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Authors: Yujiro Sano, Cathlene Hillier, Michael Haan, & David Zarifa

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Youth Migration in the Context Of Rural Brain Drain: Longitudinal Evidence From Canada

Yujiro Sano
Nipissing University
North Bay, Ontario, Canada
yujiros@nipissingu.ca

Cathlene Hillier
Nipissing University
North Bay, Ontario, Canada
cathlenh@nipissingu.ca

Michael Haan
Western University
London, Ontario, Canada
mhaan2@uwo.ca

David Zarifa
Nipissing University
North Bay, Ontario, Canada
davidz@nipissingu.ca

Abstract

Population growth in many major cities is partly driven by migration from rural areas, which constrains these communities' development. Despite this concern, research that longitudinally examines the patterns and predictors of youth out-migration to urban areas, as well as return migration to rural areas, is very limited in Canada. To address this void, we longitudinally link Canada's Youth in Transition Survey, Cohort A, and the Programme for International Student Assessment reading scores, measured at age 15, to individuals' tax filer information through age 30 via the T1 Family File to examine the characteristics and extent of rural Canada's youth out- and return migration. Our analysis points to two important findings: (a) the 'leavers' are more educated with higher levels of employability and income than the 'stayers' and (b) the 'returners' tend to come back to rural areas as a result of economic constraints in urban areas. Based on these findings, we provide several recommendations for policymakers and future research.

Keywords: Brain drain, out-migration, Programme for International Student Assessment, return migration, T1 Family File

1.0 Introduction

Youth out-migration has long been a concern in the vitality and growth of rural communities worldwide (Petrin, Schafft, & Meece, 2014). Rural-urban migration is often exacerbated by the fact that the 'leavers' are frequently the highly educated

and trained, and the 'stayers' are those with comparatively lower skills, education, or income, contributing to 'brain drain' and human capital deficiencies in these locations (Brown & Shafft, 2011; Mills & Hazarika, 2001). Moreover, even among those who eventually return to their hometowns, researchers point to a mixed bag of unsuccessful 'boomerangs' and successful 'high-fliers' who come back to regain a sense of stability (Carr & Kefalas, 2009). The rural brain drain phenomenon raises concern that these communities will lack educated and trained people to fill jobs as they become available in the future. Both urban and rural areas may lack enough workers with post-secondary education (PSE) to occupy future jobs, but rural areas are believed to be the most at-risk (Harling Stalker & Phyne, 2014). As such, higher unemployment rates and lower average incomes may emerge in tandem with the 'degree of rurality,' as rural areas with no metropolitan influence typically show higher proportions of their populations holding less than high school education (Wells, Manly, Kommers, & Kimball, 2019; Moazzami, 2015a). Rural populations are aging much faster than their urban counterparts, through both the out-migration of youth and the in-migration of seniors (Moazzami, 2015b).

Prior Canadian research on rural–urban migration has been specific to a certain province or group of provinces (Andres & Licker, 2004 Bourgeois & Kirby, 2012; Corbett, 2007, 2009; Harling Stalker, & Phyne, 2014; Looker & Naylor, 2010) and has used cross-sectional data (Malatest, Barry, & Krebs, 2002; Moazzami, 2015a, 2015b). Studies using data at the national level have employed that of the Canadian census, which limits the predictors of rural–urban migration that researchers can examine (Clemenson & Pitblado, 2007; Dupuy, Mayer, & Morissette, 2000; Rothwell, Bollman, Tremblay, & Marshall, 2002). For example, respondents' age and level of education are available from census data, but other important factors for leaving or staying would not be included, such as family background measures and students' previous academic achievement. These factors have been found to be significant in rural–urban migration research in the United States (e.g., Artz & Yu, 2011; Carr & Kefalas, 2009). Further, while the magnitude of return migration to rural communities has been examined with census data (Dupuy et al., 2000), there is little research on the predictors of Canadian youth who return to rural locations after previously locating to urban areas. Details on returners can be of particular interest to rural municipalities seeking to attract educated and skilled youth.

