OFF-RESERVE EMPLOYMENT OPTIONS FOR ON-RESERVE FIRST NATIONS IN CANADA

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ABSTRACT

Alternative land management options for First Nations are intended to improve their well-being through on-Reserve economic development. Another means by which First Nations are increasing their participation in the economy is through migration off Reserve, primarily urban centres. A third, to date neglected, means by which First Nations participate in the economy is through accessing off-Reserve employment while retaining Reserve residence. While positive urban agglomeration spillovers in the form of employment opportunities for rural populations are well established for the general population, this has not been investigated for Reserve populations. This paper examines the incidence and determinants of off-Reserve employment by Reserve residents in Canada. We find that along with distance, population growth rates and a higher percentage of the population over the age of 15, out-commuting rates from Reserves are influential in Community Well-Being Scores. Out-commuting is, in turn, facilitated by high school completion rates and negatively affected by distance. We conclude that improved access to off-Reserve employment for Reserve residents is an important means of improving the well-being of Reserve populations, and that a high school education is associated with off-Reserve employment.

INTRODUCTION

Canada's *Federal Framework for Aboriginal Economic Development* of 2009 (AANDC 2009), and the *Update* of 2012 (AANDC 2012), identifies both the development of Reserve lands and assets, and the development of human capital, as the means to First Nations participating fully in the Canadian Economy. These new initiatives are set against a backdrop of long-standing appalling socio-economic outcomes for many First Nations' Reserves. The Aboriginal Affairs and Northern Development Canada (AANDC) Community Well-Being (CWB) Index study of 2011 indicated that CWB scores were 35% lower for First Nations[1] Reserves than for non-Aboriginal[2] communities. Of the "bottom 100" Canadian communities in 2006, all but four of them were First Nations Reserve Communities (AANDC 2011).

Among the initiatives of the federal government to assist and support economic development of First Nations on reserve lands have been the *First Nations Commercial and Industrial Development Act*, the *Indian Oil and Gas Act*, work to reform income assistance, and most notably, the *First Nations Land Management Act* (FNLMA) (AANDC 2012). At the same time, First Nations populations in pursuit of economic opportunity and quality of life are rapidly urbanizing, not unlike the non-Aboriginal population (Howard and Proulx 2011; Norris and Clatworthy 2010). Given the rapidly growing Aboriginal population (19% increase between 2006 and 2011, compared with 7% for the non-Aboriginal population over the same time period) and the dire economic circumstances on many Reserves both on-Reserve improvements and migration to off-Reserve destinations likely represent necessary ways of greater economic participation and improvements in well-being.

A somewhat neglected channel by which First Nations may achieve improved economic outcomes resides at the intersection of improving conditions on Reserves and participation in off-Reserve employment. That is, Reserves may continue to be places of residence for First Nations while their labour force members "commute" to places of employment off-Reserve, either daily or by way of longer term stays at the employment sites. Retaining on-Reserve residence may permit continued participation in traditional culture and lifestyles, while allowing for greater off-Reserve employment opportunities. It is important then, to examine the extent to which First Nations living on Reserves in Canada participate in off-Reserve employment, and the determinants of this participation. This will be useful both for understanding this particular path for economic integration and for strategic policy design. Improving access to the off-Reserve labour market and finding novel ways of engaging in employment away from home, as well as improving the attractiveness of Reserves as place of residence may be strategies that improve well-being.

This paper seeks to fill this gap in the literature by examining the role of out-commuting in community well-being on Reserves, as measured by the Aboriginal Affairs and Northern Development Canada (AANDC) Community Well-Being Index (CWB). In addition the key determinants of out-commuting are estimated. We find that out-commuting is positively related to community well-being, controlling for a range of other demographic, economic, and geographic factors, and that high school completion facilitates out-commuting. Remoteness and demographic characteristics are also important.

This paper is structured as follows. Following the Introduction is a review of Selected Literature and the Conceptual Framework. Section 4 contains a description of the data and the empirical implementation with the results following in Section 5. Section 6 contains conclusions and policy implications.

SELECTED LITERATURE

Relevant empirical literature may be found both in a small developing literature concerned directly with Canadian Aboriginal communities,

[1] "First Nations" is a Canadian term, which came into common usage in the 1970s, used to replace the words band or Indian (the latter with the associated negative connotations).

[2] Aboriginal peoples of Canada are defined in the Constitution Act, 1982, Section 35(2) as including the Indian, Inuit and Métis peoples of Canada. Statistics Canada defines Aboriginal ancestry as referring to whether a person reported ancestry associated with the Aboriginal peoples of Canada.

and a much larger regional economic literature that examines the patterns of concentration of economic activity in urban areas, with implications for rural or peripheral areas like Reserves. The latter includes findings on the nature and consequences of commuting — that is, where the place of residence is rural and the place of work is urban (or other rural). In addition, the policy literature on place-based versus people-based approached is relevant. A selected and brief overview of each of these major areas is presented below.

ABORIGINAL ECONOMIC INTEGRATION

Evident throughout the developing literature on the economic integration of Aboriginal communities in Canada is the very marked and persistent wage and income gaps between Aboriginal and non-Aboriginal populations (de Silva 1999; George & Kuhn 1994; Patrinos & Sakellariou 1992; Pendakur & Pendakur 1998, 2002, 2007, 2011). The size of the gap varies among Aboriginal communities in Canada and though it remains large, there is some evidence that it is narrowing.

