Rural-to-Urban Commuting: Three Degrees of Integration

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Abstract: Commuting ties between rural places of residence and urban places of employment are among the most visible forms of rural-urban integration. For some rural areas, access to urban employment is a key source of population retention and growth. However, this access varies considerably across rural areas, with distance representing a primary deterrent. In addition to distance, the size of the urban community will also influence rural-to-urban commuting opportunities. In this paper, using Canadian data, we empirically estimate the influence of local rural population and job growth on rural out-commuting within the urban hierarchy. We find consistent support for the deconcentration hypothesis where population moves to rural areas for lifestyle and quality of life reasons, while retaining urban employment. Further we find some evidence that in addition to distance from the nearest urban center being a deterrent, increased remoteness from the top of the urban hierarchy exerts a *positive* influence on out-commuting. Recognition of these types of rural-urban linkages through commuting is essential in designing Canadian rural policy and targeted programs that may effectively support local rural populations. In particular, they point to the need to have reasonable transportation infrastructure for urban accessibility, which should be complemented by other "built" infrastructure to improve the livability of rural communities.

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Introduction

Effective rural development policy remains elusive in most developed countries in spite of efforts on a number of fronts, most often through agriculture portfolios. There is no shortage of expressed concern over the long-term decline in many rural areas as their historic economic bases provide successively fewer jobs (Canada Senate 2008; OECD 2006; Pezzini 2001; Whitener 2007). Increased rural-urban integration, in the form of out-commuting from rural areas, holds promise as a means for (some) rural areas to capture positive spatial spillovers of urban-based economic growth. However, embracing a strategy focused on urban linkages will require a major shift in policy focus. A better understanding of the underlying determinants of rural out-commuting through empirical investigation will be instrumental in this shift. Specifically it is important to know whether out-commuting is a constructive, positive adaptation that allows the rural labor force to access urban agglomeration economies while choosing a rural lifestyle.

Programs such as the Canadian Rural Partnership in Canada (AAFC 2008) and the 2008 U.S. Farm Bill (USDA 2008) focus on local economic bases and local capacity-building as a point of departure for rural development. Yet, looking inward to the resources and assets of the rural community for population growth and retention largely misses the point that most rural economies are defined by their degree of regional integration with urban centers of growth. Moreover, while the sector-specific focus of rural policy in both Canada and the U.S. (e.g., agriculture, forestry, fisheries, mining, etc.) reflects the physical landscape, most of the rural population is not primarily dependent on these natural resources for their livelihood. Even rural residents that engage in farming, for example, receive most of their incomes from off-farm employment, whereas remote rural communities that rely primarily on natural resources for their livelihood comprise a small part of the overall rural population. Thus, given the importance of urban integration for the rural population, local capacity building and asset assessment is insufficient as a rural policy and may even distract from the need to recognize a broader regional framework.

Growing interdependence between rural and urban areas and the importance of regional networks is consistent with improved transportation, communication, and information flows. It is not surprising that

individual 'dots on the map' cannot be self-sufficient economies that generate agglomeration benefits and endogenous growth. Integration with regional and national economies is essential for the growth and vitality of rural communities. Though forms of integration vary, the relationship with nearby urban centers is the primary avenue for accessing the benefits of urban-based economic growth. Deconcentration of urban economic activity to rural areas and rural-to-urban commuting are two of the ways in which rural areas participate in this growth. Accessible urban centers also serve as markets for rural goods and services, as well as for rural recreation. Evidence suggests that a large share of rural areas that experience job and population growth are *near* urban centers (say within 120 kms), especially large centers (Partridge et al. 2008; Ali et al. forthcoming). Rural-urban interdependence through commuting may also be conceptualized as a complex network of interdependency rather than a unidirectional influence (Goetz et al. 2010). Thus, explicitly considering rural-urban interdependence by implementing a regional policy approach to economic development would better serve both rural and urban areas.

Local job growth is expected to reduce reliance on out-commuting, *ceteris paribus*, because workers would rather avoid the time and monetary commuting costs. Yet, commuting from rural places-of-residence to urban places-of-work can 'decouple' local job and population growth. Thus, local population growth may no longer be so dependent on local job growth, but instead on job growth in urban places within commuting distance, leading to geographically large regional labor markets (Goetz et al. 2010; Shearmur and Polèse 2007; Renkow 2003). For rural areas near urban centers, this means of population growth may be their best rural development strategy.

In assessing urban access, distance to the nearest urban center may be an incomplete measure of rural-urban integration, especially if the nearest urban center is relatively low in the urban hierarchy. Higher-tiered centers offer a greater number and variety of jobs, allowing for a higher degree of integration and better matching between labor demand and supply. Further, the scope for rural communities to become attractive places of residence depends on ready access to the highest-order of goods and services (medical, transportation and entertainment). The scope for rural input-output linkages will also depend on the hierarchical tier of the urban center from which rural remoteness is measured. Thus, the economic future of a rural community near a small urban center in the sparsely populated Great Plains region of North America is clearly different from that of the same-size rural community in more populated southern Ontario or the Northeastern U.S. Thus, a complete

assessment of rural options would measure “distance” across the full range of the urban hierarchy.

The contribution of this paper is the use of an urban hierarchy context to disentangle the local job growth vs. population growth effects on rural out-commuting, and to consider rural development policy implications. In particular, we represent rural commuting access as distance not only from the nearest urban center, but also from higher tiers of the urban hierarchy. We find that out-commuting is negatively affected by remoteness from the nearest urban center, and in addition, possibly affected by remoteness from the highest-ordered urban areas through indirect effects such as the structure of the local rural economy.

The paper is organized as follows. Section 2 presents a selected review of the literature, followed by the theoretical framework in Section 3. Sections 4 and 5 present the empirical implementation and a descriptive background. Results and sensitivity analyses comprise Section 6; policy implication and conclusions are presented in Section 7.

Selected Literature

Access to urban employment as a rural development strategy is not new (Berry 1970; Henry et al. 1997; Moss et al. 2004; Partridge and Olfert 2009; Polèse and Shearmur 2006). Rural labor force accessing urban employment is due to conditions both in rural and in urban areas. Primary production and routine manufacturing, which have been historical mainstays of North American rural economies, have enjoyed increased productivity through labor-saving technological change and economies of size and scale. In many locations, job growth of other sectors has been insufficient to absorb the released labor, leading to job and population loss. Two exceptions are rural areas that have become bedroom communities to metropolitan areas (Cavailhès et al. 2004; Henry et al. 1997; Olfert and Stabler 1998; Mitchell 2005; Renkow 2003) and amenity-rich areas (Deller et al. 2001; McGranahan 2008; Wu 2006).

In addition to rural economy characteristics, urban agglomeration economies that 'pull' commuters also contribute to rural-urban dependence. These economies arise where the size, diversity, and complexity of urban centers yield greater human capital, enhanced innovation, higher productivity and thus higher factor returns (Duranton and Puga 2004; Faggian and McCann, 2009). The bases for agglomeration economies include thick labor markets, input-output linkages, and knowledge spillovers that combine to produce productivity advantages

for firms in close proximity to each other (Marshall 1920). In addition, urbanization economies confer advantages on all firms, regardless of industry, due to their co-location in urban centers that makes accessing inputs and services less costly and production more efficient (Duranton and Puga 2004; Rosenthal and Strange 2001). New Economic Geography shows how endogenous growth in the core due to economies of scale and lower transportation costs can lead to a core-periphery pattern (Krugman 1991).

The provision of the higher-order of goods and services (urban amenities) augments the advantages of concentrated economic activities for households (Glaeser and Kahn 2003), beyond productivity advantages accruing to firms. The importance of agglomeration economies may be summarized in the characterization of cities as "engines of growth" (Partridge et al. 2007a; Golden 2004). Urban agglomeration economies generate the advantages that make them attractive employment destinations for rural out-commuters.

Empirical evidence regarding the effect of urban agglomeration economies on surrounding rural areas has often been cast in the terminology of 'spread' and 'backwash,' the former indicating positive spillovers and the latter negative (Barkley et al. 1996; Henry et al. 1997; Partridge et al. 2007b). Commuting by rural dwellers is one of the means by which rural areas enjoy spread effects. Commuting ties between rural and urban areas are increasing in most developed countries (McKee and McKee 2004; Mitchell 2005; Renkow 2003). Spread effects also include urban-to-rural business relocations because of lower land and labor costs, the development of input-output linkages with rural locations, and nearby urban areas serving as markets for rural businesses.

If rural restructuring underlies rural-to-urban commuting, regardless of whether this consists of urban industry relocating to nearby rural areas, or rural areas experiencing a long term decline in their (primary) economic base, then (negative) rural job growth would be a major driver of out-commuting. Policy solutions would then revolve around ways to leverage local assets to promote endogenous local growth. If, on the other hand, deconcentration of urban population to rural areas is the dominant underlying force, then rural population growth would be the primary driver (Rouwendal and Meijer 2001). This scenario would call for augmenting transportation infrastructure and other ‘built’ amenities as a way to attract/retain urban commuters and leverage urban-led growth. Indeed, the deconcentration hypothesis is also closely related to the now established relationship between amenities and rural population growth. Deller and Deller (2010), however, point to an additional consideration that rural economic development and growth may itself generate an increase in local

crime, noting that some forms of social capital may have an ameliorating effect. Further the relationship between out-commuting and local job and population growth may also vary depending on the time frame being considered. Generally, job growth should elicit a more immediate commuting response rather than a more-expensive migration response that may eventually take place at a later time (Shearmur and Polèse 2007).

In the only study that directly tests the restructuring versus deconcentration hypotheses of rural-to-urban commuting, Renkow and Hoover (2000) examined whether out-commuting is positively (deconcentration), or negatively (rural restructuring) related to local rural population growth in North Carolina.[1] They found that deconcentration is more consistent with observed trends in out-commuting.