We aim to advance the literature by analyzing nationally representative longitudinal survey data linked to administrative tax filer data to examine youth out-migration from rural to urban areas and subsequent return migration to rural areas. To investigate the extent and characteristics of rural youth migration and 'brain drain' in Canada, we examine two key research questions. First, what is the overall magnitude of youth out-migration from rural to urban areas and youth return migration from urban to rural areas? Second, what are the determinants of youth out-migration and return migration?

In the next section, we outline two bodies of literature to document the potential factors that influence youth out-migration to urban areas and return migration back to rural areas in Canada. First, we review the literature regarding push and pull factors experienced by rural youth. This body of literature exclusively examines youth's perceptions of staying within or moving out of rural areas. Second, we review the literature that explores the characteristics associated with the actual leaving, staying, and returning of rural youth.

2.0 Literature Review

2.1 Youth's Perceptions of Staying in or Leaving Rural Areas: Push and Pull Factors

Research on the plans of high school students examines the push and pull factors related to youth's perceptions of where they will live and work after completing their education. Overall, this body of literature can be summarized into three main categories of push and pull factors: (a) educational and employment opportunities, (b) social ties, and (c) demographic and socioeconomic characteristics.

First, the perception that urban centers offer more job opportunities and lucrative career prospects is a strong enticement for youth to consider leaving their rural communities. For example, the negative perceptions of rural areas include inability to achieve high income, lack of access to shopping centers, and few educational and career opportunities (Malatest et al., 2002). Research in the United States finds that students' perceived lack of economic opportunity in the community is the strongest predictor of the desire to leave their hometown (Bourgeois & Kirby, 2012; Petrin, Farmer, Meece, & Byun, 2011), and students are more likely to plan on staying if they see future employment opportunities in their rural communities (Demi, Mclaughlin, & Snyder, 2009; Mclaughlin, Shoff, & Demi, 2014). Similar findings are also reported in several European countries, including Iceland (Bjarnason & Thorlindsson, 2006) and the Netherlands (Thiessen, Fortuijn, Strijker, & Haartsen, 2010). Reflecting on these motivations, some rural students may perceive leaving their rural communities as an opportunity to become successful (Pederson & Gram, 2018), whereas youth who choose stay are sometimes perceived as not 'smart enough to leave' (Malatest et al., 2002).

Second, social ties play a critical role in shaping youth's intention of out-migration and return migration. Social ties can include the attachment that youth feel toward their hometown and can be related to a desire to return to stay with family. Students are less likely to plan on leaving their rural communities when they view rural areas as safe and clean environments (Bourgeois & Kirby, 2012), ideal to raise families (Malatest et al., 2002), and rich in social supports from family and friends (Demi et al., 2009; McLaughlin et al., 2014; Pretty, Bramston, Patrick, & Pannach, 2006).

Finally, perceptions of leaving or staying may be influenced by several demographic and socioeconomic characteristics. Specifically, gender and age are significantly associated with the intention to leave. For example, in their survey of 1,945 youth from four regions of Canada (i.e., West, Ontario, Quebec, and Atlantic), Malatest and colleagues (2002) found that the greatest proportion of those who plan to leave are 15 to 19 years old. Moreover, women in a small rural community in Nova Scotia were found to feel a greater need to move to urban areas to gain PSE and employment than their male counterparts due to fewer opportunities for women to attain higher paying jobs (Corbett, 2007). In addition to such demographic characteristics, research also shows that socioeconomic status is strongly correlated with ideas of leaving (Demi et al., 2009).

2.2 Youth's Patterns and Predictors of Leaving, Staying, and Returning

There is a growing body of literature that explores the determinants of youth out- and return migration in industrialized societies such as Canada. Using Canadian census, tax records, and the Survey of Labour and Income Dynamics, for example,

Dupuy, Mayer, and Morisette (2009) discovered that Canadian youth aged 15 to 19 leave rural areas more often than urban areas, except for those who live in New Brunswick. For those who left rural areas, only about one-quarter return to their rural regions after leaving. It has also been revealed that the in-migration rate in Canada exceeds the out-migration rates for ages 25 to 69, although the out-migration rate is larger for those aged 15 to 24 (Rothwell et al., 2002). These findings generally suggest that it is common for youth to leave rural communities and, normally, not to return once they have (Andres & Licker, 2004; Artz, 2003).