In spite of the pervasive poverty and low incomes of Aboriginal populations, Chokie and Partridge (2008) find that initial higher shares of Aboriginal populations do not contribute to long term higher poverty levels in communities once other geographic, demographic and labour market characteristics are controlled for. This is consistent with other findings that education gaps account for at least part of the differential incomes, and also that there is a high return to education among the Aboriginal populations (Mendelson 2006; Richards and Vining 2004; Sharp et al. 2009).

There has also be some investigation of the differences between Aboriginal populations remaining on their Reserves and those who have moved off-Reserve, primarily to urban centres. These studies have found that off-reserve populations are faring better than those remaining on-Reserve in terms of labour market participation, income and educational attainment (Drost and Richards 2003; Pendakur and Pendakur 2011; Richards et al. 2010). Not unlike rural-to-urban migrations of the general population, there is consistent geographic migration from Reserves (largely small, rural and remote) to urban locations with greater quantity and diversity of economic opportunity. Between 1996 and 2006, for example, the percentage of First Nations living off Reserve increased from 58% to 60% (Statistics Canada 2009).

RURAL–URBAN SPILLOVERS

Global and long-standing concentration of economic activity and population in urban centres can be attributed to the presence of agglomeration economies, or productivity advantages of urban areas, and to the preferences for proximity to urban amenities, goods and services (Krugman 1991; Ferguson et al. 2007; Florida et al. 2008; Glaeser et al. 2001; Jacobs 1969; Word Bank 2009). Firms seek out urban locations to realize the productivity advantages arising from economies of size and scale, concentrations of skilled labour and knowledge spillovers, as well as urbanization economies due to urban infrastructure. Individuals seek out urban centres because of the job opportunities but also because of urban amenities, such as access to a full range of public and private services, variety and cultural amenities. While both firms and individuals concentrate in urban centres it is not clear whether the migrations are led by firms or by household preferences (Partridge and Rickman 2003).

Rural areas benefit from spillovers from urban concentrations through input–output linkages and access to employment opportunities and goods and services through commuting (Barkley et al. 1996; Henry et al. 1997; Partridge et al. 2007a; Partridge et al. 2007b). Rural regions with strong linkages to urban areas through close proximity or transportation/communication access are in an ideal position to benefit from urban growth. This is especially true for those rural regions reliant on natural resources that depend to be very capital intensive and increasingly so as their ability to support a rural labour force is limited. Greater distances from urban centres can thus be a significant detriment to the retention and attraction of population in rural areas.

The interdependency between rural and urban economies is especially evident in patterns of rural labour force commuting to urban centres of employment (Green and Meyer 1997; Partridge et al. 2010; Ali et al. 2011). Rural areas deficient in job opportunities face having their labour force migrate to urban areas, or if avail-

able, commute to jobs in accessible urban or other rural areas. Attractive rural areas that are located near urban centres may in fact become their "bedroom communities". For the Aboriginal labour force members living on-Reserve, access to employment in a rural or urban community within commuting distance may be an important source of income. Given the cost of commuting, the distance over which an employed individual will commute to earn income is limited. Urban centre size or the "tier" to which the labour force members commute is also important. Larger, more diverse centres induce longer commutes, as they offer more diverse and more lucrative employment opportunities.

PLACE-BASED VERSUS PEOPLE-BASED POLICY

Canadian First Nation's Reserves are located mainly in rural areas. In the dataset used in this analysis, the average distance of the Reserves from the nearest large (500K) urban centre was 458 km (284 miles). Rural communities are generally not able to directly realize the economies associated with concentrations of economic activity and are often dependent on primary sectors where productivity improvements are won through increasingly labour-saving technologies (Green and Myer 1997; Partridge et al. 2010). The typical outcome of this process is that labour and population increasingly concentrate in urban centres while rural areas become more sparsely populated. Individuals migrate or commute in order to improve their expected well-being, including considerations of both economic opportunity and quality of life. From a policy perspective, people-based policies such as education, health, information and communication will improve the mobility of the individuals, thus facilitating the migration from rural to urban areas.There are instances, however, where the mobility of the labour force and population may not be possible or desirable. In these cases, there may be a need for place-based policy in addition to people-based policies. Conceptually, place-based policies involve the type of intervention where the resulting assets and/or the increased capacity cannot leave the community/region. Examples would be infrastructure, local organizational innovation, governance reform and support for business development in specific places (Bolton 1992; Olfert et al. forthcoming; Partridge and Rickman 2003). The 2009 World Bank report suggests that the potential candidates for place-based policy are places which are "are economically distant from places that are doing well" (World Bank 2009), as is the case with most Canadian First Nations Reserves. In addition to remote locations, historical, language and cultural factors may make the population and labour resources relatively immobile. In the absence of local policy interventions, pockets of poverty can be persistent (Chokie and Partridge 2007; Olfert et al. forthcoming).Broadly, there is a growing connectedness of rural and urban places, in terms of workers in urban areas being resident in rural areas (Green and Myer 1997; Partridge et al. 2007a; Partridge et al. 2007b). The extent to which this is an option is strongly influence by the cost of travel and wage differentials (Hoover and Renkow 2000). Within the context of rural Aboriginal Reserves, investigating the commuting interdependencies should be informative for future Federal expenditures in infrastructure and transport planning.

