defined along an urban-rural divide and highlights some of the main characteristics of remote and agro-rural Canada.

Finally, the dimension captures the association between a lower level of income and a higher growth between 1991 and 1996. Although this analysis did not focus on changes across time, a study conducted in parallel to this one showed that the economic recession period of 1991-1994 did not hit rural areas as much as the urban core (Alasia and Rothwell, 2003). Hence, rural regions recorded income growth rates generally above average during that period and this trend appears to be captured by this factor.

Table 3. Remote and agro-rural attributes: Average values by factor score septiles

Variable	Factor score septile							CDs Average
	1 <sup>st</sup> Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup> Middle	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup> Highest	
Fertility rate	1.1	1.2	1.2	1.3	1.4	1.5	1.9	1.4
Rent is 30 percent or more of income	46	44	43	40	37	32	25	38
Agricultural employment (percent)	1	2	3	3	6	10	20	6
Owner housing costs are 30 percent or more of income	18	16	15	13	13	12	10	14
Percent of population less than 20 years of age	26	28	28	29	30	31	35	29
Percent of workers earning less than \$10 per hour	25	26	30	31	30	34	40	31
Average income growth between 1991 and 1996 (percent)	6	9	9	11	11	11	14	10
Average years of schooling for population 25 to 54 years of age	13.3	12.9	12.4	12.2	12.2	12.2	11.9	12.4
Average income per person reporting some income	18,425	17,435	15,772	15,481	15,503	15,234	14,201	16,005

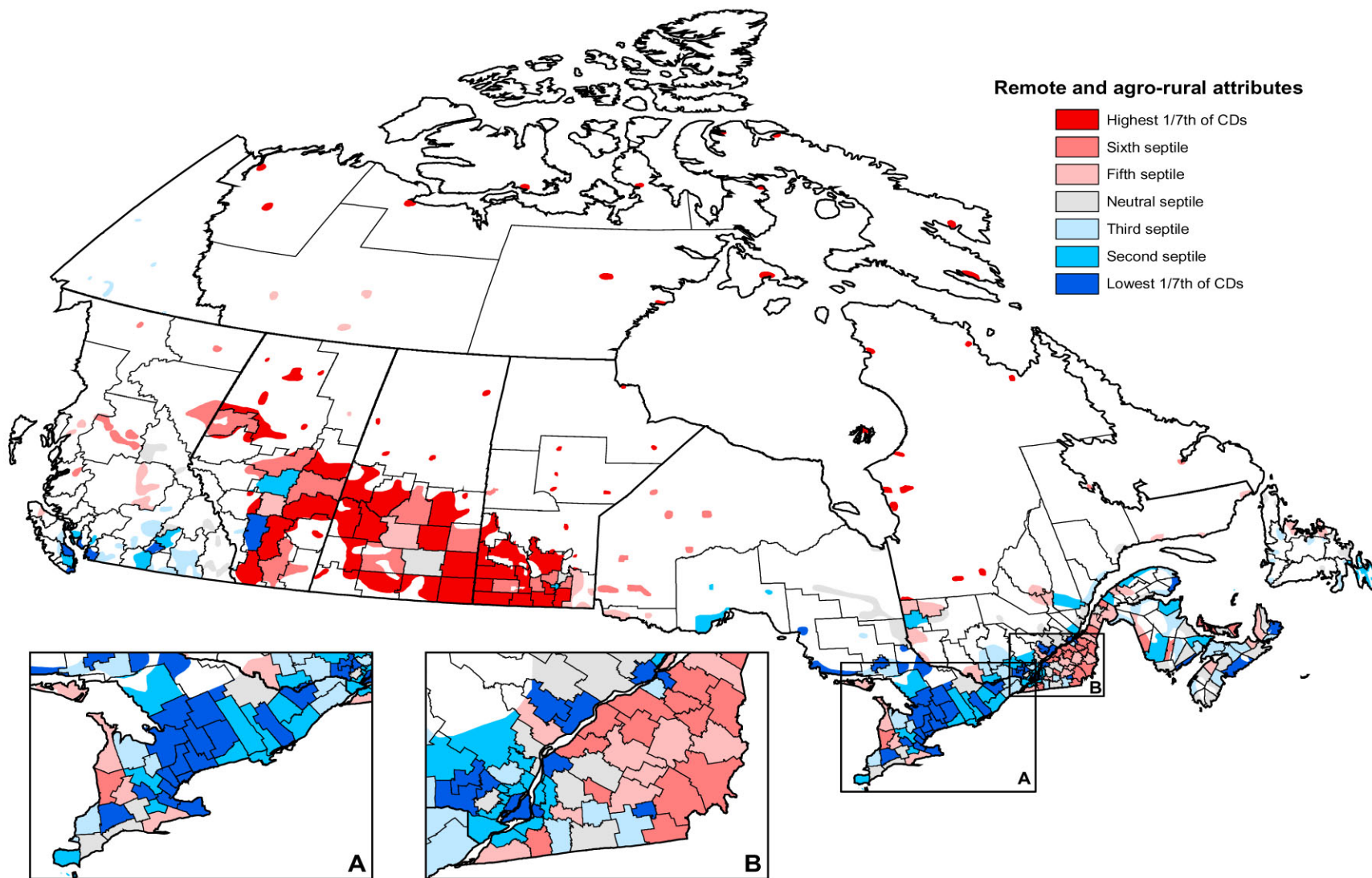
Source: Statistics Canada. Census of Population, 1996, author's computation.

Table 4. Remote and agro-rural attributes: Percent distribution of CDs by the septile class of factor scores within each type of region

Regional type (CD units)	Factor score septile							Total
	1 <sup>st</sup> Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup> Middle	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup> Highest	
Predominantly urban regions (25)	64.0	36.0	0.0	0.0	0.0	0.0	0.0	100
Intermediate regions (37)	35.1	29.7	13.5	13.5	8.1	0.0	0.0	100
Rural metro-adjacent regions (86)	9.3	11.6	15.1	18.6	11.6	22.1	11.6	100
Rural non-metro-adj. regions (117)	3.4	9.4	18.8	15.4	19.7	13.7	19.7	100
Rural northern regions (23)	0.0	0.0	4.3	13.0	21.7	26.1	34.8	100

Source: Statistics Canada. Census of Population, 1996, author's computation.

Map 2. Remote and agro-rural attributes



Source: Author's computation based on Census of Population, 1996.  
 Map produced by Spatial Analysis and Geomatics Applications (SAGA), Agriculture Division, Statistics Canada, 2003.



### ***Third dimension: Demographic and labour force attributes***

The factor named *demographic and labour force attributes* presents six variables strongly associated with it, all with a positive association. High factor scores are associated with a high proportion of population 65 years of age and over, a high percent of seniors moving into the CD over the previous five years, high shares of part-time and (non-agricultural) self-employment, high shares of households owning the house of residence and high shares of individuals with earnings below \$10 per hour.

CDs in the 1<sup>st</sup> septile of factor scores have 6 percent of their population above 65 years of age (versus 17 percent for the 7<sup>th</sup> septile) and the share of senior in-migrants is 6 percent (versus 15 percent for the 7<sup>th</sup> septile) (Table 5). Part-time employment is 17 percent and non-agricultural self-employment is 8 percent (versus 25 and 12 percent respectively for the 7<sup>th</sup> septile). Low wage earners represent 24 percent within the 1<sup>st</sup> septile (versus 37 percent), but house owners represent

only 58 percent of the 1<sup>st</sup> septile (versus 76 percent for the top septile).