Further, research points to education as a critical determinant of youth out- and return migration. As younger populations experience increased levels of education, the likelihood that they will settle in urban areas rather than return to rural communities increases as well (Carr & Kefalas, 2009; Dupuy et al., 2009; Garasky, 2002; Rothwell et al., 2002). For example, the highest in- and out-migration is observed among those with PSE in small towns and rural areas (Rothwell et al. 2002). Using Canadian census data from 1976 to 1996, Clemenson and Pitblado (2007) also support this idea that the chance of out-migration increases with education level (see also Rothwell et al., 2002). Beyond census data, other studies in Canada reflect similar findings of out-migration rates. Looker and Naylor (2009) conducted a longitudinal survey of youth in Hamilton, Ontario and Halifax, Nova Scotia. Findings from their analysis reveal that being female and having lower levels of parental education are negatively associated with moving from rural to urban areas. Moreover, youth in rural areas have been observed to have lower education, full-time employment rates, and income when compared to their urban counterparts. In the small Atlantic community of Digby Neck, Nova Scotia, Corbett (2007) found that of the one-fifth of the population (aged 19 to 56) that moved away, men were more likely to stay in their community. Those who stayed were found to be less educated and were more likely to remain within fifty kilometers of their community.

In the United States, research shows similar patterns of human capital losses and youth migration (Mayer, Matlin, & Olson-Hazboun, 2018; von Reichert, Cromartie, & Arthun, 2014a, 2014b). Using 1985–1990 data from the US census, Gibbs and Cromartie (1994) found that among 20- to 34-year-olds, who make up over half of those who moved, college-educated individuals are the majority of both in- and out-migration (see also Garasky, 2002; Gibbs, 1995). In their sample of Iowa State University alumni (1982–2006), Artz and Yu (2011) similarly found that those whose fathers had higher education were less likely to stay in rural locations. In the same study, however, older and married respondents were more likely to stay in rural areas.

Moreover, Australian and European research is reaching similar conclusions. For example, education is positively associated with the likelihood of settling in urban locations (Alston, 2004; Gabriel, 2006). Furthermore, demographic variables such as age, Aboriginal status, and being Australian born have positive associations with migrating to these remote locations. In the Netherlands, Haartsen and Thiessen's (2014) survey of return migrants to rural areas revealed that 80% of respondents left rural communities to pursue higher education. Finally, in the canton of Jura, a French-speaking region in northwest Switzerland, Rérat (2016) found lack of job opportunities as the primary reason for individuals not returning to rural communities, followed by staying with a partner.

The literature review points to two important overall conclusions. First, previous studies using census data, small-scale longitudinal studies, and in-depth qualitative approaches in Canada and elsewhere conclude that youth out-migration to urban

areas is very common and that once they leave, many do not return to rural areas. Therefore, using a nationally representative longitudinal survey, it is important to assess the overall magnitude of youth out-migration to urban areas and return migration back to rural areas. Second, youth out-migration and subsequent return migration may be motivated by multiple sets of characteristics, including demographic (e.g., age, sex, native-born status, and Aboriginal status), parental resource (e.g., parental income and education), familial (e.g., family structure and marital status), human capital (e.g., academic performance and education), and socioeconomic (e.g., employment and income) characteristics. As such, we examine the demographic, parental resource, familial, human capital, and socioeconomic predictors of youth out-migration and return migration.

3.0 Data and Methods

To investigate our research questions, we use two different data sources: Statistics Canada's Youth in Transition Survey, Cohort A (YITS-A), and T1 Family Filer tax data (T1FF). Targeting youth who were born in 1984 and enrolled in schools in one of ten Canadian provinces and tracking them longitudinally every two years from 2000 to 2010, the YITS-A data are particularly helpful in understanding the role of 'brain drain' on rural-urban migration. First, the data have information on the highest level of education of respondents and their parent(s). In addition, YITS-A data have been linked to youths' reading scores in the Programme for International Student Assessment (PISA), which measure a standardized international assessment of academic skills at the age of 15. Finally, Statistics Canada has recently linked the YITS-A data to T1FF tax filer data, which allow us to capture youths' postal codes of residence on an annual basis and to track their geographical movement from ages 15 to 30 (i.e., from 2000 to 2015).

