THREE ESSAYS ON FIRST NATIONS ECONOMIC DEVELOPMENT

A Thesis Submitted to the

College of Graduate and Postdoctoral Studies

In Partial Fulfillment of the Requirements

For the Degree of Doctor of Philosophy

In the Department of Agricultural and Resource Economics

University of Saskatchewan

Saskatoon

By

OMID MIRZAEI

PERMISSION TO USE

In presenting this thesis/dissertation in partial fulfillment of the requirements for a Postgraduate degree from the University of Saskatchewan, I agree that the Libraries of this University may make it freely available for inspection. I further agree that permission for copying of this thesis/dissertation in any manner, in whole or in part, for scholarly purposes may be granted by the professor or professors who supervised my thesis/dissertation work or, in their absence, by the Head of the Department or the Dean of the College in which my thesis work was done. It is understood that any copying or publication or use of this thesis/dissertation or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of Saskatchewan in any scholarly use which may be made of any material in my thesis/dissertation.

Requests for permission to copy or to make other uses of materials in this thesis/dissertation in whole or part should be addressed to:

    Department Head

    Department of Agricultural and Resource Economics

    University of Saskatchewan

    51 Campus Drive

    Saskatoon, Saskatchewan S7N 5A8

    Canada

    OR

    Dean

    College of Graduate and Postdoctoral Studies

    University of Saskatchewan

    116 Thorvaldson Building, 110 Science Place

    Saskatoon, Saskatchewan S7N 5C9

    Canada

ABSTRACT

This dissertation contains three essays on topics in First Nations economic development in Canada. The first essay explores the issue of underdevelopment through the lens of economic leakage and multiplier effects of spending. The second essay explores the issue of food insecurity as an implication of underdevelopment in First Nations reserve economies. Finally, the last essay investigates First Nation Governments' investment in band-owned businesses and collaboration in business development opportunities between First Nations communities.

The first essay explores the rate of economic leakage and the economic impacts of First Nation spending. Using data collected from a comprehensive survey of household spending by two First Nations in Saskatchewan, Canada, I use Input-Output models to refine regional multipliers for these distinct populations. Results indicate that economic leakage rates for First Nation economies is roughly 90 percent; meaning that 90 cents of every dollar spent by First Nations for goods and services occurs off-reserve. Using the new multipliers, I find that First Nation spending contributes over $741 million to Saskatchewan's GDP, creates approximately 11,244 full-time jobs, and leads to an estimated increase of over $462 million in labor force income for the province. If policy makers intend to build on-reserve economies, strategies must be found to recapture off-reserve spending by providing comparable on-reserve goods and services. In the absence of on-reserve economic development, First Nation economic growth will likely remain stagnant with few wealth generating opportunities and lower standards of living for First Nation members.

A direct implication of high rates of economic leakage is alarming rates of food insecurity in most First Nations communities across Canada. In the second essay, I explore some of the most important factors affecting household food consumption and food insecurity in First Nations communities. I use disaggregate household food expenditure data from 466 First Nation households in six First Nation communities to explore the influence of household income, household size, age of head-of-household, and distance to commercial food markets on the quantity and types of foods purchased. I also explore spatial inequalities and issues related to the accessibility of food. Results indicate that while income, size, and age of the household head are significant determinants of total food expenditures, their impact changes with the type of food purchased and with the community. With the dietary transition of First Nations from traditional subsistence-based localized food systems to store bought foods, this study of the new food consumption paradigm has important implications for public policies on mitigating food insecurity in First Nation communities and for food subsidy programs such as Nutrition North Canada.

The third essay investigates the investment behaviour of the First Nation Governments (FNGs) ($N = 68$) in the Province of Saskatchewan, Canada. The economic development of Saskatchewan First Nations is typically led by elected Chief and Councils who invest revenues into First Nation-owned businesses or through joint ventures with other FNGs. I argue that when FNGs invest in solely-controlled capital stock, conventional theories of investment behavior can be employed. However, in cases of jointly-controlled capital stock between two or more FNGs it is necessary to account for externalities originating from other FNGs. To test this hypothesis, I developed a spatially augmented model of investment behaviour. Results show that like firms, investment behaviour of FNGs

follows the principal accelerator mechanisms in which capacity utilization is a major determinant of investment behaviour. However, the capacities of FNGs differ from those of firms; most notably in terms of the extent to which neighbouring FNGs influence the investment behaviour of other FNGs. Results indicate that accounting for other FNGs' externalities improves explanatory power of empirical models of First Nation investment behaviour.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1   Estimating the Regional Economic Impacts of First Nation Spending in Saskatchewan, Canada[1]

1.1   Introduction

Compared to non-Aboriginal Canadians, Aboriginal people in Canada experience lower quality of life measures across a variety of metrics. These include lower standards of living, higher poverty and unemployment rates, higher dependency on welfare, inadequate housing, lower educational achievement, higher rates of chronic disease, and lower life expectancy (Berg and Gabel 2017; Anderson 2016; INAC 2015, 2005; NCCAH 2013; Miller 2012). It has been estimated that these conditions cost the Canadian Government $12 billion annually (CCPA 2013). While the complexities of these challenges defy a quick resolution, scholars and First Nation leaders have proposed various development strategies to overcome these conditions. For example, Peredo et al. (2004) and Stevens (2001) have called for greater entrepreneurial development and business investment to improve the economic circumstances among First Nation

communities. Smith (2000) suggests that First Nations must regain control over their natural resources and use economic development as a vehicle to sustain their cultural identity. Chief Clarence Louie of the Osoyoos Indian Band (British Columbia) has similarly noted that 'the remedy to most of our [First Nation] problems is economic development' (McDonald 2014). The Assembly of First Nations National Chief Perry Bellegarde has stated: 'Creating the conditions for First Nations peoples to succeed…is the best economic stimulus plan for Canada. It will add billions to the economy and save billions more in social costs' (HFNCOMMS 2016). For scholars and First Nation leaders alike, having a sustainable, self-reliant economy is considered to be among the most important factors for improving the socio-economic circumstances of First Nation communities in Canada.

Despite general agreement that economic development is the remedy for many of the challenges confronting First Nation communities, the development of First Nation economies has been difficult to achieve due to high transaction costs and policy constraints that have limited opportunities for First Nations to develop on-reserve businesses. With limited services available on-reserve, First Nation members must go off-reserve to acquire goods and services. The revenue that leaves First Nation reserves is then captured by regional businesses and urban centres, whose owners employ workers, pay wages, and expand businesses opportunities – revenues and benefits that are lost to First Nations. This situation has been characterized as 'economic leakage' where revenues leave First Nation communities sooner than optimal (Miller 2012).

Unfortunately, the leakage that occurs on many First Nation reserves is nearly immediate and often significant. For example, Aboriginal Investment Services (2010) determined that 62.2% of all spending by the Six Nations (Haudenosaunee) in Ontario occurs off-

reserve. This equates to a leakage of $160 million annually that is absorbed by off-reserve businesses. The revenue that is spent off-reserve then has multiplier effects on the regional economy. These include the direct effects that occur when a First Nation member spends money on goods and services that are provided by off-reserve purveyors, the indirect effects when those service providers spends part of that revenue on new inventory and/or pay utilities, and the induced effects when increased labour income, originated from the direct and indirect effects, is spent within the economy (Carr et al. 2013; Miller and Blair 1985). In the case of Six Nations the multiplier effect of $160 million of off-reserve spending actually contributes $208 million to the regional economy (Aboriginal Investment Services 2010).

In collaboration with the One Arrow First Nation (OAFN) and Beardy's Okemasis First Nation (BOFN), we conducted an economic leakage analysis that quantified the total amount of revenue that left the OAFN and BOFN reserves, the types of goods and services acquired, and the locations of those transactions. Given the significant, yet often-unrecognized impact of First Nation spending, we then set out to determine the multiplier effects of all final demand from all (N=70) First Nations in Saskatchewan in order to determine the economic impact of First Nations' spending on the provincial economy.

The use of national and provincial multipliers originated from Input-Output models is a common approach in economic impact studies. Often researcher and policy makers use such national and provincial multipliers as more local multipliers do not exist as data is difficult to obtain. However, this may exacerbate the problem leading to incorrect estimates. When dealing with regions that are distinct due to economic or demographic characteristics, creating new multipliers may be worth the added cost of obtaining these data (Deller et al. 1993). Using our survey data, we refine the provincial multipliers to

calculate economic impacts of First Nations households based on their spending patterns. This contribution helps to create more accurate estimations of economic impacts in distinct populations such as First Nation communities.

These newly-calculated multipliers are used to estimate the total economic impact for First Nations' households of all First Nations in Saskatchewan, as measured by changes in provincial GDP, employment, and employment revenue. Furthermore, the total economic impact for First Nation Governments' spending is estimated. Developing pattern-based multipliers for First Nations' households, this research represents the first full accounting for First Nation spending on a provincial economy in Canada. This study could be of interest to others investigating economic impacts of spending of distinct populations or regions. The use of refined multipliers reflects unique characteristics of First Nations households spending, which could lead to better estimations of economic impacts (Deller et al. 1993). This study could also be of interest to policy makers as it gives a relatively thorough estimate of total demand originated from economic activities of First Nation communities at a provincial level.

1.2 Research Site and Methodology

1.2.1 Research Site

As early as the mid-1600s First Nations in Canada entered into a number of peace and friendship treaties with European nations (with the 1664 Treaty of Albany being the first). These early treaties did not involve land conveyance, but rather set conditions for mutually beneficial terms of trade and to fortify military alliances (Natcher et al. 2009). However, after receiving semi-independent nation status from the British government in 1867 (British North American Act), Canada began to expand its territorial base westward.

4

In an effort to facilitate the safe expansion of colonial settlement, the Canadian government launched a campaign of treaty making with First Nations. In exchange for relinquishing claim to vast tracts of their traditional territories, First Nations, who at the time were being ravaged by disease and starvation (Daschuk 2013), were provided reserve lands that would be set aside from European encroachment. The specific formula for determining the size of reserves varied. For example, in Treaties One and Two, 65 hectares were added for every family of five or more. However, in Treaties Three through Eleven, families of five were awarded 260 hectares of reserve land. Through the treaty making process 2,366 reserves were established across Canada, encompassing a collective land base of 3,377,826 hectares (INAC 2017).

In the province of Saskatchewan, 205 reserves have been established for 70 First Nations. Not all of the 205 reserves are permanently occupied, but rather some reserves are used for subsistence purposes (e.g., hunting, trapping and fishing), others have been set aside for non-renewable resource extraction, and some are used for the continuance of cultural activities. The total First Nation population in Saskatchewan is estimated to be 114,570, of which 54,460 (47.5%) reside on-reserve. The total First Nation population represents roughly 11% of Saskatchewan's total population (Census 2016). The 70 First Nations in Saskatchewan are culturally and politically diverse. This diversity is reflected in five distinct linguistic groups. They are signatory to six historic treaties (Treaties 2, 4, 5, 6, 8, and 10).

Among the 70 First Nations in Saskatchewan are the One Arrow First Nation (OAFN) and the Beardy's Okamasis First Nation (BOFN). The OAFN entered into Treaty 6 in 1878. The OAFN reserve was established approximately 100 km north of Saskatoon (Figure 2-1). Since that time, and on the basis of revised population estimates, 13

additional reserves have been established, totalling 3,776 hectares. As of 2019, the total population of OAFN is 1,986, of which 761 members live on-reserve. The services found on the OAFN reserves are minimal but include a general store, rodeo grounds, sports grounds, school, health clinic, band office, skating rink, fire hall, band hall, and community maintenance facilities (water treatment plant, pumping station). However, one of OAFN's reserves (Sounding Sky Reserve) is located within the city of Saskatoon where they have established a successful gas and convenience store, as well as a 15-unit apartment complex for OAFN members.

Located directly west of OAFN is the Beardy's Okemasis First Nation (BOFN). The BOFN entered into Treaty 6 on August 28, 1872 and its main reserve was established just west of Duck Lake, Saskatchewan (population 610). In addition to its main reserve, BOFN has 7 other reserves, totalling 20,346 hectares. The current (2019) BOFN population is 3,503, with 1,336 members residing on-reserve. On-reserve businesses are few and include a convenience store and gas bar, an accredited Health Clinic, a Federal Minimum Security Healing Lodge, and a water treatment facility. Like the OAFN, as well as other First Nations in the province, BOFN has a very young population, who have limited educational achievement, lower than average incomes, limited employment opportunities, and a reliance on government transfers (see Table 2-1).

Table 1-1 Saskatchewan First Nations Demographics

Saskatchewan	On-reserve Population (total Pop.)	Median Age	Educational Attainment	Average Earnings	% of income from Government Transfers	Employment Rate
SK Non-Aboriginal	NA	37.4	79.3%	$46,853	11%	63.5%
Beardy's and Okamasis First Nation	1,336 (3,503)	24.3	58%	$24,987	32%	28.7%
One Arrow First Nation	761 (1,986)	20.5	39.5%	$21,651	44%	25.6%

Notes: Sources of information is Census 2016. Populations are as of registered population in 2019. Educational attainment is measured as percentage of population with 15+ years of age with secondary, post-secondary, and trades certificates.

1.2.2 Methodology

1.2.2.1 Leakage Study

Between April and July 2015, household surveys were administered to 256 on-reserve households, including 156 (92%) OAFN households and 100 (32%) BOFN households. This sample represents 53% of all on-reserve households for these two First Nations.[2] Teams of First Nation researchers administered the surveys face-to-face to male and/or female heads of household. The surveys included a series of demographic questions, including age, gender, and employment characteristics of household members. Respondents were then asked to estimate their household's total monthly expenditures based on list of expense categories (e.g., food, clothing, appliances, entertainment, others), including purchasing history, location of purchase (town and name of store), total

---

[2] Percentages are based on Census 2016 data.

amount spent, and frequency of purchasing. All expenditures were then aggregated to an annual basis and pooled together in terms of expense categories and locations of purchase.

To calculate total spending of First Nations' government departments, annual consolidated audits were examined. These audits identified the total annual revenue generated from businesses, as well as from federal government transfers. Annual audits were used to calculate total annual expenditures for goods and services. These expenditures include both operational and investment spending. Wherever it was possible, amortization costs were removed to represent the actual expenditures made by each First Nation.

To determine the total spending of all 70 First Nations, we used the average between OAFN and BOFNs' median household expenditures as a proxy for all First Nation household spending.[3] To estimate the total spending of each Nation's government for 68 of the 70 First Nations in the province, we accessed data made available through First Nations Financial Transparency Act (FNFTA).[4] Under the requirements of this Act, First Nations publicly disclose their annual consolidated audits and the schedules of all service related expenses (INAC 2013). These consolidated audits were used to determine the total amount spent by First Nation governments for various goods and services.

---

[3] Our results indicate that only 2.5% of household spending was made out of the province. This proportion has not been assumed to be necessarily true in other First Nations. All expenditures have been assumed to be within the province.

[4] Data were available for only 68 of the 70 First Nations in Saskatchewan.

1.2.2.2   Multiplier Effect

Based on our estimate of the annual household expenditures for OAFN and BOFN, the total annual household expenditures for the other 68 First Nations were estimated. These estimates are thought to be reasonable for three reasons. First, the total households' expenditures for other First Nations is adjusted for their population. Second, our results show that the majority of households' expenditures were made on transportation, food, and household operations in which, arguably, the most important factors are the distance to a population centre, especially in case of transportation, and size of the household. Third, the geographical distribution pattern of Saskatchewan First Nations is relatively homogenous with respect to distances to the population centres. The majority of Saskatchewan First Nations (56 or 80%) are located within 150 km of at least one of the nine Census Metropolitan Areas (CMAs). These CMAs include Saskatoon, Regina, Prince Albert, Moose Jaw, North Battleford, Yorkton, Swift Current, Estevan, and Lloydminister (Figure 2-1). For these reasons, we assumed relative homogeneity between First Nations in terms of household spending.
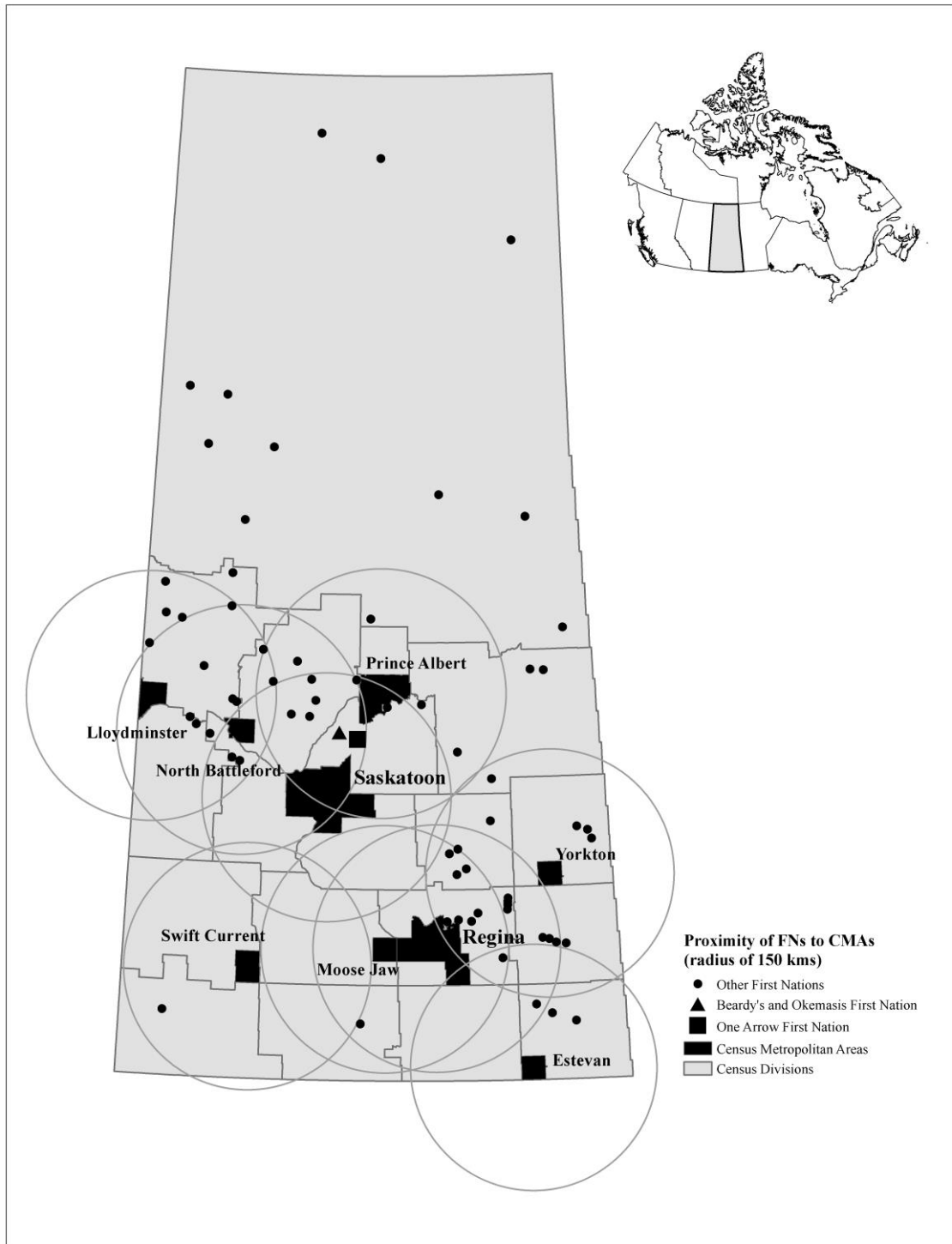
Figure 1-1 Geographical Distribution of Saskatchewan First Nations Communities and Census Metropolitan Areas (CMAs)

Considering the aggregate spending for all 70 First Nations, the multiplier effects of all final demand from First Nations' spending were calculated based on Input-Output tables developed by Statistics Canada. Canadian I-O tables are derived from surveys, tax records, and other administrative sources. The economic activities documented are those by consumers (both in consuming domestic and imported goods and services), producers (both production for domestic markets and export markets), governments, and non-profit organizations. Originally, the Canadian I-O system has been a rectangular one where inputs and outputs of industries are classified by commodity. The I-O multipliers are then developed based on a square matrix i.e. the industry by industry matrix. Due to confidentiality reasons, I-O tables at the provincial/territorial level are available only at a higher level of aggregation of industries than at the national level. Statistics Canada provides four different types of multipliers, specifically output, Gross Domestic Product (GDP), income, and employment.

Output multipliers translate actual expenditures into total output or production requirements as a result of an increase in final demand expenditures, including the inputs required to produce the output represented by the new demand. GDP multipliers represent the change in local value added associated with a unit change in final demand (Ghanem 2005). Only that portion of the value of new production that becomes a factor of payments (wages, rents, profits, and interest) is represented, so this multiplier will always be less than one. Income multipliers estimate the changes in wages and salaries due to an increase in final demand, that is, the portion that becomes income to someone in Saskatchewan (Ghanem 2005). Employment multipliers represent the change in employment (Ghanem 2005), and in this paper, the number of jobs created per million dollars spent by First

11

Nations. Three of these four multipliers (GDP, income, and employment) were used to assess the provincial impact of First Nations' spending.

An illustration of principal computational foundations of I-O models and multipliers is presented here as a background of the research methodology used in this study. Considering an economy with n sectors, the total final demand for each sector can be written as equation (2-1).

$$X_i = z_{i1} + z_{i2} + \cdots + z_{in} + Y_i \qquad (2\text{-}1)$$

where $i \in [1, n]$ and z terms represent the interindustry sales by sector i, and Y_i represents sector i's sales to final demand.