Rural policy recommendations regarding the relative merits of local job creation versus facilitating commuting ties to urban areas will depend on the set of alternatives facing rural communities[2]. The efficacy of facilitating out-commuting as a rural development strategy depends on the type and location of a rural area relative to the urban hierarchy. Understanding the determinants of rural-to-urban commuting is important to defining the dimensions of the by now common acknowledgement that for rural policy, 'one size does *not* fit all' (Partridge and Olfert 2009; Polèse and Shearmur 2006; Mitchell 2005; Pezzini 2001; Freshwater 1997).

Theoretical Framework

Rural-to-urban commuting decisions are closely related to local employment prospects, access to urban employment and the other location attributes of both rural and accessible urban areas. Of course the residential location decision is also closely tied to the commuting-to-work possibilities (Eliasson et al. 2003). We employ a general utility function, where the representative individual in rural location *i* derives utility from consuming traded goods (X), housing (H), site-specific amenities (S), and leisure time (L):

$$U_i = U_i(X_i, H_i, S_i, L_i). \quad (1)$$

Site-specific amenities include natural/environmental attributes, favorable recreation opportunities, or other rural quality-of-life considerations. Utility for the non-commuting individual is maximized subject to constraints

[1]Renkow and Hoover (2000) describe a process of rural restructuring where local (rural) job growth increases as firms relocate from urban areas to rural fringes. Local rural population growth accompanying local job growth is associated with less out-commuting. Analogously, loss of a local (rural) economic base results in increased out-commuting.
[2]Urban development, like rural development, would be better served through the coordination of rural and urban joint interests through a regional approach that accounts for their interdependencies.

in income, housing costs, distance costs, and time. Consumption of traded goods and housing are then influenced by an initial endowment, the wage rate, housing rents, prices, as well as the probability of finding/retaining employment (e_i).

The individual budget constraint will include distance costs associated with accessing the site where employment is found and where income is spent on housing and traded goods. Including consideration of the full urban hierarchy, we include distances (D_{ij}) from rural area *i* to urban centre *j* (where *j* ranges from the nearest urban center to the nearest *higher*-tiered urban center when the nearest is not at the top of the urban hierarchy, as formalized below). In addition to impacting the wage rate and the prices of traded goods through transportation costs, distance also infringes on the time constraint faced in the available hours of leisure, work and commuting. Both direct transportation costs and time costs related to commuting will increase with distance.

Utility maximizing individual residing in a rural area will compare the utility gained from local employment with that attained through commuting to employment in a nearby urban center.[3] The commuting individual faces the same constraints (prices, wages, time, and the probability of finding employment (e_i)) as the non-commuting individual but in addition faces the distance related constraints of commuting. An individual may engage in employment in either *i* or *j*, though a household may have members employed in either or both.

Aggregating across individuals in a given locality, the reduced-form commuting function is:

$$C_{ij}=C_{ij}(e_i, e_j, D_{ij}, Z_{ij}), \qquad (2)$$

where C_{ij} is the aggregate commuters from rural area *i* to urban center *j* and Z represents a range of characteristics of rural community *i* and urban center *j*, other than employment rates. If more than one commuting destination is possible, the above commuting decision would also include corresponding conditions in alternative destinations. This representation is consistent with the basic gravity model (Thorsen and Gitlesen 1998; Ubøe 2004). In reduced form, the primary determinants of the rural-to-urban commuting decision include distance, rural/urban employment prospects, and local population growth. In this, note that out-commuting affects labor supply, which affects relative wages, and urban access for commuting influences housing costs. Thus, our reduced-form specification does not include relative wages or housing costs due to endogeneity. Yet,

[3]Whether in rural or urban areas, commuting individuals (or households with commuter(s)) also face a possible residential relocation decision that may occur in the future. However, we are taking initial location as given, and the observed commuting decision is viewed relative to current residence.

because distance is a major underlying factor that affects commuting behavior, distance will capture much of the underlying effects of wages and housing costs.

Data and Empirical Implementation

Data Sources

Before describing data sources, we first define "rural" and "rural development." We define rural as being outside of urban metropolitan areas (urban centers or urban agglomerations), defined below. Metropolitan areas include the central urban core, inner suburbs, outer suburbs, and the exurban (peri-urban) fringe, all of which are generally defined as having high commuting rates to the urbanized core. This means that "rural" areas are defined as being outside of the area that would have high (or highest) levels of urban sprawl. Second, while rural areas can have relatively high commuting rates to urban areas, by definition, if rates reach 50% the areas cease being rural as they would then be officially included in the metro area (by the Statistics Canada definition).

For purposes of our study, successful rural development is defined as population growth and retention, in which relative population growth is an outcome of both economic conditions and quality of life. Thus, in terms of land use, successfully-managed rural development can actually reduce net-sprawl because it retains population in rural communities with already built infrastructure. Conversely, if rural residents move to cities (or if fewer urban residents migrate to rural communities), that would likely put more stress on urban areas because of the need to build new infrastructure in places that are often at the exurban fringe. More development on the urban fringe would presumably lead to more urban sprawl and expensive urban infrastructure provision.

Censuses of Population for 1991, 1996, 2001, 2006 and special tabulations of place-of-residence by place-of-work for the experienced labor forces 15 years and over for the same census years comprise the primary data sources. These data are available at the 1996 constant boundary Census Consolidated Subdivision (CCS) levels.[4] Commuters, in this paper, are referred to as those workers who report a rural place-of-residence but an urban place-of-work in the census.[5] The dependent variable, 2006 out-commuting rate, is defined as the percentage of

[4] Statistics Canada defines a CCS as a group of adjacent census subdivisions. Generally small urban census subdivisions (towns, villages, etc.) are combined with a surrounding rural census subdivision (du Plessis et al. 2002).

[5] Urban areas are referred to as Census Agglomerations (CA) and Census metropolitan areas (CMA) which consist of an urban core and one or more adjacent municipalities. The population required for a CMA is an urban core of at least 100,000 population, and at least 10,000 for a CA. To be included in the CA or CMA, adjacent municipalities must be highly

workers residing in a rural CCS who commute to *any* of the 137 urban centers (CA/CMAs) in 2006. After excluding CCSs with missing values on the dependent or some explanatory variables (for data confidentiality reasons), a total of 1,815 rural CCSs entered the empirical analysis. Six sparsely populated CCSs in the Yukon and Northwest Territories are also excluded because of their geographic isolation.

Empirical Implementation

Even though our main focus is on out-commuting from rural communities to urban job centers, we first explore if such out commuting is beneficial to the growth and viability of the rural communities through a job growth-commuting relationship. Formally, we specify the job growth-commuting relationship as follows:

$$\%\text{Jobgr}_{i,1991\text{-}06} = \alpha + \boldsymbol{\beta}\mathbf{Geog}_i + \boldsymbol{\gamma}\mathbf{Demog}_{i,1991} + \varphi\text{Com}_{i,1991} + \boldsymbol{\lambda}\mathbf{Prov} + \boldsymbol{\varepsilon}_i \quad (3)$$

Percentage job growth in rural CCSs over 1991-2006 period is regressed on a set of distance variables (**Geog**) reflecting their spatial locations in the urban hierarchy, beginning of the period (1991) population and workforce (**Demog**) in the community, and their past commuting patterns (Com). Lagged values are used to avoid direct endogeneity. The **Geog** vector includes four distance measures: distance (kms) to the nearest urban center of any size, its square to capture any nonlinearities, incremental distance to the nearest medium size urban center (100,000-499,000 population), and incremental distance to the nearest large urban center ($\geq$ 500,000 population) (defined below). That is, our urban hierarchy comprises 'small' (10,000-99,999), 'medium' (100,000-499,999) and 'large' ($\geq$ 500,000) urban centers. Of course the 'nearest' may be of any size.

The **Demog** vector includes 1991 total population of the CCSs, percent in 15-64 years age, percent with secondary and post-secondary education, and population growth of the nearest urban center over 1991-2006 period. The **Prov** vector contains province dummies. The Stata Cluster command is used to adjust t-statistics for the clustering of the error terms within a given Census Division (CD), i.e., adjusted for spatial autocorrelation.[6]

Following this exploratory model, we estimate our main commuting model and a number of alternative specifications to test sensitivity of the parameter estimates. The base commuting model is specified as follows:

$$\%\text{Com}_{i,2006} = \alpha + \boldsymbol{\beta}\mathbf{Geog}_i + \boldsymbol{\delta}\mathbf{Econ}_{i,1991\text{-}01} + \boldsymbol{\gamma}\mathbf{Demog}_{i,1991} + \boldsymbol{\lambda}\mathbf{Prov} + \boldsymbol{\varepsilon}_i \quad (4)$$

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integrated with the central urban area, as measured by commuting flows (du Plessis et al. 2002). Rural areas are those CCSs that are not urban. In Canada, there are a total of 2,607 CCSs, of which 2,090 are rural and 517 are urban. The urban CCSs constitute the 137 CA/CMAs.

[6]CDs are 288 regions (in 1996), containing 10 CCSs on average.

Here, current commuting rates are regressed on the past economic, demographic, pre-determined location factors, and province dummies. The **Geog, Demog,** and **Prov** vectors represent the same set of variables described above. The **Econ** vector includes three additional variables: CCS population growth over 1991-2001, CCS job growth over 1991-2001 period, and an interaction term between the distance to the nearest urban center and population growth. This interaction term allows us to determine how rapidly population growth effects (on out-commuting) attenuate with distance. Similar to the first model, this model is estimated using the Stata Cluster command to adjust t-statistics for the clustering of error terms within a given Census Division (CD). Other specifications for sensitivity analyses are presented in Section 6.

Rural population growth, controlling for job growth, is expected to be positively related to rural out commuting to urban centers if the urban deconcentration process dominates. On the household side, deconcentration from urban to nearby rural areas, may be due to: lower housing costs in rural areas, preferences for rural lifestyle, urban disamenities, and rural amenities. Whatever the source, higher rural population growth rates exert a positive influence on labor supply, and thus on out-commuting rates.