Despite the aforementioned strengths, the sample is limited in two important ways. First, due to low linkage rates, we can only link YITS-A data to T1FF tax filer data from 2002 onward. Second, rural–urban migration can only occur among rural respondents. Therefore, we restrict our sample to those who lived in rural areas at the age of 17 (i.e., in 2002). Similarly, return migration can only happen among those urban residents who migrated from rural areas. For this reason, we choose the respondents who have moved to urban areas between the age of 17 (i.e., in 2002) and 25 (i.e., in 2010) and who stayed in urban areas until the age of 25 as a study sample for return migration analysis. This 25-year-old cut-off point is selected due to a limitation of data. Specifically, after the age of 25, education can only be identified among respondents with tuition credits. While tuition credits may be treated as a marker of the attendance of post-secondary institutions, this approach unfortunately does not explicitly indicate level of education (i.e., college–trade, university or higher). For both rural–urban migration and return migration, we use Statistics Canada's postal code conversion file (PCCF+) to extract geographic information through the urban-rural code to create the urban-rural place of residence variable. To this end, we have two analytical samples in this study, namely 2,400 respondents who lived in rural areas at the age of 17 (weighted sample=55100) and 1,100 respondents who migrated to urban areas between the age of 17 and 25 and stayed in urban areas until the age of 25 (weighted sample=25300).

3.1 Dependent Variables

In this study, there are two main dependent variables. For one, we capture the first rural–urban migration by the age of 30. Specifically, this variable enables us to understand the risk associated with migrating from 2002 to 2015 (i.e., from age 17 to 30). For another, we capture the first return migration from urban to rural areas. To create this variable, we first limit the sample to the respondents who left rural areas between 2002 (i.e., age 17) and 2010 (i.e., age 25) and stayed in urban areas throughout until 2010. This sample restriction allows us to examine the risk associated with returning to rural areas from 2010 to 2015 (i.e., from age 25 to 30). For both variables, respondents who had not experienced 'failure' (i.e., out-migrated or return migrated) by the final data point (i.e., 2015 or age 30) are considered left-censored.

3.2 Independent Variables

Based on the literature review, we introduce five blocks of independent variables in this study: demographic, parental resource, familial, human capital, and socioeconomic variables. There are five demographic variables, including (a) visible minority status (0=not visible minority; 1=visible minority), (b) aboriginal status (0=not aboriginal; 1=aboriginal), (c) foreign-born status (0=not foreign-born; 1=foreign-born), (d) province of residence (0=Newfoundland and Labrador; 1=Prince Edward Island; 2=Nova Scotia; 3=New Brunswick; 4=Quebec; 5=Ontario; 6=Manitoba; 7=Saskatchewan; 8=Alberta; 9=British Columbia), and (e) sex (0=female; 1=male). Two parental resource variables include parental education (0=high school or less; 1=college/trade; 2=university or higher) and logged parental income (continuous scale). Familial variables capture familial relations such as family structure (0=two biological parents; 1=two parents, other; 2=single parent) and marital status (0=never married; 1=currently married; 2=common-law; 3=formerly married). Two human capital variables are respondents' PISA reading scores (continuous scale) and education (0=high school or less; 1=college/trade; 2=university or higher). Finally, socioeconomic variables include logged income (continuous scale) and type of occupation (0=no employment; 1=primary/blue collar; 2=distribution; 3=white-collar). In this study, we treat marital status, income, and type of occupation as time-varying lagged variables.