Across entire n sectors in the economy, equation (2-1) can be written as the following set of equations.

$$X_1 = a_{11}X_1 + a_{12}X_2 + \cdots + a_{1n}X_n + Y_1 \qquad (2\text{-}2)$$

$$X_2 = a_{21}X_1 + a_{22}X_2 + \cdots + a_{2n}X_n + Y_2$$

$$\vdots$$

$$X_i = a_{i1}X_1 + a_{i2}X_2 + \cdots + a_{in}X_n + Y_i$$

$$\vdots$$

$$X_n = a_{n1}X_1 + a_{n2}X_2 + \cdots + a_{nn}X_n + Y_n$$

which could be written in a matrix form as equation (2-3).

$$(I - A)X = Y \Longrightarrow X = (I - A)^{-1}Y \quad (2\text{-}3)$$

where matrix A represents technical coefficients between different sectors of the economy, matrix X represents final demands for each sector, and matrix Y represents each section's sales to final demand, as follows.

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix}_{n*n} \qquad X = \begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_n \end{bmatrix}_{n*1} \qquad Y = \begin{bmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_n \end{bmatrix}_{n*1}$$

The concept of I-O multipliers originates from assumed exogenous changes in final demand of different sectors. For instance, an output multiplier for section 1, is defined as the total value of production in all sectors of the economy that is necessary to satisfy a dollar's worth of final demand for sector 1's output. Depending on how one defines the total value of production, multipliers will be defined as either simple or total. For instance, the total output multiplier includes the direct, indirect, and induced effects whereas the simple output multiplier only includes direct and indirect effects. An additional dollar's worth of final demand for the output of sector 1, denoted as $(\Delta Y)_1$, would be reflected as the following.

$$(\Delta Y)_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \\ \vdots \\ 0 \end{bmatrix}$$

Hence, the implication -- for all sectors in the economy -- of an additional dollar's worth of final demand for sector 1's output, denoted as $(\Delta X)_1$, would be calculated from equation (2-4).

$$(\Delta X)_1 = (I - A)^{-1}(\Delta Y)_1 \qquad (2\text{-}4)$$

13

Assuming the availability of matrix of coefficients A, one can calculate the matrix $B = (I - A)^{-1}$. The elements of B, denoted as b_{ij}, $(\Delta X)_1$ can be calculated via equation (2-5).

$$(\Delta X)_1 = \sum_{i=1}^{n} b_{i1} \qquad \text{(2-5)}$$

Therefore, in general, the simple output multiplier for sector j, denoted as M_j, is given by equation (2-6).

$$M_j = \sum_{i=1}^{n} b_{ij} \qquad \text{(2-6)}$$

The simple output multiplier considers the direct and indirect effects, obtained from a model in which households are assumed to be exogenous. The total output multiplier accounts for the direct and indirect effects as well as the induced effects. Through household income generation, induced effects account for labour income in a given economy. The total output multiplier could be calculated by adding another sector to the economy, households. This makes the coefficient matrix i.e. $\overline{A}$, to be of dimension $(n + 1 * n + 1)$. The total output multiplier for sector j, denoted as $\overline{M}_j$, is given by equation (2-7).

$$\overline{M}_j = \sum_{i=1}^{n+1} \overline{b}_{ij} \qquad \text{(2-7)}$$

where $\overline{b}_{ij}$ represents elements of a new matrix $\overline{B}$, derived from $\overline{A}$.

Income multipliers can be derived by taking a step further. A simple household income multiplier, denoted by I_j, could be derived using equation (2-8).

$$I_j = \sum_{i=1}^{n} a_{n+1,i} x_{ij} \qquad \text{(2-8)}$$

where x_{ij} represents elements of matrix $(\Delta X)_j$, originating from an initial \$1 change in final demand for sector j using coefficients in Matrix B i.e. calculated from Eq. 5. And a total household income multiplier, denoted by $\bar{I}_j$, could be derived using equation (2-9).

$$\bar{I}_j = \sum_{i=1}^{n+1} a_{n+1,i}\bar{x}_{ij} \quad (2\text{-}9)$$

where x_{ij} represents elements of matrix $\left(\overline{\Delta X}\right)_j$, originating from an initial \$1 change in final demand for sector j using coefficients in Matrix $\overline{B}$. Using the same principles, employment multipliers can be derived. However, in calculation of employment multipliers, instead of monetary labour input coefficients, the physical labour input coefficients are considered (Miller and Blair 1985).

There are limitations to this approach that we acknowledge. For example, I-O models have been criticized for using fixed coefficients and a lack of supply side constraints (Bess and Ambargis 2011; Coughlin and Mandelbaum 1991). In addition, I-O tables are developed based on the assumption that the interrelation between different industries in an economic system remains unchanged during the year. Another assumption, the lack of a supply side, implies that industries can respond to increases in demand by recruiting more inputs, and therefore increase production to meet the increase in demand. However, there is a limit on most inputs, especially at the regional level. While these assumptions might be challenging in some cases, I-O models and multiplier effect analyses originating from them are arguably the most transparent approaches for conducting different types of economic impact studies that are used to assess sectoral contributions and priorities in an economy (e.g. Toh and Thangavelu 2012; Mattas and Shrestha 1991), economic benefit analyses (e.g. Carr et al. 2013), and economic cost analyses (e.g. Okuyama and Santos 2013; Santos et al. 2013; Vasconcelos and Carpio 2015).

1.3 Results

Using the model depicted above, we estimate OAFN and BOFN economic leakage rates to be 90% and 91.4%, respectively. The percentage of revenue that is being spent on-reserve is limited largely to fuel ($535,000) and tobacco ($600,000) purchases. In the case of OAFN and BOFN (as with all other Saskatchewan First Nations), on-reserve stores enroll in the Provincial Fuel and Tobacco Tax Refund Program that removes Provincial Sales Tax (6%) on fuel and tobacco products for First Nation members. The tax deductions serve as significant incentive for on-reserve spending for these goods. However, on-reserve spending for other goods and services is limited due to high costs and limited product inventories.

Table 2-2 summarizes the economic leakage for OAFN and BOFN. Our results indicate that First Nation households spend over $12 million on goods and services annually, of which, approximately $11 million is spent off-reserve. Food expenditures, estimated at over $4 million (33% of spending), is the largest household expenditure, followed by transportation costs at over $3.3 million. Combined, Food and Transportation costs account for over 60% of total household spending. Geographically, $9.3 out of $12 million in household spending occurs in Saskatoon and Prince Albert, the two closest CMAs to OAFN and BOFN. This accounts for approximately 77% of the total household spending. The other 23% supports 12 other regional economies.

Table 1-2 One Arrow First Nation (OAFN) and Beardy's Okemasis First Nation (BOFN) Economic Leakage Results

Where did you spend your money?		How did you spend your money?	
Location	Annual $	Category	Annual $
OAFN Reserve	514,752	Food	3,969,224
BOFN Reserve	633,038	Transportation	3,362,738
Saskatoon	5,096,887	Clothing	1,117,772
Prince Albert	4,590,519	Household operations	1,655,808
Duck Lake	535,272	Recreation	806,213
Rosthern	412,528	Tobacco products	598,466
Out of province (Manitoba & Ottawa)	307,897	Household furnishing and equipment	280,624
Humboldt	19,836	Professional services	219,432
Wakaw	27,492	Personal care	50,122
Hague	1,308	Education	64,804
Cudworth	1,800	Others	27,070
Regina	10,704		
Warman	240		
Total	12,152,273	Total	12,152,273

Table 2-3 shows the estimated impact of household spending on provincial GDP, the number of jobs created (employment), and labour income. Each index is followed by a percentage of total contribution. It is estimated that annually, OAFN and BOFN's household spending alone contributes approximately $10 million to Saskatchewan's GDP, helps to create approximately 125 jobs, and leads to an estimated increase of $5.4 million in labour income for the province. When aggregated for all 70 First Nations,[5] it is estimated that on-reserve First Nation households' spending contributes over $245 million (0.39%) to Saskatchewan's GDP, helps to create approximately 3,232 jobs

---

[5] All estimates are deflated to 2010 using 2015 Saskatchewan's CPI (Statistics Canada 2016).

(0.73%), and leads to an estimated increase of over $139 million (0.56%) in labour force

income for the province.

Table 1-3 Economic Impacts of OAFN and BOFN Spending on Saskatchewan's Economy - Household Expenditure Level

		OAFN		BOFN	
		Total contribution $	Total contribution %	Total contribution $	Total contribution %
GDP	Transportation and warehousing	940,451	0.0015%	1,628,222	0.0026%
	Accommodation and food services	1,240,964	0.0020%	1,708,977	0.0027%
	Retail trade	942,295	0.0015%	902,562	0.0014%
	Arts, entertainment and recreation	285,407	0.0005%	337,114	0.0005%
	Professional, scientific and technical services	103,902	0.0002%	92,741	0.0001%
	Utilities	321,434	0.0005%	945,280	0.0015%
	Other services (except public administration)	5,006	0.0000%	38,190	0.0001%
	Educational services	1,747	0.0000%	51,269	0.0001%
	Total	3,841,206	0.0061%	5,779,398	0.0091%
Employment	Transportation and warehousing	9	0.0020%	15	0.0034%
	Accommodation and food services	24	0.0054%	33	0.0075%
	Retail trade	14	0.0032%	13	0.0029%
	Arts, entertainment and recreation	4	0.0009%	5	0.0011%
	Professional, scientific and technical services	1	0.0002%	1	0.0002%
	Utilities	1	0.0002%	3	0.0007%
	Other services (except public administration)	0	0.0000%	1	0.0002%
	Educational services	0	0.0000%	1	0.0002%
	Total	53	0.0119%	72	0.0162%
Labour Income	Transportation and warehousing	500,451	0.0020%	866,442	0.0035%
	Accommodation and food services	805,895	0.0033%	1,109,827	0.0045%
	Retail trade	586,109	0.0024%	561,394	0.0023%
	Arts, entertainment and recreation	174,697	0.0007%	206,347	0.0008%
	Professional, scientific and technical services	65,233	0.0003%	58,225	0.0002%
	Utilities	100,025	0.0004%	294,157	0.0012%
	Other services (except public administration)	3,307	0.0000%	25,229	0.0001%
	Educational services	1,319	0.0000%	38,698	0.0002%
	Total	2,237,036	0.0091%	3,196,449	0.0129%

When spending from First Nation governments is included the impacts are even more pronounced, with $741 million (1.17%) added to Saskatchewan's GDP, the creation of 11,244 jobs (2.55%), and an estimated increase of over $462 million (1.86%) in labour force income for the province (see Table 2-4).

Table 1-4 Economic Impacts of First Nation Spending

	Estimated Spending (deflated to 2010)	Contribution to GDP	Contribution to Job Creation	Contribution to Labour Force Income
First Nation Household Spending	$284 million	$245 million (.39%)	3,232 (.73%)	$139 million (.56%)
First Nation Government Spending	$527 million	$496 million (0.78%)	8,012 (1.82%)	$323 million (1.30%)
Total Spending	$811 million	$741 million (1.17%)	11,244 (2.55%)	$462 million (1.86%)

1.4 Discussion

Household consumption constitutes a significant portion of the GDP in any economy. In Saskatchewan, household final consumption is estimated to constitute approximately 43% of the nominal GDP in 2014 (Government of Saskatchewan 2018). However, First Nation communities and reserve economies are, in most cases, deprived from this contribution due to high economic leakage rates. A comparison of previous leakage studies between First Nation and other communities indicates that estimated economic leakage rates are significantly higher in First Nation communities. In a regional leakage study done in Lillooet, British Columbia, 60-75% of residents reported they make out-of-the-region purchases for categories such as clothing, furniture, and electronics. Approximately 8% had made out-of-the-region purchases for services such as home maintenance and repairs (Fraser Basin Council 2014). In another leakage study conducted

in the West Nipissing municipality in Ontario, the estimated leakage rate in retail sector was estimated to be approximately 25% (Cachon and Lagrandeur 2015).

Our results indicate that economic leakage rates are 90% and 91.4%, for OAFN and BOFN, respectively. This means that .90¢ of every dollar earned by on-reserve households, immediately leaves the community and is spent on goods and services found off-reserve. The impacts associated with this high level of leakage, and the absence of local spending, result in stagnant economic growth, few wealth generating opportunities, and the perpetuation of lower standards of living for First Nation members. The primary cause of economic leakage on First Nation reserves can be attributed to the lack of on-reserve business that can provide valued goods and services (Clarkson and Murphy 2014; Meyers Norris Penny 2014; Miller 2012; Unama'ki Economic Benefits Office 2011; Aboriginal Investment Services 2010).

Various strategies have been proposed to reduce economic leakage and strengthen the on-reserve economies of First Nations in Canada and Native American tribes in the United States. Table 2-5 summarizes most relevant causes of high economic leakage along with suggested strategies to reduce leakage in reserve economies. These studies suggest that if a greater proportion of First Nation spending could be recaptured, the multiplier effects could be significant for First Nation economic development (Anderson 2016; Clarkson and Murphy 2014; Meyers Norris Penny 2014; Miller 2012; Unama'ki Economic Benefits Office 2011; Aboriginal Investment Services 2010).

Using our refined multipliers for First Nation communities, this study argues that if characteristics of a relatively large group of regional residents are considered, one can estimate the impacts of households' spending more accurately. When the population of

21

interest is large and distinct enough, the cost of developing refined multipliers might be well worth it (Deller et al. 1993). This could create estimates that are more reflective of the population's actual impacts. Furthermore, this study underlines the significance of First Nations' spending at the provincial level. Despite of such significance, our results show that First Nation communities are often deprived from multiplier effects of such expenditures due to high economic leakage rates. Estimation of the economic impacts of First Nations spending shows potential significance of economic development opportunities, if lost revenue is recaptured by on-reserve economies.

However, recapturing lost revenue through business and entrepreneurial development has proven challenging due to unique barriers faced by First Nations. Miller (2012) suggests that entrepreneurs typically secure start-up capital in one of three ways, including asset-based loans e.g. loans backed by home mortgages, regular i.e. non-asset-based loans, and accumulated family wealth. Yet the opportunity for First Nation entrepreneurs to access asset-based and non-asset-based loans is limited for a number of reasons. Foremost are the constraints found in Canada's far-reaching Indian Act (1876), which has for nearly 150 years defined the relationship between Federal and First Nation Governments. In most treaty areas of Canada, First Nation citizens do not own their homes or property, but rather reserve lands 'are held by Her Majesty for the use and benefit of the respective bands … [where] the Governor in Council may determine whether any purpose for which lands in a reserve are used or are to be used' (Canadian Indian Act, 1876, Section 19(1). Lacking title to homes and property, First Nation citizens often lack the necessary collateral to secure loans to start or expand private on-reserve businesses (Alcantara 2007; Skeena Native Development Society 2003). For those First Nations who do manage to secure the necessary financing, the additional transaction costs associated with Federal

approvals and administrative oversight can be four to six times greater than establishing the same business off-reserve (Richard et al. 2008). These conditions have contributed to fewer businesses being established on-reserve, which in turn, has led to a lack of employment opportunities, fewer business mentors, shortages of skilled employees, and inadequate business infrastructure.

Since the majority of on-reserve residents do not hold title to homes or property, financial institutions are reluctant to provide start-up capital. In addition, a long history of poverty and inconsistent employment and credit histories among would-be First Nation entrepreneurs puts them in a high-risk category for loan default (Anderson 2016; Miller 2012). For these reasons, business development, and by association personal wealth creation, remains limited on most First Nation reserves.

Table 1-5 Proposed Strategies for Reducing Economic Leakage in First Nation Reserves

Study	Proposed reasons	Suggested strategies
(Clarkson & Murphy 2014)	- Unmanageable policy of the U.S. government holding tribal land in trust - Federally-imposed restrictions on trust land make it nearly impossible for on-reserve entrepreneurs to secure startup financing - Fewer entrepreneurial ventures exist on reservations - Fewer options are available for on-reserve consumers to spend their money on-reserve - Items found in on-reserve businesses are overpriced	- Returning title to trust land to tribes and individuals in fee under a new tribal status that confers permanent jurisdiction to the tribe, complete with full taxation powers - Fostering entrepreneurship and new ventures as a main strategy for tribal economic development
(Meyers Norris Penny 2014)	- The primary reasons given for shopping at a particular location were overall selection, attractive prices and convenience - The primary reasons for choosing restaurants were type of food followed by closeness to residence location - The primary reasons for selecting a particular contractor were being recommended by a trusted source, quality of work and good past experience.	- Communicating the findings of the economic leakage study with residents and businesses and initiating a 'shop local' campaign - Setting multi-year milestones for reducing economic leakage and monitor the progress each year - Encouraging entrepreneurship in areas that are under-serviced - Pursue strategic partnerships with stakeholder groups that have similar concerns around economic leakage - Attracting more number of visitors to visit the community by hosting more events - Proving mentorship for businesses to secure more number of contracts with the Mohawk Council of Akwesasne (MCA) government

(Miller 2012)	• Lack of effective property rights • Lack of business infrastructure • Lack of a variety of small and large businesses • Few number of publicly i.e. band-owned, and privately i.e. citizen-owned, businesses • Lack of needed goods and services within the local economy • Lack of lowest price items	✓ Diversifying economic activities within Aboriginal communities ✓ Starting and operating on-reserve consumer-oriented businesses ✓ Developing banking systems on-reserve ✓ Developing a housing market on-reserve ✓ Working cooperatively with neighbouring rural areas through partnerships ✓ Encouraging entrepreneurship and creating a business-friendly environment on-reserves
(Unama'ki Economic Benefits Office 2011)	• Lack of enough selection of products in First Nation-owned businesses and more variety in non-First Nation owned businesses • Few number of businesses which, in turn, contributes to the lack of enough selection of products • Overpriced products and services are offered on-reserve	✓ Examining new business ventures, partnerships or purchasing cooperatives/agreements ✓ Business support, training and development initiatives ✓ Collecting employee data ✓ Implementation and promotion of procurement policies designed to increase support for first nation owned businesses ✓ Establishing and keeping a continuously updated database of First Nation businesses ✓ Developing a First Nation entrepreneur network ✓ Exploring environmental initiatives and green technology

| (Aboriginal Investment Services 2010) | • Overpriced items in on-reserve stores
• Various products are being offered in off-reserve areas
• More friendly services are being offered in off-reserve areas | ✓ Working together on an economic development strategy that is based on a positive communications plan
✓ Setting short-term goals in reducing economic leakage e.g. a five-year plan for reducing X percentage of the current economic leakage
✓ Planning on business development and creating viable joint ventures that import revenue from outside
✓ A comprehensive review of infrastructure capacity in terms of road, access, facilities, water, power, heat, internet, sewer and emergency/security services
✓ A review of available community lands
✓ Identification of development opportunities best suited to these locations
✓ Diversification into various economic sectors |

The motivation for this research rests largely in the recognition by OAFN and BOFN that the first step towards their own economic development was to gain an understanding of the amount and types of economic leakage occurring in their communities. This was considered a foundational piece of information for future business development. With areas of leakage identified, they would be in a better position to secure necessary financing, launch new businesses, and recapture local spending. This in turn would lead to job creation and opportunities for revenue circulation within reserve economies. With this information, new markets could be identified and assessed in terms of business potential. For example, in this study we found that OAFN and BOFN households spend over $4 million annually on groceries, take-out food/coffee and restaurants in neighbouring off-reserve areas.

Although each First Nation owns and operates a convenience store on its own reserve, there is still a high rate of economic leakage for grocery purchases. Our results show that limited inventory and higher prices compared to neighbouring off-reserve retailers contributed to this leakage. One strategy now being explored is to pool their collective resources by partnering between themselves or with an established grocer in order to capitalize on economies of scale, thereby enabling them to offer lower prices and a more diversified inventory. This strategy is consistent with other studies that encourage strategic partnerships (Meyers Norris Penny 2014; Miller 2012; Unama'ki Economic Benefits Office 2011; Aboriginal Investment Services 2010) that facilitate procurement policies designed to improve the financial advantage of First Nation businesses (Unama'ki Economic Benefits Office 2011). This could also provide opportunities for First Nation entrepreneurs to develop, market, and sell local products and services through established outlets, resulting potentially in business spin-offs and other forms of local investment.

On-reserve business development is a key contributor to sustainable First Nation economic development, and it should be found to be a core part of strategic planning and policy making efforts. While this is a reasonable strategy for most First Nation communities, its long-term objective should not be overshadowed by short-term benefits. The goal of developing on-reserve businesses should be to increase value added on-reserves. However, if this comes with higher costs and lower quality and variety of consumer goods and services, then residents on-reserves may not be better off, even with more employment.

In Canada, First Nations are beginning to work more closely with the Federal Government to develop strategic plans to establish business-friendly environments. Such environments help to use more of a fast-growing population's labour force in economic activities, reducing costs to the Canadian economy. Until such environments are more established, social welfare programs and government funding will remain necessary. However, all seem to agree that this is not a sustainable solution to the challenges faced by First Nations. While these challenges are complex, and no single strategy will remedy the social and economic conditions plaguing many First Nation communities in Canada, a thorough understanding of economic leakage of First Nation economies, and the recapturing of First Nation spending, represents a necessary step moving forward.

2 An Empirical Analysis of Food Expenditures by First Nation Households in Canada: Factors Affecting Household Food Security[6]

2.1 Introduction

In the 2014 State of Knowledge Report on Food Security in Northern Canada, a stark picture was presented on the high rate of food insecurity experienced by Canada's Indigenous communities. While the rates of food insecurity have shown to differ by age, gender, community, and region in which one lives (Natcher et al. 2016), the overall statistics for Indigenous peoples in Canada are nonetheless alarming. Indigenous people in Canada experience food insecurity at rates higher than any other Indigenous group in industrialized nations (CCA 2014; Gionet and Roshanafshar 2013). It has been estimated that upwards of 70% of First Nations living on-reserve have been food insecure (Skinner et al. 2014), compared to 7% of Canada's non-Aboriginal population (Gionet and Roshanafshar 2013). First Nation households also suffer from a number of factors that predispose them to be at greater risk of being food insecure, including high rates of poverty, being

---

[6] An updated version of this manuscript is published in the Food Studies: An Interdisciplinary Journal:
Mirzaei, O., and Natcher, D. C. (2021). An Empirical Analysis of Food Expenditures by First Nation Households in Canada: Factors Affecting Household Food Security. 11(1): 15-31. Available at: https://cgscholar.com/bookstore/works/an-empirical-analysis-of-food-expenditures-by-first-nation-households-in-canada?category_id=cgrn&path=cgrn%2F219%2F220.

comprised of mainly single parent households, and a reliance on social assistance (Willows et al. 2011). These and other socio-economic factors have created conditions where First Nation households are at extreme risk of being food insecure (Power 2008).