Low factor scores (i.e., low share of elderly, part-time, self-employment, and low wage earners) are a dominant feature of predominantly urban CDs and also the rural northern CDs, at the opposite side of the regional type spectrum (Table 6). Intermediate CDs show a distribution skewed toward low scores, even though the range covers all the septiles.

In contrast, rural metro-adjacent and rural non-metro-adjacent CDs present distributions skewed toward high factor scores. The variation within the regional type is noticeable, as groupings of these types of CDs are found in each category of factor scores. The dual connotation (urban-remote) of the low factor scores distribution is evident when the factor scores are mapped (Map 3).



Table 5. Demographic and labour force attributes: Average values by factor score septiles

Variable	Factor score septile							CDs Average
	1 <sup>st</sup> Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup> Middle	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup> Highest	
Percent of population of 65 years of age and over	6	10	10	12	13	14	17	12
Senior in-migration rate	6	8	8	10	11	12	15	10
Percent with part-time employment	17	19	20	20	21	22	25	21
Percent self-employed (non-agricultural)	8	8	9	9	9	11	12	9
Percent of households owning their house	58	69	70	72	75	76	76	71
Percent of workers earning less than \$10 per hour	24	27	28	31	33	35	37	31

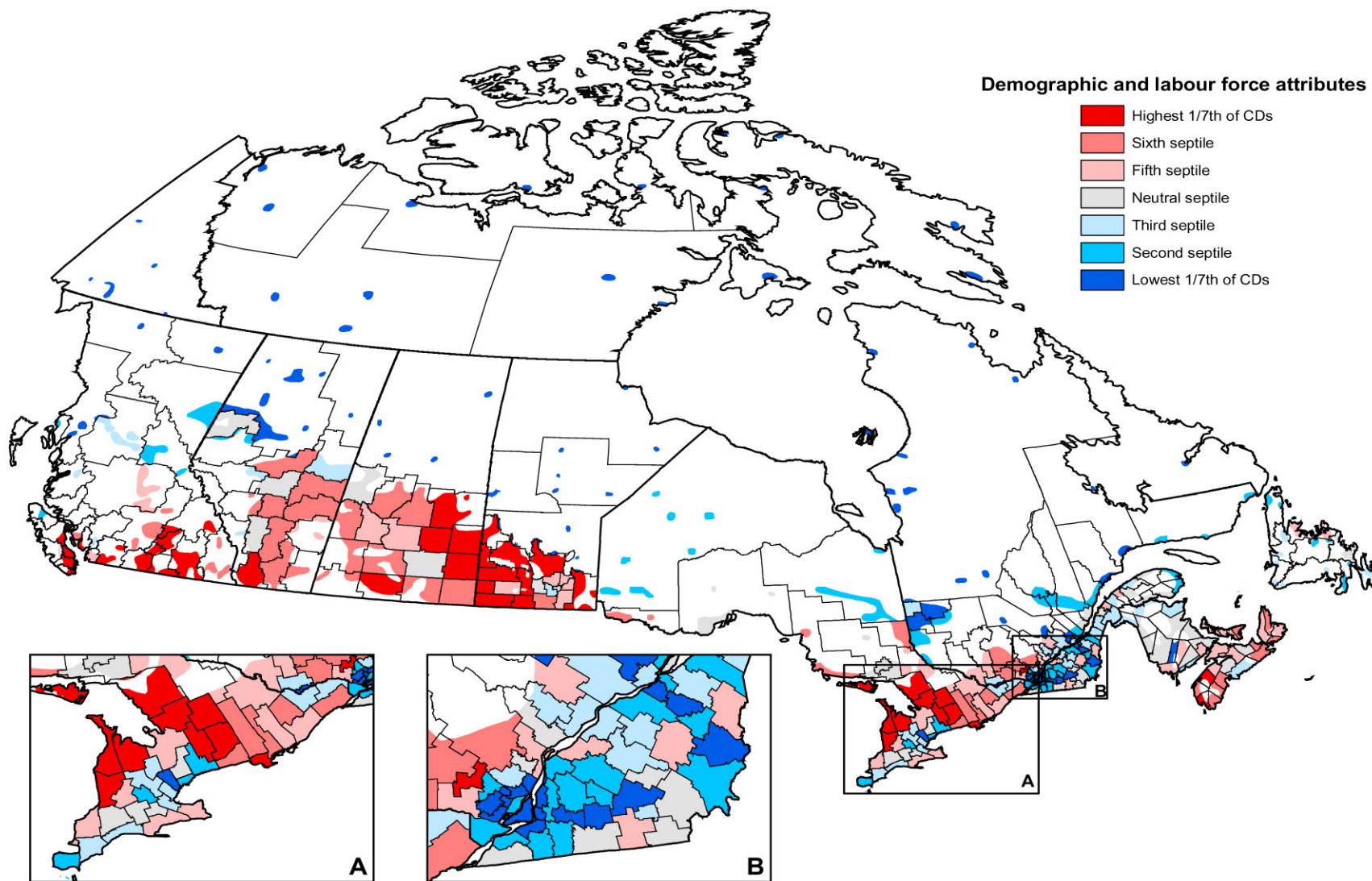
Source: Statistics Canada. Census of Population, 1996, author's computation.

Table 6. Demographic and labour force attributes: Percent distribution of CDs by septile class of factor scores within each type of region

Regional type (CD units)	Factor score septile							Total
	1 <sup>st</sup> Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup> Middle	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup> Highest	
Predominantly urban regions (25)	40.0	16.0	20.0	16.0	4.0	-0.0	4.0	100
Intermediate regions (37)	8.1	29.7	21.6	24.3	10.8	2.7	2.7	100
Rural metro-adjacent regions (86)	7.0	7.0	11.6	14.0	25.6	25.6	9.3	100
Rural non-metro-adj. regions (117)	5.1	12.0	14.5	14.5	12.0	15.4	26.5	100
Rural northern regions (23)	69.6	26.1	4.3	0.0	0.0	0.0	0.0	100

Source: Statistics Canada. Census of Population, 1996, author's computation.

### Map 3. Demographic and labour force attributes



Source: Author's computation based on Census of Population, 1996.  
Map produced by Spatial Analysis and Geomatics Applications (SAGA), Agriculture Division, Statistics Canada, 2003.

***Fourth dimension: Employment attributes, complex manufacturing versus non-agricultural primary production***

This factor is strongly associated with four variables which primarily describe the employment structure of the CD and in particular the opposing structure between employment in the “other” primary sector (i.e., forestry, fishing, mining, gas and oil) and employment in complex manufacturing.

The CDs falling in the bottom septile (first column in Table 7 and in dark blue in Map 4) have on average 12 percent of their employment in the “other” primary sector, while only 2 percent are employed in complex manufacturing. They also have an unemployment rate of 20 percent and only 12 percent of the farm family income is generated by off-farm employment. Thus, the area showing these characteristics can be properly described as resource-based communities. On the other hand, the top septile includes CDs with a low share of employment in the “other” primary sector (1 percent) and about 12 percent of employment in complex manufacturing.

Predominantly urban CDs have factor scores concentrated mainly in the top three septiles and no predominantly urban CD falls in the two lowest septiles (Table 8). In contrast, rural northern CDs have factor scores concentrated in the bottom two septiles. Thus, we see an urban to rural gradient. The intermediate, rural metro-adjacent, and rural non-metro-adjacent CDs indicate a gradual shift of the factor score distribution from the top septiles to the bottom ones; yet the range of variation for these three regional types is substantially larger than for predominantly urban regions and rural northern regions.

The CDs reported in dark blue (Map 4) are those with low factor scores, that is the resource-based regions (high relative intensity in “other” primary employment). As one could expect, many of the CDs with low factor scores are clustered along the Atlantic coast. Another area of relatively low scores stretches from northern Québec to northern Manitoba. In Alberta low scores are recorded for north-eastern Alberta (which includes the tar sands project at Fort McMurray) while blue shades cover a cluster of CDs in northern B.C. from the inland to the coast.