CONCEPTUAL MODEL OF COMMUNITY WELL-BEING

Based on the literature, we hypothesize that socio-economic well-being (CWB) of Reserve populations will be a function of their demographic characteristic including human capital, access to urban employment through commuting and local conditions that may be captured through provincial fixed effects. Our expectations regarding the influential factors for the CWB can be expressed as:

$$CWB = f(DEMOG, HUMCAP, GEOG, OUTCOM, PFE) \quad (1)$$

Influential demographic characteristics (DEMOG) include the percentage of the labour force that is of potential labour force age, as well as population size and growth rates. Higher population growth is often seen as indicative of vibrant economic growth where the increase is the result of net in-migration. However, where high population growth rates are the result of natural increase, it can also lead to population pressures in the absence of a vibrant local economy. Local

population growth along with language, cultural or other barriers to geographic mobility, may lead to pockets of poverty. A higher proportion of the population of working age (15+) would be expected to improve economic well-being through the capacity to earn income.

Human capital (represented by the vector of variables HUMCAP) is generally seen as essential to the economic health and growth of any community as human capital levels will determine the long term productivity of the region. Further, the presence of high levels of human capital will attract firms and more human capital. In this paper human capital will be measured by educational attainment variables as indicated below.

Our GEOG vector contains distances from the Reserve to urban centres of various sizes. Remoteness from larger urban centres will reduce access to jobs and also to markets for local entrepreneurs, as well as access to a full range of public and private goods and services. Distance from markets will typically disadvantage a region in terms of input–output linkages with other firms, access to final markets, access to jobs, to information and knowledge and access to goods and services. Distance is thus hypothesized to exert a negative influence on CWB.

The out-commuting behavior of the Reserve labour force (OUTCOM) may be expected to influence the CWB in two ways. On the one hand, participation in the off-Reserve labour market provides a means of accessing income-earning opportunities off-Reserve. In addition to, commuting to off-Reserve jobs will also bring in knowledge and experience that will improve the competitiveness of the labour force. Both of these influences are positive in terms of CWB. However, commuting to off-Reserve employment may also have negative effects because the labour force is absent from the Reserve (for example, through work arrangements such as a "fly-in" work force for a week or two at a time to remote resource exploitation opportunities such as mining or work in oil and gas fields). Further the cost of commuting reduces net earnings. For these reasons the expected direction of influence of the out-commuting rate, our variable of primary interest, is ambiguous.

Finally provincial fixed effects (PFE) are important because of varying provincial institutions, policies and economic conditions. The general economic health and growth of the province would be expected to influence the ability of Reserve members to access opportunities, and thus affect their CWB. To control for a range of influences that may be associated with the province where the Reserve is located, we include provincial dummy variables. The remaining coefficients can then be interpreted as the influence of each variable, over and above the influence that the province itself may exert. It is hypothesized that more positive provincial level outcomes will lead to higher CWB on the Reserves. The influence of each province, will be indicated relative to a reference (omitted) province.

DATA AND EMPIRICAL IMPLEMENTATION

Data Sources

Four main data sources are used in this analysis: Census of population, a special tabulation from the census of the Population on commuting patterns (place-of-residence, POR and place-of-work POW), geographical data (distances), and Aboriginal Community well-being measures. Because Reserves are unique Census Subdivisions (CSD's)[3] the Census data were retrieved at the CSD level, the observations for this analysis.

The 2001 and 2006[4] Census of Population provides data on demographic (population size, growth and age structure), employment (labour

[3] Census subdivision (CSD) is the general term for municipalities (as determined by provincial/territorial legislation) or areas treated as municipal equivalents for statistical purposes (e.g., Indian Reserves, Indian settlements and unorganized territories) (Statistics Canada 2011). Reserves are considered any of eight CSD types: Indian Reserve (IRI), Indian settlement (S-É), Indian government district (IGD), Terres réservées aux Cris (TC), Terres réservées aux Naskapis (TK), Nisga'a village (NVL), Nisga'a land (NL), Teslin land (TL). as well as selected CSDs of various other types that are northern communities in Saskatchewan, the Northwest Territories and the Yukon Territory.

[4] The 2006 Census is the most recent complete Census and the most recent year for which the Community Well-Being Index is available. The 2011 Census did not collect data on the labour force and economic characteristics of the population because that information was part of the discontinued long form. The National Household Survey that is to replace the long form will not provide directly comparable data and the economic/labour force characteristics from that survey will first be availably in late 2013.

force and participation rates), income characteristics (total and employment income) and educational attainment (percentages completed high school and with a Bachelor's degree or higher.[5]

In addition to the standard Census data, custom tabulations were acquired for the POR (place-of-residence) and POW (place-of-work). These data tell us, for each Reserve, the number of people who are employed[6] on the Reserve. Total employment minus on-Reserve jobs is our definition of out-commuting, which we express as a rate. For 2001 we have information regarding whether the off-Reserve jobs were in rural or urban areas, and gender of the commuters. One limitation, however, is that the Statistics Canada does not indicate where people may be living both on and off Reserve, only primary residence.

There were 396 Reserve CSD's in the 2006 census dataset and 384 in 2001. Only those Reserve CSD's from the Census of population for which both the commuting (POW and POR) data were also available for both 2001 and 2006 were used in the study.

This resulted in 312 usable CSD's for the analysis.

Geographical data from the C-RERL database[7] was used to for the distances from the centroid of the Reserve to the centroid of urban centers differentiated by size. There are three distances used for each Reserve:

- The distance (km) to the *nearest* urban center, regardless of whether it is a CMA[8] or CA[9]
- The incremental distance in km to the nearest medium urban center (defined as population between 100,000 and 499,000)
- The incremental distance in km to the nearest large urban center (population > 500,000)

Our structure of distances results in a non-linear structure, representing the urban hierarchy, consistent with other representation of distances in commuting studies (Partridge et al. 2010; Ali et al. 2011).