3.3 Statistical Analysis

Due to the time-to-event nature of our dependent variables, we use a survival analysis to examine factors associated with the risk of (a) out-migration—moving from rural to urban areas for the first time by the age of 30 and (b) return migration—returning from urban to rural areas for the first time by the age of 30 (Cox & Oakes, 1984). With multiple relevant techniques available, Cox regression analysis is chosen for several reasons. For example, we can leave the baseline hazard function unspecified, indicating that the baseline hazard can take any form. In addition, because we have three time-varying variables in our analysis, it is important that, unlike other parametric models, Cox regression analysis allows us to incorporate time-varying variables. In this case, we are interested in the instantaneous rate of the first rural-urban migration and its subsequent return migration. This can be defined as a function of time-constant variables. We build ten models, five models each for out-migration and return migration. Demographic, parental resource, familial, human capital, and socioeconomic variables are sequentially added in Models 1, 2, 3, 4, and 5, respectively. Findings are shown with hazard ratios (HRs). HRs larger

than one indicate that respondents are more likely to move from rural to urban areas and return from urban to rural areas, while those smaller than one imply smaller odds of doing so. Sampling weights provided by Statistics Canada are applied to all analyses in this study.

4.0 Results

Table 1 shows the findings from the univariate analysis. Overall, our results show that the magnitude of out-migration far outpaces the magnitude of return migration. Specifically, we find that the great majority of respondents (70%) left rural for urban areas between the ages of 17 and 30. However, among those who left, only 24% of them returned to rural areas between ages 25 and 30. In addition, only few respondents are visible minority (2 and 3% for out-migration and return migration, respectively), aboriginal (3 and 4% for out-migration and return migration, respectively), foreign-born (11 and 12% for out-migration and return migration, respectively), and had a single parent (12 and 13% for out-migration and return migration, respectively). The largest number of respondents lived in Ontario (36% for both out-migration and return migration), followed by Quebec (35 and 33% for out-migration and return migration, respectively), and British Columbia (8 and 9% for out-migration and return migration, respectively). We also find that the percentage of respondents with a university degree or higher (36 and 42% for out-migration and return migration, respectively) is higher than that of their parent(s) (19 and 20% for out-migration and return migration, respectively).

Table 1. *Baseline Characteristics of Youth in Transition Survey (Cohort A)—Family File*

	Out-migration	**Return migration**
Migration by age 30		
No	30	76
Yes	70	24
Visible minority status		
Not visible minority	98	97
Visible minority	2	3
Aboriginal status		
Not aboriginal	97	96
Aboriginal	3	4
Foreign-born status		
Not foreign-born	89	88
Foreign-born youth and parents	11	12
Province of residence		
Newfoundland and Labrador	2	2
Prince Edward Island	1	1
Nova Scotia	7	6
New Brunswick	6	6

Table 1 continued		
Quebec	35	33
Ontario	36	36
Manitoba	1	1
Saskatchewan	1	1
Alberta	3	5
British Columbia	8	9
Sex		
Female	50	53
Male	50	47
Parental education		
High school or less	44	43
College–trade	37	37
University or higher	19	20
Logged parental income†	10.85	10.87
Family structure		
Two biological parents	73	74
Two parents, other	15	13
Single parent	12	13
Education		
High school or less	23	19
College–trade	41	39
University or higher	36	42
PISA reading scores†	521.28	537.22
Unweighted sample	2400	1100
Weighted sample	55100	25300

†Mean scores are reported for continuous variables

4.1 Cox Proportional Hazard Models

We employ a series of Cox proportional hazard models to examine the risks of moving from rural to urban areas. These findings are shown in Table 2 below. In Model 1, we find that two demographic variables are significantly associated with youth out-migration. Specifically, compared to those in Newfoundland and Labrador, respondents from Prince Edward Island (HR=0.636, $p<0.001$), Nova Scotia (HR=0.675, $p<0.001$), New Brunswick (HR=0.824, $p<0.05$), Quebec (HR=0.824, $p<0.05$), and Ontario (HR=0.787, $p<0.05$) are all less likely to leave rural areas. Similarly, male respondents are less likely to move to urban areas than their female counterparts (HR=0.894, $p<0.05$).

When we include parental resource variables in Model 2, with respondents whose parents have college–trade degrees being more likely to leave rural areas than those whose parents have high school education or less (HR=1.116, p<0.05). Model 3 includes familial variables and shows that respondents with two non-biological parents are more likely to out-migrate to urban areas than their counterparts with two biological parents (HR=1.307, p<0.001). Also, respondents in common-law relationships are more likely to move to urban areas than their never-married counterparts (HR=1.031, p<0.05).