In contrast, high factor scores (i.e., relatively high employment in complex manufacturing and a lack of “other” primary employment) are located in most of southern Ontario and Québec. Also the entire province of Saskatchewan, southern Manitoba and a large part of south-eastern Alberta record high scores. However, for these CDs, the results are also due to the relatively high ratio between the employment in the two sectors, determined by a lack of “other” primary employment more than by high levels of complex manufacturing employment. Relatively high employment in agriculture also affects this result.

Finally, it is interesting to note that areas that score high on this dimension are not necessarily in the same range for the first factor (labour force and economic attributes). Thus, a resource-based economy does not necessarily imply low performance as measured by the labour and economic dimension discussed above.

Table 7. Employment attributes, complex manufacturing versus non-agricultural primary production: Average values by factor score septiles

Variable	Factor score septile							CDs Average
	1 <sup>st</sup> Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup> Middle	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup> Highest	
Other primary employment (percent)	12	6	3	3	2	1	1	4
Complex manufacturing employment (percent)	2	3	4	6	5	9	12	6
Total unemployment rate	20	15	13	11	10	9	10	12
Off-farm earnings as a percent of total farm family income	12	26	30	50	48	54	55	39

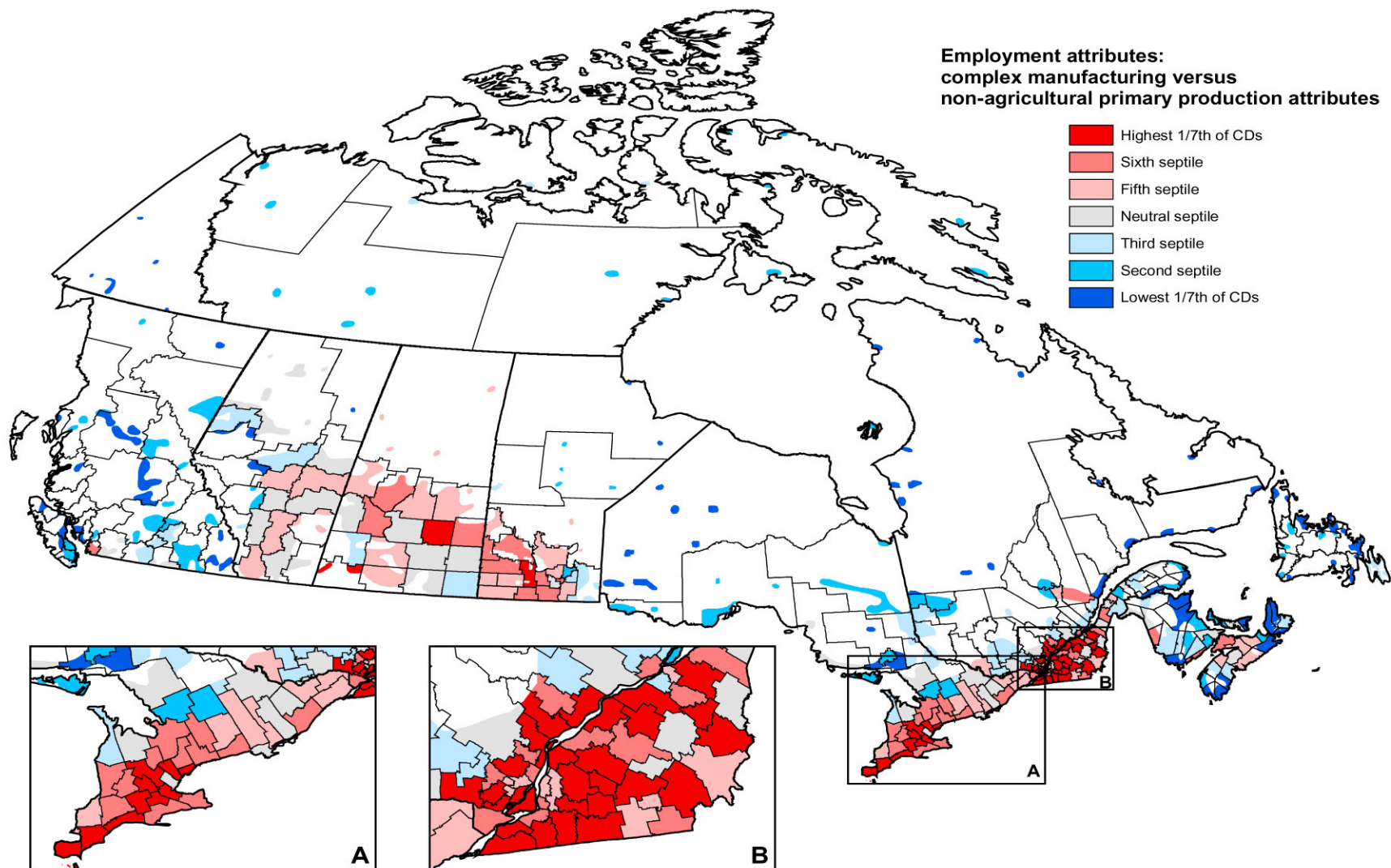
Source: Statistics Canada. Census of Population, 1996, author's computation.

Table 8. Employment attributes, complex manufacturing versus non-agricultural primary production: Percent distribution of CDs by septile class of factor scores within each type of region

Regional type (CD units)	Factor score septile							Total
	1 <sup>st</sup> Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup> Middle	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup> Highest	
Predominantly urban regions (25)	0.0	0.0	4.0	12.0	24.0	32.0	28.0	100
Intermediate regions (37)	0.0	8.1	5.4	16.2	13.5	24.3	32.4	100
Rural metro-adjacent regions (86)	5.8	10.5	17.4	12.8	18.6	16.3	18.6	100
Rural non-metro-adj. regions (117)	22.2	17.1	17.1	18.8	11.1	8.5	5.1	100
Rural northern regions (23)	43.5	39.1	13.0	0.0	4.3	0.0	0.0	100

Source: Statistics Canada. Census of Population, 1996, author's computation.

Map 4. Employment attributes: complex manufacturing versus non-agricultural primary production attributes



Source: Author's computation based on Census of Population, 1996.  
Map produced by Spatial Analysis and Geomatics Applications (SAGA), Agriculture Division, Statistics Canada, 2003.



***Fifth dimension: Employment attributes, traditional manufacturing versus government employment attributes***

This factor is strongly associated with four variables that essentially describe the employment structure of the locality. In particular, the factor points to the way in which non-market services (i.e., government services, educational services and health services) tend not to be in the same CDs as traditional manufacturing employment (which includes processing of agricultural products, fish, wood, minerals, gas and oil).

CDs with high positive factor scores (7<sup>th</sup> septile) show a lower than average employment share in non-market services (17 percent versus 32 percent for the bottom septile) and a higher than average employment in traditional manufacturing (17 percent versus 3 percent for the bottom septile) (Table 9). High factor scores are also reported for the participation shares of males relative to females (1.4 ratio versus 1.2 ratio for the bottom septile) and the average share of households owning their house (75 percent versus 54 percent in the 1<sup>st</sup> septile). The nature of the factor, however, seems to describe more than simply the structure of employment by sector. Positive scores are indicative of a more “traditional” employment structure not only because of the traditional manufacturing employment, but also because of the relative participation rate of the two genders. Female participation in the formal economy, relative to male participation, appears particularly low where traditional manufacturing employment prevails.

