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Census Metropolitan Area and Census Agglomeration Influenced Zones (MIZ): A Description of the Methodology

by

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ABSTRACT

This working paper provides an overview of census **m**etropolitan and census agglomeration **i**nfluenced **z**ones, or **MIZ**, their background and the methodology used to define them. The MIZ classification is an approach to better differentiate areas of Canada outside of census metropolitan areas (CMA) and census agglomerations (CA). Census subdivisions that lie outside these areas are classified into one of four zones of influence ranging from "strong" to "no" influence according to the degree of influence that CMA/CAs have on them. The MIZ classification fills a gap in Statistics Canada's geographic framework and promotes data integration since we expect it will be possible to obtain survey data as well as census data based on the same geographic structure.

Studies done with a preliminary version of MIZ showed the potential of MIZ to reveal the diversity of non-metropolitan Canada. Based on feedback received on that initial research, this working paper reports on more recent work that has been done to refine the number and data breakpoints for MIZ categories and to examine the additional variables of distances between census subdivisions (CSDs), physical adjacency and a north–south allocation.

This is the second in a series of three related Geography Working Papers (Catalogue no. 92F0138MIE) that describe a new statistical area classification that includes census metropolitan areas/census agglomerations, MIZ and the North concept. The first working paper (No. 2000-1) briefly describes MIZ and provides tables of selected socio-economic characteristics from the 1991 Census tabulated by the MIZ categories. The third working paper (No. 2000-3) describes the North concept and the methodology used to define a continuous line across Canada that separates the north from the south to further differentiate the MIZ classification.

1. INTRODUCTION

Statistics Canada has developed a new concept to provide a more detailed geographic infrastructure for the vast territory making up the non-census metropolitan area/census agglomeration (non-CMA/CA) areas in Canada. Traditionally, non-CMA/CA areas (which include 22% of Canada's population and 96% of the land area) are a residual of CMA/CAs[1]—what is not clearly defined as CMA/CA is non-CMA/CA. It has been argued that important differences in the social and economic well being of Canadians are masked by the current dichotomy, and consequently a classification that better differentiates non-CMA/CA areas is required. The new concept, called **census metropolitan area and census agglomeration influenced zones (MIZ)**[2], classifies municipalities (census subdivisions) that lie outside CMAs and CAs according to the degree of influence that CMA/CAs have on them.

A similar argument can be made with reference to the urban/rural[3] classification of Canada and the need to better reflect the urban-rural continuum than is possible with the existing urban/rural dichotomy. However, while there is a growing interest in an improved urban/rural classification, especially for the rural portion, there is equal concern on the part of users to protect the current classification of urban/rural for longitudinal analysis. Consequently, the MIZ concept attempts to provide the differentiation required while preserving the urban/rural concept.

Research by Geography Division into methods of enhancing the portrayal of non-metropolitan area geography was prompted by related work on rural classifications that began almost a decade ago. In 1990, the Organization for Economic Co-operation and Development (OECD) established a rural development program. One aspect of this program was a rural indicators project, designed to improve the understanding of rural conditions by collecting internationally comparable data (OECD, 1994). As part of Canada's contribution to this initiative, the Research Sub-committee of the Interdepartmental Committee on Rural and Remote Canada (on which Statistics Canada has representation) produced a further breakdown to the rural definition at the census division or "county" level for Canada (ICRRC, 1995). Statistics Canada and the Geography Division recognised the benefit of differentiating non-metropolitan Canada at the census subdivision or "municipal" level and developed the metropolitan influence zone (MIZ) concept using a methodology similar to that used to delineate CMAs and CAs. The first studies that used these metropolitan influence zones showed the diversity of non-metropolitan Canada and recommended that more research be done (Howatson-Leo and Earl, 1995). Based on feedback received on that initial research, more work has been done to refine the number and data breakpoints for MIZ categories and to examine the additional variables of distances between census subdivisions (CSDs), physical adjacency and a north–south allocation.

2. LITERATURE REVIEW

During the course of the research a literature review was completed, focusing on the metropolitan/non-metropolitan dichotomy including the numerous methods used to define this relationship. This section summarises the literature on the concepts of distance, adjacency and accessibility, and how they relate to commuter data, and draws parallels to place of work data as a basis for developing a non-CMA/CA classification.