The reasons for these conditions are complex and cannot be attributed to a single cause or circumstance. Rather, the high rates of food insecurity experienced by Canada's First Nation peoples can be attributed to multitude of factors with origins traced back generations. For example, the government-sponsored modernization schemes of the early 20th century were designed specifically to hasten the assimilation of Indigenous peoples (Natcher 2019). Some of these policies included strictly enforced game regulations (Sandlos 2008), forced confinement to reserves (Daschuk 2013), restrictive agricultural policies (Carter 1993), residential schooling (Trevithick 1998), and mandatory training in industrial vocations (Miller 1996). While the intended assimilationist outcomes of these policies failed to achieve the desired colonial objectives entirely, they did have a debilitating effect on Indigenous peoples and their traditional food systems by hastening a dietary transition to European-based commercial foods (Natcher 2019; Chen and Natcher 2019). This has involved transitioning from a diet based largely on animal and plant species that were nutrient rich, high in animal protein, and harvested directly from local environments (Kuhnlein et al. 2013), to market-based diets that are highly processed, comprised of saturated fats and sugars, and are to a large extent culturally incompatible with Indigenous food preferences. This change in food procurement—from physical activities required for traditional food harvesting to one that is more sedentary in attainment — has since contributed to a general decline in the physical (Ayach and Korda 2010; Compher 2006; Belanger-Ducharme and

Tremblay 2005), nutritional (Kuhnlein et al. 2013) and emotional health of First Nation peoples (CCA 2014).

The challenges associated with this dietary transition have been further exacerbated by extraordinarily high costs and limited accessibility of commercial foods on First Nation reserves. For instance, it can cost a family of four living on a First Nation reserve between $360 to $450 a week to provide a nutritious diet , compared to $200 to $250 in non-First Nation communities (Gionet and Roshanafshar 2013; INAC 2007). Yet even in cases where one can afford the high costs of commercial foods, the quality, quantity, and consistent availability is often limited. Further, the foods that are regularly available in reserve stores are highly processed and of poor nutritional quality.

To help offset the high costs of store-bought foods, and to expand retail inventories, since 2011 the federal government has provided subsidies to food retailers, who are then expected to pass on those savings to consumers. For example, in 2016, Nutrition North Canada (NNC) spent $64.8 million to subsidize the transport of 25.5 million kg of perishable goods. This included $21 million (32% of budget) to subsidize the shipment of 7.4 million kg of fruits and vegetables. However, to qualify for NNC support, First Nation communities must lack year-round surface transportation (excluding those closures due to seasonal weather conditions that last less than four weeks at a time), have an airport, post office, or grocery store, and have a year-round population (Government of Canada 2019). Unfortunately, most First Nation reserves do not qualify for NNC support because they lack one or more of these conditions. By not qualifying for governmental support, First Nations households are forced to pay high prices for foods that have limited nutritional quality.

In this study, we use disaggregate household food expenditure data from 466 First Nation households in six First Nation communities to explore the influence of household income, household size, age of head-of-household, and distance to commercial food markets on the quantity and types of foods purchased by First Nation households. A sample of surveys conducted is provided in the Appendix. We also explore spatial inequalities and issues related to the accessibility of food, comparing income effects across different categories of food expenditures. Our results provide important insights into the food consumption behaviour in this distinct, highly food insecure, and fast-growing population in Canada. Given the high rates of food insecurity in First Nation communities, examining the distinctive characteristics of their food expenditure patterns is an important area of research, about which little is currently known.

Following this introduction, we review the literature that proved most informative to our analysis. Following this review, we describe the methods that were used for data gathering and analysis. A discussion of those findings follows. We conclude with a brief summary of our major findings and offer direction for policy consideration.

2.2 Literature Review

Food consumption behaviour has long been a focus of nutritional scientists (Worsley 2002), economists (Lusk et al. 2011) and other social scientists (Roos et al. 1998). General findings indicate that household food consumption is driven by a host of socio-economic factors, including the size of the household, income, and the age of the household head, which influence household food expenditures. A significant body of literature has found a positive relationship between household size and its food expenditures (Garcia and Grande 2010; Heien et al. 1989; Jacobson et

al. 2010; Mihalopoulos and Demoussis 2001; Nayga 1995; Neulinger and Simon 2011; Ricciuto et al. 2006; Thiele and Weiss 2003; Davis et al. 1983). Garcia and Grande (2010) found that on average, the food expenditure of a three-person household is typically 1.5 times greater than a one-person household. Holding household composition, income, and education levels constant, Ricciuto et al. (2006) conclude that when household size doubles, the quantity of purchased food increases by 65-84%, depending on the type of food. While gains in household size increases the household's total food consumption, the total expenditure per individual declines due to economies of scale (Ricciuto et al. 2006). While the impact of household size on food expenditures varies depending on the types of food purchased, its overall impact is positive and often significant.

Household income is also considered a key determinant in household food consumption behaviour (Bai et al. 2012; Angulo et al. 2007; Garcia and Grande 2010; Heien et al. 1989; Jacobson et al. 2010; Mihalopoulos and Demoussis 2001; Nayga 1995; Neulinger and Simon 2011; Ricciuto et al. 2006; Thiele and Weiss 2003; Davis et al. 1983). The impact of household income on food expenditures has its roots in Engel's law (1857), which states that while household food expenditures increase with gains in income, the proportion of the overall income spent on food decreases. Comparing the impact of income on household's food consumption between different income levels, some studies found larger income effects amongst lower-income households (Jacobson et al. 2010; Mihalopoulos and Demoussis 2001; Ricciuto et al. 2006; Heien et al. 1989). A common finding in the literature is the positive and significant effect of income on household food expenditures.

While income is an important determinant of food expenditures, so too is the influence of age. For instance, elderly people tend not to increase their food consumption when their income increases

33

due to facing higher financial risks (Garcia and Grande 2010; Grande 2000). Others have found that age also affects the type of food being consumed (Jacobson et al. 2010; Mihalopoulos and Demoussis 2001; Nayga 1995). For instance, Nayga (1995) showed that age impacts the consumption of fresh and processed fruits and vegetables positively while Mihalopoulos and Demoussis (2001) found age impacts consumption of 'take-out' foods negatively. Jacobson et al. (2010) similarly showed that impact of age is positive for food consumed at home and negative for take-out foods, as well as foods consumed in pubs, cafes, and restaurants.

The lack of accessibility to supermarkets and other food vendors is also a contributing factor to the types of foods households purchase. The term 'food desert' is often applied to areas with low accessibility to affordable and high-quality food. The threshold for determining whether an individual lives in a food desert is considered by some to be .5 km (Clarke et al. 2002; Guy and David 2004; Whelan et al. 2002; Wrigley et al. 2002). However, studies conducted in major cities in Canada show that the average distance one travels to reach a supermarket ranges from .8 km in Montreal, Quebec (Apparicio et al. 2007), 1.3 km in London, Ontario (Larsen and Gilliland, 2008), and 1.4 km in Edmonton, Alberta (Smoyer-Tomic et al. 2006).

In rural setting the threshold for determining food deserts is considerably different. Whereas in many urban areas, consumers may be able to walk or utilize public transportation, in rural areas those options are often unavailable. In rural areas the distances that characterize food deserts is therefore much larger, ranging from anywhere between 7 to 21 km (McEntee and Agyeman 2010; Morton and Blanchard 2007; Dean and Sharkey 2011; Sharkey and Horel 2008). This is particularly true for First Nation reserves that are often located in remote rural areas, far removed from regional centers.

2.3 Methodology

In this study, we collect data from households in six First Nation communities in the Canadian provinces of Saskatchewan and Alberta. These First Nation communities include One Arrow First Nation (OAFN) and Beardy's Okemasis First Nation (BOFN), which are located in the Province of Saskatchewan, and John D'or Prairie (JD), Fox Lake (FL), Garden River (GR), and Lubicon Lake Band (LLB) located in the Province of Alberta (see Figure 3-1).
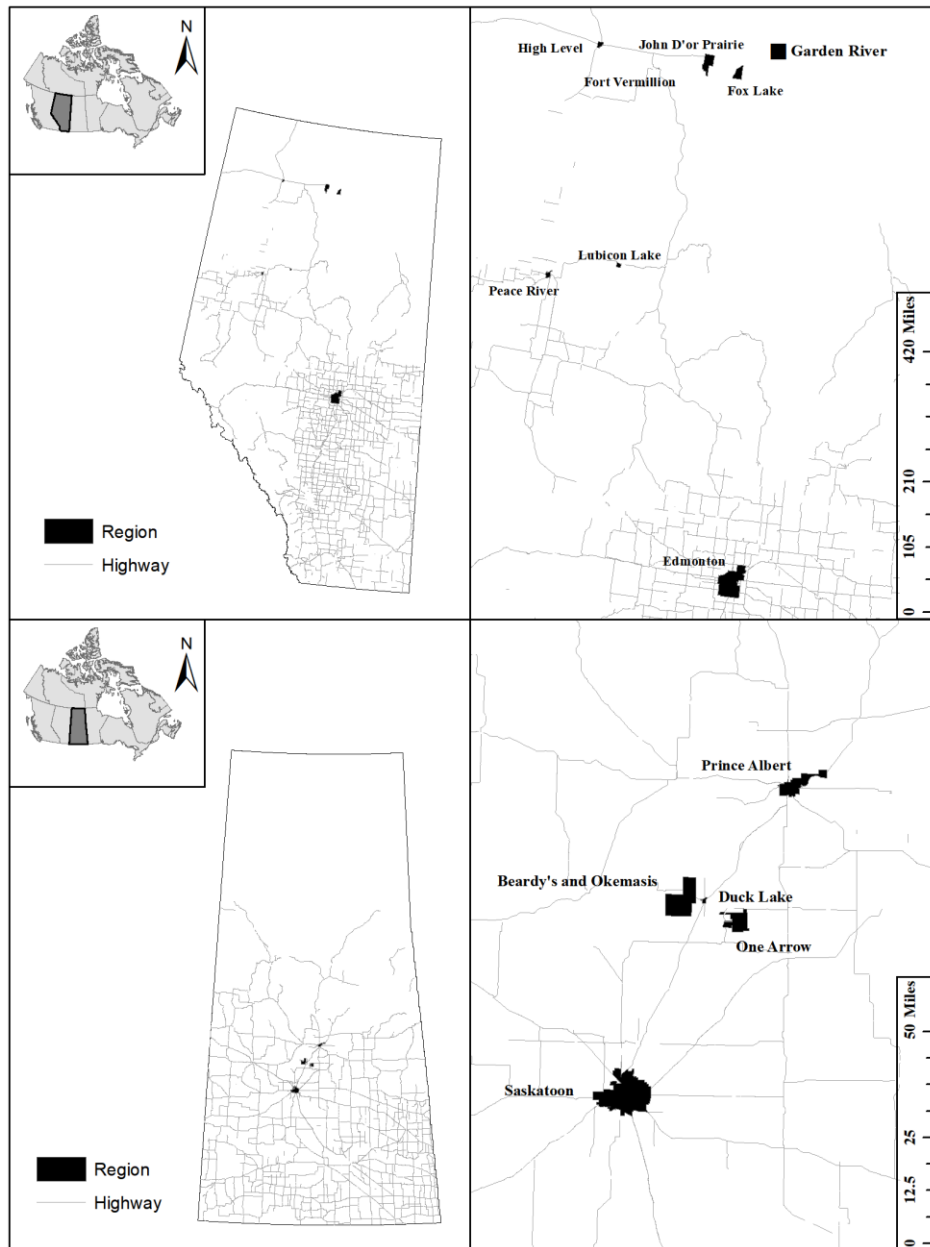
Figure 2-1 Map of Surveyed First Nation Communities and Surrounding Regional Centres

The selection of communities was opportunistic. The authors have a history of collaboration with these communities (Natcher and Hickey 2002; Natcher 2016, 2019) and this research is part of

collaborative research program focusing on First Nation economic development (Mirzaei et al. 2020). The personal relationships that have been established between the research team and community members were instrumental for eliciting household spending data, which in the absence of such trust may not have been so readily shared.

While our sample of communities was opportunistic, these communities are more or less representative of the diversity that exists among First nation communities in Canada based on spatial heterogeneity. In the cases of OAFN and BOFN they are located in close proximity to two major city centers (Saskatoon and Prince Albert), which are accessible via an all-weather paved highway. Lubicon Lake is located approximately 100 km east of the regional center of Peace River and is accessible via an all-weather paved road. In the case of John D'or Prairie, Fox Lake and Garden River each demonstrated varying degrees of isolation. John D'or Prairie is located approximately 50 km from Fort Vermillion and 120 km east of High Level, which are accessible by dirt roads. Fox Lake is located on the south side of the Peace River and is accessed via a ferry that crosses the Wabasca River during open water and an ice-road that is constructed during winter months. For a few weeks in spring (ice-break-up) and fall (ice freeze-up), residents of Fox Lake do not have regular access to outside of the community. Garden River is located within the boundaries of Wood Buffalo National Park (WBNP) and is accessed by unpaved road that is often subject to closure due to seasonal weather variability. Table 3-1 below provides key demographic information for each First Nation that partnered in this research as well as other First Nations in Saskatchewan and Alberta.

Table 2-1 Summary of Key Demographics for the Six First Nations

Community	On-reserve population (total pop.)	% of on-reserve population under the age of 19	Median age	# of HHs	Avg. HH size	Avg. earnings	Employment rate
OAFN	862 (2,067)	48%	20.5	170	5	21,651	25.6%
BOFN	1,403 (3,538)	42%	24.3	310	5	24,987	28.7%
LRRCN	4,778 (5,950)	54%	18.2	525	9	23,882	25.4%
Lubicon Lake Band	158 (715)	49%	21.0	110	3	24,184	25.0%
First Nations in Saskatchewan	54,460 (114,570)	46%	22.4	11,475	5	23,859	28.1%
First Nations in Alberta	50,050 (136,590)	44%	24.9	9,735	5	27,586	33.7%

Notes: All statistics are based on Census 2016 except for populations for the partnered First Nations which are as of 2019 (Source: Statistics Canada 2018a, 2018b). LRRCN includes all three communities of John D'or Prairie, Fox Lake, and Garden River.

Between 2015 and 2018, household expenditure surveys were delivered in each First Nation community (N=6). In total, data were collected from 466 on-reserve households, representing a sample of 41% of all on-reserve households.[7] Teams of First Nation researchers were trained and then administered the surveys face-to-face to household heads. The surveys included a series of

---

[7] The response rate in each community is as follows. OAFN: 156 (92%), BOFN: 100 (32%), LRRCN (John D'or): 46 (18%), LRRCN (Fox Lake): 84 (24%), LRRCN (Garden River): 26 (25%), LLB: 54 (57%).

demographic questions, including age, gender, and employment characteristics of household members. Respondents were then asked to estimate their household's expenditures based on a list of expense categories (e.g., food, clothing, appliances, entertainment, others) and location of purchase. Food expenditure categories included groceries, fast food/coffee take-out, dine-in restaurants, and others. Other food items include expenditures on snacks and any other types of food that were not found in the other sub-categories.

Brief descriptions of the variables used are as follows. A household is defined as a unit where permanent occupants share domestic and economic responsibilities. We use total household expenditure as a measure of total household income. This is consistent with previous studies (e.g., Mihalopoulos and Demoussis 2001) where total household expenditures were assumed to be an accurate proxy for household income. The age of the household head is used as the measure of age but when there are two household heads, we use the average of their ages as a proxy for the age of the household head. For each First Nation, we estimate distances to three locations with respect to household food expenditures. These include the closest location, the most distant location, and the location where most of the food spending has occurred. We also estimate a weighted average distance for each community based on proportional household food spending in different locations.

Because of the spatial heterogeneity among households from in each First Nation community, we control for geographical attributes. All estimations have been conducted in R statistical packages using Ordinary Least Squares (OLS) (R Core Team 2013). Distances were calculated using the "sp" package in R (Bivand et al. 2013; Pebesma and Bivand 2005). We use heteroskedasticity-corrected standard errors for all inferences including t-tests and joint F(Wald)-tests. As Euclidean distances were used to approximate spatial proximities, the results presented in Table 3-3 should

be considered cautiously. For instance, even though the distance between the Fox Lake community in LRRCN and the closest location where its households' spending occurred (i.e. 86.9 km) is lower than Garden River (i.e., 128.6 km), other geographic attributes, such as not having year-round road access could impact household expenditures. We account for such differences by running a Wald F-test of marginal contribution to test for the significant impacts of geographical attributes.

The main empirical model investigating food expenditures used in this study is given by equation (3-1):

$$Y_i = b_0 + b_1(age)_i + b_2(size)_i + b_3(income)_i + \sum_{j=1}^{5} b_j(FN)_j + e_i \tag{3-1}$$

where Y_i is the ith household's monthly expenditures on total food, home-food, take-outs, restaurants, and others. Variables age, size, and income are included as the determinants of food expenditures. Dummy variables for First Nations (FN) are included to account for spatial characteristics.

2.4 Results

Results show that the average total food expenditure per month is approximately $914 with ranges between $725 and $1142. This includes average monthly home-food purchases ($720), take-out ($98), restaurants ($54), and other foods ($43) (see Table 3-2). Figure 3-2 compares the average proportional expenditures on different types of food - i.e. home-food, take-out, restaurants, and others, in the six communities. As shown, in all communities, home-food is the main type of food consumption, accounting for an average of 79% of all food expenditures. Other types of food consumption including take-out, restaurants, and others, which account for 10%, 6%, and 5% of

total food expenditures, respectively. While home-food is the main type of food consumption in all six communities, its proportional share in their diet varies between communities. More isolated communities i.e. the communities of LRRCN and LLB, have significantly higher home-food consumption than the others (see Table 3-3).

Table 3-2 presents household expenditures in each First Nation based on types of expenditures. As shown, food (28.5%) and transportation (27.5%) are the two largest categories of expenditures, which together account for approximately 56% of total household expenditures. The communities of Garden River, Fox Lake, and John D'or have the highest average food expenditure, respectively. These three communities are also the most remote communities out of the six (see Table 3-3).

All six communities have local stores. However, only 12.2% of food purchases, on average, has been made locally. Respondents attributed this to overpricing and limited selection and poor food quality.[8] Table 3-3 represents the geographical characteristics of the six communities. As shown, all six communities are relatively remote using all measures of spatial proximity. Households in OAFN and BOFN make most (43%) of their food purchases in Saskatoon - which is a Census Metropolitan Area in Saskatchewan – the LRRCN and LLB households make respectively most (62% and 98%) of their food purchases in High Level and Peace River, Alberta.

---

[8] The average expenditure for local food purchases in each community is as follows. OAFN: 7.3%; BOFN: 8.7%; John D'or Prairie: 9.8%; Fox Lake: 29.8%; Garden River: 17.9%; Lubicon Lake: 0%)

Table 2-2 Descriptive Sample Statistics

	Combined (N = 453)	OAFN (N = 155)	BOFN (N = 93)	John D'or (N = 44)	Fox Lake (N = 81)	Garden River (N = 26)	LLB (N = 54)
Socio-Economic Factors							
Age (year)	43.4	42.9	46.8	44.1	40.9	42.1	43.1
Average HH Size	7	5	5	9	9	9	3
Income ($)	3069.7	2623.4	2478.3	4183.5	3416.6	3845.4	3567.4
Food Expenditures							
Total Food ($)	913.6	910.2	785.6	999.7	1073.0	1141.8	724.6
	(674.8)	(617.3)	(826.2)	(638.2)	(748.5)	(610.9)	(321.3)
Home-food ($)	719.1	656.2	533.5	815.8	993.1	1007.6	590.7
	(566.6)	(446.1)	(606.4)	(554.8)	(724.3)	(590.0)	(252.3)
Take-outs ($)	97.6	129.2	114.3	93.7	47.0	65.6	72.4
	(157)	(195.6)	(195.9)	(70.3)	(84.9)	(45.5)	(90.7)
Restaurants ($)	54.3	36.2	82.0	85.2	32.4	68.6	59.6
	(84.6)	(82.5)	(121.7)	(65.5)	(38.6)	(60.3)	(63.7)
Others ($)	42.6	88.6	55.8	5.0	.4	0.0	1.8
	(105.4)	(156.5)	(76.8)	(12.9)	(2.4)	(0.0)	(13.6)

Notes: Numbers are averages with standard deviations in the parentheses. All types of Food Expenditures and Income are reported as monthly in CAD.