Our main dependent variable is the Community Well-Being (CWB) Index provided by AANDC.[10] We use the calculated aggregate CWB score for each of the Reserve CSDs, based on Census data for labour force, income, education and housing characteristics. The disadvantage of using this index is that because it is such a broad composite measure it removes our ability to include explanatory variables such as education and employment rates in our models. We thus limit ourselves to independent variable that will be more exogenous. These variables were available for all of the 312 "Reserve" CSD's in the study, but due to a change in how the index was calculated between 2001 and 2006, only information for the year 2006 will be used.

Descriptive Statistics for the main variables in the study are shown in Table 1.

EMPIRICAL IMPLEMENTATION

Main Model

Our basic empirical model to be estimated is:

$$CWB_t = \alpha + \beta_1 DEMOG_{t-1} + \beta_2 GEOG + \beta_3 OUTCOM_{t-1} + \beta_4 PFE + \varepsilon \quad (2)$$

Our dependent variable is the CWB described above. Vectors of demographic, geographic and out-commuting variables comprise our explanatory variables, along with provincial fixed effects. Note that we use lagged explanatory variables to avoid direct statistical

5 Note that for 2001, the education variables were available for the population aged 20+ while for 2006 for 25+.

6 Employed persons are those who, during the reference week: did any paid work at all at a job or business, or are self-employed. It also includes unpaid family work, or had a job but were not at work (Statistics Canada 2006).

7 The C-RERL data base is part of the Canada Rural Economy Research Lab, a Canadian Foundation for Innovation-funded lab at the University of Saskatchewan; its Geographic Information Systems provide distance estimates.

8 CMA is Statistics Canada's Census Metropolitan Area, consisting of one or more adjacent municipalities situated around a major urban core with a population of at least 100,000.

9 CA is Statistics Canada's Census Agglomeration, where the urban core must have a population of at least 10,000.

10 The Community Well-Being (CWB) Index is a means of measuring socio-economic well-being in First Nations, Inuit and other Canadian communities. <http://www.aadnc-aandc.gc.ca/eng/1100100016600/1100100016641> The index and its components are constructed using data from the Canadian Census of Population.

TABLE 1
Selected Descriptive Statistics, 2001 and 2006

Variable (all $ values are nominal)		*Mean*	*Min.*	*Max.*
Community Well-Being Score 2006		57.2	0	89
Out-commuters/Total Employed (15+)	2001 (%)	13.00	0.00	100.00
	2006 (%)	12.90	0.00	92.30
Dist. to the Nearest Urban Centre (CA/CMA) km		142.12	1.42	793.48
Dist. to the Nearest Med. Urban Centre (100–499,000 Pop.) km		144.60	1.42	793.48
Dist. to the Nearest Lge. (>500,000) Urban Centre km		458.90	21.82	2061.89
Population 15+/Total Population	2001 (%)	65.53	49.00	97.22
	2006 (%)	68.93	50.14	97.14
Total Population on Reserve, % Chg. 2001–2006 (%)		10.50	–31.50	233.00
Total Population on the Reserve in	2001	732.39	60	5020
	2006	811.10	45	5175
Percentage of 25+ Population with High School, 2006 (%)		5.11	0	36.84
Percentage of 25+ Pop. with Bachelor Degree, 2006 (%)		14.96	0	43.75
Percentage of Population < Age 4	2001 (%)	10.55	0	20.4
	2006 (%)	9.93	0	18.64
Provincial Percapita Employment Income Change (%)		22.37	16.21	36.40
Provincial Employment Rate 2006 (%)		63.72	47.95	70.85
CWB Housing Component 2006		59.1	0	100
Average Employment Income on Reserve in	2001 ($)	14,589.82	0	44,017.00
	2006 ($)	17,609.36	0	48,054.00
Avg. Employment Income on Reserve, % Chg. 2001–2006 (%)		18.70	–100	196.30
Per Capita Employment Income on Reserve in	2001 ($)	3,924.81	0	24,093.52
	2006 ($)	5,133.75	0	30,612.18
Per Capita Total Income on Reserve in	2001 ($)	8,018.61	0	30,786.44
	2006 ($)	9,807.27	0	50,946.60
Employment Rate (Employed 15+/Population 15+)	2001 (%)	40.00	16.70	78.60
	2006 (%)	41.10	14.30	85.70
Percentage of Out-commuters Going to Rural CSD's	2001 (%)	69.20	0.00	100.00
	2006 (%)	72.13	0.00	100.00
Percentage of Out-Commuters Going to Urban CSD's	2001 (%)	30.80	0.00	100.00
	2006 (%)	27.10	0.00	100.00
Participation Rate (Labour Force 15+/Pop. 15+)	2001 (%)	54.00	23.80	89.00
	2006 (%)	54.00	16.90	86.00

Source: Statistics Canada, Census of Population, 2001 and 2006; Census of Population, Custom Tabulations for POR and POW; C-RERL (distances); AANDC, 2006.

endogeneity.[11] The ECON vector of variables identified in the conceptual model above is not included in the empirical model because virtually all employment, labour force and income data are already represented in the CWB index.