Moreover, we find PISA reading scores and education are significant predictors of youth out-migration in Model 4. PISA reading scores are positively associated with youth out-migration (HR=1.001, p<0.001), indicating that respondents with higher reading skills are more likely to leave rural areas than those with lower reading skills. Compared to those with high school education or less, respondents with college–trade education (HR=1.279, p<0.01) and university education or higher (HR=1.327, p<0.01) are more likely to move to urban areas. It is noteworthy that the role of sex and parental education on youth out-migration is fully attenuated in Model 4 when we account for human capital variables.

Finally, our analysis reveals in Model 5 that income is positively associated with youth out-migration (HR=1.063, p<0.001), indicating that respondents with higher income are more likely to leave rural areas than those with lower income. Also, respondents with employment in distribution (HR=1.071, p<0.001) and white-collar (HR=1.076, p<0.001) sectors are more likely to move to urban areas than their counterparts without any employment. When we account for socioeconomic variables in Model 5, we observe the relationship between youth out-migration and foreign-born status is suppressed by labor market characteristics, making it statistically significant in Model 5.

Table 2. *Cox Proportional Hazard Models Predicting the Risk of 'Migrating to Urban Areas' Between Ages 17 and 30*

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Visible minority status					
Not visible minorities	-	-	-	-	-
Visible minorities	1.002	1.002	1.041	1.019	0.942
Aboriginal status					
Not aboriginal	-	-	-	-	-
Aboriginal	1.232	1.248	1.186	1.204	1.224
Foreign-born status					
Not foreign-born	-	-	-	-	-
Foreign-born	1.185	1.181	1.195	1.144	1.189*
Province					
Newfoundland and Labrador	-	-	-	-	-
Prince Edward Island	0.636***	0.644***	0.634***	0.632***	0.624***
Nova Scotia	0.675***	0.678***	0.665***	0.666***	0.694***
New Brunswick	0.824*	0.830*	0.814*	0.819*	0.838

Table 2 continued

Quebec	0.824*	0.837*	0.797*	0.812*	0.796*
Ontario	0.787*	0.793*	0.773*	0.774*	0.746**
Manitoba	1.258	1.241	1.231	1.188	1.197
Saskatchewan	1.290	1.290	1.234	1.214	1.127
Alberta	0.906	0.924	0.909	0.904	0.861
British Columbia	0.992	0.996	0.972	0.946	0.901
Sex					
Female	-	-	-	-	-
Male	0.894*	0.893*	0.908*	0.982	0.975
Parental education					
High school or less		-	-	-	-
College/trade		1.116*	1.115*	1.053	1.049
University or higher		1.108	1.109	1.033	1.065
Logged parental income		0.985	1.004	0.983	0.975
Family structure					
Two biological parents			-	-	-
Two parents, other			1.307***	1.338***	1.343***
Single parent			1.190	1.218	1.279
Marital status†					
Never married			-	-	-
Currently married			1.011	1.014	1.002
Common-law			1.031*	1.036*	1.026
Formerly married			0.992	1.001	1.000
Education					
High school or less				-	-
College/trade				1.279**	1.201*
University or higher				1.327**	1.247*
PISA reading scores				1.001***	1.001***
Logged income†					1.063***
Type of occupation†					
No employment					-
Primary/blue collar					0.967
Distribution					1.071***
White-collar					1.076***
Log pseudo-likelihood	-4185918	-4185473	-4183408	-4177198	-4162187

†We treat martial status, logged income, and type of occupation as lagged variables
*p<0.05, **p<0.01, ***p<0.001; results shown with hazard ratio