Table 2-3 First Nations versus Distances Travelled for Commercial Food Purchases

	Closest location[a]		Most distant location		Location w/ most purchases		Weighted average distance	
	City/Town	Km	City/Town	Km	City/Town	Kms	City/Town	Km
OAFN	Duck Lake	15.5	Saskatoon†	80.5	Saskatoon†	80.5	NA	59.4
BOFN	Duck Lake	9.2	Saskatoon†	78.7	Saskatoon†	78.7	NA	54.4
LRRCN (John D'or)	Fort Vermillion	56.9	Edmonton†	561.7	High Level	119.9	NA	127.8
LRRCN (Fox Lake)	Fort Vermillion	86.9	Edmonton†	551.7	High Level	151.2	NA	107.3
LRRCN (Garden River)	Fort Vermillion	128.6	Edmonton†	576.1	High Level	189.1	NA	155.6
Lubicon Lake Band	Red Earth	51.8	Edmonton†	363.4	Peace River	78	NA	78.4

Notes: † represents Census Metropolitan Area (CMA); a: In calculating the closest location, own "reserve" is excluded; non-designated locations are added to Saskatoon in OAFN and BOFN, to High Level in LRRCN's communities, and to Peace River in LLB.
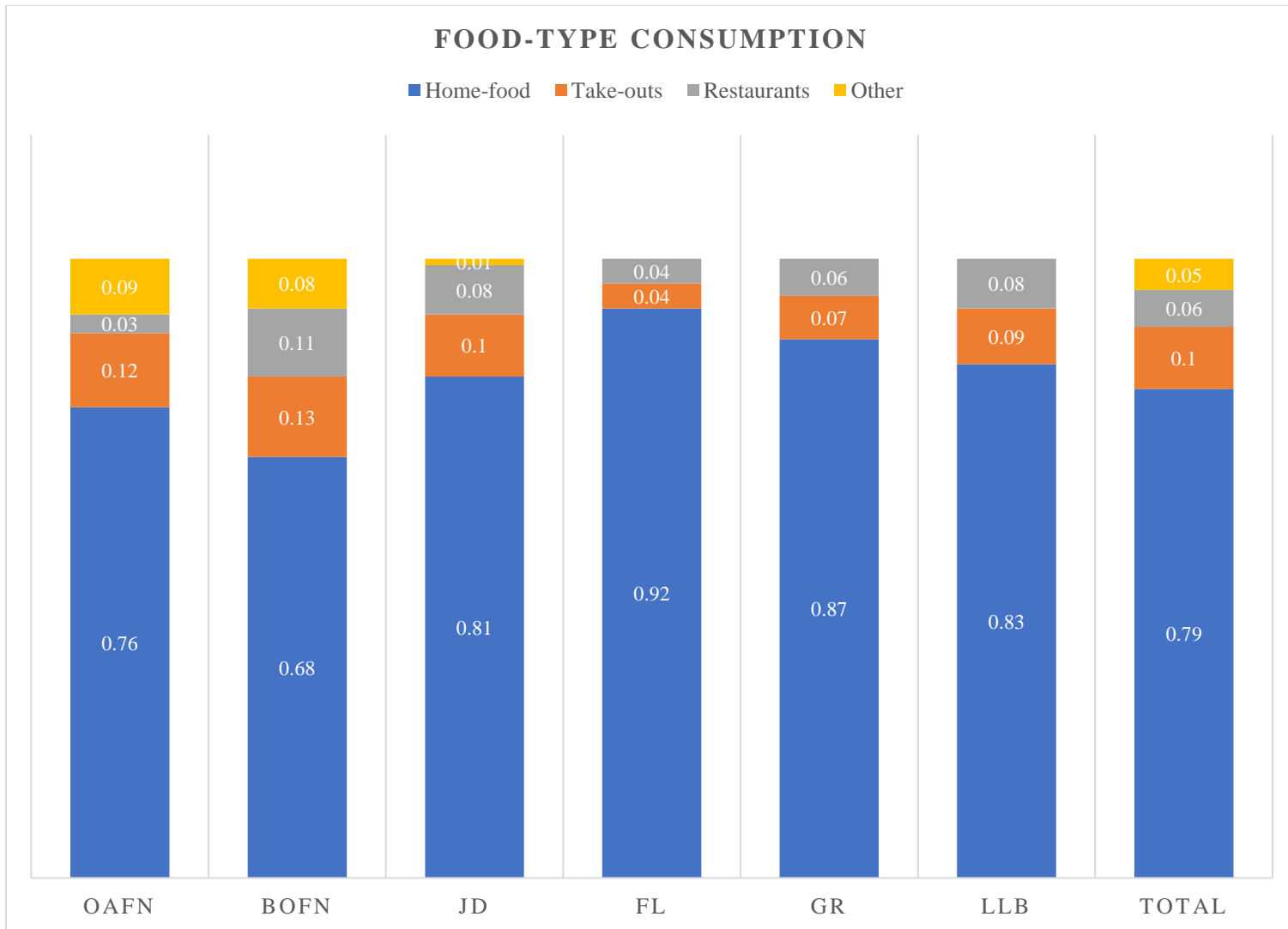
Figure 2-2 Average Proportions of Food Expenditures Based on Food Type in Each Community

Table 2-4 Types of Expenditures Across First Nations in Sample

Category	OAFN		BOFN		John D'or		Fox Lake		Garden River		LLB		Total	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Transportation	1,231.2	25.2%	2,183.3	29.3%	4,078.0	33.8%	2,325.2	16.3%	1,242.9	26.2%	1,994.7	49.0%	13,055.2	27.5%
Food	**1,693.0**	**34.7%**	**2,331.5**	**31.3%**	**2,880.2**	**23.8%**	**4,418.0**	**30.9%**	**1,411.3**	**29.7%**	**826.0**	**20.3%**	**13,559.9**	**28.5%**
Recreation	369.6	7.6%	447.2	6.0%	935.2	7.7%	694.1	4.9%	233.5	4.9%	67.7	1.7%	2,747.3	5.8%
Clothing	448.7	9.2%	685.3	9.2%	845.7	7.0%	1,953.7	13.7%	234.0	4.9%	143.1	3.5%	4,310.5	9.1%
Professional services	115.9	2.4%	106.0	1.4%	38.2	0.3%	269.2	1.9%	15.6	0.3%	15.7	0.4%	560.6	1.2%
Furnishing and equipment	225.8	4.6%	56.2	0.8%	657.5	5.4%	872.5	6.1%	212.9	4.5%	230.0	5.7%	2,254.8	4.7%
Household operations	420.2	8.6%	1,265.6	17.0%	1,400.2	11.6%	1,948.1	13.6%	748.1	15.7%	309.7	7.6%	6,091.8	12.8%
Personal care	5.8	0.1%	45.4	0.6%	312.7	2.6%	616.3	4.3%	24.5	0.5%	30.6	0.8%	1,035.4	2.2%
Education	2.1	0.0%	64.2	0.9%	1.6	0.0%	7.7	0.1%	0.0	0.0%	2.9	0.1%	78.6	0.2%
Tobacco products	348.1	7.1%	256.4	3.4%	629.0	5.2%	1,003.5	7.0%	412.4	8.7%	109.6	2.7%	2,759.0	5.8%
Others	23.3	0.5%	3.8	0.1%	303.9	2.5%	166.8	1.2%	217.6	4.6%	336.9	8.3%	1,052.3	2.2%
Total	4,883.7	100.0%	7,444.9	100.0%	12,082.1	100.0%	14,275.0	100.0%	4,752.9	100.0%	4,066.9	100.0%	47,505.4	100.0%

Notes: Values are in thousand $ CAD. In John D'or, Fox Lake, Garden River, and LLB: Recreation includes recreation, gaming, and attendance and participation in cultural events. Others includes health care services, hunting/fishing, and others. Transportation includes barge crossing as well (in Fox Lake only).

Table 2-5 Determinants of Expenditure on Types of Food

	Total Food	Home-food	Take-outs	Restaurants	Other
Age	-6.18***	-4.78***	-.74*	.36	-1.02***
	(1.47)	(1.35)	(.41)	(.24)	(.25)
Size	47.59*	50.56**	-10.41*	2.07	5.37
	(25.58)	(25.12)	(5.46)	(3.42)	(4.06)
Income	.21***	.14***	.04***	.02***	.01***
	(.02)	(.02)	(.01)	(.00)	(.00)
C	145.22	174.98	-11.52	-23.79	5.53
	(126.23)	(120.84)	(30.21)	(15.94)	(11.05)
Observations	453	453	453	453	453
$Adj.R^2$	.50	.42	.27	.25	.17
$F-statistic$	21.60***	17.67***	6.04***	12.91***	15.08***

Notes: *** $P < 0.01$, ** $P < 0.05$, * $P < 0.1$. Heteroskedasticity-corrected standard errors in parentheses. All regressions control for the communities in which households are located to account for spatial inequalities limiting access to foods. Results indicate an F-statistic of 6.06 and statistically significant at 99% level of significance suggesting the significant role of community controls in this model. F-statistics are calculated using heteroskedasticity-robust standard errors.

Table 3-5 presents the results of regressions with total and different types of food expenditures as dependent variables and age of the household head, household size, and household income as independent variables. The empirical model explained a substantial proportion of variation in total food consumption (50%) and different types of food consumption (17-42%). The first column of Table 3-5 shows the determinants of total food expenditures. This is our empirical model as specified in equation (3-1). As shown, all three factors are significant determinants of total food expenditures. Columns 2 to 5 of Table 3-5 show the results of regressing different types of food expenditures - i.e., home-food, take-out, restaurants, and others on the same independent variables. The Ramsey RESET test was run to test for specification errors. The test statistically did not reject

the null of no necessary higher-order polynomial fitted terms[9] which implies inclusion of the relevant variables in our specification. Table 3-6 presents the results of regressing total food expenditures on age, size, and income in each community separately. Household size, income, and age of the household head together explained a substantial proportion of total food expenditures' variation (19-77%).

Results show that the average monthly income is approximately $3070 with ranges between $2480 and $4180 (see Table 3-2). Empirical estimations indicate that income is a significant factor affecting total food expenditures and all types of foods purchases positively across all communities (see Table 3-5 and Table 3-6). However, the magnitude of impacts varies between communities, with the highest being in BOFN (.32) (see Table 3-6). This could be because amongst the six First Nations, BOFN is the closest to the location of purchases, which translates into larger income effects due to better accessibility.

Results show that the average age of the household head is 43 (see Table 3-2). Our results show that the age of the household head negatively impacts total food expenditures and all types of foods purchases across all communities except for John D'or (see Table 3-5 and Table 3-6). Its impact is statistically significant on total food expenditure and on all types of food purchases except for

_____

[9] The test statistic was not significant at 95% for the model without communities' controls.

restaurants (see Table 3-5). Within the six communities, age is only statistically significant in OAFN and Garden River (see Table 3-6).

Table 2-6 Determinants of Food Expenditure Across the Six First Nation Communities

	All	OAFN	BOFN	John D'or	Fox Lake	Garden River	LLB
Age	-6.46***	-5.84***	-2.17	2.18	-4.58	-12.92**	-4.38
	(1.41)	(2.16)	(2.24)	(3.67)	(5.75)	(5.94)	(2.75)
Size	54.90**	31.57	30.09	-41.81	71.37	-17.38	70.30**
	(27.25)	(43.10)	(46.42)	(68.65)	(47.80)	(51.80)	(29.48)
Income	.19***	.24***	.32***	.23***	.23***	.26**	.04**
	(.02)	(.03)	(.06)	(.03)	(.09)	(.12)	(.02)
C	460.26***	464.91***	32.23	49.34	289.74	745.83*	603.61***
	(111.37)	(143.86)	(176.39)	(153.94)	(320.02)	(414.63)	(153.04)
Observations	453	155	93	44	81	26	54
$Adj.R^2$	.47	.58	.71	.77	.35	.19	.25
$F-statistic$	37.28***	24.08***	13.30***	41.35***	2.35*	2.69*	6.08***

Notes: *** $P < 0.01$, ** $P < 0.05$, * $P < 0.1$. Heteroskedasticity-corrected standard errors in parentheses. F-statistics are calculated using heteroskedasticity-robust standard errors.

2.5 Discussion

On-reserve First Nation households are a distinct population that is predisposed to experiencing high rates of food insecurity. Multiple regression analyses of expenditures on different types of food reveal several important findings. Firstly, while income affects total food expenditures positively, its impact on food consumption is dependent on the type of food being purchased. That is, an increase in household income affects home-food consumption more than it does the consumption of other types of foods i.e. take-out, restaurants, and other foods. Secondly, the impact of household size, which is only significant in home-food and take-outs cases, is positive on home-food consumption and negative on take-out. That is, holding income and age of the household head constant, larger households spend more on home-food and less on take-out.

Furthermore, our results indicate that the impact of household size on total food expenditures is positive in all communities except for Garden River and John D'or.

Our results also show that households living in more remote communities have higher average total food expenditures. In these communities, food at home accounts for a larger proportion of total food expenditures. Four out of the six communities are located between 52 and 130 km from the closest locations of food purchases. Being located in relatively remote areas, it is not surprising to see that a significant proportion of transportation expenditures occur to acquire necessary goods and services from population centres. Given the significant proportion of food expenditures, one may conclude that buying food is perhaps the most important driver of transportation costs in these communities. In fact, more than half of on-reserve households' expenditures have been spent on transportation and food. These factors pose formidable challenges for the more isolated First Nation communities to be food secure. For example, there is a total of 70 First Nations in Saskatchewan and 45 First Nations in Alberta (INAC 2019). Out of the 70 in Saskatchewan, 60 are located outside of a 50 km radius from a service centre some of which are far remote (i.e. more than 350 km). In Alberta, 27 out of the 45 are located outside of a 50 km radius from a service centre with some being more than 200 km away. These estimates are indicative of spatial remoteness of First Nation communities in Saskatchewan and Alberta. Nonetheless, no First Nations in Alberta and only three in Saskatchewan are eligible for NNC subsidies.

None of the six communities studied here qualified for NNC subsidies. For instance, the community of Fox Lake is relatively remote without year-round access. Yet, it is ineligible because it is accessible by road and ferry for the majority of the year, despite periods of fall freeze up and spring break up that affect the stability of its winter ice road. The community of Garden River is

49

equally remote with access depended on road conditions, which during periods of the year are impassable. Yet Fox Lake and Garden River are far from unique in that many communities in the provincial north are equally remote but are excluded from the NNC program. For this reason, Burnett et al. (2015) argue that the NNC program ignores the communities located in northern regions of the provinces, which suffer from an alarming rates of food insecurity, but due to NNC criteria, do not qualify for program support. To better meet the needs of food insecure communities, Galloway (2014, 2017) has called for changes in the NNC program that can lead to a more accurate evaluation tool for determining what communities qualify for NNC support. The findings from our research support that recommendation.

2.6 Conclusion

In this study, we set out to examine on-reserve First Nation households' food expenditure in six First Nation communities. We explored the influence of household income, household size, age of head-of-household, and distance to commercial food markets on the quantity and types of foods purchased. We also explored spatial inequalities and issues related to the accessibility of food. Our findings indicate that most of the food expenditures occurred in the form of home-food consumption. Empirical results also indicate that income, household size, and age of the household head are significant factors of total food expenditures with positive effects for the first two and negative effects for the latter.

This study has implications for developing more informed public policies about the factors that affect food insecurity in First Nation communities. On-reserve households experience food insecurity at significantly higher rates than their non-Aboriginal counterparts. Given the spatial

inequalities of First Nation reserves and distinguishable cultural and social characteristics of First Nation populations, this study provides unique insight into the factors that influence food expenditure patterns of First Nation households in Canada. We believe these insights can now be used to inform future policies that may reduce food insecurity among Canada's Indigenous populations.

3 A Spatial Model of Investment Behaviour for First Nation Governments[10]

3.1 Introduction

In neoclassical theories of investment behaviour, capacity utilization factors such as output have been assumed to be the main driver of capital spending (Chirinko 1993; Girardi 2017; Petri 2015) as past levels of output influence future and desired level of capital stock. In these theories, an implicit assumption is that enterprises do not share capital stock. Although this is often true, there are certain circumstances where this assumption is violated, as in the case of First Nation[11] investment behavior in Canada.

In Canada, First Nation Governments (FNGs) are funded through two primary mechanisms. In one, the federal government transfers funds to FNGs to cover the costs of programs and service delivery to First Nation citizens. This support is guaranteed through federal legislation (e.g., British North America Act 1867) and provisions found in historic treaties (1-11) (Government of Canada

---

[11] First Nations, Metis and Inuit peoples (referred to as Aboriginal or Indigenous peoples) are the first inhabitants of Canada. This is equivalent to the term Native American which is commonly used in the U.S. We use the term First Nations instead of Native American when using examples from the U.S..

2019). Federal transfers are earmarked for specific expenditures, for instance health, education, and housing, and FNG are obligated to direct federal funds to those specified programs and services (INAC 2013). In many cases, however, federal transfers fall short of the actual costs of service delivery. For example, there have been significant funding shortfalls for on-reserve education due to fast population growth on reserves (First Nations Education Council 2009; Statistics Canada 2008). Due to this funding shortfall, FNGs are often challenged to deliver services and programs (INAC 2013).

In order to deliver necessary services, FNGs employ another approach and engage in a range of economic development activities in order to create self-generated revenues (Anderson 1999; Dana 2015; Dana and Anderson 2007; Miller 2012). Revenue generation includes the establishment of band-owned or jointly owned enterprises that are used cover federal funding shortfalls and to create employment for First Nation members. The revenues generated from band-owned enterprises are also more flexible than ear-marked federal transfers and can be directed to those programs and services that are considered by FNG to be of most need (INAC 2013). Previous studies (e.g., Anderson 1999) have found that the vast majority of (e.g. 89% in Saskatchewan) of revenues earned by First Nation businesses are generated from band-owned businesses and joint ventures/partnerships. A strategic goal for FNGs is to maximize their self-generated revenues through investing in business development activities.

The number of band-owned businesses and joint ventures/partnerships has grown considerably over the past two decades (Weir 2007). These business developments can vary in size and can include gas stations (Flanagan and Harding 2017), energy contracting services (Government of Canada 2014), wildland fire fighting (Government of Canada 2018) and cannabis retail outlets

(Subramaniam 2018). These forms of development represent vehicles for FNGs to exert some measure of financial independence in service provisioning (Natcher et al. 2014). In addition to band-owned enterprises, FNG often pursues joint ventures and partnerships with other FNGs, or with non-Aboriginal businesses partners. Such partnerships are entered into as a strategy to pool tribal resources and to capitalize on economies of scale (Anderson 1997, 1999; Anderson and Bone 1995). These types of joint ventures can include casino development (Saskatchewan Indian Gaming Authority 2019) and resource extraction activities (Anderson 1999; Office of Treaty Commissioner 2019).

Using revenues that are generated from either band-owned or jointly owned enterprises to cover programing and service costs does carry considerable risk. As noted by Natcher et al. (2014) a band-owned business that has all of its revenues dispersed to support the services and programming needs of First Nation members may eventually be weakened by a lack of funds for reinvestment and growth. Yet a business that does not allocate funds to support the social needs of community members will garner little community support, leaving both the enterprise and leadership vulnerable to change. Therefore, the challenge for FNG is to find a balance between meeting the social needs of community members and the need for reinvestment in order to stabilize and grow businesses into the future.

First Nation Governments (FNGs) invest in joint ventures and partnerships with each other, as well as with non-Aboriginal enterprises where capital is shared. These joint ventures and partnerships are established based on mutual benefits to the partners. Decisions about whether to invest/reinvest revenues into these joint ventures and partnerships are therefore jointly made between an FNG and its respective partners. We propose that such investments decisions can be accounted for in

empirical models of investment behaviour. In this study, we compile data from financial statements of the majority of FNGs in Saskatchewan (68 out of 70 FNG) to create a unique dataset of FNGs' financial performances for the period of 2014-2016. We develop a model of investment for Saskatchewan FNGs and propose that similar to firms, capacity utilization (e.g., output) induces investment. However, what is different in the FNGs context is that a new measure of output is considered. This new measure is represented by self-generated revenues over which FNGs have greater authority. Furthermore, as past research underlines the abundance of jointly-controlled capital stocks through joint ventures and partnerships (Anderson 1999), we propose that investment decisions could be affected by partnering with other FNGs. That is, in joint ventures, it is the purview of shareholders to decide whether to expand, contract, or keep the same level of capital i.e. how the revenues are invested or reinvested. Given that partners are often members of the same tribal councils, and can be considered 'geographical neighbours', we use spatial econometric modeling techniques to account for such effects.

This paper is structured as follows. In section 2, we provide a brief review of First Nations business development as well as aggregate investment literatures with a focus on the accelerator mechanism of investment. Section 3 presents our proposed empirical solution to the spatial externality issues by way of two examples. Section 4 describes the data used in this study. In section 5, we present the results of our empirical estimations including regular and spatial econometric specifications. In sections 6 and 7, we discuss some of the key findings and potential implications of this study.

3.2 Related Literature Review

3.2.1 First Nations Business Development

In Canada, First Nation communities employ a combination of ownership structures in business development including privately-owned businesses, band-owned businesses, and joint ventures/partnerships (Anderson 1999; Cornell 2006; Cornell et al. 2007; Dana 2015; Dana and Anderson 2007; Foley 2006; Gallagher and Selman 2016; Helin 2006; Miller 2012; Wuttunee 2007). Privately-owned businesses are those owned and run by First Nation citizens. The establishment of privately-owned businesses has been challenged by the lack of financial capacity and required capital (Miller 2012; Mirzaei et al. 2020). With privately-owned businesses often lacking the necessary financial and human resources to succeed, FNGs have turned to band-owned businesses and joint ventures/partnerships. Band-owned businesses and joint ventures/partnerships benefit from a larger pool of resources and are used to generate revenue for FNGs that can be used to bridge the common shortfall of federal transfers for service delivery.

The majority of business development activities in First Nation communities occur through forms of band-owned businesses and joint ventures/partnerships (Anderson 1999; Dana 2015; Dana and Anderson 2007; Miller 2012). For instance, Anderson (1999) found that while 50% of First Nation businesses in Saskatchewan were privately-owned, they only contributed 11% of total revenues. The other 89% of revenue was generated through band-owned businesses and joint ventures/partnerships, 47% and 42% respectively (Anderson 1999) (see Figure 4-1). These businesses are usually the main employers on reserves by creating jobs for First Nation citizens through direct (e.g., hiring band members) and indirect (e.g., economic spin-offs) employment.

Band-owned businesses and joint ventures/partnerships operate in various sectors of the economy (Anderson 1999; Miller 2012). In northern Saskatchewan, the Kitsaki Development Corporation owned by Lac La Ronge First Nation is noted as a successful example of an FNG investing in mining (Decter and Kowell 1989; Hindle et al. 2005). Lac La Ronge First Nation and its neighbouring First Nations are partners in mining related services in trucking and catering (Anderson 1999). The gaming industry has been a major arena of FNGs' investment, with seven out of the nine operating casinos in the province have been developed through partnerships between two or more FNGs (Saskatchewan Indian Gaming Authority 2019). FNGs have also partnered with non-First Nation enterprises; for example, the 2016 partnership between English River and Peter Ballantyne Cree First Nations and JNE Welding (Office of Treaty Commissioner 2019). While the development of band-owned businesses and joint ventures/partnerships is influenced by a host of financial factors (e.g., revenue, working capital), other factors (e.g., political stability and location) can also affect the investment behavior of FNGs.