As was observed for *demographic and labour force attributes*, the predominantly urban and rural northern regions present a somewhat similar pattern (Table 10). For both regional types, the distribution of CDs by size class of factor scores shows a concentration in the lowest septile. Yet, the characteristics of the rural northern CDs are more polarised than for predominantly urban

CDs. Intermediate CDs present a factor score distribution skewed toward the bottom septiles, while rural metro-adjacent and rural non-metro-adjacent CDs have a distribution skewed toward the top septiles. Nevertheless, for these regional types the diversity of conditions appears considerable.

Across eastern Canada, the pattern appears somewhat more scattered than for the previous maps. A major cluster of CDs with high factor scores (traditional manufacturing employment structure) are found in southern Québec outside the major urban cores; while a small grouping of CDs with these characteristics are also found in south-west Ontario (Map 5). In contrast, CDs with a prevalence of non-market employment and a less traditional employment structure (dark blue) are found across all the Territories, central Saskatchewan, and particularly the CDs surrounding Regina and Saskatoon. In Manitoba, this type of CD is located north and west of Winnipeg, including the city of Winnipeg, but excluding the CDs immediately surrounding Winnipeg. Finally, part of northern Ontario, most of south-eastern Ontario, and the core metropolitan areas along the Highway 401 corridor also present low factor scores.

CDs with a national, provincial or territorial capital city (i.e. a strong presence of government employment) are dark blue – that is, they have low factor scores on the *traditional manufacturing versus government employment* dimension. Conversely, CDs that are relatively intensive in fish processing (north and south shores of Newfoundland and a few other counties in the other Atlantic Provinces) and wood processing (Atlantic Provinces, south-eastern Québec, north-western Alberta and the interior of British Columbia) indicate high factor scores.

Table 9. Employment attributes, traditional manufacturing versus government employment attributes: Average values by factor score septiles

Variable	Factor score septile							CDs Average
	1 <sup>st</sup> Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup> Middle	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup> Highest	
Non-market services employment (percent)	32	26	23	21	21	19	17	23
Traditional manufacturing employment (percent)	3	5	5	7	7	11	17	8
Percent of households owning their house	54	71	73	74	75	74	75	71
Male participation rate divided by female participation rate	1.2	1.2	1.3	1.2	1.3	1.3	1.4	1.3

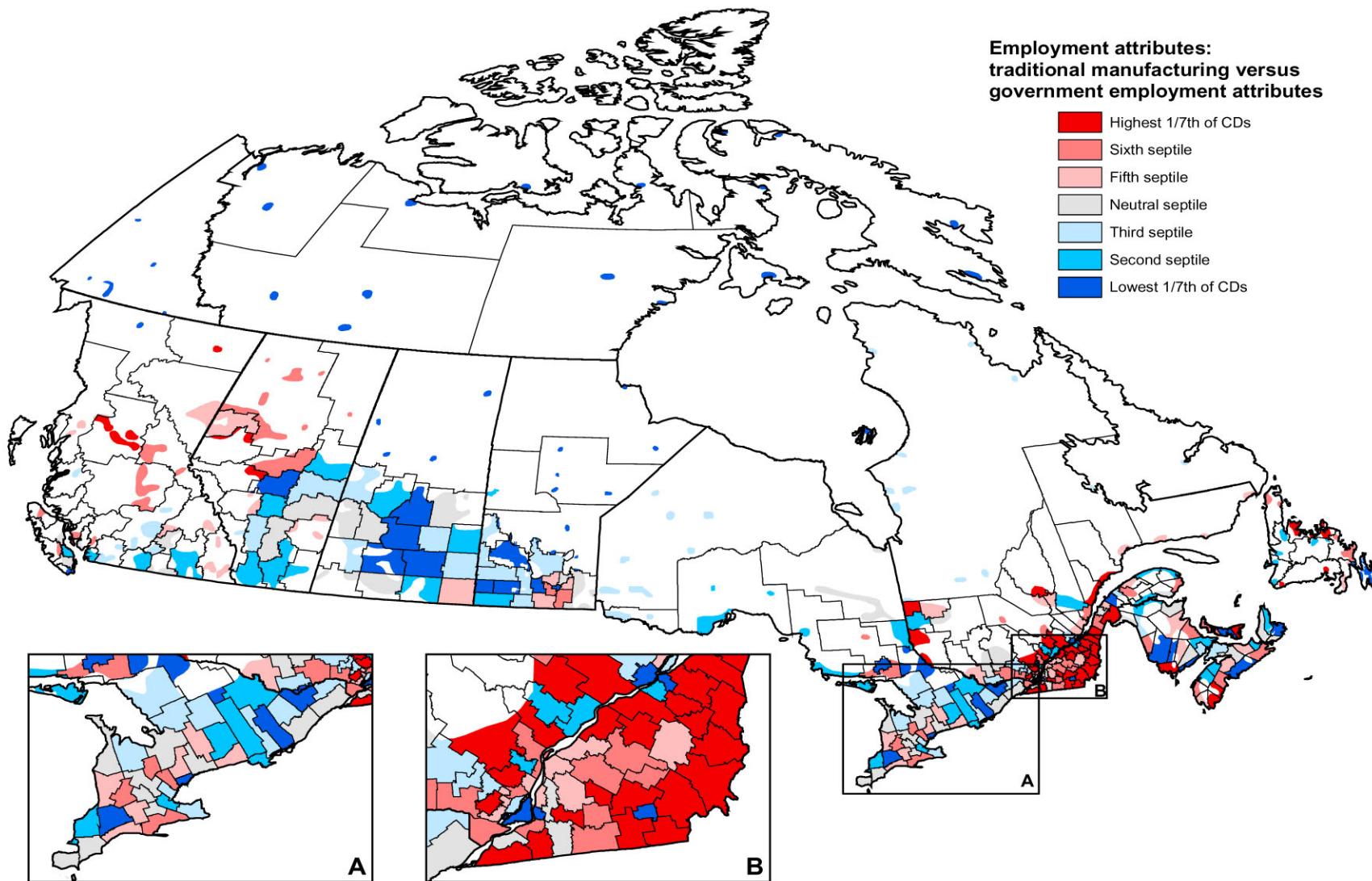
Source: Statistics Canada. Census of Population, 1996, author's computation.

Table 10. Employment attributes, traditional manufacturing versus government employment attributes: Percent distribution of CDs by septile class of factor scores within each type of region

Regional type (CD units)	Factor score septile							Total
	1 <sup>st</sup> Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup> Middle	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup> Highest	
Predominantly urban regions (25)	44.0	8.0	8.0	12.0	16.0	12.0	0.0	100
Intermediate regions (37)	27.0	21.6	8.1	21.6	8.1	10.8	2.7	100
Rural metro-adjacent regions (86)	8.1	11.6	15.1	14.0	16.3	15.1	19.8	100
Rural non-metro-adj. regions (117)	2.6	17.1	17.1	14.5	15.4	16.2	17.1	100
Rural northern regions (23)	43.5	4.3	13.0	8.7	8.7	8.7	13.0	100

Source: Statistics Canada. Census of Population, 1996, author's computation.

Map 5. Employment attributes: traditional manufacturing versus government employment attributes



Source: Author's computation based on Census of Population, 1996.  
Map produced by Spatial Analysis and Geomatics Applications (SAGA), Agriculture Division, Statistics Canada, 2003.

***Sixth dimension: Demographic dynamics attributes***

The last dimension to emerge in the analysis presents four variables positively associated with it. They are: population growth; the percent of households where the owner's gross housing costs are greater than 30 percent of household income; the percent of the population below 20 years of age; and the percent of the workforce with (non-agricultural) self-employment. Hence, the factor appears to describe primarily the demographic dynamics of the CD.