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[1] A **CMA/CA** is a large urban area, together with adjacent urban and rural areas that have a high degree of economic and social integration with that urban area. CMAs and CAs are defined around urban areas that have attained certain population thresholds: 100,000 for CMAs and 10,000 for CAs.

[2] In response to consultations with the user community, Geography Division modified the original name of Metropolitan Influence Zones to Census Metropolitan Area and Census Agglomeration Influenced Zones. The MIZ acronym was retained.

[3] **Urban areas** are determined by a combination of population density (400 per square kilometre), population threshold (1,000) and, to a limited degree, land usage and proximity to another urban area (joined by a road link of less than 2 kilometres). All territory lying outside urban areas is considered **rural area**.

2.1 Distance

Distance is, according to Nystuen (in Berry and Marble, 1968), a fundamental spatial concept. Distance can be complex. It can be measured in physical terms, for example measuring the road distance from one city to the next, in monetary cost terms, for example travel costs between points, or as a time measurement such as the length of time taken to travel between points. Distance measures may be a proxy for accessibility, a primary concern in the metropolitan/non-metropolitan problem. Each of the distance measures from this non-exhaustive list, in turn, has its own unique characteristics and limits in terms of measurement suitability.

An example of the difficulty in measuring physical distance between two cities is the determination of initial and concluding measurement points. If one were to measure from centre to centre, one could measure from a geographic centre, a population centre or an economic centre.

Time (for example, commuter times) rather than physical distance is often used as a measure of distance since, as a measure, it embodies factors such as mode of travel, travel speed, travel conditions and congestion. Discussions of time and distance and their relationship are a recurrent theme throughout geography. Janelle (1968) labelled the time and space relationship as time-space convergence, and Harvey (1989) discussed the time distance relationship as time-space compression. More recently Castells (1989, 1993) and Jameson (1991) have discussed time and distance in more abstract terms as the space of flows, a measure of time and space influenced by electronic spaces and its implications. Despite this rich field of theoretical discussion on the connection between time and distance, a direct correlation between time and distance is troublesome, but the intimate association between the two is indisputable. Further measures of distance are distance decay functions, accessibility measures, or point to point measures of time or space.

2.2 Adjacency

Adjacency can be summarised by Tobler's important assertion: "...[the] first law of geography: everything is related to everything else, but near things are more related than distant things" (Tobler, 1970, p. 236). Numerous studies have examined this issue and the conclusion is that proximity promotes interaction between areas. There is greater interaction between areas separated by a short distance, and interaction generally decreases as distance increases.

2.3 Accessibility

Questions related to accessibility are crucial to the question of better defining the metropolitan and non-metropolitan continuum (aspects of the urban/rural continuum). Accessibility is closely related to distance and adjacency. Accessibility to goods and services is generally more available in the urban regions. Gould (1969, p. 64) cautions: "accessibility is a slippery notion ... one of those common terms that everyone uses until faced with the problem of defining and measuring it". At its simplest, accessibility is a measure of the ease in which a place or economic activity can be reached from another and in turn determines the value, activity and intensity of the activity and place (Song, 1996). Accessibility, like distance, may be measured in terms of geodetic distance, journey distance, journey time or cost. Accessibility may be measured from a single point to a single point, or to all other points or areas in a region. Accessibility may be related to the geographic or economic contents of areas, for example, access to labour markets, populations, health care or education facilities. Barriers other than physical distance can also influence accessibility, for example, social status or income limits, climatic conditions, physical features or cultural barriers.

2.4 Commuter Flows and Place of Work

Perhaps one of the most popular measures of accessibility, and its implicit underlying principle of distance and adjacency concepts, is commuter flows. More than a simple measure of work journeys, commuter flows reflect the connections to another area. Because people tend to seek and use services in those places where they work, the distribution of service providers and facilities will generally mirror that pattern of function. The 1994 U.S. Department of Transportation report, *Journey To Work Trends In The United States*, stated that "Thirty years ago, most commuter trips were traditional, home-to-work, suburb-to-central city trips. A journey to work in 1990 is more likely to include side trips for day care, for convenience shopping, or some other purpose aside from getting to or from work". Thus there is an interdependence of the home area and the work area. Cervero's (1995) research also reveals that community boundaries are largely political artifacts and do not always correspond to a community's commuter-sheds. Commuters are not concerned about the political boundaries so much as the amenities and trade-offs associated with the communities. What is important is the interrelationship between the commuter's place of residence and place of work.