Conversely, rural community job growth (all else constant) is expected to be negatively related to out-commuting rates as local employment will be more attractive than urban employment due to commuting costs. If it is rural restructuring or local economic conditions that are of primary importance, population growth will not be statistically significant when controlling for local job growth.

Where population growth is strongly correlated with job growth, it would be more difficult to separately identify job growth and population growth effects (Partridge and Rickman 2003). However, this correlation will be weaker where rural commuting to urban areas decouples place-of-residence from place-of-work (Shearmur and Polèse 2007). The correlation between CCS population growth and CCS job growth in our data for rural Canada is only 0.27, suggesting we can identify the two separate effects.

Finally, urban access as measured by distance will be an intervening factor in deciding the relative importance of restructuring versus deconcentration. Out-commuting following from deconcentration will diminish with distance costs, and thus is expected to be more prominent closer to urban areas. Distance to successively larger urban areas indirectly affects job growth because proximity to larger cities affects local market potential and accessibility to inputs (Partridge et al. 2007a, 2007b). To the extent that proximity to larger

urban centers has effects that are independent of these indirect job-growth effects, incremental distance to medium and large urban areas will also influence out commuting rates (including potential commuting costs and availability of higher-skilled local jobs).[7] Because each successive tier of the urban hierarchy will contain all the functions of the preceding one, plus *additional* functions (and goods and services), our distance structure is incremental (see Partridge et al. 2008 for a discussion).[8] Thus, we use distance to the nearest urban center and then, if the nearest is a 'small' urban center, we include the additional (incremental) distance to a medium-sized urban center (100K-499K) and beyond the medium, to a large urban center ($\geq$500K) (if applicable).

[Insert Figure 1 here]

The map in Figure 1 illustrates our use of incremental distances for Morse, Saskatchewan, which is a small rural municipality of about 1,700 population in south central Saskatchewan. It's nearest urban center is Swift Current, Saskatchewan, which is 69kms away (1991 population 16,000). The nearest medium-size urban center of at least 100,000 population is Regina, Saskatchewan, 164km from Morse, or an *incremental* distance of 95km (164-69). The nearest large urban center of at least 500,000 population is Calgary, Alberta, 499km from Morse, or an incremental distance of 335km (499-164).

Descriptive Background

[Insert Table 1 here]

The row totals of Table 1 show that the size of the rural workforce has gradually declined from about 2.6m to 2.3m between 1991 and 2006. [The shaded cells in Table 1 are the ones of most interest to this paper.] The proportion of rural workers that commute to work (1-noncommuting rate) increased from 36% in 1991 to 43% in 2006. That is, in 2006, only 57% of rural workers worked in the same CCS where they resided. Another 18% commuted to other rural areas, while 25% commuted to urban CCSs.

[7]It should be noted that the observed out-commuting is to *any* urban center, not restricted to the nearest, or any other particular, urban center.
[8]We assume the successively higher order functions and goods and services will be reflected in the quantity and type of labor demanded at each level.

[Insert Table 2 here]

While the total rural work force has declined, Table 2 shows that the commuting rural workforce has increased from 930K to 994K. Focusing on the 43% of rural workers who commute, about 57% have urban places of work in 2006 (571,540/994,330). While the number of rural (residence) workers commuting to other rural places of work increased by about 5% (from 401K to 423K) over the 1991-2006 interval, the percentage commuting to urban places of work increased by about 8% (from about 529k to about 572k). Thus urban places both account for 35% more place-of-work destinations for rural commuters than do rural places (about 572k vs. 423k) and this share is exhibiting a faster rate of growth.

Jobs in rural areas (held by non-commuters and commuters) have decreased from 2.3m to just under 2million (-14.3%) between 1991 and 2006. Likewise, the ratio of rural workers to rural jobs in rural areas equaled 1.14 (2,609,225/2,297,290) in 1991 and 1.17 (2,312,665/1,969,775) in 2006. Thus the rural 'job deficit' is increasing, further illustrating a growing dependence of the rural labor force on urban employment.

Of course there is considerable variability in rural Canada in terms of access to urban employment, and the local job deficit. Clearly distance to an urban center will be an important factor in commuting costs, and in the feasibility of deconcentration of population and economic activity to a rural location. For example, the aforementioned rural jobs deficit rises to 1.56 within 75kms of the nearest urban area (in 2006). However, remoteness may be reflected in not just distance to the nearest urban center, but also distance to the top of the urban hierarchy. The local economic structure, and therefore susceptibility to economic restructuring, is likely also influenced by the rural area's location relative to major urban centers. In the Canadian context, these 'engines of growth' are the 9 ‘large’ urban centers of more than 500,000 (Partridge et al. 2007a). Corcoran et al. (2010) likewise point to the necessity of a 'rurality' definition that is more precise than the simple rural-urban dichotomy, in examining the spatial variations in human capital.

Table 3 presents descriptive data to capture the 'types of rural' in Canada, both relative to standard ‘commuting distances’ and ‘remoteness from the top of the urban hierarchy’. The maximum reasonable

commuting distance as considered to be 120kms,[9] and remoteness is considered to be farther than 298kms (the mean distance) from the top of the urban hierarchy, that is, from 'large' (≥500,000 population) urban centers. Table 3 illustrates the following 'three rurals' in rural Canada: (1) **remote** rural, farther than 120kms from the nearest urban center; (2) **urban-adjacent in Core Canada,** within commuting distance (120kms) of the nearest urban center AND no more than 298kms from as urban area of at least 500,000 residents; and (3) **urban-adjacent but in Non-core Canada,** within 120kms of an urban center, but >298kms from a large urban area.[10] About 14% of rural Canadians reside in the first category, 62% in the second, and 24% in the third.

One of the clear trends shown in Table 3 is that being remote from any urban area leads to less population and job growth. Yet, being within 120kms of an urban area is not sufficient in itself to support strong population or job growth. For example, remote rural population growth equaled -6.5% over the 1991-2006 period, while it averaged -7.8% in non-core urban adjacent rural Canada (i.e., >298km from a large urban center). In the core areas (<120kms from the nearest AND <298kms a large urban centre) the mean population growth was **plus** 4%.

[Insert Table 3 here]

Rural job growth rates exhibit a similar pattern. As for population, the penalty for being non-core urban adjacent is higher than for being in remote rural. In addition, urban-adjacent non-core rural CCSs are very similar to remote rural CCSs in terms of other economic characteristics such as reliance on agriculture and extraction-based industries, smaller manufacturing sectors, and the lack of high-skilled professional and managerial occupations. One likely explanation is that remoteness from large urban areas precludes the local development of diversified economies with higher-paying local jobs. Specifically, proximity (even outside of normal commuting distance) to a large urban center has a much stronger influence on these basic economic measures than does simple access to any urban area regardless of size. In terms of our main inquiry regarding rural commuting, this table suggests that we need to include consideration of not only distance, but also remoteness from the top of the urban hierarchy.

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[9]Ali et al. (forthcoming) find that the typical urban commuting shed in Canada extends out about 120kms—though large cities such as Toronto have larger commuting sheds, and small urban centers have smaller sheds. Note that other distances in the neighborhood of 120 km produced similar results.

[10]Observers of the rural U.S. often point to 3 rurals: remote, urban adjacent, and amenity-rich. Ferguson et al. (2007) argue that natural amenity driven growth is much less pronounced in rural Canada where sparse urban centers play a more prominent role in determining rural Canadian growth patterns.

[Insert Figure 2 here]

Figure 2 depicts the location of the 'three rurals' for the 4 western provinces and central/eastern Canada. The figure shows that the scope for rural areas to benefit from greater urban integration apparently varies substantially across the country. The rural northern Great Plains region of Saskatchewan, as well as much of Atlantic Canada, is remote from the top of the hierarchy, even though they have smaller nearby urban centers. This type of remoteness may affect commuting integration with accessible urban centers, both through effects on the nature of the local rural economy ('push' factors), and also directly through limiting the number and type of commuting destinations.

Empirical Results

1991-2006 Job Growth

Though understanding rural-to-urban out-commuting is important in itself, the literature review clearly indicates two competing potential explanations: (1) good commuting access of a rural community helps it attract/retain population, spurring subsequent *local* job growth in retail and associated local industries; and (2) close commuting ties are the first step in a downward spiral in which rural residents first out-commute to an urban area, then relocate to the urban area to reduce commuting costs. Thus, to understand whether out-commuting is a positive force for rural development, we first need to assess some determinants of job growth, especially its interplay with out-commuting. If out-commuting to urban areas is positively associated with local rural job growth, then facilitating closer links with the nearest urban center(s) forms a viable policy option. The model shown in column 1 of Table 4 regresses 1991-2006 rural CCS job growth on a series of control variables. Because we assume distance to urban centers underlies the location of industries and households, we view this equation as a parsimonious reduced-form representation of job growth. A more in depth exploration of rural Canadian job growth is left to future research.

The job growth results are generally as expected. First, taking as our point of departure rural communities immediately adjacent to urban areas, every 1km farther from the nearest urban area is associated with 0.073% less job growth. Yet, this nearest urban distance effect declines with greater distance as suggested by the statistically significant positive quadratic term. When evaluated at the mean distance of 61kms, distance to the

nearest urban center is associated with about 3.7% less job growth over the 15 year span.[11] Though the incremental distance (beyond the nearest urban center) to reach a medium-sized urban center of 100K-499K residents is statistically insignificant, the incremental distance (beyond the nearest medium-sized urban center) to reach a large urban center of at least 500K residents is statistically significant at the 1% level. This large urban center effect is consistent with the "engine of growth model" where bigger cities exert a large economic influence even beyond normal commuting distance (Partridge et al. 2007b). The results suggest that job growth is about 5% less when evaluated at the mean 184km mean incremental distance to a large urban area. Access to large urban centers in Canada appears to play a more important role than in the U.S., where Partridge et al. (2008) found that the nearest urban center (regardless of size) played the strongest role.