CDs in the lowest septile recorded on average a population loss of 3 percent between 1991 and 1996 and only 28 percent of the population was below 20 years of age (Table 11). At the opposite end of the distribution, the top septile CDs present a population growth of 15 percent on average.

Interestingly, there seems to be almost no relationship between the distribution of CDs by size of factor scores and the regional type of CD (Table 12). The distribution of CDs within each regional type is almost evenly distributed across septiles. Predominantly urban and intermediate CDs tend to present slightly higher shares in the central septiles. While the only pattern that emerges more neatly is the polarization of scores

in the two extreme categories for the rural northern CDs, indicating that these tend to show either very positive or highly negative population dynamics.

Nevertheless, the spatial distribution of the factor scores presents a rather clear pattern (Map 6). The CDs with low factor scores (negative population dynamics associated with low population growth and low share of youth) cover most of the Atlantic Provinces and eastern Québec. Low factor scores are also found in southern Ontario and across a large part of northern Ontario. A second major cluster of CDs with negative population dynamics covers most of the prairies, except the northern CDs. In contrast, in eastern Canada, the CDs with high factor scores (denoting population growth and a high share of youth) are clustered in the area north of Ottawa and Montréal and in a broad zone extending north of Toronto, but not including it. In central Canada, high scores are predominant across the northern CDs and extend to the Territories. Also, higher scores are found in most of Alberta, particularly west of the Calgary-Edmonton corridor and in most of British Columbia.

Table 11. Demographic dynamics attribute: Average values by factor score septiles

Variable	Factor score septile							CDs Average
	1 <sup>st</sup> Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup> Middle	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup> Highest	
Percent population change from 1991 to 1996	-3	-1	2	3	4	8	15	4
Owner housing costs are 30 percent or more of income	10	13	14	14	14	15	16	14
Percent of population less than 20 years of age	28	27	28	29	30	31	32	29
Percent self-employed (non-agricultural)	8	7	8	10	10	11	11	9

Source: Statistics Canada. Census of Population, 1996, author's computation.

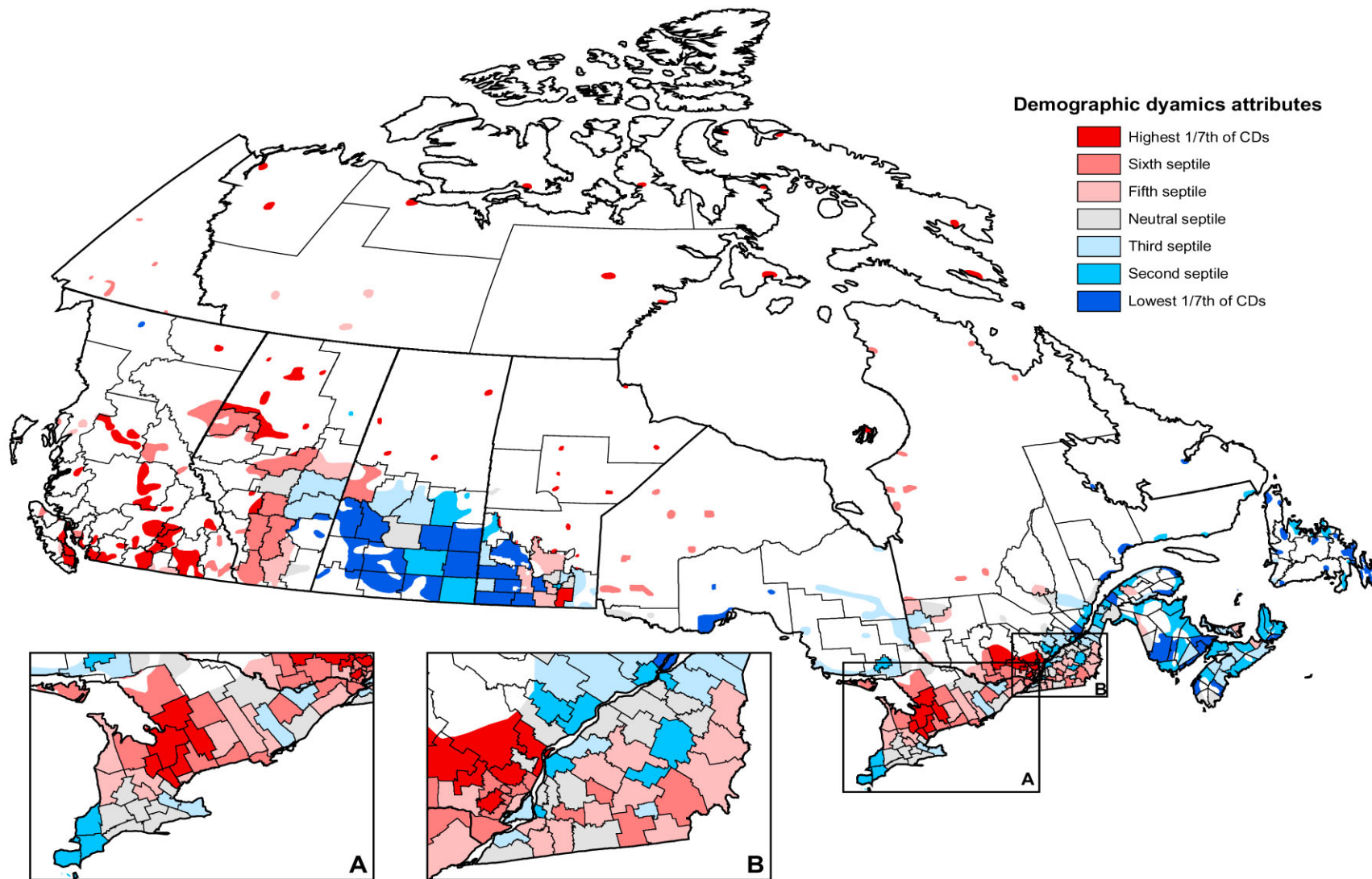
Table 12. Demographic dynamics attribute: Percent distribution of CDs by septile class of factor scores within each type of region

Regional type (CD units)	Factor score septile							Total
	1 <sup>st</sup> Lowest	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup> Middle	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup> Highest	
Predominantly urban regions (25)	4.0	12.0	16.0	24.0	16.0	20.0	8.0	100
Intermediate regions (37)	10.8	24.3	21.6	13.5	18.9	8.1	2.7	100
Rural metro-adjacent regions (86)	11.6	7.0	16.3	19.8	12.8	17.4	15.1	100
Rural non-metro-adj. regions (117)	19.7	17.9	12.0	11.1	13.7	12.0	13.7	100
Rural northern regions (23)	13.0	8.7	4.3	4.3	13.0	17.4	39.1	100

Source: Statistics Canada. Census of Population, 1996, author's computation.



Map 6. Demographic dynamics attributes



Source: Author's computation based on Census of Population, 1996.  
Map produced by Spatial Analysis and Geomatics Applications (SAGA), Agriculture Division, Statistics Canada, 2003.

**Combining dimensions: an example**

Each dimension allows us to classify the CDs according to the size of the factor score for the given CD. This section presents an example of how the results generated by the factor analysis can be further used to create regional types that combine the values of more than one dimension (or factor). Specifically, two of the dimensions identified are combined to generate a more articulated classification of regional types: these dimensions are the factor for *labour force and economic attributes* and the factor for *remote and agro-rural attributes*.

For this purpose, CDs are classified into three groups representing the bottom third, the middle third and the top third of the scores of the *labour force and economic attributes* dimension. Similarly, we classify three groups of CDs using the factor scores of the *remote and agro-rural attributes* dimension. The three groups for each dimension are then combined to generate a nine-class typology (Table 13).