Place of work and commuter flows are not interchangeable terms. Place of work (as collected by the Canadian census) refers to the number of workers in the work force and the place in which they work without concern for trip length, time or mode of transport. It establishes place of work in relation to place of residence. Commuter flows on the other hand measure the patterns of commuter traffic and, depending on the study can include factors such as trip length, mode of commute, intervening stops, time of day, secondary purposes and other factors. Commuter flows can measure inter-urban and/or intra-urban flows. Relating commuter flows trip length can create complications when directly compared to place of work distances. Commuter flow studies often report their findings in time rather than distance. Direct correspondence is difficult to establish, so ranges related to time and distance can be used in place of exact distances.

When measuring commuter flows, all individual factors or behaviour cannot be accounted for, but commuter flows reveal spatial patterns in the aggregate. Commuter flows are comprised of a variety of factors, none of which is sufficient on its own to explain its significance. They are an amalgamation of the number of people travelling from home to work, by a variety of transportation means and distances, measured not just by physical space, but by cost and time. Some researchers such as Morrill et al (1995) have suggested that the only required measurement for economic and social integration between areas is commuter flows. Using commuter flow data, the relative influence of an urban centre on a rural area (or any related area) can be noted by the number of commuters living in an area and commuting to the urban core.

2.5 Summary

The relationships between commuter flows, place of work, distance, adjacency and accessibility have been discussed in the preceding review of literature and research. These are the processes at work that affect the extent and intensity of the interaction between CMA/CA and non-CMA/CA areas. In devising measures that could classify the extent and intensity of this interaction, certain pragmatic principles were kept in mind. Any classification system for non-CMA/CA areas would have to be applied the same way across the country. Any data used would have to be readily available from the geography and census databases. Application of any classification would have to be operationally feasible within the budgets available. The rest of this paper describes the methodology used to derive the MIZ classification – the application of theory to practice.

3. METHODOLOGY

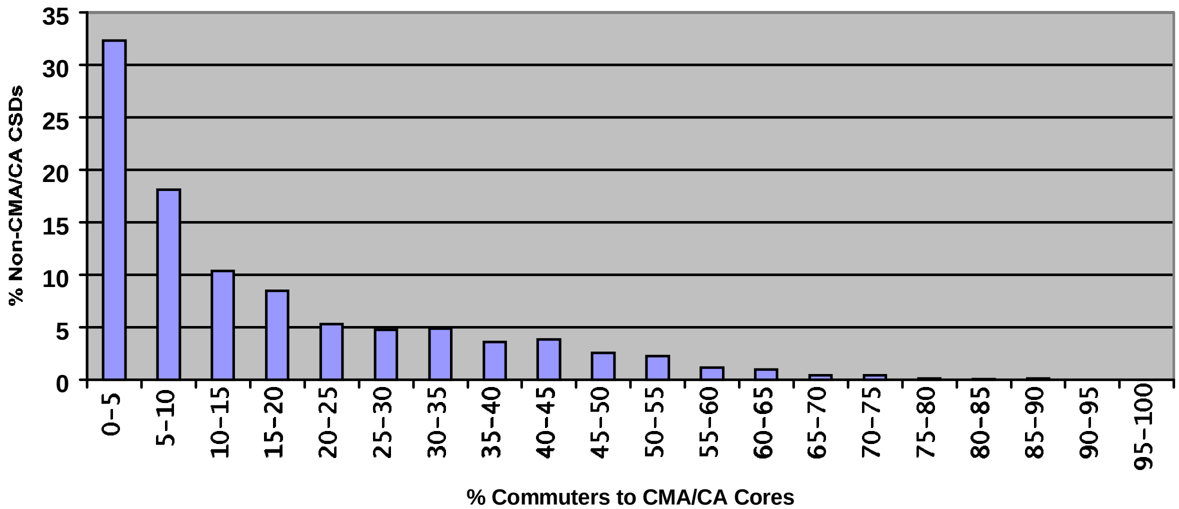
The methodology used to develop the MIZ concept was modelled on the methodology used for the CMA/CA concept. In brief, CMA/CAs are delineated on the basis of certain rules including minimum thresholds for commuting flows that are tabulated from place of work data from the Census. For example, when 50% or more of the employed labour force, that live in a municipality outside a large urban area, work in the large urban area, then the municipality is included in the CMA/CA (see *1996 Census Dictionary* for more details). All municipalities that meet the commuting thresholds are then grouped together with the urban area to form the CMA/CA. Place of work data are used because they are available on a national scale and a close relationship with commuting data is demonstrated in the literature and in past research. Census subdivisions (municipalities) provide a geographic area large enough to minimise the effects of data suppression rules for confidentiality yet small enough to provide a fairly detailed geographic breakdown since there are nearly 6,000 census subdivisions compared with about 300 census divisions.