First Nation businesses %

- Privately-owned: 50%
- Band-owned: 33%
- Joint venture/Partnership: 17%

Proportion of annual revenue %

- Privately-owned: 11%
- Band-owned: 47%
- Joint venture/Partnership: 42%
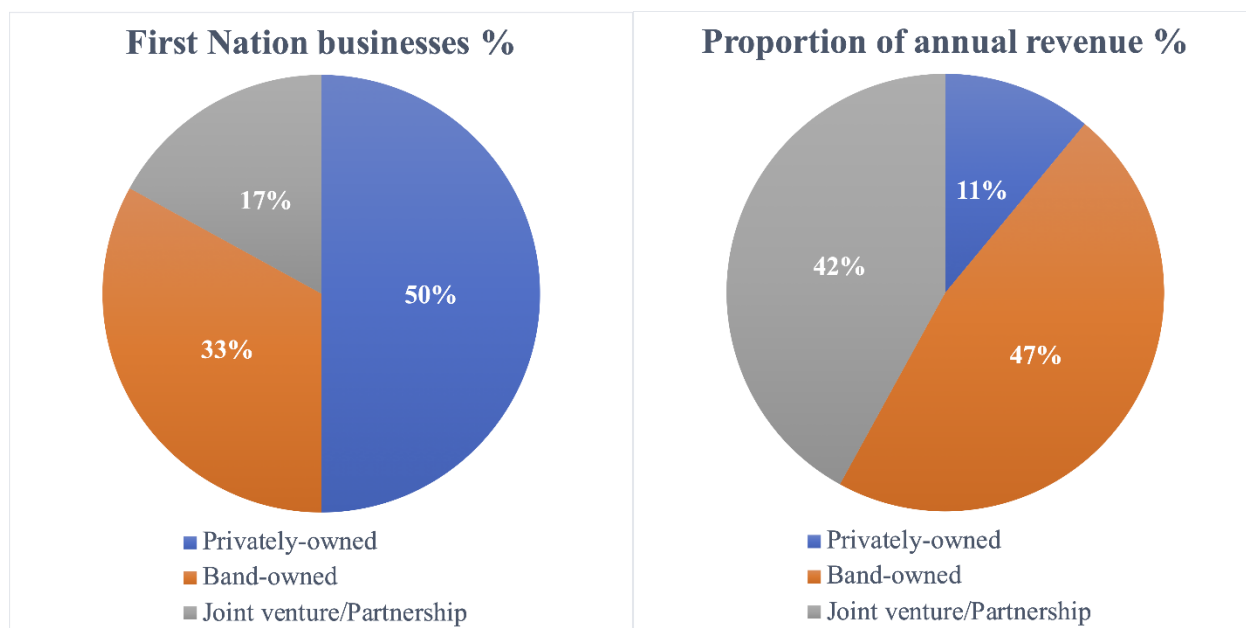
Figure 3-1 Business Ownership Structures and Their Contributions in Saskatchewan First Nations Business Economies (Source: Anderson (1999))

Political instability among First Nations influences investment behaviour as it can detract FNGs from long term investment strategies. Previous research has shown among those First Nations who demonstrated that least amount of political turn over were those using customary election codes (average term 6.6 years), whereas First Nations using the electoral provisions of the Indian Act had the highest level of political instability (average term 4.5 years) (Natcher et al. 2013). Out of the seventy First Nations in Saskatchewan, twenty (28%) administer their elections through Indian Act provisions, forty-four (63%) use customary election codes, and six (9%) have opted into the First Nations Election Act (FNEA) (INAC 2016). Political stability contributes to business investments and long-term planning which can lead to increased economic development in First Nation communities (INAC 2016; Natcher et al. 2013).

The location of First Nations reserves has an impact on FNGs' economic development. Reserve lands were often placed in remote and marginally productive areas in order to limit contact, competition and conflict with European Settlers (Daschuk 2013). This relative isolation has created challenges for FNGs to access population centers for business development (see Figure 4-2). First Nations located in the northern areas of Saskatchewan are considered particularly disadvantaged (Anderson 1999).[12] While remoteness is an impediment to business development, the formation of Tribal Councils (TC) has been used to overcome locational constraints and capitalize on economies of scale (Anderson 1999). Tribal Councils are established to advance the political, economic and cultural interests of member Nations. First Nations that are members of the same TC tend to be located in close relative proximity. In Saskatchewan, sixty one out of the seventy First Nations are affiliated with one of the nine TCs. Location has an impact on First Nations economic activities through direct (e.g., proximity to urban centres) and indirect (e.g., TC affiliations) effects.

3.2.2 Aggregate Investment

A review of the aggregate investment literature indicates various factors influencing the investment behaviour. Determinants of aggregate investment are generally grouped by capacity utilization and financial factors (Jorgenson 1971). The proxies for capacity utilization include a

---

[12] The cutoff level is considered as latitude 55° north.

range of operational factors including sales/revenues, profit, and output (Cleary 1999; Diamond 1962; Eisner 1960; Jorgenson 1971; Romer 2012). Financing parameters include measures of accessibility of funds including internal and external finance (Jorgenson 1971). Internal finance factors are often represented by liquidity and cash flow variables (Cleary 1999; Evans 1967; Farla 2014; Jorgenson 1971; Kadapakkam et al. 1998; Resek 1966). External finance factors often include variables such as interest rates, rates of return, and the market value of the firm (Farla 2014; Jorgenson 1971; Resek 1966). Previous studies have underlined the importance of both sets of variables in influencing the investment behaviour.

The essence of flexible accelerator theory of investment behaviour can be found in the fundamental flexible accelerator mechanism which states that investment shall be a result of capital adjustment towards its desired level (Girardi 2017; Jorgenson and Siebert 1968). Eisner and his colleagues developed various specifications of an accelerator model of investment behaviour. In these studies, they investigated the 'accelerator component' of investment (Eisner 1960, 1963, 1967; Eisner and Nadiri 1968; Eisner and Strotz 1963). In their model, the accelerator mechanism was based on the notion that past changes in output induce demand for the capital stock. Considering sales as a measure of output, past changes in sales were shown as significant determinants of investment behaviour (Eisner 1960). Diamond (1962) further developed Eisner's lag investment function. Having a slightly different measure of accelerator component and accounting for capital stock's growth, he also concluded that changes in sales account for a large proportion of variance of capital expenditures. His results also showed that previous rate of growth of capital stock has significant effects on investment expenditures (Diamond 1962). Finally, Jorgenson and his colleagues developed a series of models of what is now referred to as the benchmark of neoclassical theories

of aggregate investment (Girardi 2017; Hall and Jorgenson 1967; Jorgenson 1971, 1963; Jorgenson and Siebert 1968; Romer 2012).

In Jorgenson's model, capacity utilization has been assumed as one of the most important determinants of investment behaviour (Jorgenson 1971; Jorgenson and Siebert 1968). However, it has been argued that the Jorgenson's model fails to consider that investment is limited by output and infinite rates of investment are impossible (Romer 2012). Due to the shortcomings of the Jorgenson's model, adjustment-costs models were introduced where the costs of change in capital e.g. installation costs, are accounted for over and above the costs of purchasing capital goods (Girardi 2017; Petri 2015).

In this study, we adapt the Jorgenson's model because it is the benchmark of neoclassical empirical models of investment and can better serve in complex settings such as ours where potential impacts of other FNGs are tested for. Furthermore, its underlying assumptions are close to FNGs' actual investment behaviour. For instance, FNGs' investment is not as limited by output than regular firms' because output can increase significantly outside of FNGs planned budgetary constraints (e.g., money received from federal transfers) (Anderson et al. 2006).

3.3 Proposed Model

Our notion of the flexible accelerator theory of investment behaviour has the closest match with that of Jorgenson and Siebert's (1968). As they put:

$$I_t = (1 - \theta)(K_t^* - K_{t-1}) + \delta K_{t-1} \qquad \text{(4-1)}$$

where I_t is gross investment in each period, θ is rate of adjustment to the desired level of capital, K_t^* and K_t are the desired level and actual level of capital in each period, respectively, and δ is the constant rate of replacement investment. Following Jorgenson and Siebert's (1968) notion of the accelerator theory, we consider the desired level of capital stock to be proportional to output. We also assume a proportional replacement investment to actual capital stock. Therefore, K_t^* is as follows.

$$K_t^* = \alpha Q_t \qquad (4\text{-}2)$$

where α is the desired capital-output ratio and Q_t is a measure of output.

Based on the flexible accelerator mechanism, the actual level of capital in each period could be approximated as the weighted average of previous levels of desired capital with geometrically diminishing weights. Therefore,

$$K_t = \sum_{i=0}^{\infty} \mu_i(\theta) K_{t-i}^* \qquad (4\text{-}3)$$

Hence, change in actual levels of capital between two consequent periods would be given by:

$$K_t - K_{t-1} = \sum_{i=0}^{\infty} \mu_i(\theta)(K_{t-i}^* - K_{t-i-1}^*) \qquad (4\text{-}4)$$

So,

$$I_t = \sum_{i=0}^{\infty} \mu_i(\theta)(K^*_{t-i} - K^*_{t-i-1}) + \delta K_{t-1} \tag{4-5}$$

Finally, using Pascal distributed lag functions to approximate $\mu_i(\theta)$, the flexible accelerator theory of investment behaviour takes the following form.

$$I_t = \sum_{i=0}^{\infty} \gamma_i(K^*_{t-i} - K^*_{t-i-1}) - \sum_{i=0}^{\infty} \beta_i(K_{t-i-1} - K_{t-i-2}) + \delta K_{t-1} \tag{4-6}$$

Replacing equation (4-2) into equation (4-6), the flexible accelerator model takes the following form.

$$I_t = \alpha \sum_{i=0}^{\infty} \gamma_i(Q_{t-i} - Q_{t-i-1}) - \sum_{i=0}^{\infty} \beta_i(K_{t-i-1} - K_{t-i-2}) + \delta K_{t-1} \tag{4-7}$$

Our point of departure is equation (4-6). We propose that when FNGs have common capital stock jointly controlled by multiple FNGs, K^*_t and K_t could be written as:

$$K^*_t = K^*_{t,own} + K^*_{t,common} \tag{4-8}$$

$$K_t = K_{t,own} + K_{t,common} \tag{4-9}$$

where $K^*_{t,own}$ and $K^*_{t,common}$ are the desired levels of capital controlled by self and in partnership with others, respectively, and $K_{t,own}$ and $K_{t,common}$ are the actual levels of capital controlled by self and in partnership with others, respectively. Replacing equations (4-8) and (4-9) into equation (4-6), it will become:

$$I_t = \sum_{i=0}^{\infty} \gamma_i \left(K^*_{t-i,own} + K^*_{t-i,common} - K^*_{t-i-1,own} - K^*_{t-i-1,common} \right) - \sum_{i=0}^{\infty} \beta_i \left(K_{t-i-1,own} + K_{t-i-1,common} - K_{t-i-2,own} - K_{t-i-2,common} \right) + \delta \left(K_{t-1,own} + K_{t-1,common} \right) \tag{4-10}$$

Equation (4-10) underlines that at least parts of K^*_t and K_t, i.e. $K^*_{t,common}$ and $K_{t,common}$, are not determined entirely by one entity, but also by joint decisions with other partners. As equations (4-8) and (4-9) note $K^*_{t,common}$ and $K_{t,common}$ affect K^*_t and K_t. Yet, arguably, they are not completely controlled by one FNG. If not accounted for, they could introduce externalities to the model. From an empirical standpoint, estimating equation (4-10) is challenging because entities do not report their solely- and jointly-controlled capital stocks separately. We propose a solution to overcome this by estimating spatial specifications, where impacts of $K^*_{t,common}$ and $K_{t,common}$ are pooled together in a separate term and tested as a restriction. Without such considerations, estimating with cross-sectional data on entities that are not independent of each other may lead to autocorrelation in the estimations and cause serious problems. We assess these effects by means of two approaches including the Bayesian comparison approach introduced by LeSage (2014) and the robust Lagrange Multiplier (LM) tests introduced by Anselin et al. (1996). We use five weight matrices for the comparison purposes with K closest neighbours (from K3 to K7) as the spatial structure of dependence.

Our specification strategy begins with estimating the SLX model to avoid the initial restrictions that could potentially be produced on the spillover effects in Spatial Lag Model, Spatial Error Model, and SARAR (i.e. full) models (Halleck Vega and Elhorst (2015)). We then test for an extension to Spatial Durbin Model (SDM) and Spatial Durbin Error Model (SDEM) specifications by means of the Bayesian comparison approach and robust LM tests. We use the robust versions of the LM tests because they test for the existence of one type of spatial dependence while being robust to the presence of the other type. The robust LM tests are applied to the residuals of the SLX model. Estimations of the spatial models have been conducted using the "spatialreg" package in R (Bivand et al. 2013; R Core Team 2013).

In the Bayesian comparison approach, the Bayesian posterior model probabilities are used to compare three model specifications SLX, SDM, and SDEM across five weight matrices (i.e. K3 to K7). These probabilities are calculated based on the log marginal likelihood of different model options. A higher log marginal likelihood is associated with a higher posterior probability for the model. A strength of the Bayesian approach is that the posterior model probabilities are calculated over their entire parameter spaces (Elhorst and Halleck Vega 2017; LeSage 2014). Details on this approach can be found in LeSage (2014, 2015) and LeSage and Pace (2009).

Saskatchewan FNGs are not consistent of the way they prepare their affiliated entities' statements. While some FNGs report their 'band-owned' businesses' financials so as separate entities, others consolidate them into the government's i.e. administration's statements. To overcome this problem, we conduct two empirical sets of estimations. The first empirical example refers to the accelerator model of gross investment in capital stock. In this example, the choice of variables is based on the theoretical groundwork laid out by Jorgensen and Siebert. The second empirical

example uses business investments only. In this example, the dependent variable is the *level* of investment in business activities held by an FNG. Also, the choice of control variables is as they are suggested by First Nations economic development literature. Taken together, the two empirical examples provide justification for approach.

To estimate the first empirical example, we estimate an empirical version of equation (4-7) where we consider the current and lagged changes in output and lagged net investment i.e. equation (4-11).

$$I_t = \beta_0 + \beta_1 \Delta Q_t + \beta_2 \Delta Q_{t-1} + \beta_3 \Delta K_{t-1} + \beta_4 K_t + \varepsilon_t \qquad (4\text{-}11)$$

To estimate the second empirical example, we use lagged output, tangible capital assets, and working capital as explanatory variables along with two binary variables, Tribal Council and Election. Since we use levels of output, instead of changes, using lagged outputs from different periods will introduce multicollinearity to the model.[13] To prevent that, we only use one lag of output. The second empirical example is shown in equation (4-12).

---

[13] This is because while changes in output in different time periods might not be highly correlated with one another, the levels of output will be.

$$LBI_t = \beta_0 + \beta_1 Q_{t-1} + \beta_2 LOI_t + \beta_3 WC_{t-1} + \beta_4 TC_t + + \beta_5 Election_t + \varepsilon_t \quad (4\text{-}12)$$

In section 4, a list of the variables used in our empirical estimations is presented along with a brief description.

3.4 Data

This study utilizes data from 68 (97%) First Nations in Saskatchewan.[14] Constructing a unique dataset, we pull our data from consolidated annual financial statements of FNGs including the statements of financial position (i.e. balance sheet), operations (i.e. income statement), and changes in net debt for the period of 2014-2016. Effective from 2013 and in accordance with the Canadian Public Sector Accounting Board's (PSAB) standards, these financial statements are audited and made available through the First Nations Financial Transparency Act (FNFTA). The followings are the variables included in this study accompanied by a description for each.

- *Revenue* (Q_t) is the total amount of all types of revenue that the FNG has received in a particular year. This includes transfers from the federal government of Canada plus those revenues generated by the FNG's own economic activities and any other types of revenues.

---

[14] Based on Indigenous and Northern Affairs Canada (INAC) databases, there are a total of 70 First Nations in Saskatchewan. Due to lack of data, 2 First Nations are excluded from our sample.

- *Non-designated revenue* (Q_t^*) is the *Revenue* excluding the federal government's transfers through Indigenous and Northern Affairs Canada, Health Canada, and CMHC.[15]

- *Capital Stock* (K_t) is the total level of tangible capital assets that an FNG owns in a particular year. These include buildings, roadways, types of inventories etc.

- *Gross Investment* (I_t) is the total tangible capital assets' acquisition expenditure made by an FNG in a particular year.

- *Level of Business Investments* (LBI_t) is measured through the total 'level' of investment in business activities owned by an FNG. Different business activities include Government Business Enterprises (GBEs), various types of long-term investments e.g. portfolio investments, and limited partnership interests. GBEs are band-owned businesses that are controlled by the FNG but not dependent on the Nation for their continuing operations.[16]

---

[15] We acknowledge that non-designated revenue is neither exclusive to the revenues generated from own economic activities nor does it encompass fully unallocated sources of revenue. While it only excludes those revenues about which we were certain that they were earmarked for specific purposes, we assume that it is a reliable and robust estimation of the revenues that an FNG has more control over in terms of spending on its own terms.

16 According to Public Sector Accounting Board (PSAB):

A Government Business Enterprise (GBE) is:

'A separate entity with the power to contract in its own name and that can sue and be sued;

was delegated the financial and operational authority to carry on a business;

sells goods and services to individuals and organizations outside of the government reporting entity as its principal activity; and

can, in the normal course of its operations, maintain its operations and meet its liabilities from revenues received from sources outside of the government reporting entity.'

Long-term investments are investments in entities that are not controlled by the FNG. Limited partnerships are somewhat in between the previous two. Depending on the share of ownership and types of shares, the degree of authority varies between different businesses and First Nations.

- *Working Capital* (WC_t) is considered as a measure of liquidity and calculated by subtracting liabilities from financial assets[17] owned by an FNG in a particular year.

- *TC* is a nominal variable categorizing First Nations into two categories based on whether they are affiliated with one of the nine Tribal Councils in Saskatchewan, or they are unaffiliated.

- *Election* is a nominal variable categorizing First Nations into two categories based on whether their electoral system is still operating under provisions of Indian Act, or if they have opted out: being those operating under the FNEA and those utilizing customary election codes.

---

[17] The common approach to measure liquidity is to subtract current liabilities from current assets. Since data on current assets and current liabilities were not available for all FNGs in our sample, we used another measure. FNGs are considered as public sectors and they follow accounting structural rules that are slightly different than those of 'regular' corporations. One difference is that while some FNGs report their current assets and current liabilities, the others don't. All FNGs categorize their assets into financial and non-financial assets. Hence, we used financial assets minus liabilities as a measure of liquidity in this study.

3.5 Results

Table 4-1 presents some descriptive statistics about the variables used in our study. Generally, our results underline significant heterogeneity of Saskatchewan FNGs' economic circumstances. In particular, the distributions of variables used in this study are all right-skewed. That is, with respect to all variables considered, a higher number of Saskatchewan FNGs are below the average FNG.

Our results show that in 2016, the average FNG in Saskatchewan had a total *revenue* of approx. $14 million with a range of approximately $0.5 million and $107 million. The average FNG's total *revenue* decreased from $15.33 million in 2014 to $14.30 million in 2016. Moreover, the average FNG in Saskatchewan had a total *non-designated revenue* of approx. $7 million where the minimum and maximum were approx. $0.3 million and $45 million, respectively. The average FNG's *non-designated revenue* increased from approx. $6 million in 2014 to $7 million in 2016.

In 2016, the average FNG in Saskatchewan had approx. $23.5 million worth of *capital stock* where the minimum and maximum were approx. $0.01 million and $104 million, respectively. The average level of *capital stock* increased from approx. $22 million in 2014 to $23.5 million in 2016. In 2015, the average *working capital* of Saskatchewan FNGs, measured by financial assets minus liabilities, was approx. $0.92 million with a relatively high standard deviation of approximately $13 million. Out of the 68 FNGs, 22 had a positive *working capital*.

Table 3-1 Sample Descriptive Statistics

	Revenue			Non-designated Revenue			Capital Stock			Gross Investment (2016)	Level of Business Investments (2016)	Working Capital (2015)
	2016	2015	2014	2016	2015	2014	2016	2015	2014			
Mean	14.30	14.70	15.33	6.88	5.78	5.97	23.42	22.44	22.02	1.67	5.47	0.92
Median	11.89	11.55	12.06	5.68	4.72	4.87	20.43	20.05	19.39	0.66	0.54	-2.57
Std. Dev.	16.10	17.50	16.29	7.24	5.70	5.36	16.67	16.42	16.45	2.50	12.96	13.08
Min	0.53	0.56	0.53	0.28	-1.17	0.27	0.01	0.01	0.01	0.00	-1.21	-15.39
Max	107.32	118.45	103.59	44.56	35.56	36.05	103.95	107.36	110.69	14.70	81.42	75.72
Count	68	68	68	68	68	68	68	68	68	68	68	68

Notes: Numbers are rounded to 2 decimal points. Values are in million $.

In 2016, *gross investment* of the average FNG in Saskatchewan was $1.67 million. While four FNGs had not spent anything on acquiring tangible capital assets in 2016, the maximum recorded value was approx. $15 million. In 2016, the average *level of business investments* run by FNGs was $5.47 million. As previously defined, the *level of business investments* is a summation of business activities run by an FNG.[18] Figure 4-2 shows the geographical distribution of *gross*

---

[18] A couple of notes are necessary to be stated about this variable. First, depending on the size of operation and other factors e.g. the ability of a GBE to fulfill its operations and liabilities, an FNG might consider a business activity as a separate entity or not. If it does not so, such activities are consolidated in the Government's body report and are not included in our measure of level of business investments.

investment and *level of business investments* in Saskatchewan FNGs. Circles show the locations of First Nation communities based on the main residential reserve for each FN (which is considered as the location of FNG). Size of the circle represents magnitude of the variable of interest. Both maps show spatial clustering in FNGs' investment behaviour. We run other spatial descriptive analyses e.g. Moran's I test and plotting current-spatially lagged variables to explore this pattern in further details.