Map 7 shows the spatial patterns of these nine regional types defined on the two major dimensions of the factor analysis. If we select the

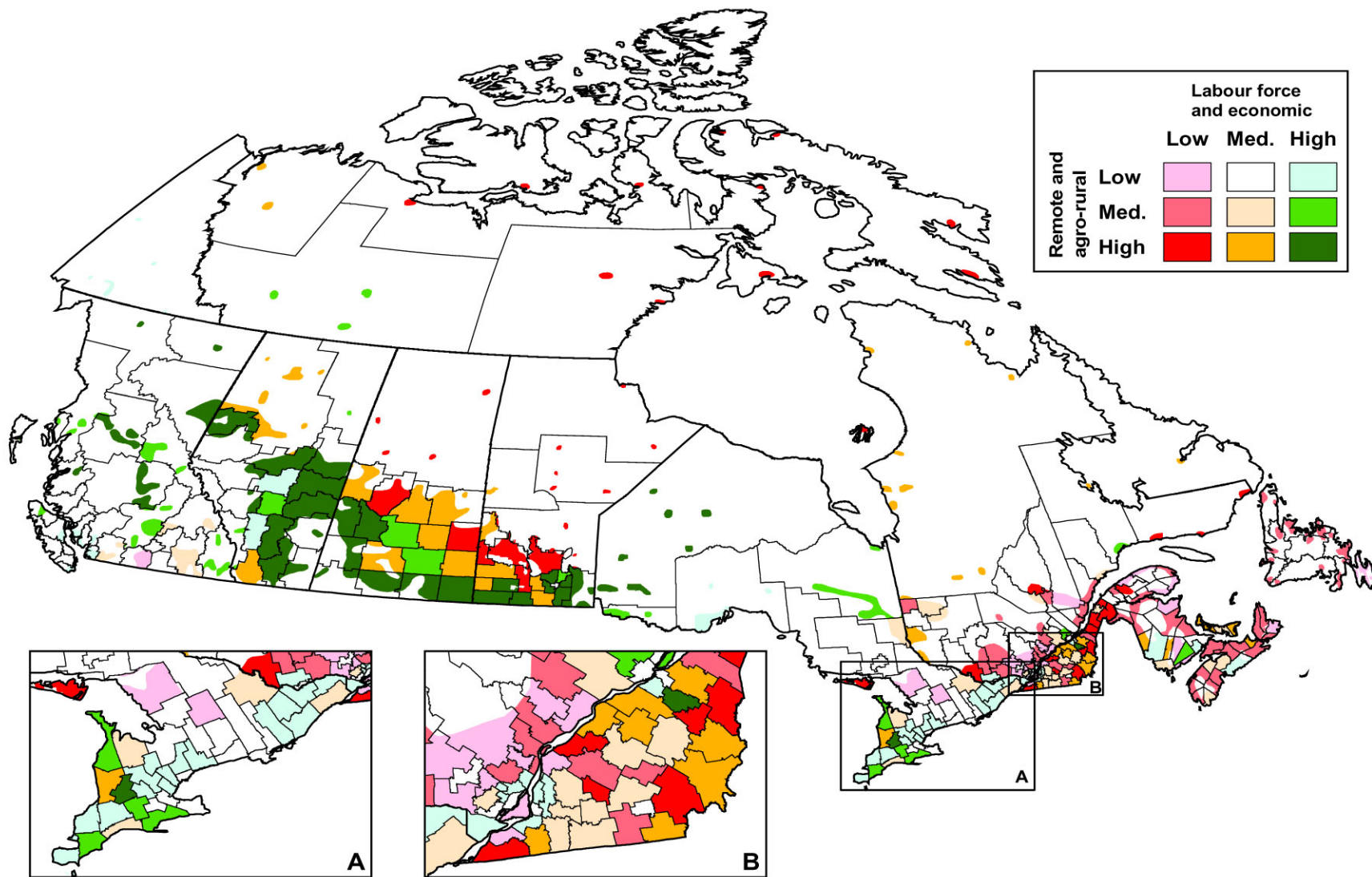
CDs that rank high on the “*remote and agro-rural*” dimension (i.e., dark shades), we can compare the CDs with low “*labour force and economic*” attributes (i.e., dark red) versus CDs with high “*labour force and economic*” attributes (i.e., dark green). Dark green CDs (i.e., high “*remote and agro-rural*” attributes with high “*labour force and economic*” attributes) are concentrated in a band running from northern Ontario through southern Manitoba and southern Saskatchewan to most of Alberta (on either side of the Calgary – Edmonton corridor) and into northern British Columbia.

The CDs reported in dark red are also high on the “*remote and agro-rural*” dimension but with relatively low economic performance. In western Canada, this includes northern Manitoba, northern Saskatchewan and the eastern Arctic. In eastern Canada, this includes scattered CDs north of the St. Lawrence River (plus a few scattered CDs south of the St. Lawrence River), the Gaspé region of Québec, northern New Brunswick, most of Nova Scotia outside of Halifax and all of Newfoundland outside of St. John’s.

Table 13. Typology from cross-classifying two dimensions

CDs ranked by size of "remote and agro-rural attribute "	CDs ranked by size of "labour force and economic attributes"		
	Lower one-third of CDs: red colour	Middle one-third of CDs: yellow colour	Higher one-third of CDs: green colour
Lower one-third of CDs: lighter shade			
Middle one-third of CDs: medium shade			
Higher one-third of CDs: darker shade			

Map 7. Overlap of two dimensions: "labour force and economic" and "remote and agro-rural" attributes



Source: Author's computation based on Census of Population, 1996.  
 Map produced by Spatial Analysis and Geomatics Applications (SAGA), Agriculture Division, Statistics Canada, 2003.

## **Conclusions**

The concept of rural diversity is today well established. The challenge is to gain an understanding of the nature of this diversity and its spatial distribution. The six dimensions identified in this analysis provide a profile of the CDs on a number of attributes.

Although the distinction is not always clear-cut, some of the factors are more “diagnostic” while others are more “descriptive”. “Diagnostic” variables are indicators of socio-economic conditions deemed to be desirable or undesirable, such as the unemployment rate and the percent of individuals in low-income families. “Descriptive” variables are not necessarily indicative of unfavourable social or economic conditions.

The spatial distribution of the factors reveals regional differences as well as differences between CD regional types. This demonstrates the utility of the broad territorial approach adopted, which allows a better understanding of both regional patterns as well as hierarchical spatial structures (i.e., the groupings of CDs with similar spatial patterns).

The results indicate the multi-dimensional nature of performance and the variety of possible combinations of demographic, social and economic characteristics (e.g. resource-based regions with poor economic performance versus resource-based regions with high economic performance; various combinations of demographic, rural attributes and economic performance; and so on).

Our classification of census divisions was compared to the classification of census divisions by regional type – predominantly urban, intermediate, rural metro-adjacent, rural non-metro-adjacent and rural northern regions. The latter classification has the major advantage of having a simple and clear-cut definition and the classification seems to capture relatively well the variation of some of the dimensions identified in this study. Nonetheless, for specific policy purposes, it would appear appropriate to use more refined regionalization structures, which could be more sensitive to the spatial variation of conditions that prevail among rural areas.