The DEMOG vector includes the total population on the Reserve in 2001, population growth between 2001–2006, and the proportion of the population over the age of 15 in 2001. The 15+ population represents the labour resource on the Reserve, those of income-earning age. The estimated β_1's will show how each demographic variable is related to the CWB. The expectation is that larger total population and a higher proportion in the 15+ age group will exert positive influences on CWB, such that those βs will have a positive sign. The direction of influence of population growth is ambiguous as described above.

GEOG is comprised of the distances to the nearest urban centre, the incremental distance to the nearest medium urban center (where the nearest is smaller than medium) and the incremental distance to the nearest large urban centre (where the nearest is not a large centre). The estimated β_2's will show the relationships, expected to be negative, between each of the distance variables and the CWB.

The variable of primary interest is the out-commuting rate of Reserve residents, OUTCOM. This rate is constructed as the (total number of Reserve residents employed minus the jobs on Reserve)/total number employed. The estimated β_3 will show the direction and nature of how the out-commuting rate influences CWB

Finally, provincial dummy variables are included to control for differences that are due to provincial conditions, government policies and programs. In some specifications, provincial per capita employment growth and the employment rate are used as alternate representations of provincial fixed effects. The coefficients represented by β_4 will, in each case, show the direction and influence of that variable on CWB, holding all else constant.

Each estimated equation has an error term represented by ε that captures all the forces nfluencing CWB, that are NOT explicitly included as variables in the regression. It is assumed that the error term is normally distributed.

Out-Commuting Model

While our main interest is how out-commuting affects CWB, a secondary question arises as to what, in turn, influences the out-commuting rate. Our commuting model is consistent with the basic gravity model commonly applied to rural-to-urban commuting (Partridge et al. 2010; Thorsen and Gitlesen 1998; Ubøe 2004). The expected primary determinants of out-commuting include distance, economic conditions in the commuting destinations (in this case off-Reserve) approximated by provincial level characteristics, human capital of the Reserve labour force, and the on-Reserve labour constraints. We also include consideration of the quality and quantity of the housing stock on-Reserve to represent the attractiveness of living on-Reserve while commuting to off-Reserve employment, as opposed to migrating off-Reserve. Our commuting model is:

$$\%\text{Out-Com}_t = \delta + \lambda_1 \text{GEOG} + \lambda_2 \text{HUMCAP}_t + \lambda_3 \text{DEP}_t + \lambda_4 \text{HSG}_t + \lambda_5 \text{PFE} + \varepsilon \quad (3)$$

where GEOG contains the same set of distance variables described above for the main model, and as above, distance is expected to negatively affect the out-commuting rate resulting in a –ve sign for λ_1. HUMCAP contains two education measures, % high school completion and % with a Bachelor's degree or higher; both λ_2 and λ_3 are expected to have positive values. DEP contains the % population <4 years to represent the childcare constraints on out-commuting and thus λ_3 is expected to be negative. It is expected that better housing would translate into higher out-commuting rates. Provincial fixed effects will be represented by the provincial employment rate, expected to positively influence the out-commuting rate (λ_5 is expected to have a positive sign).

[11] If we used 2006 out-commuting rates to explain 2006 CWB, there could be some reverse causation (CWB influencing the out-commuting rate) and further there would not have been enough time elapsed to allow commuting behaviour to have an effect on CWB. Lagging the explanatory variables avoids this problem to some extent.

RESULTS

We present results in two main parts, first the models for the determinants of Community Well-Being, followed by results for the determinants of out-commuting.

Main results: CWB determinants

Our main results for the CWB determinants are presented in Table 2. As discussed above, we use 2001 values of explanatory variables that are time variant to explain 2006 levels of CWB, to avoid direct statistical endogeneity and to allow time for adjustments. This includes the out-commuting rate, our variable of primary interest, as well as controls. In addition, we include provincial dummies to control for variations in CWB that are peculiar to the Reserve being located in a particular province. These province-specific effects include things like the transportation network, policies with respect to natural resources exploitation, affirmative action policies and policies related to the provision of public services to Aboriginal people. Finally, we include distance to the nearest urban centre, as well as incremental distances to medium and large size urban centres, to represent the cost of remoteness. This cost will be reflected in the cost of commuting as well as in the access to a range of public and private goods and services including higher levels of education and information.

We begin with Model 1 including only the out-commuting rate from the reserve. Model 2 then adds the strictly exogenous variables such as distances and the provincial fixed effects. In Model 2 the out-commuting rate remains positive and significant at the 1% level while distance to the nearest urban centre exerts a negative influence as expected. The two incremental distance variables to larger size centres are not significant. The provincial dummies indicate that except for Manitoba and Alberta all provinces have significantly higher CWB scores than Saskatchewan the omitted province.[12] Saskatchewan and Manitoba have the highest percentages of their population of Aboriginal origin, 15.3% in Saskatchewan and 16.7% in Manitoba. Thus provinces with the highest concentrations of Aboriginal populations have the lowest CWB scores, controlling for other determinants.

Model 3, our Full Model adds to Model 2, three control variables — total population size, the 2001-2006 population growth rate and the percentage of the population over the age of 15. The out-commuting rate remains positively associated with CWB and statistically significant. The out-commuting coefficient of 6.6 indicates that at the mean out-commuting rate of 13% (Table 1), an increase of 10 percentage points, to 23%, for example, would lead to an increase in the CWB of 0.66 points. To put this in perspective, at the mean CWB of 57 (Table 1), this represents a relatively small increase. So while there is a positive statistically significant relationship between more out-commuting and higher CWB, there are clearly many other factors contributing to a community's CWB score. Distance to the nearest urban centre remains negative and significant, though now only at the 10% level.