MIZ focuses on the municipalities that are **outside** of the existing CMAs/CAs and measures the degree to which **all** CMAs/CAs influence the municipality, as measured by commuting flows. To delineate MIZs the percentages of the employed labour force living in a municipality (census subdivision) and working in the urban core of any CMA/CA were combined. Thus, in contrast to CMA/CA delineation, the MIZs do not represent the extent of the metropolitan influence of any individual urban core, but rather recognise multiple centres of attraction.

3.1 Using Place of Work Data

The research to develop the MIZ concept was based on 1991 Census place of work (POW) data by census subdivision (CSD). Figure 1 shows the percentage of non-CMA/CA CSDs by the percentage of their employed labour force commuting to CMA and CA cores.

Figure 1. Percentage of Non-CMA/CA CSDs by Percentage of Commuters to CMA/CA Cores



The first attempt to create the MIZ classification involved a search for natural breakpoints in the POW distribution. The first classification made the commuting breaks at 0% (No MIZ)[4], 0.1% to less than 20% (Weak MIZ), and greater than or equal to 20% (Moderate MIZ). A prototype was developed and tested on New Brunswick and Saskatchewan (see Howatson-Leo and Earl, 1995).

Feedback from users on that first MIZ prototype was taken into consideration in subsequent research. Analysis of the histogram, although valid, was not sufficient as the sole basis for selecting breakpoints. The concern was that the histogram reflected a morphological relationship and even precipitous changes did not necessarily reflect influence changes. It was suggested that the breakpoint between weak and moderate MIZ should be reviewed and that possibly the No MIZ and Weak MIZ categories should be combined. A third category (Strong MIZ) was suggested for the classification below 50% (50% is the commuting value used to determine inclusion within a CMA or CA). Therefore, a second round of analysis was undertaken to identify more options for further examination. The following observations were made.

1. The number of CSDs with a low percentage of commuters declines rapidly from the 0.1% - 5% to the 20% - 25% category. From the 20% - 25% group to 30% - 35%, a plateau is evident. After this point, the decline is moderate and steady. CSDs with 50% or more commuting to a CMA/CA core includes CSD outliers (CSDs with 50% or more commuting to a single CMA/CA that are not part of a CMA or CA because they are not contiguous to the CMA or CA). This pattern is consistent with expectations based on proximity—a few close CSDs would have high commuting percentages to CMA and CA cores while many CSDs would have low commuting percentages.
2. A breakpoint between the weak and moderate category is in the range 0.1% to 25%. The dominance of the category 0.1% to 5% supports a 5% breakpoint.
3. A breakpoint between the moderate and the strong category is in the 20% to 35% range.
4. Since 50% is the commuting breakpoint for inclusion within a CMA or CA, preference was given to considering 30% as a breakpoint between the strong and moderate MIZ categories to achieve a spread in the category ranges. This places the moderate/strong break in the middle of the plateau separating the two broad trends.

[4] The category of “No MIZ” includes CSDs that have no commuters and CSDs that were suppressed because their resident labour force was less than 40 persons.