Second, the level of business investments would be negative if Government-owned enterprises' liabilities are more than their assets and this difference was not offset by other types of business investments made by the FNG.
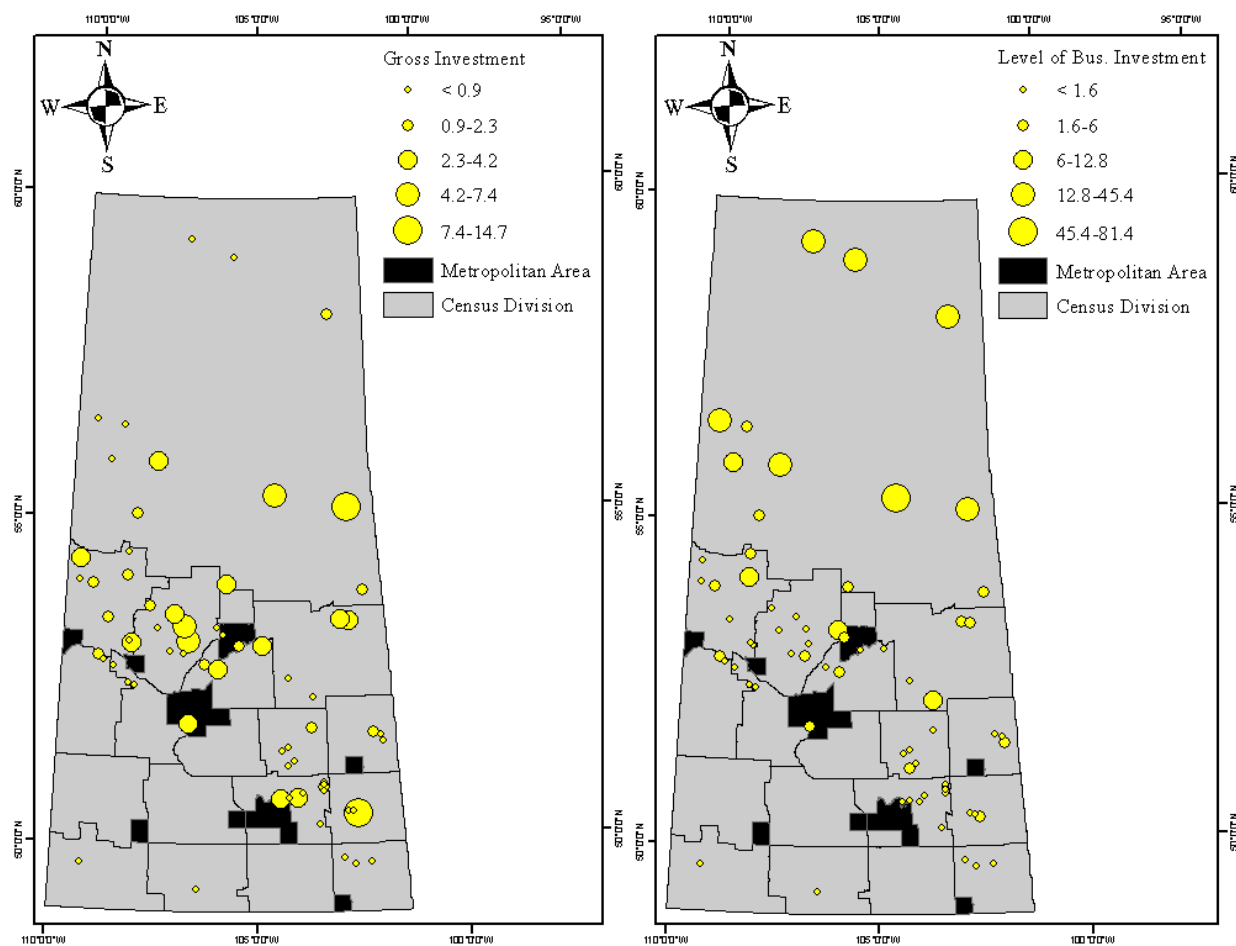
Figure 3-2 Geographical Distribution of Gross Investment and Level of Business Investments of Saskatchewan First Nation Governments in 2016 (Values in Million $ CAD)

Table 4-2 shows the results of testing for spatial correlation using Moran's I test. As shown, all spatial correlation coefficients are positive. Depending on the choice of variable to represent investment, its magnitude changes. For *gross investment (I_t),* it ranges between .07 to .12 and is significant for four out of the five neighbouring criteria. For *level of business investments (LBI_t),* it ranges between .27 to .37 and is significant in all five neighbouring criteria.

Table 3-2 Spatial Correlation Coefficients

	$K = 3\ (K3)$	$K = 4\ (K4)$	$K = 5\ (K5)$	$K = 6\ (K6)$	$K = 7\ (K7)$
Gross investment (I_t)	.076	.120**	.109**	.080**	.070**
Level of business investments (LBI_t)	.329***	.376***	.337***	.301***	.275***

Notes: ***$P < 0.01$, **$P < 0.05$, *$P < 0.1$. The table represents Global Moran's I statistics.

While Moran's I test gives as estimation of the association between investment in an FNG and in its neighbours, it assumes a linear relationship between the two. Figure 4-3 below presents the functional forms and shows plots of our two choices of investment variables including *gross investment (I_t)* and *level of business investments (LBI_t)* against their spatially lagged values. At the top are plots for *gross investment (I_t),* and at the bottom are plots for *level of business investments (LBI_t)* for the five neighbouring criteria. While positive spatial association can be observed in all cases, the relationship is stronger in cases where the level of business investments was considered. Such relationship is robust throughout the neighbouring criteria for both investment variables.

Gross Investment

$K = 3$	$K = 4$	$K = 5$	$K = 6$	$K = 7$

Level of Business Investment

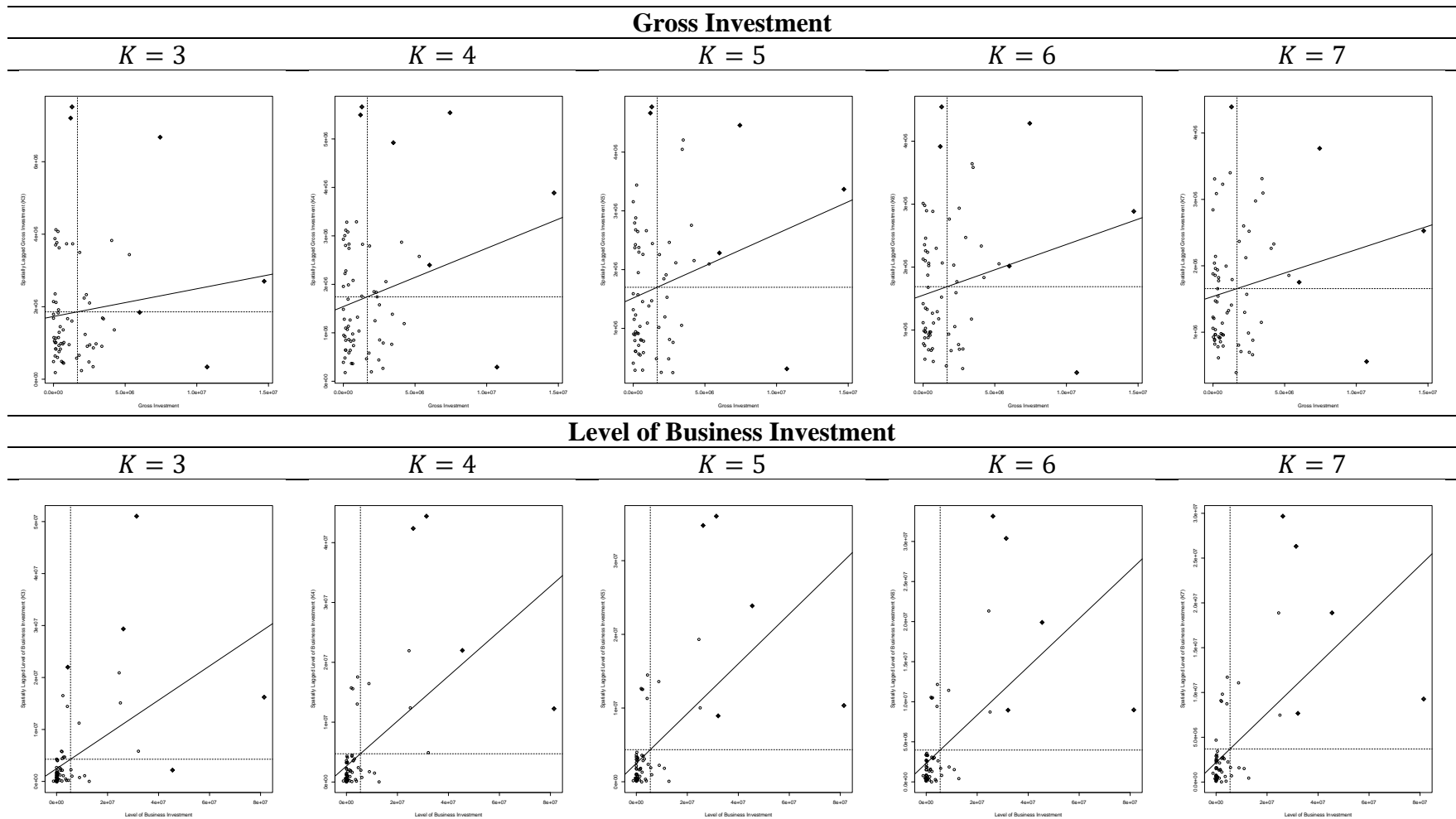| $K = 3$	$K = 4$	$K = 5$	$K = 6$	$K = 7$

Figure 3-3 Spatial Relationship between Investments in Neighbouring First Nation Governments

75

The estimated posterior model probabilities of three model specifications (i.e. SLX, SDM, and SDEM) and five weight matrices (i.e. K3 to K7) are summarized in Table 4-3. The values are renormalized using the maximum element of the entire matrix so that the best specification and weight matrix could be determined. As a result, the sum of the values in each matrix amounts to 1. As shown, for the first empirical example (i.e. equation (4-11)), the model probabilities favor the K5 matrix, and provide evidence in favor of SEDM specification. For the second empirical example (i.e. equation (4-12)), the SDEM is favored but with the K7 weight matrix.

Table 3-3 Bayesian Posterior Model Probabilities

	First empirical example (gross investment)				
	$K3$	$K4$	$K5$	$K6$	$K7$
SLX	0.0001	0.0416	0.1757	0.0347	0.0517
SDM	0.0002	0.0359	0.1481	0.0288	0.0436
SDEM	0.0002	0.0490	0.2883	0.0412	0.0608
	Second empirical example (level of business investment)				
	$K3$	$K4$	$K5$	$K6$	$K7$
SLX	0.0014	0.0069	0.0167	0.1038	0.1621
SDM	0.0067	0.0068	0.0172	0.1048	0.1597
SDEM	0.0043	0.0069	0.0295	0.1453	0.2280

Table 4-4 presents the results of estimating the accelerator model of investment behaviour as specified in equation (4-11). Model 1 and model 2 represent the results when output was measured by total *revenue* and total *non-designated revenue*, respectively. The estimated model 1 shows that even though positive, current and previous changes in an FNG's total *revenue* do not affect *gross investment* significantly. However, when *non-designated revenue* was assumed as the measure of output, i.e. model 2, such impacts became stronger and significant for current changes. As shown in Table 4-4, the impacts of net investment in previous periods were positive and significant in

both models 1 and 2. Finally, the impact of the *capital stock* was positive and significant in both models 1 and 2. Also, model 2 shows a better overall fit.

The estimation results for SLX and SDEM specifications are also reported in Table 4-4. Posterior probabilities for the three model specifications are relatively close for the K5 matrix (see Table 4-3). This could be an indication of weak spatial dependence through the SDM and SDEM specifications meaning that the SLX model is the appropriate specification (LeSage 2014). Due to this, we estimate both SLX and SEDM specifications. As shown in Table 4-4, the only significant spatially lagged explanatory variable is the current changes in *non-designated revenue*.

As shown in Table 4-4, the robust LM tests do not indicate which extension is more appropriate since both test statistics appear to be insignificant. The estimated Hausman test statistic based on Pace and LeSage (2008) is 0.20737, which follows a chi-squared distribution with 9 degrees of freedom. Therefore, the null hypothesis that the SLX and SDEM estimates are the same cannot be rejected. This is in line with the predictions of the robust LM tests approach. Based on these, our conclusion is that the SLX model seems to be the appropriate specification and no further extensions are required. Both log-likelihood and R^2 criteria show that the spatial models have a better fit.

Table 3-4 Regular and Spatial Regression Results - First Empirical Example

	Model 1	Model 2	$K = 5\ (K5)$	
			(SLX)	(SDEM)
ΔQ_t	.046 (.107)	.	.	.
ΔQ_{t-1}	.088 (.059)	.	.	.
ΔQ_t^*	.	.256** (.102)	.276** (.104)	.276*** (.097)
ΔQ_{t-1}^*	.	.119 (.097)	.124 (.095)	.120 (.089)
ΔK_{t-1}	.449*** (.103)	.328*** (.114)	.348*** (.120)	.348*** (.113)
K_{t-1}	.066*** (.015)	.048*** (.015)	.038** (.016)	.038** (.015)
$W(\Delta Q_t^*)$	.	.	.614** (.260)	.614*** (.229)
$W(\Delta Q_{t-1}^*)$	.	.	.347 (.271)	.346 (.241)
$W(\Delta K_{t-1})$	.	.	-.300 (.258)	-.309 (.232)
$W(K_{t-1})$	.	.	.002 (.036)	.003 (.032)
ρ	.	.	.	-.128 (.221)
Observations	68	68	68	68
$Adj.R^2$	.419	.457	.476	.541
LogLik	-137.868	-135.588	-132.156	-131.987
Robust LM - Lag			.413	
Robust LM - Error			.575	

Notes: $^{***}\ P < 0.01,\ ^{**}\ P < 0.05,\ ^{*}\ P < 0.1$. Standard errors in parentheses. Asymptotic std. error reported for the spatial autocorrelation coefficient ρ. The dependent variable is *gross investment* (I_t) measured by spending on capital assets. *Nagelkerke pseudo $- R^2$* reported for the SDEM specification.

Table 4-5 presents the results of the empirical model of the business activities as specified in equation (4-12). As shown, the level of *non-designated revenue* in the previous period has a

positive and statistically significant impact on the *level of business investments*. The impact of other investments is also positive, not statistically significant, and relatively low. Our measure of *working capital* was also positive and statistically significant.

Our results show that First Nation communities that were a member of one of the 9 TCs had, on average, higher business activities run by their FNG. Our results also show that First Nations with greater political stability had, on average, higher business activities.

The estimation results for SLX and SDEM specifications are also reported in Table 4-5. As shown, both specifications show a better fit and the level of *non-designated revenue* in neighbouring FNGs has a positive and significant impact on an FNG's level of business activities. Results from the robust LM tests and the log likelihoods show that the SDEM extension is not necessary. This is also supported by the Hausman test statistic (Pace and LeSage 2008) amounting to 1.329 with 9 degrees of freedom on the SDEM specification. These results are supportive of the SLX model as the appropriate model specification.

Table 3-5 Regular and Spatial Regression Results - Second Empirical Example

	Model 1	$K = 7$ (K7)	
		(SLX)	(SDEM)
Q^*_{t-1}	.488***	.547***	.541***
	(.152)	(.141)	(.132)
LOI_t	.068	.043	.046
	(.044)	(.042)	(.040)
WC_{t-1}	.702***	.621***	.621***
	(.054)	(.051)	(.047)
$W(Q^*_{t-1})$	.	1.216***	1.179***
		(.395)	(.386)
$W(LOI_t)$	.	-.154	-.130
		(.151)	(.146)
$W(WC_{t-1})$	.	.163	.155
		(.115)	(.111)
TC_t	2.705*	1.834	1.788
	(1.597)	(1.431)	(1.328)
$Election_t$	2.946***	2.376**	2.386***
	(1.068)	(.958)	(.886)
ρ	.	.	.095
			(.234)
Observations	68	68	68
$Adj. R^2$	.909	.932	.940
LogLik	-186.023	-174.483	-174.427
Robust LM - Lag	.	.062	.
Robust LM - Error	.	.009	.

Notes: *** $P < 0.01$, ** $P < 0.05$, * $P < 0.1$. Standard errors in parentheses. Asymptotic std. error reported for the spatial autocorrelation coefficient ρ. The dependent variable is *level of business investments* (LBI_t). $Nagelkerke\ pseudo - R^2$ reported for the SDEM specification.

3.6 Discussion

Neoclassical theories of aggregate investment behaviour are based on an implicit underlying assumption that capital stock is fully and solely owned by entities of interest and there is no shared capital between entities. In this study, we set out to accommodate the relaxation of this assumption. That is, we test for potential externalities of other FNGs because joint ventures and partnerships

between FNGs form shared capital between them. Using data from 68 First Nations in the Province of Saskatchewan over the period 2014-2016, we investigated the influence of neighbouring FNGs' investments on an FNG's investment behaviour over and above its own conditions. We drew upon the accelerator mechanism in aggregate investment and estimated two empirical examples to quantify such interconnections.

3.6.1   First Specification

In the first empirical example, we estimated an accelerator model of investment behaviour to explain variance in FNGs' gross investment in capital stock. In general, our results corroborate the findings of previous studies on accelerator mechanism where capacity utilization was assumed as the main driver of investment (Cleary 1999; Evans 1967; Farla 2014; Jorgenson 1971; Resek 1966). A few interesting points are worth to be discussed in further details.

First, we found that for FNGs' investment, *non-designated revenue* is a better proxy of output than *total revenue*. The impact of changes in *non-designated revenue* on *gross investment* is positive and diminishes over time. That is, such impacts are higher and significant for immediate changes in *non-designated revenue*, but lower and insignificant for lagged changes. These results corroborate the findings of previous studies where positive impacts of output and revenue on investment behaviour was observed (Chirinko 1993; Jorgenson and Siebert 1968; Romer 2012). The time-diminishing aspect of this impact may be interpreted as immediate exhaustion of funds in FNGs (INAC 2013). However, a word of caution is that we could not go back further than two periods due to the lack of data.

Second, our results indicate that the lagged value of changes in *capital stock* i.e. ΔK_{t-1} has a positive and significant impact on *gross investment*. This means the more net investment has been made in the past, the more *gross investment* is going to be made in the current period. Holding all other variables constant, this relationship may partly be explained by the fact that the more net investment an FNG had had in previous periods, the more capital stock it had at the beginning of the current period to be both replaced and added to.

Third, our results show that the replacement investment which was assumed to be proportional to the actual level of *capital stock* have significant positive impacts on *gross investment*. This is estimated to be approx. 0.05 and statistically significant for the lagged level of *capital stock*. This estimate could be interpreted as the average rate of replacement investment across Saskatchewan FNGs.

Finally, having a positive significant coefficient for the spatial lag of *non-designated revenue*, we find that neighbouring FNGs have a positive impact on an FNG's investment. This accords with our earlier observations, which showed a spatial clustering in FNG's investments. Moreover, compared to the regular models where the neighbouring effects were ignored, we find a better fit for the spatially augmented models. This is shown by comparing the $Adj. R^2$s and log likelihoods of the spatial models. This has been shown by the Bayesian posterior model probabilities. We find that the SLX model specification fits the data the best. These results are supportive of the argument that shared capital stock can introduce externalities from neighbouring FNGs.

3.6.2 Second specification

The second empirical example was set out to explore the most important factors of business investments made by FNGs. The results reveal several important points. First, it is shown that higher levels of an FNG's *non-designated revenue* in the past is associated with higher levels of business activities run by the FNG. It corroborates results of previous studies that own-source revenues are positively associated with business development in First Nation communities (INAC 2013). Second, our measure of *working capital*, considered as a proxy for liquidity, shows a positive and significant contribution to the *level of business investments* in FNGs. Thirdly, other investments, as measured by the total level of tangible capital assets i.e. LOI showed to have positive impacts on the level of business investments in both regular and spatial models, but not statistically significant.

Another point is the difference between the impacts of tangible capital assets and working capital on FNGs' business development, which is significantly higher for working capital. This shows that as FNGs move towards expanding their business activities, liquidity seems to be more important than the stock of capital assets. While both are positive and significant, tangible capital assets should be considered as more of infrastructure to business development in First Nations. This implies that while expanding the total level of tangible capital assets is important, FNGs should also try to keep a positive working capital by holding more financial assets than their liabilities, in order to grow their business activities.

Our results indicate that among those FNGs with higher levels of business activities, are those First Nations that have greater political stability and such relationship is statistically significant. This confirms our hypothesis that there is a positive relationship between opting out from the Indian

Act - and thus having more political stability within the FNG - and having higher levels of business activities. These results reflect those of Natcher et al. (2013) who also found a positive relationship between political stability and better socio-economic circumstances in Saskatchewan First Nations communities. However, this finding needs to be interpreted with some caution. Conducting time-series analyses to investigate the viability of a causal relationship would be an important step for future research.

With regards to the nominal variable Tribal Council (TC), its sign was positive but only statistically significant in the non-spatial model. This result supports evidence from previous observations where it was found that First Nations affiliated with TCs were better developed compared to those that were not (Anderson 1995, 1999). In the spatial models, the impact of TC became insignificant. This could be explained by the fact that partnering FNGs are located geographically close to each other and are often members of the same TC.

3.7   Conclusion

This paper developed an improved model of FNG investment by accounting for investments in neighbouring FNGs. Drawing on the accelerator theory of investment behaviour, we proposed that similar to firms, the past levels of output can serve as a proxy for FNG's capacity. However, our results show that FNGs' output is better measured by self-generated revenues as opposed to total revenues. We also argued that when FNGs share capital stock, joint investment decisions can introduce externalities to the investment model and accounting for them can improve the explanatory power and statistical inferences. This study has important implications for two areas

of research including First Nations economic development and the general field of aggregate investment in macroeconomics.