Total population size is conventionally expected to be positively related to CWB because it would represent the scope for realizing some economies of size and scale that should translate into productivity and income gains. Further in the context of small remote communities threshold population size would be required to support a range of public and private services. However, all this presupposes a more organic process than is represented by the allocation of Reserve lands to particular populations, with entitlements related to continued attachment to that reserve. In the estimated model, the sign of the coefficient is negative, though it is not statistically significant, so no inferences can be made.

The expected effect of population growth rates for Reserves also is unclear. Where population growth is the result of net in-migration, higher growth rates identify a community/region as having attractive economic and/or quality of life attributes. In the case of Reserves, population growth is likely to be primarily the result of natural increase because of high fertility rates

[12] Saskatchewan is, of course, included in the analysis and all the coefficients reflect the relationships evident across provinces. In the set of provincial "dummies" a reference province is chosen as the omitted province so that all other province coefficients are interpreted relative to that reference province. The sign on the coefficients for the other provinces shows how the CWB in each province compares with that of the reference province (Saskatchewan), given that all the other factors in the equation have been controlled for.

TABLE 2
Determinants of 2006 CWB Index

Independent Variables	*Model 1 Coefficient (t-ratio)*	*Model 2 Coefficient (t-ratio)*	*Full Model Coefficient (t-ratio)*
Out-Commuting Rate, 2001	**17.5621 *** (4.99)**	**10.4069 *** (3.52)**	**6.6056 *** (3.16)**
Distance to Nearest Urban Centre		–0.0127 *** (–3.06)	–0.0072 ** (–2.03)
Incr. Distance to Nearest Med. Urban Centre		0.0159 (0.36)	0.0051 (0.12)
Incr. Distance to Nearest Lge. Urban Centre		–0.0025 (–0.87)	–0.0005 (–0.2)
Total Population, 2001 ('000)			–0.4309 (–0.91)
Pop. Growth Rate, 2001–2006			–0.4617 *** (–3.2)
Percentage Pop. 15+, 2001			78.0141 *** (10.54)
Provincial Dummy Variables			
Newfoundland & Labrador		21.5882 *** (9.89)	6.4665 *** (2.71)
Prince Edward Island		22.0703 *** (17.79)	16.5073 *** (13.61)
Nova Scotia		12.9084 *** (5.43)	10.1918 *** (4.35)
New Brunswick		14.6029 *** (7.94)	8.8248 *** (5.36)
Quebec		12.3412 *** (6.55)	8.1526 *** (5.2)
Ontario		12.7861 *** (7.57)	6.5545 *** (3.95)
Manitoba		0.0539 (0.03)	–0.6414 (–0.54)
Alberta		1.6350 (0.93)	1.8695 (1.37)
British Columbia		12.2748 *** (6.88)	2.2533 (1.26)
Constant	54.1385 *** (82.31)	50.5762 *** (33.74)	3.4785 (0.75)
N	289	289	287
Adj. R^2	0.1366	0.4866	0.6752

Note: The Yukon, Northwest Territories and Nunavut are excluded from all Models. All models are estimated with robust standard errors. An Urban Centre as a Census Agglomeration Area (CA) or a Census Metropolitan Area (CMA), essentially a place with a core area population of 10,000 or more. The Adjusted R^2 (with Robust standard errors) are an approximation to the adjusted R^2 statistic that would occur if the (conditional) variance were constant.
*** indicates significance at the 1% level, ** at the 5% and * at the 10% level.
For the provincial dummies, SK is the omitted province.

and also because in-migration is not really an option. Given the fixed land resource size, and the population pressures represented by rapid growth, the estimated negative sign on this coefficient is not unexpected. Higher population growth rates have a negative influence on CWB statistically significant at the 5% level.

The proportion of the population that is in the labour force ages (15+) is positively related to CWB as expected. The coefficient of 78.0141 may be interpreted as follows. A 10 percentage point increase in the % of the population over the age of 15, would translate into an increase in the CWB of 7.8 points (10 × 78). Given that the mean value of the CWB is 57 (Table 1) and the standard deviation 10.8, this represents a substantial impact.

In the Full Model our provincial dummies are smaller in size, though most retain their statistically significant superiority to Saskatchewan, the reference province, at the 1% level. The exception is British Columbia where the coefficient is no longer statistically significant.

Interprovincial Differences

So far simple provincial dummies have been used to control for provincial differences. In Table 4 we exploit more specific information about the economic conditions in the provinces. The Full Model from Table 2 is replicated in the first column of Table 3. Understandably the set of economic descriptors for the provinces are strongly related to each other, so we utilize in our final specifications one level variable, the provincial employment rate and one change variable, the growth in provincial per capita employment income in alternative models, Model 1 and 2 in Table 3 respectively. Surprisingly both of these variables are negative and strongly statistically significant. The opposite sign would be expected if the Aboriginal labour force is integrated into the provincial labour market. A tighter labour market in the province and/or more robust growth should translate into higher CWB indices for Reserves. The opposite seems to be the case. These results are driven in large part by the relatively robust conditions in Alberta and to a lesser extent in Saskatchewan, provinces where the CWB indices are lower than other provinces. The implication is that the Aboriginal population is not sharing in the good economic fortunes of the provinces, perhaps due to a segmented or dual labour market.