We also employ multivariate analysis to examine the characteristics associated with the risks of returning from urban to rural areas. These findings are shown in Table 3 below. Model 1 shows province as the only significant demographic predictor of returning from urban areas. Respondents in Prince Edward Island (HR=2.728, $p<0.01$), Nova Scotia (HR=2.229, $p<0.05$), and New Brunswick (HR=1.928, $p<0.05$) are more likely to return to rural areas than their counterparts in Newfoundland and Labrador. While parental resource variables are not significantly associated with return migration in Model 2, we find in Model 3 that formerly-married respondents (HR=1.302, $p<0.05$) and those with two non-biological parents (HR=1.486, $p<0.05$) are more likely to return to rural areas than never-married respondents and those with two biological parents, respectively. In Model 4, it is observed that PISA reading scores are negatively associated with returning to rural areas (HR=0.997, $p<0.001$), indicating that respondents with higher PISA reading scores are less likely to move back to rural areas than their counterparts with lower scores. Importantly, the role of parental education is suppressed by PISA reading scores in Model 4, showing that respondents whose parents have college–trade education (HR=1.375, $p<0.05$) and university education or higher (HR=1.459, $p<0.05$) are significantly more likely to return to rural areas than those whose parents have high school education or less. Adding socioeconomic variables in Model 5, we find that income is negatively associated with returning to rural areas (HR=0.955, $p<0.01$), indicating that respondents with higher income are less likely to move back to rural areas than those with lower income.

Table 3. *Cox Proportional Hazard Models Predicting the Risk of 'Returning Back to Rural Areas' Between Ages 25 and 30*

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Visible minority status					
Not visible minorities	-	-	-	-	-
Visible minorities	1.031	1.048	1.087	1.007	1.022
Aboriginal status					
Not aboriginal	-	-	-	-	
Aboriginal	1.342	1.337	1.174	1.091	1.080
Foreign-born status					
Not foreign-born	-	-	-	-	-
Foreign-born	0.878	0.864	0.823	0.857	0.857
Province					
Newfoundland and Labrador	-	-	-	-	-
Prince Edward Island	2.728**	2.732**	2.598**	2.880**	2.960**
Nova Scotia	2.229*	2.219*	2.145*	2.270*	2.321**
New Brunswick	1.928*	1.924*	1.876*	1.937*	1.980*
Quebec	1.540	1.577	1.485	1.700	1.744
Ontario	1.767	1.772	1.730	1.848	1.927

Table 3 continued

Manitoba	1.220	1.199	1.272	1.422	1.433
Saskatchewan	0.494	0.497	0.515	0.539	0.549
Alberta	0.699	0.717	0.726	0.818	0.851
British Columbia	0.678	0.650	0.619	0.658	0.662
Sex					
Female	-	-	-	-	-
Male	0.916	0.913	0.910	0.834	0.858
Parental education					
High school or less		-	-	-	-
College–trade		1.275	1.262	1.375*	1.395*
University or higher		1.348	1.317	1.453*	1.459*
Logged parental income		0.988	1.038	1.048	1.056
Family structure					
Two biological parents			-	-	-
Two parents, other			1.486*	1.475*	1.468*
Single parent			1.234	1.193	1.194
Marital status†					
Never married			-	-	-
Currently married			0.931	0.934	0.936
Common-law			0.945	0.939	0.952
Formerly married			1.302*	1.281*	1.283*
Education					
High school or less				-	-
College–trade				0.845	0.854
University or higher				0.942	0.970
PISA reading scores				0.997**	0.997**
Logged income†					0.955**
Type of occupation†					
No employment					-
Primary–blue collar					1.098
Distribution					0.855
White-collar					1.101
Log pseudo-likelihood	-604492	-604109	-602736	-601552	-600947

†We treat martial status, logged income, and type of occupation as lagged variables
*p<0.05, **p<0.01, ***p<0.001; results shown with hazard ratio

5.0 Discussion and Conclusions

Population growth in many major cities is partly driven by migration from rural areas, which constrains these communities' economic, social, cultural, and political development. Reflecting on this concern, a growing body of literature aims to understand the determinants of youth migration in the context of rural brain drain. Our study contributes to the existing literature in several important ways. First, we empirically map out the magnitude and characteristics of youth who move from rural to urban areas. Second, this study examines the magnitude and predictors associated with return migration from urban to rural areas, which has been scarcely studied in the literature. Third, previous research on urban-rural migration in Canada is often conducted at the provincial level with cross-sectional data. We make a unique methodological contribution by linking Statistics Canada's YITS-A, youths' reading scores in the PISA, and T1FF tax filer data while tracking youth's out-migration and return migration longitudinally at the national level. While previous studies using census data commonly identify basic demographic variables such as education, age, and sex as predictors of youth's migration, combining these data allows us to explore other potential factors, such as students' previous academic achievement as well as labour market and familial trajectories in adulthood. To this end, our findings set the stage for policymakers in their targeted efforts to keep and attract skilled, educated workers in rural areas.