5. A 20% breakpoint between the moderate and strong categories has the added advantage of providing a relatively equal distribution of the number of CSDs across the three categories. Whereas with the 30% breakpoint between moderate and strong, the distribution of the number of CSDs is about 20% in the strong, 50% in the moderate and 30% in the weak category.
   (In terms of population distribution, with a 20% breakpoint between moderate and strong, the population in the strong category is about 40%, 27% in the moderate and 33% in the weak. The population distribution using a 30% breakpoint places about 40% of the population in both the strong and moderate categories and 20% in the weak category. Equal distribution of the population across categories was seen as an added benefit since it makes the design of output tables easier. However, it was not seen as a criterion for influencing the choice of breakpoints).
6. The fourth category of 'No MIZ' was taken as a given. It was also retained because it is the category in which suppressed CSDs (those with a resident labour force of less than 40) were assigned.
7. In short, two options were felt to warrant further investigation:
   Option 1, using categories of 0% (No MIZ); 0.1% to 5% (Weak MIZ); 5% to 20% (Moderate MIZ) and 20% and over (Strong MIZ); and
   Option 2, using 0% (No MIZ); 0.1% to 5% (Weak MIZ); 5% to 30% (Moderate MIZ) and 30% and over (Strong MIZ).

This analysis, although a start, was not conclusive to support these breakpoints. Nor did it address the theoretical constructs associated with commuter behaviour and the associated concepts of accessibility, adjacency, distance and time. Further investigation was required.

3.2 Further Evaluation Using Census Data Profiles

Although initial work had adapted a modified CMA/CA methodology using place of work data, there were other potential approaches that needed to be assessed before committing to the POW approach to deriving a MIZ classification. Since the objective of this research was to design a classification that best revealed data trends, data profiles were generated from the 1991 Census for each of these potential approaches. Dr. Richard Rounds (of the Rural Development Institute, Brandon University in Brandon, Manitoba) was asked to evaluate these profiles and make recommendations on which approach was best and whether any improvements should be considered. The following alternative classifications and approaches were evaluated.

1. **The existing classification of CMA/CA and non-CMA/CA.** This classification is the reference point. Any alternative classification has to perform better than this classification with respect to the additional information revealed in the data.

2. **The OECD classification** (as presented in *Rural Canada: A Profile*). The Organisation for Economic Co-operation and Development (OECD) categories of agglomerated (CMA), intermediate (CA) and rural and remote regions (non-CMA, non-CA) primarily uses a density approach to determine degree of rurality of census divisions. However, use of census division (CD) and not census subdivision (CSD) and use of population density rather then the place of work data produces significant differences in the OECD results. (There are about 300 CDs in Canada while there are about 6000 CSDs). The OECD approach tested was a modified approach. Rural was further subdivided into three sub-regions (metro adjacent, metro non-adjacent and northern hinterlands) using the Beale code approach (see Philip Ehrensaft and Jennifer Beeman, 1992).

3. **Morphological approach.** Using geographic information system (GIS) tools, CSDs were classified as either adjacent to a CMA or CA if the CSD shared a boundary segment with either a CMA or CA. CSDs were classified as non-adjacent when they did not share a boundary segment. This approach is very similar to the OECD method except that it was based on CSDs and not CDs. The advantage in this approach was that the classification could be completely generated and maintained automatically using GIS tools. This would mean minimum maintenance costs. This would be a very desirable feature if the classification also provided quality output.

4. **Four variants using place of work commuting data.** Using 5% and 20% breakpoints and 5% and 30% breakpoints, two versions were run—a smoothed[5] and an unsmoothed. The smoothed version

[5] Smoothing results in the shifting of a CSD from one category to another category (e.g., from moderate to weak). Smoothing of data occurs when a CSD is completely enclosed by another CSD and has a different category. For the involved CSDs, the weighted average of commuting flows is calculated and the CSDs take on the resulting category.

calculated the percentage commuters for two or more combined CSDs when a 'holding' CSD enclosed one or more CSDs. The unsmoothed version made no such adjustment. Each CSD was treated separately even when the CSD was held completely within the limits of another CSD. The smoothed approach had the potential advantage of easier map production but at higher maintenance cost while the unsmoothed had the reverse attributes.