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## Appendix A

Table A.1. The variables used in this study

Code	Variable definition (for detailed definitions, see Appendix B)
<i>Demographic indicators</i>	
POPCH	Percent population change 1991 to 1996
POPL20	Percent of population less than 20 years of age
POPO65	Percent of population 65 years of age and over
IMOLD	Senior in-migration rate: Percent of persons 55 to 74 years of age living in a different CSD 5 years ago
FERTIL	Fertility rate (estimated as number of persons under 19 years of age divided by the number of women 25 to 54 years of age)
<i>Social indicators</i>	
EDUAVE	Average years of schooling for population 25 to 54 years of age
HHBLICO	Percent of persons in low-income economic families
INTRSF	Social transfer income as a percent of total income
UNTOT	Total unemployment rate (for the labour force, 15 years of age and older)
<i>Housing characteristics</i>	
RENT30	Percent of households with gross rent equal to or greater than 30 percent of household income
HOWN30	Percent of households with the owner's gross housing costs equal to or greater than 30 percent of household income
POWN	Percent of households owning their house
<i>Economic and labour market indicators</i>	
EMAGR	Agricultural employment (percent)
EMPRIM	Other primary employment (percent) (i.e. forestry, fishing, mining, gas and oil)
EMTRM	Traditional manufacturing employment (percent)
EMCMA	Complex manufacturing employment (percent)
EMDSE	Dynamic services employment (percent)
EMSSE	Non-market services employment (percent)
PARTEC	Participation rate (percent)
WKO2	Percent of families with two or more members in the labour force
MFPART	Male participation rate divided by female participation rate
SELF	Percent self-employed (non-agricultural)
WKPT	Percent with part-time employment
AVINCO	Average income per person reporting some income
ERN10	Percent of workers earning less than \$10 per hour
OFFF	Off-farm earnings as a percent of total farm family income (for economic families with a census-farm operator present)
INCH	Average income growth between 1991 and 1996 (percent)

Table A.2. CD average value of each variable within each septile

Variable Code	Septile of CD							Mean CD	Median CD	Min CD	Max CD
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>				
POPCH	-4.7	-1.1	0.9	3.1	5.1	8.4	16.3	3.9	2.9	-35.3	26.2
POPL20	24.7	26.6	27.8	28.8	29.8	31.2	37.1	29.4	28.8	20.9	49.4
POPO65	5.0	9.0	10.8	12.2	13.4	14.7	17.9	11.9	12.2	1.9	23.1
IMOLD	4.5	6.9	8.3	9.4	10.6	12.6	17.8	10.0	9.4	1.7	26.2
FERTIL	1.1	1.2	1.2	1.3	1.4	1.5	1.9	1.4	1.3	0.9	2.9
EDUAVE	11.1	11.8	12.2	12.5	12.7	13.1	13.6	12.4	12.5	9.8	14.7
HHBLICO	10.9	13.6	15.3	16.8	18.1	20.4	25.2	17.1	16.8	4.3	46.6
INTRSF	9.9	13.4	15.6	17.6	19.8	23.5	30.0	18.5	17.6	5.1	39.4
UNTOT	5.4	7.9	9.2	10.7	12.5	15.6	25.7	12.4	10.7	2.7	39.4
RENT30	20.7	31.7	36.1	39.9	42.7	46.1	50.3	38.2	39.7	6.0	60.1
HOWN30	8.3	10.8	12.4	13.6	14.7	16.3	20.0	13.7	13.5	4.7	25.6
POWN	50.2	65.7	70.5	73.2	75.5	77.8	83.4	70.8	73.2	16.0	89.7
EMAGR	0.2	0.9	1.9	3.3	5.6	9.9	23.8	6.4	3.3	0.0	45.8
EMPRIM	0.2	0.4	1.0	2.1	3.8	6.8	13.0	3.9	2.0	0.0	25.8
EMTRM	1.0	3.1	4.6	6.3	8.7	12.1	18.9	7.8	6.3	0.0	31.5
EMCMA	1.0	1.9	2.8	4.1	6.2	9.3	14.7	5.7	4.1	0.0	23.5
EMDSE	4.7	6.1	6.9	7.8	8.8	10.3	13.9	8.3	7.7	2.7	20.6
EMSSE	15.4	18.2	19.9	21.5	23.4	26.5	34.9	22.8	21.5	9.6	55.5
PARTEC	53.1	58.1	61.2	63.4	66.0	69.1	74.0	63.5	63.2	48.3	81.4
WKO2	32.7	41.1	45.5	49.4	52.4	55.9	61.9	48.3	49.5	23.1	72.1
MFPART	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.3	1.3	1.1	1.5
SELF	5.2	7.1	8.2	9.1	10.1	11.4	13.8	9.3	9.1	3.3	19.8
WKPT	16.1	17.9	19.2	20.5	21.8	23.2	25.4	20.6	20.5	13.1	28.7
AVINCO	12,308	13,791	14,702	15,889	17,081	18,206	20,228	16,005	15,888	6,681	25,934
ERN10	19.9	24.2	26.8	30.1	33.3	37.2	45.2	30.9	29.7	15.5	56.3
OFFF	0.0	0.0	28.7	55.3	58.8	63.2	71.1	39.4	55.1	0.0	79.9
INCH	3.7	6.4	8.1	9.6	11.5	13.6	18.2	10.1	9.6	-4.7	27.3

Note: For each row, the CDs are (re)ranked according to the specific variable – CDs are (re)grouped into 7 groups of equal number of CDs (called “septiles”) and the average for the specific variable in each septile is reported. All data are expressed as percentage or ratios, except AVINCO is expressed in dollars and EDUAVE is expressed in years (see Appendix B for the definition and computation of each variable).  
 Source: Statistics Canada. Census of Population, 1996, author’s computation.

Table A.3. CD average and standard deviation of each variable within each type of region

Variable Code	Average					Standard deviation				
	PU	IN	RMA	RNM	RN	PU	IN	RMA	RNM	RN
POPCH	7.2	4.0	5.3	2.1	4.5	5.0	4.6	6.5	6.4	11.5
POPL20	27.7	27.9	29.1	28.9	37.4	2.9	1.8	2.8	3.4	6.5
POPO65	9.9	11.4	12.4	13.3	5.1	3.1	2.1	2.9	3.9	2.8
IMOLD	8.1	9.2	10.9	11.0	4.7	1.4	2.8	3.7	4.5	1.8
FERTIL	1.1	1.2	1.3	1.4	1.8	0.1	0.1	0.2	0.2	0.5
EDUAVE	13.5	13.0	12.5	12.1	11.8	0.6	0.6	0.6	0.7	1.0
HHBLICO	19.6	17.8	15.3	18.0	15.8	5.8	3.7	3.7	5.0	5.4
INTRSF	12.2	15.9	18.0	21.8	14.9	2.8	3.3	5.1	6.4	7.9
UNTOT	9.0	10.5	10.7	14.2	16.1	2.0	2.7	5.6	7.7	7.5
RENT30	41.9	43.0	38.6	38.3	23.9	4.0	4.5	9.1	9.0	11.0
HOWN30	17.5	14.8	14.1	12.9	10.1	3.3	2.8	3.5	3.4	2.9
POWN	64.0	65.8	75.1	74.4	52.4	10.9	7.1	5.8	7.5	19.7
EMAGR	0.9	2.8	8.8	8.1	0.7	0.7	2.0	8.0	9.7	1.3
EMPRIM	0.4	1.1	2.1	5.6	9.8	0.9	1.7	2.6	4.7	6.0
EMTRM	5.0	6.9	7.8	8.9	6.1	2.0	4.8	5.8	6.2	6.7
EMCMA	9.3	10.1	6.6	3.6	2.0	3.7	5.6	4.5	2.8	2.7
EMDSE	13.9	9.8	8.1	7.1	6.8	2.7	2.9	2.0	2.1	2.1
EMSSE	23.3	23.5	21.2	22.0	30.8	6.3	5.4	5.6	5.3	9.4
WKO2	54.3	49.9	50.2	45.3	48.0	5.3	6.0	8.8	9.9	9.8
MFPART	1.2	1.2	1.3	1.3	1.3	0.1	0.1	0.1	0.1	0.1
PARTEC	67.8	64.0	64.5	60.9	67.6	3.9	4.3	6.0	6.8	7.9
SELF	9.5	8.3	9.9	9.2	8.1	2.0	1.7	2.5	3.1	3.0
WKPT	19.6	21.3	20.7	20.9	17.9	2.2	2.3	2.8	3.3	2.5
AVINCO	19,459	17,357	15,978	14,857	16,026	2,204	2,068	1,973	2,208	3,577
ERN10	22.4	25.9	32.5	34.5	23.4	3.6	4.0	6.2	8.4	5.0
OFFF	49.7	49.0	47.5	34.7	6.4	29.1	24.4	24.6	29.8	21.3
INCH	6.4	8.1	9.5	11.6	11.9	2.8	3.0	4.3	4.5	6.2