Out-commuting and Education on Reserve Communities

Our results are generally supportive of the hypothesis that out-commuting contributes positively to community well-being on Reserves. We thus explore what factors may contribute to higher out-commuting rates. In addition to distance from urban centres, a potential determinant of out-commuting is the education levels of the Reserve populations, to the extent that higher education levels will increase the ability of Reserve residents to participate in off-Reserve employment. Indeed as the literature, and the theoretical models suggest, education is frequently seen as a major influence in the economic success of Aboriginal populations. While education is the variable of main interest, we control for a range of other influences. The results are presented in Table 4.

Model 1 includes only completely exogenous variables (distances and provincial dummies), along with two measures of education attainment, the percentage of the population ages 25+ that has a high school certificate as the highest level of education attainment, and the percentage of the population that has a University Degree or higher.[13] The explanatory variables are not lagged as reverse causality is not expected to be a problem. Both of the education variables are positive in sign though only high school completion is statistically significant. The coefficient implies that for every 10 percentage points higher high school completion, the out-commuting rate would increase by 8 percentage points, a large effect. The provincial dummies indicate that the out-commuting rate is significantly lower in Nova Scotia and significantly higher in British Columbia.

Model 2 in Table 4 is a re-estimation of Model 1 but with the provincial dummies being replaced by the provincial employment rate.

[13] A number of other variables, including lagged values were examined. These two were selected as the most informative for conceptual and practical reason.

TABLE 3
Determinants of 2006 CWB Index, Province-Level Effects

Independent Variables	*Full Model Coefficient (t-ratio)*	*Model 1 Coefficient (t-ratio)*	*Model 2 Coefficient (t-ratio)*
Out-Commuting Rate, 2001	**6.6056 *** (3.16)**	**4.9177 ** (2.43)**	**4.6558 ** (2.30)**
Distance to Nearest Urban Centre	–0.0072 ** (–2.03)	–0.0077 ** (–2.00)	–0.0086 ** (–2.09)
Incr. Distance to Nearest Med. Urban Centre	0.0051 (0.12)	–0.014 (–0.29)	–0.0134 (–0.28)
Incr. Distance to Nearest Lge. Urban Centre	–0.0005 (–0.2)	–0.0001 (–0.05)	0.0027 (1.31)
Total Population, 2001 ('000)	–0.4309 (–0.91)	–0.2996 (–0.60)	–0.2544 (–0.50)
Pop. Growth Rate, 2001–2006	–0.46167*** (–3.2)	–0.5786 *** (–4.12)	–0.5648 *** (–3.76)
Percentage Pop. 15+, 2001	78.0141 *** (10.54)	82.1992 *** (13.36)	85.3496 *** (13.89)
Provincial Employment Rate, 2006		–50.0880*** (–3.78)	
Provincial Per Capita Employment Income Change			–16.0751* (–2.41)
Provincial Dummy Variables			
Newfoundland & Labrador	6.4665 *** (2.71)		
Prince Edward Island	16.5073 *** (13.61)		
Nova Scotia	10.1918 *** (4.35)		
New Brunswick	8.8248 *** (5.36)		
Quebec	8.15256 *** (5.2)		
Ontario	6.5544 *** (3.95)		
Manitoba	–0.6414 (–0.54)		
Alberta	1.8695 (1.37)		
British Columbia	2.2533 (1.26)		
Constant	3.4785 (0.75)		
N	287		
Adj. R^2	0.6752		

Note: The Yukon, Northwest Territories and Nunavut are excluded from all Models. All models are estimated with robust standard errors. An Urban Centre as a Census Agglomeration Area (CA) or a Census Metropolitan Area (CMA), essentially a place with a core area population of 10,000 or more. The Adjusted R^2 (with Robust standard errors) are an approximation to the adjusted R^2 statistic that would occur if the (conditional) variance were constant.
*** indicates significance at the 1% level, ** at the 5% and * at the 10% level.
For the provincial dummies, SK is the omitted province.

TABLE 4
Determinants of 2006 Out-Commuting Rates

Independent Variables	*Model 1 Coefficient (t-ratio)*	*Model 2 Coefficient (t-ratio)*	*Model 3 Coefficient (t-ratio)*	*Model 4 Coefficient (t-ratio)*
Distance to Nearest Urban Centre	–0.0001 (–1)	–0.0001 (–1.07)	0 (–0.37)	–0.0001 (–0.66)
Incr. Distance to Nearest Med. Urban Centre	–0.0007 (–0.64)	–0.0005 (–0.54)	–0.0008 (–0.91)	–0.0012 (–1.39)
Incr. Distance to Nearest Lge. Urban Centre	–0.0001 (–1.4)	–0.0002 *** (–3.15)	–0.0001 ** (–2.33)	–0.0001 ** (–2.39)
% Pop. (25+) with High School, 2006	0.8422 *** (3.67)	1.0681 *** (5.38)	0.6658 *** (3.16)	0.6294 *** (2.97)
% Pop. (25+), Bachelor's Degree +, 2006	0.4824 (1.35)	0.4198 (1.18)	0.3149 (0.93)	0.3661 (1.05)
Provincial Employment Rate, 2006		0.2659 (0.76)	0.7494 ** (2.32)	0.6583 ** (2.03)
Percentage Population < 4, 2006			–1.9177 *** (–4.15)	–1.8461 *** (–3.94)
CWB Housing Score				–0.0003 (–0.48)
Provincial Dummy Variables				
Newfoundland & Labrador	–0.056 (–1.04)			
Prince Edward Island	–0.0467 (–1.39)			
Nova Scotia	–0.1054 ** (–2.4)			
New Brunswick	–0.0724 (–1.14)			
Quebec	–0.0045 (–0.11)			
Ontario	–0.0161 (–0.41)			
Manitoba	0.0199 (0.43)			
Alberta	0.0447 (0.91)			
British Columbia	0.1067 ** (2.54)			
Constant	–0.0029 (–0.05)	–0.1623 (–0.66)	–0.229 (–1.03)	–0.1557 (–0.69)
N	290	290	288	287
Adj. R^2	0.2056	0.1773	0.2465	0.2315