5. **CSDs grouped by the dominant CMA/CA type.** The possible set of types included: CMA; CA with Census Tracts; CA without Census Tracts and no metropolitan influence.
6. **"North" category.** In a variation of the place of work methodology, a north category was added to the classification. Each census subdivision (CSD) was assessed using four indicators (geographic location, southern limit of the boreal forest, heating degree–days, and accessibility) to determine whether it was in the north or south of Canada (see McNiven and Puderer, 2000).

3.3 Evaluation Findings

The evaluation conducted by Dr. Rounds resulted in the following observations and recommendations.

1. Each of the approaches in general showed consistent results with respect to trends in the data. In other words, no one approach suggested trends contrary to the other approaches. Some however were better in the sense they revealed differences and variation that others masked.
2. The approach using place of work commuting data was the preferred approach. It provided an interpretable geography (at the national level and especially at the provincial level) with clearly defined criteria that allows for variation without becoming so complicated that comprehension is lost and the geography becomes more important that the information it is meant to convey.
3. Of the four variations of classing the place of work commuting data, the 5% and 30% breakpoints were the better choice.
4. Smoothing had minimum impact on the populations. Dr. Rounds concluded that owing to the logic and improved readability of maps that result, the smoothed approach would be preferable to the unsmoothed. (Note: Dr. Rounds was not asked to examine the advantage of one approach over another relative to their maintenance costs).
5. The North should be added as a separate category because of the important differences it brings out in the data. This despite the fact that as a category, it represents only 2% of Canada's population and does not apply to all the provinces.
6. A category for zero commuters often serves as an important end category for remote rural areas. Therefore, it should be retained as a separate category and should not be combined with the "Weak" category. This finding provided strong analytical support to the earlier decision to treat 0% CSDs as a given and to assign them to a "No MIZ" category.
7. The "Strong" category (30% breakpoint) compared very well with the GIS metro adjacent category. This is one indication that the 30% breakpoint is a good selection in that it is appropriate for reflecting spatial contiguity and the associated concept of accessibility. However, Dr. Rounds also observed a tendency for the 30% breakpoint to be more restrictive in the delineation of the strong zone of influence around CAs than the simple GIS adjacent criteria. He wondered if there should be two breakpoints for the Strong category—one for CMAs and one for CAs.
8. The 5% threshold may be too limiting to the "weak" category and thus may also be allowing too much variation in the "moderate" category. Further investigation is needed to determine whether or not the breakpoint between weak and moderate categories should be increased from 5% to 10% or even 15%.

At this stage a number of decisions were made.

1. A methodology based on commuting data by CSD would be used to delineate MIZ.
2. Unsmoothed data would be used because of the financial benefits this approach represented over the map advantage of the smoothed approach. The use of unsmoothed data also had user support since it retained individual CSD properties which was considered better for identifying local spatial variations which would be lost in the CSD averaging of the smoothed approach.
3. No MIZ would be retained as a separate category.
4. A North category would be added.
5. Further research would be directed at the weak/moderate and the moderate/strong breakpoints.
6. Uniform category breakpoints would be retained, i.e., we would not create one set for CMAs and a second for CAs. This was done partly for operational efficiency. This decision was also made

because there was a sense that the observation made by Dr. Rounds was a consequence of CSD morphology and not a function of the breakpoints. If for example a smaller more structured unit (e.g., a block could be used), would the same observation be supported? This is an area for future assessment and evaluation.

3.4 Using a Distance Measure to Assess the Optimum Breakpoint Selection

As described in the literature review, there is a well-established relationship between accessibility and distance. A distance measure was introduced to assist in the selection of appropriate breakpoints between the weak/moderate and moderate/strong categories. The objective was to assess how well the selected breakpoints, as well as a number of alternatives (as suggested by Dr. Rounds), minimised the category overlap in terms of distance.

For each non-CMA/CA CSD, a distance variable and the total percentage of commuters was tabulated. The distance variable for each CSD was calculated as the distance from the geographic centre of that CSD to the geographic centre of the nearest CMA or CA. This distance is an indication of the approximate distances commuters would have to travel. The CSDs were classed into “weak”, “moderate” and “strong” categories based on the percentage of the employed labour force living in the CSD and working outside the CSD (i.e., the percentage of commuters). Variations on the breakpoints between the weak, moderate and strong categories were tested. The breakpoints between the weak and moderate category that were tested ranged from 2.5% through to 15% by 0.5% increments. The breakpoints between the moderate and strong category that were tested included 20%, 25% and 30%. For each of these combinations of breakpoints and within each category of strong, moderate and weak, the distance variable was ranked from low to high. Then the value of the distance variable at the 1st, 2nd (median) and 3rd quartiles were compared for each of the combinations of breakpoints. Table 1 shows the commuting distance in kilometres at the 1st, 2nd and 3rd quartile points for the category breakpoints of 5% between weak and moderate and 30% between moderate and strong.