One implication is that in terms of rural out-commuting, *greater* remoteness likely exerts two offsetting effects: (1) a negative effect through directly (negatively) affecting commuting costs to urban employment and (2) a positive effect through *indirectly* affecting the structure of the local economy (i.e., greater job loss) that increases the need to commute. Likewise, also consistent with urban spread effects that enhance the economic prospects of rural communities (Partridge et al. 2007a), population growth in the nearest urban area is positively associated with rural job growth.

In terms of this study, a key result is the strong positive relationship between initial 1991 out-commuting rates and local job growth over the ensuing 15 year period. Indeed, after directly controlling for distance and access effects, the initial out-commuting rate had a separate positive influence on job growth, which is consistent with out-commuters enhancing local incomes that support additional local retail and business establishments. These findings suggest that out commuting is *not* a sign of future community decline, but rather linked to its future prosperity. Such a finding suggests that one coherent rural development strategy is urban-based as demonstrated by the urban distance, urban population growth, and out commuting variables being the key statistically significant coefficients in the job growth equation. The implication is that in terms of this study, policies aimed at enhancing rural commuting opportunities, such as regional infrastructure and *regional* economic development planning may contribute to rural community growth and vitality. Yet, as we describe

[11]This estimate is based on both distance to the nearest urban center and its quadratic coefficient. These two coefficients are jointly statistically significant at 5% level (F=10.65, p-value=0.05).

below, we are not arguing that "if you build it, they will come," enhanced urban accessibility should also be complemented by other "built" amenities that make the community livable for urban commuters. For example, in a study of USDAs broadband loan program for rural communities in the U.S., Kandilov and Renkow (2010) find no stimulative effect on local economic activity, underlining the fact that it is likely a combination of infrastructure availability and other characteristics that is required.

Out Commuting

Four different cross-sectional commuting models are reported in columns 2-5 of Table 4. Model 1 shown in column (2) regresses 2006 out-commuting rates on a number of lagged determinants. It forms our base model because it uses 1991-2001 employment and population growth to mitigate any possible endogeneity with 2006 commuting rates. However, as shown in Model 2, our results prove to be robust to using 1991-2006 measures of job and population growth. We turn first to the base results in column 2 below.

Local Population and Job Growth

The results for (base) Model 1 indicate that the main population-growth term is positive and significantly associated with rural out commuting (at the 1% level), while job growth is negatively associated with out commuting (at the 13% level). If the rural area is immediately adjacent to an urban center (regardless of size), the magnitude of the marginal population growth effect is about 25 times the job growth effect (.399 vs. -.016), consistent with the deconcentration effect greatly dominating the local restructuring effect. For example, at a zero distance from the nearest urban center, a 10% increase in population growth is associated with a 4.0% increase in rural out-commuting rates, while a 10% increase in local job growth is associated with a 0.16% lower out-commuting rate.

The distance to nearest urban center (regardless of size) is interacted with population growth to capture more precisely the tradeoff between distance and population growth effects. The coefficient of this interaction term is negatively associated with out-commuting, supporting the hypothesis that urban deconcentration declines with distance. The bottom of Table 4 reports the marginal population growth effect at the mean distance of 61kms, which shows that the marginal effect of population growth on out commuting is still more than 10 times larger than the marginal influence of job growth. Indeed, it is not until 123kms that the population growth effect, which declines with distance, is completely offset by the job growth response. Finally, the bottom of Table 4 shows that

118kms is the critical distance in which the net urban deconcentration effect equals zero.[12] That is, beyond 118kms, the negative distance effect on commuting costs more than offsets the positive population growth effect on the out-commuting rate.

Within 118 kms of an urban center, rural population growth is linked to more out-commuting. Beyond this distance, the deterrent effects of increased distance more than offset the rural population growth effects. Indeed, 85% of rural Canadians live within 118kms of an urban center (compared with 86% within 120kms as shown at the bottom of Table 3). Thus, this suggests that for most rural Canadians, a leading mechanism of rural prosperity is leveraging urban growth through enhanced access, rather than endogenously trying to create local rural employment opportunities, especially in the face of the lack of agglomeration economies.

Distance effects

It is not surprising that the results show a strong negative and significant influence of distance to the nearest urban center on out-commuting rates from rural communities. That is, the more distant the nearest urban center, the lower the out-commuting rate from the rural area to urban employment opportunities. The squared-distance term has a positive and significant influence showing that distance exerts a negative influence on out-commuting rates at a decreasing rate.

It is also not surprising that the results suggest that incremental distance from a medium-sized (100-499K) urban area exerts an additional negative effect on rural out-commuting rates. However, when measured at the mean distance to the nearest urban center (any size), the marginal influence of incremental distance to the nearest *medium*-sized urban center is much smaller ($1/15^{th}$ the size) than that of distance to the nearest urban center. The implication is that at least in terms of commuting, the nearest urban center, regardless of its size, is the primary means by which access to urban areas influences rural out-commuting. Access to successively larger urban centers is less consequential (after controlling for indirect distance effects that work through job growth).

The coefficient of the incremental distance to a *large* (500K+) urban center (highest tier of the urban hierarchy) is positive and significant. That is, for those rural communities for which the nearest urban center is

[12]The critical distance is derived from: $\%Com_{2006} = \alpha + \delta_1 Popgr_{1991\text{-}01} + \delta_2 DNUC*Popgr_{1991\text{-}01}$ **+ all other variables**, where, DNUC = Distance to the nearest urban center. Taking partial derivatives with respect to Popgr and setting it equal to zero, we can write: $0 = \delta_1 + \delta_2 DNUC$, or $DNUC* = -\delta_1/\delta_2$.

either a small or medium-sized one, the greater the incremental distance (i.e., beyond the nearest medium-sized center) to a *large* urban center, the *greater* will be the rural out-commuting rate. The greater out commuting is presumably to the intervening small and medium-sized cities. At the mean distance to the nearest urban center and mean incremental distance to the nearest medium-sized urban center, every additional 100km of remoteness from a *large* center is associated with an additional 1% out-commuting from the rural community. Because we already control for job growth, this distance effect is separate from the indirect effect that remoteness has on depressing rural job growth.[13] Then, to assess whether our use of incremental distances is obscuring the *large* urban center effect, we replaced the incremental distance variables with the actual distance to the nearest small, nearest medium, and nearest large urban center, but the general pattern continues to be that small (and nearest) urban centers have the largest effects.[14]

One possible reason for a positive direct effect of remoteness from large urban centers is that very remote (from Core Canada) rural locations have an industry/occupation distribution concentrated in low-paying occupations/industries, which forces a larger share of the their skilled rural workforce to find alternative employment in small- or medium-sized urban centers. The descriptive overview in Table 3 suggests a couple of reasons. First, remoteness from major urban centers reduces the number of rural jobs in high-skilled occupations. Likewise, remoteness is often associated with a narrow natural resource base that may not be suited for the entire workforce (e.g., if physical strength is required, it may be more suitable for men than women).

Regarding the other control variables, only the positive association between out-commuting and the lagged population share in the 15-64 age group is statistically significant. A larger pool of local labor implies that all else equal, more local workers must out-commute to find employment. It is somewhat surprising that population growth in the nearest urban center is statistically insignificant, though as we see below, this result is not robust.

Cross-Section Sensitivity Analysis

[13]We note however, that this positive significant result is not robust to the re-specification in Model 2 where the lag structure of the independent variables is altered.

[14]Distance to the nearest small urban center appears to have the largest influence on rural commuting for the simple reason that for 80% of the rural CCSs, the nearest urban area is small, versus 14% that are medium-sized urban areas, and only 6% that are large CMAs. We also followed a referee's suggestion and considered only individually including distance to the nearest small urban area, then distance to the nearest medium urban area, and then distance to the nearest large urban area in three separate regressions, but again the results were unchanged. Our conclusion from this sensitivity analysis is that using actual versus incremental distances do not change the general findings.

Models 2-4 in Table 4 represent different specifications to assess the robustness of our results. First, Model 2 no longer lags the population and job growth rates from the 1991 to 2001 in assessing 2006 out commuting rates, using instead the corresponding 1991-2006 rates. [15] The main job growth, population growth, and distance results are quite similar between Models 1 and 2, suggesting that direct endogeneity is not a major concern. However, in Model 2 (and in the other two cross-sectional models), the population growth in the nearest urban center is now positive and statistically significantly linked to out commuting—further consistent with urban spread or deconcentration effects. In Model 2, the positive significant effect of the distance to the nearest large urban center has disappeared, suggesting further investigation of this relationship is required.

One concern with using out commuting *rates* as the dependent variable is that there is censoring at either a 0 or 100% out commuting rate. To account for this, we first estimated a Tobit model; the results were essentially unchanged (not shown). As an alternative way to avoid the censoring issue, we follow Ali et al. (forthcoming) and report a logistic model using the 'glogit' procedure from STATA, which is shown in column 4 (Model 3). This logit procedure is a weighted least-squares estimation technique for grouped data.[16] As can be seen, the logistic model results produce a similar pattern for the distance, population growth, and job growth results.

The final cross-sectional model (Model 4) is the between-effects model, which takes advantage of the panel data for 1991, 1996, 2001, and 2006. In deriving the between model, we first specify a model in which five-year out-commuting rates are regressed on the initial levels of the explanatory variables. For example, 1996 out commuting rates are regressed on 1991 levels of the age and education variables, distance, and the 1991-1996 population and job growth variables. The panel formulation can be seen in equation (5):

$$\%\mathrm{Com}_{i,t} = \alpha_i + y_t + \boldsymbol{\beta}\mathbf{Geog}_i + \boldsymbol{\delta}\mathbf{Econ}_{i,t,t-5} + \boldsymbol{\gamma}\mathbf{Demog}_{i,t-5} + \boldsymbol{\lambda}\mathbf{Prov} + \boldsymbol{\varepsilon}_{i,t} \quad (5)$$

where, = α_i, and y_t represent the cross-section and year dummies respectively.