Previous studies have underlined the importance of economic development as a strategic goal to improve the socio-economic circumstances in First Nation communities (Berg and Gabel 2017; INAC 2005, 2015; National Collaborating Centre for Aboriginal Health 2013; Peredo et al. 2014; Smith 2000; Stevens 2001). Although past research had noted that FNGs are the main drivers of economic development on most reserves (Anderson 1999), little attention has been paid to FNGs' investment and growth. By the means of investment, FNGs earn self-generated revenues that allows them to provide better services to their citizens and improve the socio-economic conditions of First Nation communities. This research indicates that FNG's financial statements is an important source of economic data that can be useful to studies in the First Nations context.

In this study, we showed that similar to firms, investment behaviour of FNGs could be driven by capacity utilization factors such as output. However, the perception of capacity in the First Nations context is different. Our results indicated that higher own-source revenues of FNGs in the past are associated with higher levels of investment in the future. While federal transfers will still be a necessity in most First Nation communities, this study showed that FNGs can be better served if their self-generated revenue increases.

Our results showed a spatial pattern in FNGs' investment behaviour in Saskatchewan. That is, spatial clusters of FNGs are formed with respect to investment where First Nations with higher levels of investment are located closer to those with higher levels of investment and First Nations with lower levels of investment are located close to each other. Our results indicated that such externalities serve as a contributing factor to investment in First Nation communities. We propose

that accommodating spatial externalities is not a useful tool just for economic development in First Nation communities, but also for a broader field of research. The application is informative for modeling investment in settings like FNGs e.g. investments of businesses which may have joint ventures or partnerships with other businesses.

In this paper, we considered 'neighbouring' FNGs as those located geographically close to an FNG because FNGs that enter into joint ventures and partnerships are located close to each other, thereby the term 'neighbour' refers to geographical neighbours. It is clear that the implications of the present study could be useful for the firms that enter into partnerships and share capital stock. While the notions of proximity and 'neighbours' may change in other contexts, the underlying economic implications would be the same. For instance, closeness may be defined as relational proximity and 'neighbours' could be defined as partners in the same industry groups. We hope that this study will encourage economists and other scholars studying aggregate investment to consider the potential of externalities originating from shared capital stocks.

References

Aboriginal Investment Services. (2010). Six Nations and New Credit Economic Leakage Study.

Alcantara, C. (2007). Reduce transaction costs? yes. strengthen property rights? maybe: the First Nations Land Management Act and economic development on Canadian Indian reserves. *Public Choice, 132*(3-4):421-432.

Anderson, R. B. (1997). Corporate/Indigenous partnerships in economic development: the First Nations in Canada. *World Development, 25*(9), 1483-1503.

Anderson, R. B. (1999). *Economic development among the Aboriginal peoples in Canada: the hope for the future.* North York (ON): Captus Press.

Anderson, R. B. (2002). Entrepreneurship and Aboriginal Canadians: a case study in economic development. *Journal of Developmental Entrepreneurship, 7*, 45-65.

Anderson, R. B., & Bone, R. M. (1995). First Nations economic development: a contingency perspective. *The Canadian Geographer, 39*(2), 120-130.

Anderson, R. B., Dana, L.-P., & Dana, T. E. (2006). Indigenous land rights, entrepreneurship, and economic development in Canada: ''Opting-in'' to the global economy. *Journal of World Business, 41*(1), 45-55.

Anderson, T. L. (2016). *Unlocking The Wealth of Indian Nations*. Lanham, Lexington Books.

Angulo, A. M., Gil, J. M., & Mur, J. (2007). Spanish demand for food away from home: analysis of panel data. *Journal of Agricultural Economics*, 58(2), 289–307.

Anselin, L., Bera, A. K., Florax, R., & Yoon, M. J. (1996). Simple diagnostic tests for spatial

  dependence. *Regional Science and Urban Economics, 26*(1), 77–104.

Apparicio, P., Cloutier, M-S., & Shearmur, R. (2007). The case of Montréal's missing food deserts:

  evaluation of accessibility to food supermarkets. *International Journal of Health*

  Geographics, 6(4), doi:10.1186/1476-072X-6-4.

Ayach, B. B., & Korda, H. (2010). Type 2 diabetes epidemic in First Nations people of Canada.

  Ethnicity and Disease, 20(3), 300-303.

Bai, J., Zhang, C., Qiao, F., & Wahl, T. (2012). Disaggregating household expenditures on food

  away from home in Beijing by type of food facility and type of meal. *China Agricultural*

  Economic Review, 4(1), 18–35.

Belanger-Ducharme, F., & Tremblay, A. (2005). Prevalence of obesity in Canada. *Obesity Review*,

  6(3), 183-186.

Berg, N. & Gabel, T. (2017). Who was affected by new welfare reform strategies? Microdata

  estimates from Canada. *Applied Economics, 49*(14), 1395-1413.

Bess, R. & Ambargis, Z. O. (2011). Input-Output models for impact analysis: suggestions for

  practitioners using RIMS II multipliers. (Bureau of Economic Analysis (BEA) working

  papers 0081).

Bischoff, C. W. (1969). Hypothesis testing and the demand for capital goods. *The Review of*

  Economics and Statistics, 51(3), 354-368.

Pebesma, E. J. & Bivand, R. S. (2005). Classes and methods for spatial data in R. R News 5 (2), https://cran.r-project.org/doc/Rnews/.

Bivand, R. S., Pebesma, E., & Gomez-Rubio, V. (2013). Applied spatial data analysis with R, Second edition. Springer, NY. http://www.asdar-book.org/

Burnett, K., Skinner, K., & Joseph, L. (2015). From Food Mail to Nutrition North Canada: Reconsidering federal food subsidy programs for northern Ontario. *Canadian Food Studies*, 2(1), 141-156.

[CCA] Council of Canadian Academies. (2014). Aboriginal food security in northern Canada: an assessment of the state of knowledge. Council of Canadian Academies: expert panel on the state of knowledge of food security in northern Canada. Ottawa.

[CCPA] Canadian Centre for Policy Alternatives (CA). (2013). Delivering the good: Alternative federal budget 2015. Ottawa, Canadian Centre for Policy Alternatives. Available at: https://www.policyalternatives.ca/publications/reports/alternative-federal-budget-2015).

Cachon, J-C. & Lagrandeur, L. (2015). West Nipissing leakage analysis and market feasibility study. Chamber of Commerce. Ontario, Canada.

Carr, K., Natcher, D. C., & Olfert, R. (2013). Measuring the economic impact of publicly funded research in Northern Canada. *Polar Geography, 36*, 291-304.

Carter, S. (2007). *Lost harvests: Prairie Indian reserve farmers and government policy*. Montreal: McGill-Queen's University Press.

Chen, A., & Natcher, D. (2019). Greening Canada's Arctic food system: Local food procurement strategies for combating food insecurity. *Canadian Food Studies*, 6(1), 140–154.

Chirinko, R. S. (1993). Business fixed investment spending: modeling strategies, empirical results, and policy implications. *Journal of Economic Literature, 31*(4)*,* 1875-1911.

Clarke, G., Eyre, H., & Guy, C. (2002). Deriving indicators of access to food retail provision in British cities: studies of Cardiff, Leeds and Bradford. *Urban Studies*, 39(11), 2041–2060.

Clarkson, G. & Murphy, A. (2014). Tribal leakage: How the curse of Trust land impedes tribal economic self-sustainability. *Journal of Law, Economics and Policy, 12*, 177–192.

Cleary, S. (1999). The relationship between firm investment and financial status. *The Journal of Finance, 54*(2), 673-692.

Compher, C. (2006). The nutrition transition in American Indians. *Journal of Transcultural Nursing*, 17(3), 217-223.

Cornell, S. (2006). *What makes First Nations enterprises successful? lessons from the Harvard Project (JOPNA No. 2006-01).* Retrieved from: https://hpaied.org/publications/jopna-what-makes-first-nations-enterprises-successful-lessons-harvard-project.

Cornell, S., Jorgensen, M., Record, I. W., & Timeche, J. (2007). Citizen entrepreneurship: an underutilized development resource. In *Rebuilding Native Nations: Strategies for Governance and Development.* The University of Arizona Press, 197-222.

Coughlin, C. C. & Mandelbaum, T. B. (1991). A consumer's guide to regional economic multipliers. *Federal Reserve Bank of St. Louis Review, 73*, 19-32.

Dana, L-P. (2015). Indigenous entrepreneurship: an emerging field of research. *International Journal of Business and Globalisation, 14*(2):158.

Dana, L.-P. (2015). Indigenous entrepreneurship: an emerging field of research. *International Journal of Business and Globalisation, 14*(2), 158-169.

Dana, L.-P., & Anderson, R. B. (2007). A multidisciplinary theory of entrepreneurship as a function of cultural perceptions of opportunity. *International Handbook of Indigenous Entrepreneurship,* 595-603.

Daschuk, J. (2013). *Clearing the plains: Disease, politics of starvation, and the loss of Aboriginal life*. Regina, SK: University of Regina Press.

Daschuk, J. W. (2013). *Clearing the plains: disease, politics of starvation, and the loss of Aboriginal life.* Regina, University of Regina Press.

Davis, C., Moussie, M., Dinning, S., & Christakis, G. (1983). Socioeconomic determinants of food expenditure patterns among racially different low-income households: an empirical analysis. *Western Journal of Agricultural Economics*, 8(2), 183-196.

Dean, W. R., & Sharkey, J. R. (2011). Rural and urban differences in the associations between characteristics of the community food environment and fruit and vegetable intake. *Journal of Nutrition Education and Behavior*, 43(6), 426-433.

Decter, M., & Kowell, J. (1989). *A Case Study of the Kitsaki Development Corporation*. Retrieved from: https://communityrenewal.ca/sites/all/files/resource/P071_Kitsaki.pdf.

Deller, S. C., Sumathi, N. R., & Marcouiller, D. (1993). Regional economic models for the State of Wisconsin: An application of the Micro-IMPLAN modelling System. Center for Community Economic Development, Department of Agricultural Economics, University of Wisconsin-Madison, Staff Paper 93.6.

Diamond, J. (1962). Further development of a distributed lag investment function. *Econometrica, 30*(4), 788-800.

Eisner, R. (1960). A distributed lag investment function. *Econometrica, 28*(1), 1-29.

Eisner, R. (1963). Investment: Fact and fancy. *The American Economic Review, 53*(2), 237-246.

Eisner, R. (1967). A permanent income theory for investment: Some empirical explorations. *The American Economic Review, 57*(3), 363-390.

Eisner, R., & Nadiri, M. I. (1968). Investment behaviour and neo-classical theory. *The Review of Economics and Statistics, 50*(3), 369-382.

Eisner, R., & Strotz, R. H. (1963). *Determinants of Business Investment.* Upper Saddle River, NJ: Prentice Hall.

Elhorst J. P., & Halleck Vega, S. (2017, English translation). The SLX model: Extensions and the sensitivity of spatial spillovers to W. *Papeles de Economía Española 152*: 34-50.

Evans, M. K. (1967). A study of industry investment decisions. *The Review of Economics and Statistics, 49*(2), 151-164.

Farla, K. (2014). Determinants of firms' investment behaviour: a multilevel approach. *Applied Economics, 46*(34), 4231-4241.

First Nations Education Council. (2009). *Paper on First Nations education funding.* Retrieved from:

https://www.afn.ca/uploads/files/education/1._2009_february_fnec__paper_on_fn_funding__memoire_sur_financement_education_des_pn_eng.pdf.

Flanagan, T. & Harding, L. (2017). *Treaty Land Entitlement and urban reserves in Saskatchewan: A statistical evaluation.* Retrieved from: https://fcpp.org/wp-content/uploads/FC17005_TreatyLand_F1.pdf.

Foley, D. (2006). Does business success make you any less Indigenous? *Regional Frontiers of Entrepreneurship Research,* 241–257.

Fraser Basin Council. (2014). Community economic development projects. British Columbia, Canada.

Gallagher, B. & Selman, M. (2016). Warrior entrepreneur. *The American Indian Quarterly, 39*(1):73–94.

Galloway, T. (2014). Is the Nutrition North Canada retail subsidy program meeting the goal of making nutritious and perishable food more accessible and affordable in the North? *Canadian Journal of Public Health*, 105(5), 395-397.

Galloway, T. (2017). Canada's northern food subsidy Nutrition North Canada: a comprehensive program evaluation. *International Journal of Circumpolar Health*, 76(1), 1-19.

Garcia, T. & Grande, I. (2010). Determinants of food expenditure patterns among older consumers. The Spanish case. *Appetite*, 54(1), 62-70.

Ghanem, Z. (2005). The Canadian and inter-provincial Input-Output models: The mathematical framework. Ottawa, Industry Canada.

Gionet, L. & Roshanafshar, S. (2013). Health at a glance: Select health indicators of First Nations people living off reserve, Metis and Inuit. Statistics Canada, Catalogue no. 82-624-X.

Girardi, D. (2017). Old and new formulations of the neoclassical theory of aggregate investment: A critical review, Working Paper, No. 2017-03, University of Massachusetts, Department of Economics, Amherst, MA.

Government of Canada. (2014). *Indigenous Business Directory.* Retrieved from: http://www.ic.gc.ca/eic/site/ccc_bt-rec_ec.nsf/eng/h_00011.html.

Government of Canada. (2018). *Fire protection in First Nation communities.* Retrieved from: https://www.sac-isc.gc.ca/eng/1317842518699/1535120096924.

Government of Canada. (2019). Nutrition North Canada. https://www.nutritionnorthcanada.gc.ca/eng/1415385762263/1415385790537.

Government of Canada. (2019). Specific claims. Available at: https://www.rcaanc-cirnac.gc.ca/eng/1100100030291/1539617582343.

Government of Canada. (2019). The Indian Act. R.S.C., 1985, c. I-5. Retrieved from: https://laws-lois.justice.gc.ca/PDF/I-5.pdf.

Government of Saskatchewan. (2018). Saskatchewan provincial economic accounts. January 2018 edition. Saskatchewan Bureau of Statistics, Ministry of Finance.

Grande, I. (2000). Profiling older consumers. 29th European Marketing Academy Conference.

Guy, C. M., & David, G. (2004). Measuring physical access to 'healthy foods' in areas of social deprivation: a case study in Cardiff. *International Journal of Consumer Studies*, 28(3), 222–224.

Hall, R. E., & Jorgenson, D. W. (1967). Tax policy and investment behaviour. *The American Economic Review, 57*(3), 391-414.

Halleck Vega, S. & Elhorst, J. P. (2015). The SLX model. *Journal of Regional Science, 55*(3), 339-363.

Heien, D., Jarvis, S. & Perali, F. (1989). Food consumption in Mexico: demographic and economic effects. *Food Policy*, 14(2), 167-179.

Helin, C. (2006). *Dances with Dependency: Out of Poverty Through Self-Reliance*. Lynchburg, VA: Ravencrest Publishing.

HFNCOMMS. (2016). Assembly of First Nations (AFN) National Chief says that Federal Budget is a Significant Step in Closing the Gap for First Nations. (Huu-ay-aht First Nations, https://huuayaht.org/2016/03/23/afederal-budget/).

Hindle, K., Anderson, R. B., Giberson, R. J., & Kayseas, B. (2005). Relating practice to theory in Indigenous entrepreneurship: A pilot investigation of the Kitsaki partnership portfolio. *The American Indian Quarterly, 29*(1/2), 1-23.

[INAC] Indigenous and Northern Affairs Canada. (2005). Comparison of socio-economic conditions, 1996 and 2001: Registered Indians, Registered Indians Living on Reserve and the Total Population of Canada. Ottawa, Indigenous and Northern Affairs Canada.

[INAC] Indigenous and Northern Affairs Canada. (2007). The revised northern food basket. http://publications.gc.ca/collections/collection_2008/inac-ainc/R3-56-2007E.pdf.

[INAC] Indigenous and Northern Affairs Canada. (2013). Creating the conditions for economic success on reserve lands A report on the experiences of 25 First Nation communities. Retrieved from: https://www.aadnc-aandc.gc.ca/eng/1372346462220/1372346568198.

[INAC] Indigenous and Northern Affairs Canada. (2013). First Nations Financial Transparency Act (FNFTA). Ottawa, Minister of Justice.

[INAC] Indigenous and Northern Affairs Canada. (2015). The community well-being index: well-Being in First Nations communities, 1981-2011. Ottawa (ON): Indigenous and Northern Affairs Canada.

[INAC] Indigenous and Northern Affairs Canada. (2016). First Nation profiles. (http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Search/FNListGrid.aspx?lang=eng).

[INAC] Indigenous and Northern Affairs Canada. (2016). *Leasdership selection in First Nations.* Retrieved from: https://www.aadnc-aandc.gc.ca/eng/1323195944486/1323196005595.

[INAC] Indigenous and Northern Affairs Canada. (2017). Land base statistics. (https://www.aadnc-aandc.gc.ca/eng/1359993855530/1359993914323).

[INAC] Indigenous and Northern Affairs Canada. (2019). First Nations profiles. Ottawa, Indigenous and Northern Affairs Canada. http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Index.aspx?lasng=eng.

[INAC] Indigenous and Northern Affairs Canada. (2020). Settlement report on specific claims. custom searches at Reporting Centre on Specific Claims. as of February 26, 2020. http://services.aadnc-aandc.gc.ca/SCBRI_E/Main/ReportingCentre/External/externalreporting.aspx.

Jacobson, D., Mavrikiou, P. & Minas, C. (2010). Household size, income and expenditure on food: the case of Cyprus. The Journal of Socio-Economics, 39(2), 319-328.

Jorgenson, D. W. (1963). Capital theory and investment behaviour. The American Economic Review, 53(2), 247-259.

Jorgenson, D. W. (1971). Econometric studies of investment behavior: A survey. Journal of Economic Literature, 9(4), 1111-1147.

Jorgenson, D. W., & Siebert, C. D. (1968). A comparison of alternative theories of corporate investment behaviour. The Americal Economic Review, 58(4), 681-712.

[KPMG] Klynveld Peat Marwick Goerdeler. (2014). Framework agreement on First Nation land management. Update Assessment of Socio/Economic Development Benefits. Final Report. Ottawa, Klynveld Peat Marwick Goerdeler.

Kadapakkam, P.-R., Kumar, P. C., & Riddick, L. A. (1998). The impact of cash flows and firm size on investment: the international evidence. Journal of Banking and Finance, 22(3), 293-320.

Kuhnlein, H., Goodman, L., Receveur, O., Spigelski, D., Duran, N., Harrison, G., & Zheh, T. (2013). Gwich'in traditional food and health in Tetlit Zheh, Northwest Territories, Canada: Phase II. In: H. Kuhnlein, B. Erasmus, D. Spigelski & B. Burlingame (Eds.), Aboriginal peoples' food systems & well-being: interventions & policies for healthy communities (pp. 101–120). Rome: Food and Agricultural Organization of the UN and Centre for Aboriginal Peoples' Nutrition and Environment (CINE).

Larsen, K., & Gilliland, J. (2008). Mapping the evolution of 'food deserts' in a Canadian city: supermarket accessibility in London, Ontario, 1961–2005. International Journal of Health Geographics, 7(16), doi:10.1186/1476-072X-7-16.

LeSage, J. P. (2014). Spatial econometric panel data model specification: A Bayesian approach. *Spatial Statistics, 9*, 122-145.

LeSage, J. P. (2015). Software for Bayesian cross section and panel spatial model comparison. *Journal of Geographical Systems, 17*, 297-310.

LeSage, J. P. & Pace, R. K. (2009). *Introduction to spatial econometrics*. Boca Raton, FL: Taylor and Francis.

Lusk, J., Roosen, J. & Shogren, J. F. (2011). *The Oxford handbook of the economics of food consumption and policy*. Oxford: Oxford University Press.

Mattas, K. A. & Shrestha, C. M. (1991). A new approach to determining sectoral priorities in an economy: Input-Output elasticities. *Applied Economics, 23*, 247-254.

McDonald, J. (2014 May 29). How a B.C. native band went from poverty to prosperity. The Globe and Mail. [accessed 2017 June 19]; Report on Business: [about 18 screens]. https://www.theglobeandmail.com/report-on-business/rob-magazine/clarence-louie-feature/article18913980.

McEntee, J., & Agyeman, J. (2010). Towards the development of a GIS method for identifying rural food deserts: geographic access in Vermont, USA. *Applied Geography*, 30(1), 165–176.

Meyers Norris Penny. (2014). Mohawk Council of Akwesasne economic leakage study. Last Accessed February 2020 at: http://www.akwesasne.ca/tehotiienawakon/economic-development/.

Mihalopoulos, V. & Demoussis, M. (2001). Greek household consumption of food away from home: A microeconometric approach. *European review of Agricultural Economics*, 28(4), 421-432.

Miller, J. R. (1996). *Shingwauk's Vision: A History of Native Residential Schools*. Toronto: University of Toronto Press.

Miller, R. E. & Blair, P. D. (1985). *Input–Output analysis. Foundations and extensions*. Englewood Cliffs, Prentice-Hall Inc.

Miller, R. J. (2012). *Native America: yesterday and today. reservation 'capitalism' economic development in Indian country*. Santa Barbara (CA): Praeger.

Mirzaei, O., Natcher, D. C., & Micheels, E. T. (2020). Estimating the regional economic impacts of First Nation spending in Saskatchewan, Canada. *The Review of Regional Studies, 50*(1), 53-69.

Morton, L. W., & Blanchard, T. C. (2007). Starved for access: life in rural America's food deserts. *Rural Realities*, 1(4), 1–10.

[NCCAH] National Collaborating Centre for Aboriginal Health. (2013). An overview of Aboriginal health in Canada. Prince George (BC): University of Northern British Columbia.

Natcher, D. (2016). Social capital and the vulnerability of Aboriginal food systems in Canada. *Human Organization*, 74(3), 230-242.

Natcher, D. C. (2019). Normalizing Aboriginal subsistence economies in northern Canada. In C. Southcott, F. Abele, D. Natcher, & B. Parlee (Eds.), *Resources and Sustainable Development in the Arctic* (pp. 219-233). New York: Routledge Press.