Table 1. Example of Category Breakpoints (5% and 30%) and Quartiles for Commuting Distances

Category Breakpoints	Commuting Distance in Kilometres		
	1st Quartile	2nd Quartile (Median)	3rd Quartile
Strong (≥30%)	15.6	25.1	39.9
Moderate (5.0% to <30.0%)	34.5	54.0	93.5
Weak (0.1% to <5.0%)	86.0	154.7	347.0

The results of each of the combinations of category breakpoints were evaluated to determine which set of breakpoints would discriminate best on the distance variable by minimising overlap into the adjoining category. This evaluation showed that 5% was the best choice for a breakpoint between the weak and moderate categories. It was less clear in terms of identifying the breakpoint between the moderate and strong categories. However, the category overlap was somewhat less with the 30% breakpoint than with the 25% or 20% breakpoint. On this basis, preference was given to the 30% breakpoint.

3.5 Using Distance Measures as a Proxy for Commuting Time

The literature (U.S. DOT, 1994 and 1996; Rounds, 1997; Cervero, 1989 and 1995; Bell, 1994) indicates that for a sample of commuters, the general percentage distribution that would be expected relative to time of commute would be as shown in Table 2.

Table 2. Expected Distribution of Commuters by Commuting Time

Commuting Time (minutes)	% of commuters
Less than 15	35
15 to 29	34
30 to 44	14
45 to 59	12
Equal to or greater than 60	6

Three significant time/percentage commuter breakpoints are indicated in these data.

- Less than 30 minutes – at least 35% of commuters;
- 30 to 59 minutes – less than 35% of commuters but more than 6%;
- 60 or more minutes – 6% or less commuters.

The literature also indicates that the 6% group of commuters that spend 60 minutes or more travelling between their place of residence and place of work had, in most cases, a commute of 100 kilometres or more. Extrapolation would suggest the following relationships between commuting time, distance of commute and proportion of commuters:

- 60 or more minutes – 100 kilometres – 6% or less commuters;
- 30 to 59 minutes – 50 to 100 kilometres – less than 35% of commuters but more than 6%;
- Less than 30 minutes – less than 50 kilometres – at least 35% of commuters.

This extrapolation of distance values no doubt over-estimates the distances because there is no accounting for the increased traffic volumes and therefore reduced speeds. However, as a guide to help assess the 5% and 30% commuter-based breakpoints relative to the theoretical constructs associated with commuter behaviour, this approach was considered acceptable.

Application of these breakpoints for a given CSD would therefore suggest the following.

- A CSD less than 30 minutes/50 kilometres from a place of work location (in this case the core of a CMA/CA) would have 30% or more of its resident labour force working there.
- A CSD more than 60 minutes/100 kilometres from a work location would have less than 5% of its resident labour force working there.
- A CSD between these two categories (30 to 59 minutes and 50 to 100 kilometres) would have from 5% to 30% of its resident labour force working there.

To assess whether these expectations were valid, CSDs were tabulated for the three MIZ categories (strong, moderate and weak) by their distance from the nearest CMA/CA (see Table 3)[6].

[6] There were a total of 3,402 CSDs in the MIZ categories (see Rambeau and Todd, 2000). However, for technical reasons, commuting distances to the nearest CMA/CA could not be calculated for 48 of these CSDs. Therefore, the data in Table 3 are based on the commuting distances for 3,354 CSDs (1991 Census).