The between-effects model simply uses the average across the three periods for the dependent variable and the explanatory variables in estimating a cross sectional model.

$$\overline{\%\mathrm{Com}_i} = \mu + \boldsymbol{\beta}\mathbf{Geog}_i + \boldsymbol{\delta}\overline{\mathbf{Econ}_i} + \boldsymbol{\gamma}\overline{\mathbf{Demog}_i} + \boldsymbol{\lambda}\mathbf{Prov} + \bar{\boldsymbol{\varepsilon}}_i, \quad (6)$$

[15]The 1991-2006 sample sizes differ due to data availability on 2006 place of work employment.
[16]The glogit dependent variable is a function of the number of commuters to any CA/CMA from a CCS divided by the number of total workers in that CCS. For CCSs where the number of commuters is zero, the zero value had to be replaced by 1.0 to prevent them being dropped by the software.

where the bar represents the averages over the time periods. The between effects results reported in column (5) support the robustness of the cross-sectional findings, even though using a considerably different empirical specification. The between effects results are even stronger in terms of the magnitude of the job growth and population growth effects. Further the positive effect of distance to the nearest large urban center of Model 1is strongly supported by the between results. Overall, this sensitivity analysis suggests that most of our cross-section results are quite robust across a variety of different approaches and specifications.

[Insert Table 4 here]

Changes in Out Commuting Over 1991-2006

Table 5 reports the results of two models that examine short- or medium-term trends in out-commuting rates over the period. First, the model shown in column 1 regresses the change in 1991-2006 out-commuting rates on the same variables used in the cross sectional models described above, representing a medium-run trend. A key advantage of this model is that if there are any fixed effects in out-commuting *levels*, they would be differenced out by using growth rates. These results suggest that 1991-2006 out-commuting rates are positively associated with CCS population growth and negatively related to CCS job growth, with both coefficients being significant at the 1% level. Consistent with the 2006 commuting level results, the deconcentration hypothesis is more strongly supported because the magnitude of the population growth effect is larger than the corresponding job growth effect. The incremental distance to the nearest large urban center is positively and significantly related to the change in out-commuting rates. Unlike most of the level results, the population growth/distance to nearest urban center interaction term is statistically insignificant. In sum, these results suggest that direct distance effects are larger over this time span, as distance to the nearest urban center and incremental distance to a large CMA had coefficients that are highly statistically significant.

Column 2 presents the results of the following fixed-effects (within) model:

$$\%\mathrm{Com}_{i,t} - \overline{\%\mathrm{Com}_i} = \eta + \tau_t + \boldsymbol{\delta}(\mathbf{Econ}_{i,t,t-5} - \overline{\mathbf{Econ}_i}) + \boldsymbol{\gamma}(\mathbf{Demog}_{i,t,t-5} - \overline{\mathbf{Demog}_i}) + (\varepsilon_{i,t} - \bar{\varepsilon}_i) \qquad (7)$$

Because the cross-sectional differences are picked up in the CCS dummy variable coefficients and the time

trends are in the year coefficients, the regression equation is identified by any *changes* around the CCS variable means, adjusted for common year trends. That is, this model assesses the short-term (five-year) out-commuting effects when adjusting around the long-run time trend for the CCS. Conversely, the factors driving the "long term" trend are reflected in the models in Table 4. Note that because the distance variables do not vary over time, their effects are captured by the CCS fixed effect. The results suggest that population growth and job growth have about equal offsetting effects in describing deviations around the CCS time trend over the period. Thus, at least in terms of short-term adjustments of out-commuting to job and population growth, the restructuring hypothesis has approximately the same explanatory power as the deconcentration hypothesis. [Again, long-term patterns are better captured in the prior results.] These results support the contention that adjustments in response to short-term deviations in job growth are offset by changes in commuting patterns, while the cross-sectional (medium and long-term) results suggest that long-term deviations in job growth are more accommodated through migration or population change.

[Insert Table 5 here]

Differences in Out-Commuting Determinants for Small and Large Rural Communities

Commuting responses to the particular variables may differ depending on the initial size of the rural community. For one, larger rural communities may provide more household amenities and services. This could imply that population growth would be more strongly linked to out-commuting as urbanites would find such communities more appealing. To examine this issue, we divided the sample at a 1991 CCS population of 1,500 and re-estimated the base 2006 out-commuting rate specification from column 2 of Table 4.

[Insert Table 6 here]

The results reported in Table 6 suggest that there are key differences due to the size of the rural community. First, they suggest that the lagged population-growth response is more than twice as large in the large CCS sample, most consistent with a stronger urban deconcentration effect where ex-urbanites are relocating to larger rural communities and commuting back to work—i.e., these larger rural communities should have more

developed built amenities that support quality of life. Conversely, lagged job growth has almost no statistical association with out-commuting in larger rural communities, but a stronger association in small rural communities. One possible reason is that job growth in larger rural communities actually attracts commuters from elsewhere, minimizing the local effect on out-commuting. Likewise, with the economically inconsequential exception of incremental distance to medium-sized CMAs, distance effects are much stronger for small rural communities. Most importantly, out-commuting rates fall much more quickly with distance from the nearest urban center for smaller rural communities, again illustrating how small rural communities are less likely to be home to urban commuters.

Conclusions

Out-commuting from rural-to-urban gives rural workers access to urban agglomeration economies, while permitting a rural residential location. The underlying forces may include the loss of rural employment opportunities, i.e., a 'push factor,' or the 'pull' of urban employment opportunities combined with a preference for a rural residential location. The latter is commonly referred to as deconcentration. A better understanding of these relationships is essential to designing a rural development strategy that may place varying emphases on local rural job creation versus strengthening ties with accessible urban centers. Assuming that rural policy has the ultimate objective of sustaining and supporting a rural population outside of urban areas, enhancing “built” rural amenities and transportation infrastructure, for example, may augment the residential attributes of rural areas to attract/retain rural-based urban commuters.

Key to a strategic approach to rural development policy is an understanding both of the determinants of the rural-urban integration signified by rural out-commuting to urban jobs, and the heterogeneity of rural areas in terms of the appropriateness of urban integration versus local job creation measures. In sparsely populated regions, there will clearly be remote rural areas for which commuting integration with urban areas is not an option. Policies that are effective in some regions may be quite inappropriate in others.

In identifying the separate roles of local population growth and local job growth as drivers of out-commuting, we find strong support for the 'deconcentration' explanation for out-commuting. Rural population growth is a much larger (positive) contributor to rural out-commuting than is (negative) job growth. While local

job growth exerts a significant negative effect on out-commuting, the magnitude of this effect is relatively small, suggesting it is not primarily the loss of a local rural economic base (rural restructuring) that is driving the rural-urban integration in the form of rural-to-urban commuting. Population growth in urban-accessible rural areas is a powerful generator of rural out-commuting, over a commuting range that extends beyond a one-hour drive.

A second noteworthy finding in this paper is the role that (incremental) distance to the largest urban centers (>500,000 population in Canada) has on rural economies—i.e., not just distance to the nearest urban center of any size. Access to the largest urban areas appears to affect the industry structure of rural economies and it may also positively affect out-commuting rates, mostly due to limited work opportunities in the local area. Figure 2 illustrates (in a discrete manner) the differing degrees of remoteness regarding distance to the nearest urban center as well as distance to the top of the urban hierarchy.

The three-'rurals' represented in Figure 2 are suggestive of different types of rural policy. For rural areas within commuting distance (say <120kms), integration with the urban economy may be the best rural development strategy. Local population growth generates increased out-commuting. However, even in this group, if those rural areas are remote from the top of the hierarchy, they will have characteristics that make their development more challenging. We suggest that the structure of their local economies may be less amenable to a scenario of urban deconcentration producing rural population growth. Their economic outcomes in terms of population and job growth will reflect this smaller set of local opportunities.

Beyond the point where positive population growth effects are offset by increased distance from the nearest urban center (i.e., our estimated critical distance of 118kms), rural-urban integration is less attractive as a rural development strategy. In these areas, alternative sources of employment will be required to retain/attract population. These rural areas, home to 14% of Canada's rural population, are often resource-dependent with a more limited range of local development options, especially since amenity-led growth has not been a prominent feature in rural Canada. However, rising incomes (with amenities being a normal good) and crowding of high-amenity locations in the U.S. may in the future stimulate amenity-led growth to rural Canada.

Rural policy options may be characterized as being more or less inward-looking (where urban integration is not realistic) versus outward-looking (where integration with urban economic activity is the best option). The historical predilection to focusing on local rural resources as being key to rural development is also backward-

looking. Facilitating rural-urban integration, as an outward- and forward-looking policy would seem to be attractive for most of the rural population.

References

Agriculture and Agri-Food Canada (AAFC). 2008. *Canadian Rural Partnership*. Accessed April 3, 2008, http://www.rural.gc.ca/crpfacts_e.phtml.

Ali, K., M. R.O., and M.D. Partridge. Forthcoming. Urban Footprints in Rural Canada: Employment Spillovers by City Size. *Regional Studies*.

Barkley, D.L., M.S. Henry, and S. Bao. 1996. Identifying "Spread" versus "Backwash" Effects in Regional Economic Areas: A Density Functions Approach. *Land Economics* 72 (3): 336-57.

Berry, B.J.L. 1970. Commuting Patterns, Labor Market Participation and Regional Potential. *Growth and Change* 1(4): 3-10.