Note: All data are expressed as percentage or ratios, except AVINCO is expressed in dollars and EDUAVE is expressed in years (see Appendix B for the definition and computation of each variable). The regional types are those used by Statistics Canada: predominantly urban (PU), intermediate (IN), rural metro-adjacent (RMA), rural non-metro-adjacent (RNM) and rural northern (RN).

Source: Statistics Canada. Census of Population, 1996, author's computation.

## Appendix B: Definition of variables

The operational definition of all the variables used in this study is given below. The data source is the 1996 Census of Population. The following list explains how the variables used in this study were computed. In some cases the definition of the census is presented. For a detailed definition of the original variables refer to Statistics Canada (1997). The variables are grouped in four categories.

### Demographic indicators

*Percent population change 1991 to 1996.* This variable is taken from the 1996 Census of Population database without further computation.

*Percent of population less than 20 years of age.* This and the following variable are computed by aggregating the corresponding age cohorts available in the census.

*Percent of population 65 years of age and over.* As previous variable.

*Senior in-migration rate: Percent of persons 55 to 74 years of age living in different CSD 5 years ago.* This variable is computed as the number of persons 55 to 74 years of age living in a different CSD (census sub-division) five years ago divided by total number of individuals 55 to 74 years of age now living in the CSD. Note that movement from one CSD to another CSD within the same CD (census division) will contribute to the senior in-migration rate at the CD level, which is the level of analysis in this study.

*Fertility rate.* This variable is not available in the 1996 census database. A proxy variable was used, which was computed as the number of persons below 19 years of age divided by the number of women 25 to 54 years of age.

### Social indicators

*Average years of schooling for population 25 to 54 years of age.* This variable is taken from the Census of Population 1996 database without further computation.

*Percent of persons in low-income economic families.* This variable is taken from the census. The incidence of low-income is the proportion of individuals in economic families or unattached individuals below the low-income cut-off. The threshold values used by Statistics Canada for the determination of the incidence of low-income economic families and low-income unattached individuals vary by four urban size categories and for rural (five categories in all) and for families by family size (seven categories). For example, the low-income cut-off for a family of four in 1996 ranges from \$31,753 for an urban place

of 500,000 or more (e.g. Toronto) to \$21,944 for rural areas. This represents an attempt to capture “cost of living differences” by type location in making a determination of the incidence of low-income. For more detail on the low-income cut-off values, see Statistics Canada (1997).

*Social transfer income as a percent of total income.* This variable is computed as average social transfer income for persons of 15 years of age and over divided by total average income for persons 15 years of age and over.

*Total unemployment rate.* The number of individuals, 15 years of age and over, unemployed in the week prior to the census divided by the number in the labour force (i.e., the number employed plus the number unemployed in the week prior to the census).

### Housing characteristics

*Percent of households with gross rent equal to or greater than 30 percent of household income.* This variable is computed as the number of households with gross rent equal to or greater than 30 percent of household income divided by the total number of households living in rented accommodations.

*Percent of households with owner's gross housing costs equal to or greater than 30 percent of household income.* This variable is computed as the number of private households with owner's gross housing costs equal to or greater than 30 percent of household income divided by the total number of households living in an owned dwelling.

*Percent of households owning their house.* This variable is computed as the number of households living in an owned dwelling divided by the total number of households.

### Economic and labour market indicators

*Agricultural employment (percent).* This is calculated as the experienced employment in agriculture and services related to agriculture divided by the total experienced labour force 15 years of age and over.

*Other primary employment (percent).* This is calculated as the experienced employment in other primary sectors (fishing and trapping industries, logging and forestry industries, mining, quarrying & oil well industries) divided by the total experienced labour force 15 years of age and over.

*Traditional manufacturing employment (percent).* This is calculated as the experienced employment in traditional manufacturing industries divided by the total experienced labour force 15 years of age and

over. Traditional manufacturing sectors include employment in food processing, beverages, tobacco, rubber, plastic, leather, primary textile, clothing, wood, furniture and fixtures, and paper manufacturing sectors.

*Complex manufacturing employment (percent)*: This is calculated as the experienced employment in complex manufacturing industries divided by the total experienced labour force 15 years of age and over. Complex manufacturing sectors include employment in printing, primary metals, fabricated metal, machinery, transportation equipment, electrical and electronic, non-metallic metal, refined petroleum and coal, chemical and “other” manufacturing sectors.

*Dynamic services employment (percent)*. This is calculated as the experienced employment in dynamic service industries divided by the total experienced labour force 15 years of age and over. Dynamic services employment includes employment in transportation and storage industries, communication and other utility industries, wholesale trade industries, finance and insurance industries, real estate operator and insurance agent industries and business service industries.

*Non-market services employment (percent)*. This is calculated as the experienced employment in non-market services divided by the total experienced labour force 15 years of age and over. The non-market services employment includes employment in government service industries, educational service industries and health and social service industries.

*Participation rate*. This variable is calculated as total labour force (employed and unemployed persons age 15 years of age and over) divided by the population 15 years of age and over, and multiplied by 100.

*Male participation rate over female participation rate*. The variable is computed as the ratio between the two participation rates (males and females age 15 years of age and over).

*Percent of families (married and common-law couples) with two or more members in the labour force*. This

variable is computed as the number of families with two or more members in the labour force divided by the total number of families in private households.

*Percent with non-agricultural self-employment activity*. For individuals whose main job is not in the agricultural industry, we identify self-employment activity as the class of worker being “self-employed” (including both working in an unincorporated enterprise and in an incorporated enterprise) or reporting some non-farm self-employment income in the year previous to the census. We calculated the percent with some non-agricultural self-employment activity as the number of individuals, 25 to 54 years of age, with some non-agricultural self-employment activity divided by the total number of individuals 25 to 54 years of age.

*Percent with part-time employment*. The variable is computed as persons who worked part time (less than 30 hours per week) divided by total employment.

*Average income per person*. Average income from all sources, per person reporting some income.

*Percent earning less than \$10 per hour*. For persons with some earned income (i.e. wages and salaries and / or self-employment income is not equal to zero) and with some hours worked last week and with some weeks worked last year, average hourly earnings is calculated as earned income last year divided by estimated hours worked last year (calculated as hours worked last week multiplied by weeks worked last year). We then calculate the percent of individuals with earnings less than \$10 per hour.

*Off-farm earnings of census-farm operator families as a percent of total family income*. This variable is computed as off-farm earnings (i.e., wage and salary income plus non-farm self-employment income) of economic families with a census-farm operator divided by total income of economic families with a census-farm operator.

*Average income growth between 1991 and 1996*. This variable is computed as percent change *average income per person*, in nominal terms (i.e. with no adjustment for inflation).



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