Note: The Yukon, Northwest Territories and Nunavut are excluded from all Models. All models are estimated with robust standard errors. An Urban Centre as a Census Agglomeration Area (CA) or a Census Metropolitan Area (CMA), essentially a place with a core area population of 10,000 or more. The Adjusted R^2 (with Robust standard errors) are an approximation to the adjusted R^2 statistic that would occur if the (conditional) variance were constant.
*** indicates significance at the 1% level, ** at the 5% and * at the 10% level.
For the provincial dummies, SK is the omitted province.

While the latter is not statistically significant, it is positive, unlike the sign in the models for CWB. In Model 2, high school completion has an even larger coefficient and remains significant at the 1% level. In addition, while distance to the nearest urban centre is not significant, distance to a large urban centre (population 100,000+) is negative and statistically significant. Access to employment in a metropolitan centre is important for the out-commuting rate, consistent with other finding that in the Canadian setting access to the range and variety of employment opportunities in large metropolitan areas is an important influence in commuting behaviour (Partridge et al. 2010).

In Model 3, an additional demographic variable, the percentage of the population under the age of 4 years, is added to reflect the impact of at-home obligations on out-commuting rates. Indeed including this variable adds substantially to the explanatory power of the model and has the expected negative sign, significant at the 1% level. The provincial employment rate is now significant and positive, while distance to the nearest large urban centre remains negative and significant. High school completion remains positive and significant, though with a somewhat reduced coefficient signaling some correlation (.52) between the percentage under 4 years and high school completion rates.

Finally Model 4 represents our Full Model of out-commuting where we add an additional consideration to reflect the attractiveness of the Reserve in terms of the housing stock quantity and quality. From a policy perspective, if out-commuting were considered a desirable strategy for First Nations on Reserve to access off-Reserve employment, housing on the Reserve may be very important. Along with the CWB score computed by AANDC, separate component scores are calculated, including a Housing score that reflects both quantity and quality of housing.[14] The Housing score in the Full model is not statistically significant. Most of the other variables retain their signs and significance. It is likely that the measure of housing does not adequately reflect attributes that may increase the desirability of the Reserve as a place to live.

SUMMARY

Our empirical estimations provide support for the hypothesis that CWB is positively affected by a higher proportion jobs held by Reserve residents being off-Reserve employment. Distance from urban centres exerts a negative influence as expected, as do higher population growth rates. A strongly positive influence on CWB is the percentage of the population 15+. Out-commuting to urban areas is somewhat more positively related than out-commuting to rural areas. Provincial differences show that with the exception of Alberta and Manitoba, most provinces have higher CWB scores relative to Saskatchewan. Using provincial employment rates, and provincial employment income growth rates instead of provincial dummies yields the counter-intuitive result that better provincial economic outcomes are not associated with higher Reserve CWB scores, indicating other barriers to participation in the economy for First Nations.

The out-commuting rate is positively related to high school completion rates, confirming the anticipated high returns to education. In addition a tighter provincial labour market as represented by a higher provincial employment rate positively influences out-commuting from Reserves. Negative influences are exerted by the proportion of the population less than 4 years old, and remoteness from a metropolitan area. Housing is not found to influence out-commuting rates, though additional research is required.

CONCLUSIONS AND POLICY IMPLICATIONS

Improving the socio-economic outcomes for First Nations in Canada is on the policy agenda of all levels of government. And among First Nations, populations on Reserves are the most urgently needing improvements. Clearly a complex and challenging problem, it is likely that no single or simple solution will be found. To some extent

[14] The AANDC Housing Score is based on Census information where Quantity is defined on the basis of overcrowding, and Quality is defined based on the need for major repairs. For further details, see AANDC at <http://www.aadnc-aandc.gc.ca/eng/1100100016585/1100100016598>.

the migration of First Nations people to urban centres is likely to result in improved economic outcomes since economic opportunities are more readily available in urban centres and off-Reserve locations, though the adjustments are slow. Where populations are highly geographically mobile they will respond to differences in well-being between locations, by moving to locations where their income-earning potential is higher (in this case from Reserves to off-Reserve). In the case of First Nations in Canada, clearly the problem is not solving itself, at least not in an acceptable time frame.

Policy interventions in the form of improving education and health of the populations are having some success, mostly in improving the geographic and occupational mobility of First Nations populations. In addition the federal government's *Framework for Aboriginal Economic Development* emphasizes on-Reserve economic development. While this may be a productive strategy for some Reserves, there are many with very limited potential.

A third strategy may then be to facilitate and support initiatives that allow First Nations to reside on Reserves and at the same time access employment off-Reserve. Transportation and communication, as well as other explicit policies may be required. Importantly, for this strategy to be viable, Reserves must be attractive places to live.

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