Canada Senate. 2008. *Beyond Freefall: Halting Rural Poverty.* Final Report of the Standing Committee on Agriculture and Forestry, 39th Parliament. Accessed February 22, 2009 on the Parliamentary Internet: www.parl.gc.ca

Cavailhès, J., D. Peeters, E. Sékeris and J.-F. Thisse. 2004. The Periurban City: Why to Live Between the Suburbs and the Countryside. *Regional Science and Urban Economics* 34: 681-703.

Corcoran, J., A. Faggian and P. McCann. 2010. Human Capital in Remote Australia: The Role of Graduate Migration. *Growth and Change* (Special Issue on Best Practices in Rural Development and Policy) forthcoming.

Deller, S. C. and M.A. Deller. 2010. Rural Crime and Social Capital. *Growth and Change* (Special Issue on Best Practices in Rural Development and Policy) forthcoming.

Deller, S.C., T.H. Tsai, D.W. Marcouiller, and D.B.K. English, 2001. The Role of Amenities and Quality of Life in Rural Economic Growth. *American Journal of Agricultural Economics* 83: 352-365.

du Plessis, V., R. Beshiri, R.D. Bollman, and H. Clemenson. 2002. Definition of Rural. *Agriculture and Rural Working Paper Series Working Paper* No. 61 (series 21-601-MIE). Accessed from www.statcan.ca.

Duranton, G. and D. Puga. 2004. Micro-foundations of urban agglomeration economies. In *Handbook of Regional and Urban Economics*. Vol. 4. J.V. Henderson and J.F. Thisse (eds.). Netherlands: North-Holland. 2063–2117.

Eliasson, K., U. Lindgren and O. Westerlund. 2003. Geographical Labour Mobility: Migration or Commuting? *Regional Studies* 37.8: 827-37.

Faggian, A. and P. McCann. 2009. Human capital, graduate migration and innovation in British Regions. *Cambridge Journal of Economics* 33: 317-333.

Ferguson, M., K. Ali, M. R. Olfert, and M. D. Partridge. 2007. Voting with their Feet: Jobs Versus Amenities. *Growth and Change* 38 (1): 77–110.

Freshwater, D. 1997. Farm Production Policy versus Rural Life Policy. *American Journal of Agricultural Economics* 79(5):1515-1524.

Glaeser, E.L. and M.E. Kahn. 2003. Sprawl and Urban Growth. *NBER Working Paper Series* 9733.

Goetz, S.J., Y. Han, J. Findeis and K. J. Brasier. 2010. US Commuting Networks and Economic Growth:

Measurement and Implications for Spatial Policy. *Growth and Change* (Special Issue on Best Practices in Rural Development and Policy) forthcoming.

Golden, A. 2004. 'Mayors are right: Cities need new Deal,' *National Post* (Don Mills, Ont. Feb. 2. p. FP.15).

Henry, M.S., D.L. Barkley and S. Bao. 1997. The Hinterland's Stake in Metropolitan Growth: Evidence from Selected Southern Regions. *Journal of Regional Science* 37(3): 479-501.

Kandilov, I.T. and M. Renkow. 2010. Infrastructure Investment and Rural Economic Development: An Evaluation of USDA's Broadband Loan Program. *Growth and Change* (Special Issue on Best Practices in Rural Development and Policy) forthcoming.

Krugman, P. 1991. Increasing Returns and Economic Geography. *Journal of Political Economy* 99, 483-99.

Marshall, A. 1920. Principles of Economics, 8th ed. London: Macmillan.

McKee, D.L. and Y.A. McKee. 2004. Edge Cities, Urban Corridors and Beyond. *International Journal of Social Economics* 31(5/6): 536-43.

Mitchell, C.J. 2005. Population Change and External Commuting in Canada's Rural and Small Town Municipalities. *Canadian Journal of Regional Science* 28(3): 461-86.

McGranahan, D.A. 2008. Landscape influence on recent rural migration in the U.S. *Landscape and Urban Planning* 85: 228–240.

Moss, J.E., C.G. Jack and M.T. Wallace. 2004. Employment Location and Associated Commuting Patterns for Individuals in Disadvantaged Rural Areas in Northern Ireland. *Regional Studies* 38.2: 121-36.

OECD. 2006. *The New Rural Paradigm: Policies and Governance*. Accessed February 23, 2009 at http://www.oecd.org/document/7/0,3343,en_2649_33735_37015431_1_1_1_1,00.html.

Olfert, M. R. and J.C. Stabler. 1998. Spatial Dimensions of Rural, Gender Specific Labour Force Commuting Patterns. *Australasian Journal of Regional Studies* 4(2): 253-74.

Partridge, M.D. and D.S. Rickman. 2003. Do We Know Economic Development When We See It? *Review of Regional Studies* 33: 17-39.

Partridge, M., M.R. Olfert and A. Alessandro. 2007a. Canadian Cities as Regional Engines of Growth. *Canadian Journal of Economics* 40(1): 39-68.

Partridge, M., R.D. Bollman, M.R. Olfert and A. Alessandro. 2007b. Riding the Wave of Urban Growth in the Countryside: Spread, Backwash, or Stagnation? *Land Economics* 83(2): 128-52.

Partridge, M.D., D.S. Rickman, K. Ali and M.R. Olfert. 2008. Lost in Space: Population Dynamics in the American Hinterlands and Small Cities. *Journal of Economic Geography* 8(6): 727-757.

Partridge, M.D. and M.R. Olfert. 2009. Bridging the Rural-Urban Divide: A New Rural Policy in *Globalization and the Rural-Urban Divide.* Edited by M. Gopinath and H. Kim, Seoul National University Press, forthcoming.

Pezzini, M. 2001. Rural Policy Lessons from OECD Countries. *International Regional Science Review*. 24(1):134-145.

Polèse, M. and R. Shearmur. 2006. Why some regions will decline: A Canadian case study with thoughts on local development strategies. *Papers in Regional Science* 85(1): 23-46.

Renkow, M. and D. Hoover. 2000. Commuting, Migration, and Rural-Urban Population Dynamics. *Journal of Regional Science* 40(2): 261-87.

Renkow, M. 2003. Employment Growth, Worker Mobility, and Rural Economic Development. *American Journal of Agricultural Economics* 85(2): 503-13.

Rosenthal, S.S. and W.C. Strange. 2001. The determinants of agglomeration. *Journal of Urban Economics.* 50(2): 191–229.

Rouwendal, J. and E. Meijer. 2001. Preferences for Housing, Jobs and Commuting: A Mixed Logit Analysis. *Journal of Regional Science* 41(3): 475-505.

Shearmur, R. and M. Polèse. 2007. Do Local Factors Explain Local Employment Growth? Evidence from Canada, 1971–2001. *Regional Studies* 41(4): 453-471.

Thorsen, I. and J.P. Gitlesen. 1998. Empirical Evaluation of Alternative Model Specifications to Predict Commuting Flows. *Journal of Regional Science* 38(2): 273-92.

Ubøe, J. 2004. Aggregation of Gravity Models for Journeys to Work. *Environment and Planning A* 36: 715-29.

U.S. Department of Agriculture (USDA) 2008. 2008 Farm Bill Side-By-Side: Title VI. Rural Development. Available at: http://www.ers.usda.gov/FarmBill/2008/Titles/TitleVI Rural.htm (accessed February 6, 2009).

Whitener, L.A. and T. Parker. 2007. Policy Option for a Changing Rural America. *Amber Waves*. 3(2):68-65.

Wu, J.J. 2006. Environmental Amenities, Urban Sprawl and Community Characteristics. *Journal of Environmental Economics and Management* 52: 527-547.

Table 1: Commuters and Non-Commuters by Place of Residence

Place of Residence		Commuting Status						Total workers	
		Non-Commuters		Commuters to Rural		Commuters to Urban			
		No.	%	No.	%	No.	%	No.	%
Rural	1991	1,679,195	64.36	401,400	15.38	528,630	20.26	2,609,225	100.0
	1996	1,544,915	63.88	385,725	15.95	487,885	20.17	2,418,525	100.0
	2001	1,480,500	60.12	434,075	17.63	547,925	22.25	2,462,500	100.0
	2006	1,318,335	57.01	422,790	18.28	571,540	24.71	2,312,665	100.0
Urban	1991	7,183,880	64.18	216,695	1.94	3,792,865	33.88	11,193,440	100.0
	1996	6,577,885	62.18	212,945	2.01	3,788,420	35.81	10,579,250	100.0
	2001	7,110,459	61.80	227,475	1.98	4,167,030	36.22	11,504,964	100.0
	2006	7,281,162	61.69	228,650	1.94	4,292,845	36.37	11,802,657	100.0
Total	1991	8,863,075	64.21	618,095	4.79	4,321,495	31.31	13,802,665	100.0
	1996	8,122,800	62.49	598,670	4.60	4,276,305	32.90	12,997,775	100.0
	2001	8,590,959	61.51	661,550	4.74	4,714,955	33.76	13,967,464	100.0
	2006	8,599,497	60.92	651,440	4.62	4,864,385	34.46	14,115,322	100.0

Source: Statistics Canada, Censuses of Population, special tabulations.

Notes: Commuters are defined as workers who reside in one CCS and work in another CCS. Urban is defined as CAs and CMAs and Rural is the residual. In the case of Urban Centers, these data capture intra-urban commuting as urban centers may comprise more than one CCS.