Table 3. Frequency Distribution of CSDs by 10 km Intervals and MIZ Strength

Distance (km) of CSDs from nearest CMA/CA	No. of CSDs by MIZ Categories				% of CSDs by MIZ Categories		
	Strong	Moderate	Weak	Total	Strong	Moderate	Weak
0 - <10	55	7	0	62	88.7	11.3	0.0
10 - <20	188	85	1	274	68.6	31.0	0.4
20 - <30	162	193	9	364	44.5	53.0	2.5
30 - <40	109	213	21	343	31.8	62.1	6.1
40 - <50	67	206	37	310	21.6	66.5	11.9
50 - <60	45	171	46	262	17.2	65.3	17.5
60 - <70	15	134	71	220	6.8	60.9	32.3
70 - <80	18	84	59	161	11.2	52.2	36.6
80 - <90	5	62	59	126	4.0	49.2	46.8
90 - <100	3	55	53	111	2.7	49.6	47.7
100 - <150	9	120	172	301	3.0	39.9	57.1
≥150	10	252	558	820	1.2	30.7	68.0
Totals	686	1,582	1,086	3,354			

These data clearly support the 5% breakpoint. Transition between the two categories starts in the 80 to 100 kilometre range while the number of CSDs classified as weak are dominant in the 100 plus kilometre range. This is consistent with the often quoted ‘1 hour per 100 kilometre’ commuting rule as the outer accessibility limit. It may therefore also serve to define the effective limit of CMA/CA influence. Therefore, in general it could be stated that CSDs classified as weak MIZ, no MIZ and North are ‘rural’, while strong MIZ and moderate MIZ represent decreasing urban characteristics and increasing rural attributes.

These data indicate a transition between strong MIZ and moderate MIZ in the 20 to 40 kilometre band. Although not perfectly consistent with the extrapolated distance values, these results are still supportive of the 30% breakpoint selected, given the caveat to the extrapolated values.

There are no explicit rules for determining the classification categories and their limits. Consequently, there can never be a final definitive answer as to the number of categories that should be created and their limits. Nonetheless, there are established guidelines for structuring an analysis into this type of issue. These guidelines have been followed. Therefore, although it can not be claimed that the classification proposed is beyond reproach, the development processes described in this working paper confirm its validity.

Readily apparent is the close relationship between the MIZ categories and independent empirical and theoretical works. Not only do the MIZ categories gain support from research into commuter flows from a diverse set of analytical studies, but these studies were conducted over varying geographic scales, and conclusions reached independent of the MIZ study. On a theoretical front, academic studies have highlighted the importance of commuter flows, but have also highlighted the underlying meaning of commuter flows in human spatial interaction. Empirical studies into commuter flows have discovered different benchmark figures of commuter behaviour to which the MIZ categories display a close relationship. The theoretical and empirical analysis of the MIZ delineation supported the methodology and underlying premises as sound, and its potential utility verified by clients after presentation in academic and professional forums.

4. SUMMARY

The MIZ delineation uses four categories of zones of influence that differentiate non-CMA/CA areas and quantify their varied relationship with CMAs/CAs. These zones, representing groups of non-metropolitan census subdivisions (CSDs), are labelled as strong, moderate, weak and no MIZ.

Strong MIZ includes CSDs with a place of work flow (POW) to any CMA/CA greater than 30% of workers in the home CSDs to CMA/CA. Moderate MIZ includes CSDs with POW greater than 5% up to 30%. Weak MIZ includes CSDs with POW greater than 0% up to 5%. No MIZ includes CSDs with POW = 0% or suppressed.

MIZ in effect extends to non-CMA/CA areas the labour force market concept used to delineate CMA/CA. The MIZ classification fills a gap in our geographic framework and promotes data integration since we expect it will be possible to obtain survey data as well as census data based on the same geographic structure. The MIZ classification allows intra- and inter-provincial comparisons on pressing rural issues.

Census metropolitan area and census agglomeration influenced zones were created to better differentiate the metropolitan/non-metropolitan relationship in Canada. Analysis of the distance, adjacency and distribution of the CSDs based on the identified MIZ category demonstrates the relationship between rural and urban CSDs. In addition to the strong relationship between distance, adjacency and breakpoints in the data, the results of the analysis corresponds to previous research into commuter flows, again lending support to the MIZ categorisation. The validation of the methodology and results indicates that census metropolitan area and census agglomeration influenced zones (MIZ) are a valuable addition to Statistics Canada's geography.

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