Natcher, D. C. (2019). Subsistence, regional Planning, and the cultural carrying capacity of First Nations in Alberta, Canada. *Hunter Gatherer Research*, 3(4), 717-736.

Natcher, D. C., & Hickey, C. G. (2002). Putting the community back to community-based resource management: A criteria and indicators approach to sustainability. *Human Organization*, 61(4), 350-363.

Natcher, D. C., Hickey. C. G., Nelson, M., & Davis, S. (2009). Implications of tenure insecurity for Aboriginal land use in Canada. *Human Organization, 68*, 245-257.

Natcher, D. C., Olfert, R., Boaitey, A., & Allen, T. (2013). Political stability and the well-being of First Nations in Saskatchewan: Implications for the proposed First Nations Elections Act. Journal of Aboriginal Economic Development, 8(2), 97-110.

Natcher, D. C., Schmit, T., & Allen, T. (2014). Balancing politics and the dispersal of business revenues among First Nations in Saskatchewan, Canada. Journal of Aboriginal Economic Development, 9(1): 16-29.

Natcher, D., Shirley, S., Rodon, T., Chris, S. (2016). Constraints to wildlife harvesting among aboriginal communities in Alaska and Canada. Food Security, 8(6), 1153- 1167.

Nayga, R. (1995). Determinants of US household expenditures on fruit and vegetables: a note and update. Journal of Agricultural and Applied Economics, 27(2), 588-594.

Neulinger, A. & Simon, J. (2011). Food consumption patterns and healthy eating across the household life cycle in Hungary. *International Journal of Consumer Studies*, 35(5), 538-544.

Office of Treaty Commissioner. (2019). *Finding synergy: new partnership brings Saskatchewan First Nations and business together.* Retrieved from: http://www.otc.ca/reconciliations/details/finding_synergy_new_partnership_brings_saskatchewan_first_nations_and_business_together.html

Okuyama, Y. & Santos J. R. (2013). Disaster impact and Input-Output analysis. *Economic Systems Research, 26*, 1-12.

Pace, R. K. & LeSage, J. P. (2008). A spatial Hausman test. *Economics Letters, 101*(3), 282-284.

Peredo, A. M., Anderson, R. B., Galbraith, C. S., Honig, B., & Dana, L-P. (2004). Towards a theory of Indigenous entrepreneurship. *International Journal of Entrepreneurship and Small Business, 1*(1/2):1-20.

Petri, F. (2015). Neglected implications of neoclassical capital-labour substitution for investment theory: another criticism of Say's law. *Review of Political Economy, 27*(3), 308-340.

Power, E. M. (2008). Conceptualizing food security for Aboriginal people in Canada. *Canadian Journal of Public Health, 99*(2): 95-97.

R Core Team (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. http://www.R-project.org/.

Resek, R. W. (1966). Investment by manufacturing firms: a quarterly time-series analysis of industry data. The Review of Economics and Statistics, 48(3), 322-333.

Ricciuto, L., Tarasuk, V., & Yatchew, A. (2006). Socio-demographic influences on food purchasing among Canadian households. *European Journal of Clinical Food*, 60(6), 778-790.

Richard, G., Calla, J., & Le Dressay, A. (2008). The high costs of doing business on First Nation lands in Canada. *Journal of Academy of Business and Economics, 8*(4): 94-106.

Romer, D. (2012). *Advanced Macroeconomics.* New York, NY: McGraw-Hill.

Roos, E., Lahelma, E., Virtanen, M., Prattala, R., & Pietinen, P. (1998). Gender, socioeconomic status and family status as determinants of food behaviour. *Social Science & Medicine*, 46(12), 1519-1529.

Sandlos, J. (2008). *Hunters at the Margin: Native People and Wildlife Conservation in the Northwest Territories*. Vancouver: UBC Press.

Santos, J. R., Yu, K. D. S., Pagsuyoin, S. A. T., & Tan, R. R. (2014). Time-varying disaster recovery model for interdependent economic systems using hybrid Input-Output and Event Tree analysis. *Economic Systems Research, 26*, 60-80.

Saskatchewan Indian Gaming Authority. (2019). *Building Success*. Retrieved from: http://sigaannualreport.ca/wp-content/uploads/2019/06/SIGA-AR_2018-19-Full-report-1.pdf.

Sharkey, J., & Horel, S. (2008). Neighborhood socioeconomic deprivation and minority composition are associated with better potential spatial access to the ground-truthed food environment in a large rural area. *The Journal of Nutrition*, 138(3), 620-627.

Skeena Native Development Society. (2003). Masters in our own house: The path to prosperity. Report of the Think Tank on First Nations Wealth Creation (1999-2002). Terrace, Skeena Native Development Society.

Skinner K., Hanning R. M., & Tsuji L. J. (2014). Prevalence and severity of household food insecurity of First Nations people living in an on-reserve, sub-Arctic community within the Mushkegowuk Territory. *Public Health Nutrition*, *17*(1), 1–9.

Smith, D. H. (2000). *Modern Tribal Development: Paths to Self-Sufficiency and Cultural Integrity in Indian country*. Walnut Creek, CA: AltaMira Press.

Smoyer-Tomic, K. E., Spence, J. C., & Amrhein, C. (2006). Food deserts in the prairies? supermarket accessibility and neighborhood need in Edmonton, Canada. *The Professional Geographer*, 58(3), 307-326.

Statistics Canada. (2008). *Aboriginal Peoples in Canada in 2006: Inuit, Métis and First Nations, 2006 Census (Catalogue no. 97-558-XIE).* Retrieved from: http://www12.statcan.ca/census-recensement/2006/as-sa/97-558/pdf/97-558-XIE2006001.pdf.

Statistics Canada. (2016). Saskatchewan consumer price index annual 2015 historical tables. (https://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ09i-eng.htm).

Statistics Canada. (2018a). *Saskatchewan [Province]* (table). *Aboriginal Population Profile*. 2016 Census. Statistics Canada Catalogue no. 98-510-X2016001. Ottawa. Released July 18, 2018. http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/abpopprof/index.cfm?Lang=E (accessed April 8, 2020).

Statistics Canada. (2018b). Alberta [Province] (table). Aboriginal Population Profile. 2016 Census. Statistics Canada Catalogue no. 98-510-X2016001. Ottawa. Released

July 18, 2018. http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/abpopprof/index.cfm?Lang=E (accessed April 8, 2020).

Stevens, E. (2001). Testimony before the US Senate committee on Indian affairs. Oversight Hearing of the National Gmaing Commision.

Subramaniam, V. (2018). First licensed cannabis store on First Nation land shows investment paying off, chief says. *Financial Post.* Retrieved from: https://business.financialpost.com/cannabis/first-licensed-cannabis-store-on-first-nation-land-shows-investment-paying-off-chief-says.

Thiele, S. & Weiss, C. (2003). Consumer demand for food diversity: evidence for Germany. *Food Policy*, 28(2), 99-115.

Toh, M. H. & Thangavelu, S. M. (2012). An Input-Output study of the Singapore information sector. *Economics Systems Research, 25*, 233-244.

Trevithick, S. (1998). Native residential schooling in Canada: A review of literature. *The Canadian Journal of Native Studies*, 16(1), 49-86.

Unama'ki Economic Benefits Office. (2011). Unama'ki leakage study phase 2, final report. Membertou, NS: Unamaki Economic Benefits Office.

Vasconcelos, P. S. & Carpio, L. G. T. (2015). Estimating the economic costs of electricity deficit using Input-Output analysis: The case of Brazil. *Applied Economics, 47*, 916-927.

Weir, W. (2007). *First Nation Small Business and Entrepreneurship in Canada. Research Paper for the National Centre for First Nations Governance (NCFNG).* Retrieved from: http://www.incaonline.ca/wp-content/uploads/2015/08/warren_weir.pdf.

Whelan, A., Wrigley, N., Warm, D., & Cannings, E. (2002). Life in a 'Food Desert'. *Urban Studies*, 39(11), 2083–2100.

Willows, N., Veugelers, P., Raine, K., & Kuhle, S. (2011). Associations between household food insecurity and health outcomes in the Aboriginal population (excluding reserves). *Statistics Canada, Catalogue no. 82-003-XPE • Health Reports*, 22 (2), 15-20.

Worsley, A. (2002). Nutrition knowledge and food consumption: Can nutrition knowledge change food behaviour? *Asia Pacific Journal of Clinical Nutrition*, 11(Supp. 3), S579-S585.

Wrigley, N., Guy, C., & Lowe, M. (2002). Urban regeneration, social inclusion and large store development: the seacroft development in context. *Urban Studies*, 39(11), 2101–2114.

Wuttunee, W. W. (2007). Shattering misconceptions. Pp. 20–27 in *International Handbook of Indigenous Entrepreneurship*, edited by L.-P. Dana and R. B. Anderson. Edward Elgar.

Appendix Sample Household Expenditures Survey

ECONOMIC LEAKAGE STUDY - HOUSEHOLD

Community:	Date:	Time:	Data entered by:

Household Information

Person	Age	Gender	Works Outside the Home?	Full or Part-Time?	On or Off Reserve?	If Off-Reserve, Where?
		☐ Male ☐ Female	☐ Yes ☐ No	☐ FT ☐ PT	☐ On ☐ Off	
		☐ Male ☐ Female	☐ Yes ☐ No	☐ FT ☐ PT	☐ On ☐ Off	
		☐ Male ☐ Female	☐ Yes ☐ No	☐ FT ☐ PT	☐ On ☐ Off	
		☐ Male ☐ Female	☐ Yes ☐ No	☐ FT ☐ PT	☐ On ☐ Off	
		☐ Male ☐ Female	☐ Yes ☐ No	☐ FT ☐ PT	☐ On ☐ Off	
		☐ Male ☐ Female	☐ Yes ☐ No	☐ FT ☐ PT	☐ On ☐ Off	
		☐ Male ☐ Female	☐ Yes ☐ No	☐ FT ☐ PT	☐ On ☐ Off	
		☐ Male ☐ Female	☐ Yes ☐ No	☐ FT ☐ PT	☐ On ☐ Off	

Which of the followings applies to you?
☐ I have never owned my own business.
☐ I own a non-registered/informal business (e.g. sale of goods or services, bobcat service, security service, repairs & maintenance or building, furniture, hair stylist, tanned hides, crafts, catering, confectionary, catering, cleaning, etc.)
☐ I own a registered/formal business.
☐ I owned a formal and/or informal business at least once in my life.

Do you make an effort to purchase from First Nation owned businesses or suppliers? Please also take into account those First Nation owned businesses located off-reserve.
☐ Yes   ☐ No

If yes, why? ……………………………………………………………………………………

If no, why? …………………………………………………………………………………….

- For each entry in the following sections, please indicate whether the item is purchased from a First Nation-owned business by circling the proper answer (Y=Yes and N=No).
- Please report expenditures based on annual amounts. However, if you feel more comfortable, report based on a monthly basis. If you go with the monthly option, please clarify that.

Transportation – Annual Expenditures ($)

	Vehicle Payment (Including ATV, Skidoo and boats)	Vehicle purchases (Including ATV, Skidoo and boats)	Insurance (Including ATV, Skidoo and boats)	Repairs (Including ATV, Skidoo and boats)	Gas (Including ATV, Skidoo and boats)	Airfare & Taxi fare	Others
High Level	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Fort Vermilion	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Peace River	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Grand Prairie	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
La Crete	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Edmonton	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Slave Lake	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Other (in Alberta)	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Other (outside Alberta)	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Online Shopping	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N

Hunting/Fishing – Annual Expenditures ($)

	Fuel (Gas, Diesel, Propane)	Small Equipment (e.g. Net, Ammo, Chain Saw)	Large Equipment (e.g. Firearms, Boat, ATV)	Other
Local store	Y/N	Y/N	Y/N	Y/N
High Level	Y/N	Y/N	Y/N	Y/N
Fort Vermilion	Y/N	Y/N	Y/N	Y/N
Peace River	Y/N	Y/N	Y/N	Y/N
Grand Prairie	Y/N	Y/N	Y/N	Y/N
La Crete	Y/N	Y/N	Y/N	Y/N
Edmonton	Y/N	Y/N	Y/N	Y/N
Slave Lake	Y/N	Y/N	Y/N	Y/N
Other (in Alberta)	Y/N	Y/N	Y/N	Y/N
Other (outside Alberta)	Y/N	Y/N	Y/N	Y/N
Online Shopping	Y/N	Y/N	Y/N	Y/N

Food – Annual Expenditures ($)

	Groceries (Including diapers, baby food, personal hygiene items)	Take-Out Food/Coffee	Restaurants	Traditional Food	Other
Local store	Y/N	Y/N	Y/N	Y/N	Y/N
High Level	Y/N	Y/N	Y/N	Y/N	Y/N
Fort Vermilion	Y/N	Y/N	Y/N	Y/N	Y/N
Peace River	Y/N	Y/N	Y/N	Y/N	Y/N
Grand Prairie	Y/N	Y/N	Y/N	Y/N	Y/N
La Crete	Y/N	Y/N	Y/N	Y/N	Y/N
Edmonton	Y/N	Y/N	Y/N	Y/N	Y/N
Slave Lake	Y/N	Y/N	Y/N	Y/N	Y/N
Other (in Alberta)	Y/N	Y/N	Y/N	Y/N	Y/N
Other (outside Alberta)	Y/N	Y/N	Y/N	Y/N	Y/N

Online Shopping	Y/N		Y/N		Y/N		Y/N		Y/N

Clothing – Annual Expenditures ($)

	Men		Women		Children		Other (e.g. traditional clothing)	
Local store		Y/N		Y/N		Y/N		Y/N
High Level		Y/N		Y/N		Y/N		Y/N
Fort Vermilion		Y/N		Y/N		Y/N		Y/N
Peace River		Y/N		Y/N		Y/N		Y/N
Grand Prairie		Y/N		Y/N		Y/N		Y/N
La Crete		Y/N		Y/N		Y/N		Y/N
Edmonton		Y/N		Y/N		Y/N		Y/N
Slave Lake		Y/N		Y/N		Y/N		Y/N
Other (in Alberta)		Y/N		Y/N		Y/N		Y/N
Other (outside Alberta)		Y/N		Y/N		Y/N		Y/N
Online Shopping		Y/N		Y/N		Y/N		Y/N

Professional Services – Annual Expenditures ($)

	Legal		Accounting		Appraisers		Funerals		Childcare		Food Processing (e.g. meat cutting & sausage making)		Other (e.g. veterinary)	
High Level		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Fort Vermilion		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Peace River		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Grand Prairie		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
La Crete		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Edmonton		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Slave Lake		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Other (in Alberta)		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Other (outside Alberta)		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Online Shopping		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N

Health Care Services – Annual Expenditures ($)

	Dental		Vision		Prescription		Traditional Medicine		Other	
High Level		Y/N		Y/N		Y/N		Y/N		Y/N
Fort Vermilion		Y/N		Y/N		Y/N		Y/N		Y/N
Peace River		Y/N		Y/N		Y/N		Y/N		Y/N
Grand Prairie		Y/N		Y/N		Y/N		Y/N		Y/N
La Crete		Y/N		Y/N		Y/N		Y/N		Y/N
Edmonton		Y/N		Y/N		Y/N		Y/N		Y/N
Slave Lake		Y/N		Y/N		Y/N		Y/N		Y/N
Other (in Alberta)		Y/N		Y/N		Y/N		Y/N		Y/N
Other (outside Alberta)		Y/N		Y/N		Y/N		Y/N		Y/N
Online Shopping		Y/N		Y/N		Y/N		Y/N		Y/N

Household Furnishing/Equipment – Annual Expenditures ($)

	Furniture		Electronics		Appliances		Other	
Local store		Y/N		Y/N		Y/N		Y/N
High Level		Y/N		Y/N		Y/N		Y/N
Fort Vermilion		Y/N		Y/N		Y/N		Y/N
Peace River		Y/N		Y/N		Y/N		Y/N
Grand Prairie		Y/N		Y/N		Y/N		Y/N
La Crete		Y/N		Y/N		Y/N		Y/N
Edmonton		Y/N		Y/N		Y/N		Y/N
Slave Lake		Y/N		Y/N		Y/N		Y/N
Other (in Alberta)		Y/N		Y/N		Y/N		Y/N
Other (outside Alberta)		Y/N		Y/N		Y/N		Y/N
Online Shopping		Y/N		Y/N		Y/N		Y/N

Household Operations – Annual Expenditures ($)

	Utilities (power, water/sewer, propane, garbage disposal)		Insurance		Repairs & Construction (e.g. renovations and R&M for cabins)		Internet (Including Netflix)		Phone (home & cell, iTunes)		TV		Other (e.g. Laundromat, maintaining your yard, lawn)	
High Level		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Fort Vermilion		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Peace River		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Grand Prairie		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
La Crete		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Edmonton		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Slave Lake		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Other (in Alberta)		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Other (outside Alberta)		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N
Online Shopping		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N		Y/N

Personal Care – Annual Expenditures ($)

	Salon (e.g. hair, nails, waxing, pedicure)		Gym Membership		Piercing & Tattoos		Other (Including gifts)	
High Level		Y/N		Y/N		Y/N		Y/N
Fort Vermilion		Y/N		Y/N		Y/N		Y/N
Peace River		Y/N		Y/N		Y/N		Y/N
Grand Prairie		Y/N		Y/N		Y/N		Y/N
La Crete		Y/N		Y/N		Y/N		Y/N
Edmonton		Y/N		Y/N		Y/N		Y/N
Slave Lake		Y/N		Y/N		Y/N		Y/N
Other (in Alberta)		Y/N		Y/N		Y/N		Y/N
Other (outside Alberta)		Y/N		Y/N		Y/N		Y/N
Online Shopping		Y/N		Y/N		Y/N		Y/N

Personal Education/Training – Annual Expenditures ($)

	Activity	$	Description	
High Level				Y/N
Fort Vermilion				Y/N
Peace River				Y/N
Grand Prairie				Y/N
La Crete				Y/N
Edmonton				Y/N
Slave Lake				Y/N
Other (in Alberta)				Y/N
Other (outside Alberta)				Y/N
Online Shopping				Y/N

Tobacco & Other Products – Annual Expenditures ($)

	Cigarettes/Tobacco		Vaporizers		Snuff/Chewing Tobacco		Alcohol/Drugs		Other	
Local store		Y/N		Y/N		Y/N		Y/N		Y/N
High Level		Y/N		Y/N		Y/N		Y/N		Y/N
Fort Vermilion		Y/N		Y/N		Y/N		Y/N		Y/N
Peace River		Y/N		Y/N		Y/N		Y/N		Y/N
Grand Prairie		Y/N		Y/N		Y/N		Y/N		Y/N
La Crete		Y/N		Y/N		Y/N		Y/N		Y/N
Edmonton		Y/N		Y/N		Y/N		Y/N		Y/N
Slave Lake		Y/N		Y/N		Y/N		Y/N		Y/N
Other (in Alberta)		Y/N		Y/N		Y/N		Y/N		Y/N
Other (outside Alberta)		Y/N		Y/N		Y/N		Y/N		Y/N
Online Shopping		Y/N		Y/N		Y/N		Y/N		Y/N

Recreation – Annual Expenditures ($)

	Attendance and participation in sports (e.g. golf, hockey, baseball)		Vacations/Holidays		Other	
High Level		Y/N		Y/N		Y/N
Fort Vermilion		Y/N		Y/N		Y/N
Peace River		Y/N		Y/N		Y/N
Grand Prairie		Y/N		Y/N		Y/N
La Crete		Y/N		Y/N		Y/N
Edmonton		Y/N		Y/N		Y/N
Slave Lake		Y/N		Y/N		Y/N
Other (in Alberta)		Y/N		Y/N		Y/N
Other (outside Alberta)		Y/N		Y/N		Y/N
Online Shopping		Y/N		Y/N		Y/N

Gaming – Annual Expenditures ($)

	Bingo		VLT		Poker		Lottery Tickets		Other	
Local store		Y/N		Y/N		Y/N		Y/N		Y/N
High Level		Y/N		Y/N		Y/N		Y/N		Y/N
Fort Vermilion		Y/N		Y/N		Y/N		Y/N		Y/N
Peace River		Y/N		Y/N		Y/N		Y/N		Y/N
Grand Prairie		Y/N		Y/N		Y/N		Y/N		Y/N
La Crete		Y/N		Y/N		Y/N		Y/N		Y/N
Edmonton		Y/N		Y/N		Y/N		Y/N		Y/N
Slave Lake		Y/N		Y/N		Y/N		Y/N		Y/N
Other (in Alberta)		Y/N		Y/N		Y/N		Y/N		Y/N
Other (outside Alberta)		Y/N		Y/N		Y/N		Y/N		Y/N
Online Shopping		Y/N		Y/N		Y/N		Y/N		Y/N

Attendance and Participation in Cultural Events – Annual Expenditures ($)

	Powwow		Hand Games		Tea Dance/Round Dance		Gathering/ Assembly		Other	
High Level		Y/N		Y/N		Y/N		Y/N		Y/N
Fort Vermilion		Y/N		Y/N		Y/N		Y/N		Y/N
Peace River		Y/N		Y/N		Y/N		Y/N		Y/N
Grand Prairie		Y/N		Y/N		Y/N		Y/N		Y/N
La Crete		Y/N		Y/N		Y/N		Y/N		Y/N
Edmonton		Y/N		Y/N		Y/N		Y/N		Y/N
Slave Lake		Y/N		Y/N		Y/N		Y/N		Y/N
Other (in Alberta)		Y/N		Y/N		Y/N		Y/N		Y/N
Other (outside Alberta)		Y/N		Y/N		Y/N		Y/N		Y/N
Online Shopping		Y/N		Y/N		Y/N		Y/N		Y/N

Other – Annual Expenditures ($)

	Activity	$	Description	
Local store				Y/N
High Level				Y/N
Fort Vermilion				Y/N
Peace River				Y/N
Grand Prairie				Y/N
La Crete				Y/N
Edmonton				Y/N
Slave Lake				Y/N
Other (in Alberta)				Y/N
Other (outside Alberta)				Y/N
Online Shopping				Y/N

Additional Comments