Table 2: Commuters: Number and Percentage of Commuters to Rural and Urban Places of Work, by Place of Residence and Place of Work, 1991-2006

Place of Residence		Place of Work								
		Rural			Urban			Total		
		No.	Row%	Col.%	No.	Row%	Col.%	No.	Row%	Col.%
Rural	1991	401,400	43.16	64.94	528,630	56.84	12.23	930,030	100.00	18.83
	1996	385,725	44.15	64.43	487,885	55.85	11.41	873,610	100.00	17.92
	2001	434,075	44.20	65.61	547,925	55.80	11.62	982,000	100.00	18.26
	2006	422,790	42.52	64.90	571,540	57.48	11.75	994,330	100.00	18.03
Urban	1991	216,695	5.40	35.06	3,792,865	94.60	87.77	4,009,560	100.00	81.17
	1996	212,945	5.32	35.57	3,788,420	94.68	88.59	4,001,365	100.00	82.08
	2001	227,475	5.18	34.39	4,167,030	94.82	88.38	4,394,505	100.00	81.74
	2006	228,650	5.06	35.10	4,292,845	94.94	88.25	4,521,495	100.00	81.97
Total	1991	618,095	12.51	100.00	4,321,495	84.49	100.00	4,939,590	100.00	100.00
	1996	598,670	12.28	100.00	4,276,305	87.72	100.00	4,874,975	100.00	100.00
	2001	661,550	12.30	100.00	4,714,955	87.70	100.00	5,376,505	100.00	100.00
	2006	651,440	11.81	100.00	4,864,385	88.19	100.00	5,515,825	100.00	100.00

Source: Statistics Canada, Censuses of Population, special tabulations.

Notes: Commuters are defined as workers who reside in one CCS and work in another. Urban is defined as CAs and CMAs and Rural is the residual. In the case of Urban Centers, these data capture intra-urban commuting as urban centers may comprise more than one CCS. Row % shows work-location distribution of worker-commuters for each place of residence. Col. % shows the residence-location distribution of worker-commuters for each place of work.

Table 3: The Three Canadian Rurals

Rural Community Characteristic		Beyond 120km the Nearest UC	Within 120 AND <298km from nearest large UC	Within 120 AND >298km from nearest large UC	Within 120km, regardless of distance from nearest large UC
Out-Com rt,	Mean	4.08%	29.13%	17.99%	25.09%
	Min	0.00	0.00	0.00	0.00
	Max	72.73	100.00	100.00	100.00
Pop, 1991,	Mean	4,832	3,373	2,265	2,971
	Min	150	170	125	125
	Max	33,900	52,005	35,895	52,005
Pop Gr rt,	Mean	-6.48%	4.15%	-7.78%	-0.18%
	Min	-38.98	-46.48	-57.14	-57.14
	Max	46.06	146.48	47.89	146.48
Job Gr rt,	Mean	-12.58%	0.50%	-16.67%	-4.65%
	Min	-95.15	-94.91	-94.81	-94.91
	Max	179.69	298.63	268.57	298.63
%15-64,	Mean	63.83%	64.69%	63.02%	64.08%
	Min	45.83	49.69	48.90	48.90
	Max	83.08	85.71	85.71	85.71
%post-sec,	Mean	50.94%	51.68%	51.92%	51.76%
	Min	19.48	5.26	10.00	5.26
	Max	82.28	80.61	94.74	94.74
Empl. shares, 2006:					
Industry:					
Agriculture		23.25%	13.86%	24.84%	17.81%
Mining		4.30	0.97	3.70	1.93
Manufacturing		10.66	17.86	10.88	15.37
Construction		6.89	8.21	7.16	7.83
Professional[a]		2.17	3.19	2.33	2.88
Occupation:					
Management		6.31	7.06	5.54	6.51
Business[b]		10.58	12.71	11.55	12.29
Sciences[c]		2.66	3.43	2.52	3.10
% rural pop[d], 2006		13.59	62.48	23.93	86.41
N		160	1,054	601	1,655

[a]includes professional, scientific, and technical services industries
[b]includes business, finance and administration occupations
[c]includes natural and applied science occupations
[d]This is the share of the rural population in the specific distance category in each column. Rural is defined as the total population minus CA and CMA populations.

Table 4: All rural communities, Job Growth and Out-Commuting Determinants, (t-values in parenthesis)

Variables	%Jobgr91-06	Model 1	Model 2	Model 3	Model 4
CCS pop growth	n.a.	0.399	0.360	0.026	1.178
		(4.82)	(7.71)	(9.66)	(15.14)
CCS job growth	n.a.	-0.016	-0.021	-2.5E-04	-0.097
		(-1.60)	(-2.29)	(-0.52)	(-6.71)
Dist to nearest UC (km)	-0.073	-0.406	-0.380	-0.037	-0.366
	(-1.95)	(-9.97)	(-10.02)	(-33.82)	(-28.71)
(Dist to nearest UC)^2	2.0E-04	0.001	0.001	4.0E-05	0.001
	(3.42)	(5.40)	(6.07)	(20.86)	(21.21)
Dist to nearest UC x CCS pop gr.	n.a.	-0.003	-0.003	-2.0E-04	-0.008
		(-3.95)	(-4.93)	(-4.33)	(-10.44)
Inc. dist to nearest medium UC	-0.019	-0.014	-0.015	-0.004	-0.006
	(-1.26)	(-1.20)	(-1.52)	(-8.13)	(-1.28)
Inc. dist to nearest large UC	-0.028	0.011	0.006	-7.5E-05	0.010
	(-3.66)	(1.83)	(1.10)	(-0.29)	(3.22)
Lagged % 15-64 pop	-0.503	0.648	0.547	0.081	0.646
	(-1.53)	(5.86)	(5.37)	(11.33)	(6.25)
Lagged % with sec & post-sec edu	-0.163	3.4E-04	0.055	-0.003	0.016
	(-1.26)	(0.01)	(1.22)	(-1.14)	(0.45)
Lagged CCS pop	1.5E-05	1.8E-06	1.3E-04	-1.3E-05	4.8E-05
	(0.05)	(0.01)	(1.07)	(-3.19)	(0.48)
Pop growth of the nearest UC	0.384	0.014	0.111	0.008	0.206
	(3.84)	(0.12)	(1.89)	(3.04)	(1.99)
Province Dummies	Y	Y	Y	Y	Y
Commuting rates(%) 1991	0.391	n.a.	n.a.	n.a.	n.a.
	(3.70)				
No. of communities	1600	1815	1600	1812	1979
R^2	0.14	0.447	0.529	0.608	0.494
Marginal Pop gr. effect at 61kms[a]	n.a.	0.216	0.177	0.014	0.69
Critical distance (km)[b]	n.a.	118	131	126	153
F-stat: Dist to nearest UC & its sq.	10.65**	109.42**	107.44**	574.63**	419.53**

Notes: **Model 1**: Commuting rates (%) 2006 regressed on 1991-01 growth rates and 1991 lagged variables using Stata Cluster command; **Model 2**: Commuting rates (%) 2006 regressed on 1991-06 growth and 1991 lagged variables using Stata Cluster command; **Model 3**: glogit estimation of Model 1 using weighted least squares; **Model 4**: a "between-effect" model using 1996, 2001, and 2006 commuting rates as the dependent variable (see the text for details). In the job growth model as well as Models 1 and 2, t-statistics are adjusted for the clustering of the error terms within a given Census Division (CD), i.e., adjusted for spatial autocorrelation. CDs are 288 regions (in 1996), containing 10 CCSs on average.

[a.] This is the marginal response of population growth evaluated at the mean distance to the nearest urban center of 61kms. The marginal response does not include the distance × population growth effect if the variable is not statistically significant at the 10% level.

[b.] Critical distance refers to the distance at which the positive population growth effect is overwhelmed by the negative distance effect.

**= significant at 5% level.

Table 5: All Rural Communities, Change in Out-Commuting Determinants, (t-values in parenthesis)

Variables	Model 5	Model 6
CCS pop growth	0.073	0.039
	(4.05)	(1.51)
CCS job growth	-0.043	-0.042
	(-6.82)	(-9.53)
Dist to nearest UC (km)	-0.065	n.a.
	(-7.09)	
(Dist to nearest UC)^2	9.0E-05	n.a.
	(4.05)	
Dist to nearest UC x CCS pop gr.	-2.2E-04	-2.3E-04
	(-1.33)	(-1.32)
Inc. dist to nearest medium UC	-0.001	n.a.
	(-0.41)	
Inc. dist to nearest large UC	0.004	n.a.
	(1.97)	
Lagged % 15-64 pop	-0.016	-0.032
	(-0.29)	(-0.89)
Lagged % with sec & post-sec edu	0.002	0.033
	(0.11)	(2.10)
Lagged CCS pop	6.0E-06	-4.8E-05
	(0.15)	(-0.43)
Pop growth of the nearest UC	0.016	0.011
	(0.82)	(0.25)
Province Dummies	Y	Y
No. of communities	1600	1979
R^2	0.136	0.141
Marginal Pop growth effect at 61kms[a]	0.073	0.039
Critical distance (km)[b]	339	167
F-stat: Dist to nearest UC & its sq.	37.62**	n.a.

Notes: **Model 5**: Difference in commuting rates 1991-06 regressed on 1991-06 growth rates and 1991 lagged variables; **Model 6**: Fixed-effect (within) model using 1996, 2001, and 2006 commuting rates as the dependent variables. Year dummies are included. See the text for further details. In both Models 5 and 6, t-statistics are adjusted for the clustering of the error terms within a given Census Division (CD), i.e., adjusted for spatial autocorrelation. CDs are 288 regions (in 1996), containing 10 CCSs on average.

[a.] This is the marginal response of population growth evaluated at the mean distance to the nearest urban center of 61kms. The marginal response does not include the distance × population growth effect if the variable is not statistically significant at the 10% level.

[b.] Critical distance refers to the distance at which the positive population growth effect is overwhelmed by the negative distance effect.

**= significant at 5% level.

Table 6: Selected Results, Rural Communities with Initial Populations <> 1500 (t-values in parenthesis)

Variables	Model 1 for CCSs with 1991 pop	
	≤ 1500	> 1500
CCS pop growth	0.242	0.539
	(1.99)	(6.22)
CCS job growth	-0.038	-0.002
	(-2.67)	(-0.14)
Dist to nearest UC (km)	-0.852	-0.357
	(-8.45)	(-7.72)
(Dist to nearest UC)^2	0.003	0.001
	(5.05)	(4.85)
Dist to nearest UC x CCS pop growth	-0.003	-0.004
	(-1.91)	(-3.52)
Inc. dist to nearest medium UC	-0.011	-0.025
	(-0.79)	(-2.41)
Inc. dist to nearest large UC	0.018	0.004
	(2.40)	(0.71)
Lagged % 15-64 pop	0.425	1.418
	(3.10)	(7.84)
Lagged % with sec & post-sec education	-0.053	-0.033
	(-0.81)	(-0.51)
Lagged CCS pop	-0.002	-1.1E-04
	(-1.13)	(-0.92)
Pop growth of the nearest UC	-0.048	0.064
	(-0.30)	(0.61)
Province Dummies	Y	Y
No. of communities	876	939
R^2	0.445	0.564
Marginal Pop growth effect at 61kms[a]	0.059	0.295
Critical distance (km)[b]	91	154
F-stat: Dist to nearest UC & its sq.	99.20**	82.64**

Notes: **Model 1**: Commuting rates (%) 2006 regressed on 1991-01 growth rates and 1991 lagged variables using Stata Cluster command is used to adjust t-statistics for the clustering of the error terms within a given Census Division (CD), i.e., adjusted for spatial autocorrelation. CDs are 288 regions (in 1996), containing 10 CCSs on average.

[a.] This is the marginal response of population growth evaluated at the mean distance to the nearest urban center of 61kms. The marginal response does not include the distance × population growth effect if the variable is not statistically significant at the 10% level.

[b.] Critical distance refers to the distance at which the positive population growth effect is overwhelmed by the negative distance effect.

**= significant at 5% level.

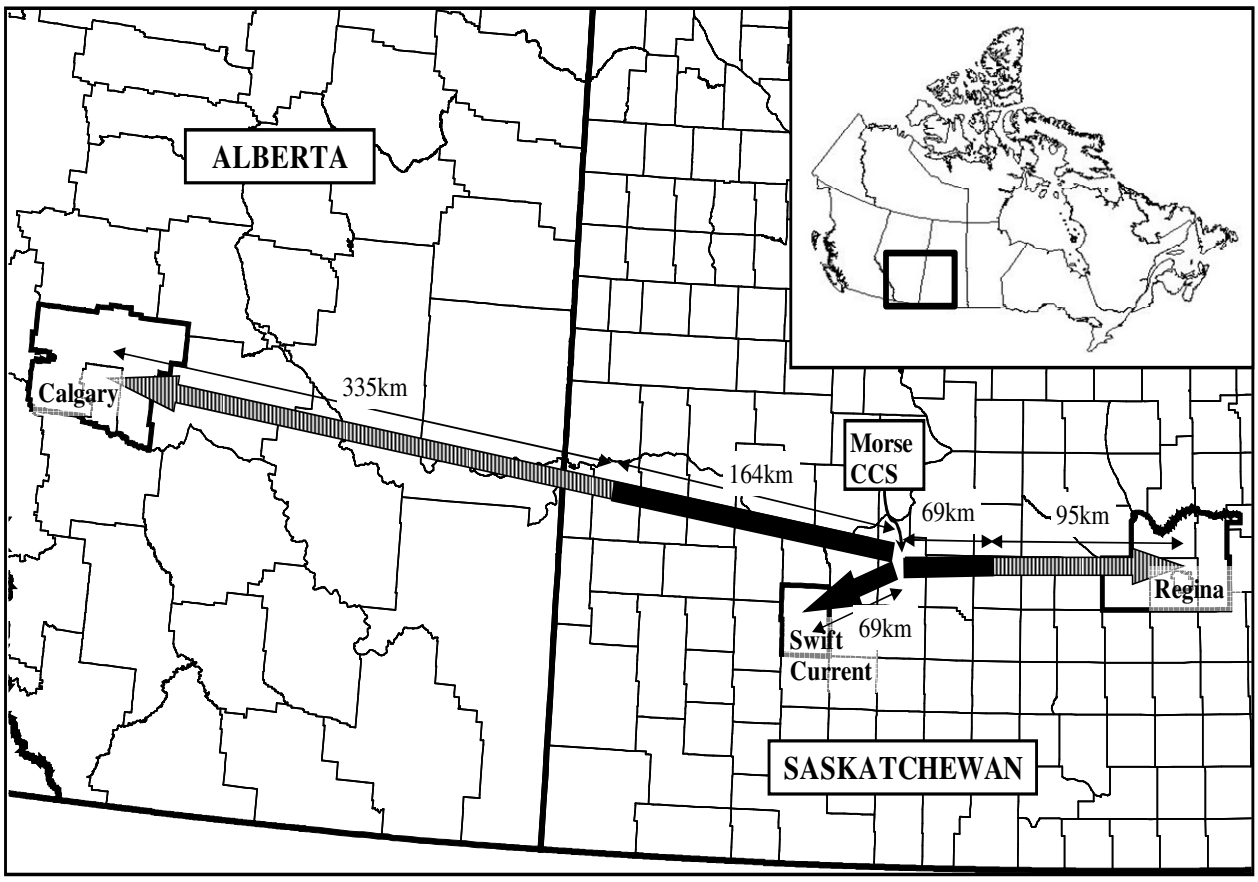

Figure 1: Illustration of incremental distance for Morse CCS, Saskatchewan

Notes: Morse CCS is a small rural municipality (No. 165) in south central Saskatchewan. Its nearest urban center is Swift Current, Saskatchewan, a CA with 1991 population of 16,000. Swift Current is 69 km away from Morse. The nearest medium size urban center of at least 100,000 population is Regina, Saskatchewan. Regina is 164 km from Morse, or an incremental distance of 95 km (164-69). The nearest large urban center of at least 500,000 population is Calgary, Alberta. Calgary is 499 km from Morse, or an incremental distance of 335 km (499-164). The black portion of the arrows shows the distance to the immediately lower tier and the grey cross-hatched arrow shows the incremental distance.

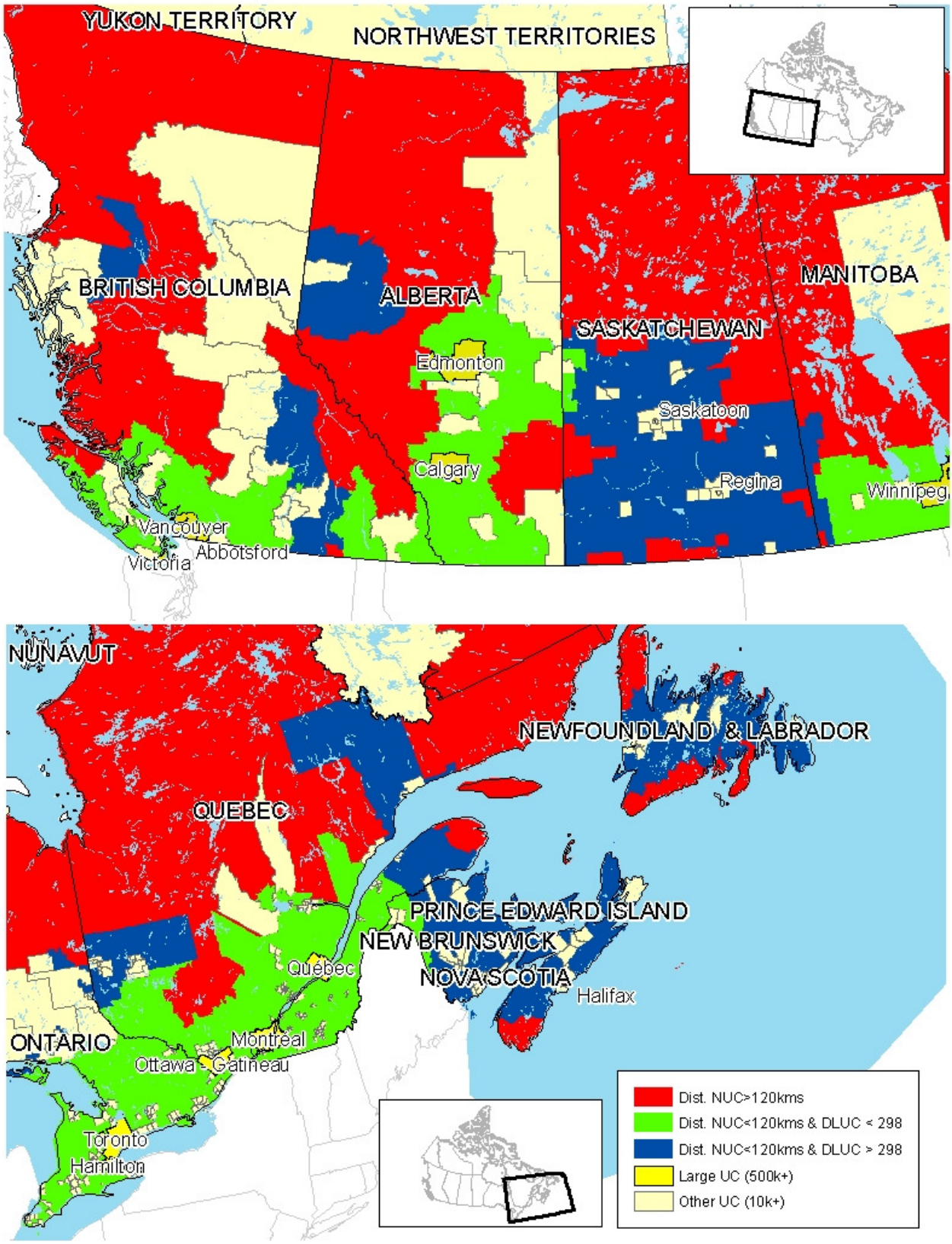

Figure 2: Three degrees of Rural-Urban Integration, Western and Eastern Canada