Findings from our analysis point to the possibility that brain drain is shaped by youth out-migration to urban areas. We find that respondents with college–trade and university or higher education are more likely to migrate from rural to urban areas than those with high school education or less. This observation is consistent with previous studies, which suggest that educational level in rural areas remains lower than in urban areas (Carr & Kefalas, 2009; Clemenson & Pitblado, 2007; Dupuy et al., 2009; Gabriel, 2006; Wells et al., 2019). These findings may be further explained by limited PSE opportunities in rural areas. Evidently, research shows that youth plan on leaving rural locations, particularly those with higher academic performance, to attend PSE in urban areas (Bourgeois & Kirby, 2012; Malatest et al., 2002). In this context, it is not too surprising that youth with higher PISA reading scores are more likely to move to urban settings. Considering PSE attainment as a key to success in Canada's knowledge-based economy, youth in rural areas who are 'smart enough to leave' may be more likely to move to urban areas, contributing to unequal distribution of human capital between rural and urban regions.

Moreover, economic patterns of youth out-migration are interesting. Although previous studies largely point to lack of job opportunities as motivation for moving to urban areas (Demi et al., 2009; McLaughlin et al., 2014), our analysis reveals that it is higher income and employment in distribution and white-collar sectors that lead to increased chances of youth leaving rural areas. We provide some explanation for these results. For example, it is likely that youth receive crucial human capital through employment, such as job-related training and experience. While accumulating human capital over time and moving up from entry-level positions to those that require higher skills, young people may face a limited pool of professional positions in rural communities, which potentially shapes their tendency to look for other employment opportunities in urban centers (Davies, 2008). In addition, research points to rural-urban migration as driven by lifestyle factors. According to Corbett (2010), there is a distinction in youths' understanding of urban and rural spaces. Although rural spaces are often perceived as safe, the perception of rural

communities as boring often fuels youths' desire to move to urban areas. In this context, higher income may serve as a ticket for an urban lifestyle that is considered more exciting. These mechanisms may partly explain why income and employment rates are lower in rural areas than in urban areas, as illustrated by previous studies (Looker & Naylor, 2009; Moazzami, 2015a).

Our analysis also points out that young people's return migration patterns are not those of an upskilling nature or suggestive of brain gain. Rather, once youth move to urban areas, those with higher PISA reading scores are less likely to return to rural regions. This finding may be explained by Malatest and colleagues' (2002) observation that youth who stay in rural areas are often perceived as 'not smart enough' in their communities. Extending this explanation to return migration, there may be a social stigma attached to returning to their small rural communities, particularly among young people who had performed well academically in high school (Corbett, 2010). Therefore, it is possible that young people who are 'smart enough' to leave their rural communities may stay in urban areas, irrespective of their economic and social experiences there. We also observe lower income as a key determinant of returning to rural communities. Lack of economic opportunities in rural areas is considered a contributing factor for youth to move to urban areas (Rérat, 2016; von Reichert et al., 2014a). Thus, it is not too surprising that young people are more likely to return to rural areas when they cannot achieve the financial success they had expected out-migrating to an urban setting. Youth's difficulty in achieving financial success may also be particularly detrimental in urban areas where the cost of living is substantially more expensive. In this context, return migration can be used as a survival strategy as some youth may be able to rely on social supports that are available from family members and friends in their rural communities (Bourgeois & Kirby, 2012; Demi et al., 2009; McLaughlin et al., 2014).

In addition to human capital and economic factors, we identify several demographic, parental resource, and familial factors as significant determinants of youth out-migration and return migration. For example, youth in Newfoundland and Labrador have higher odds of moving to urban areas compared to their counterparts in Prince Edward Island, Nova Scotia, Quebec, and Ontario. However, the odds of returning to rural areas are lower for Newfoundland and Labrador than other Atlantic Canadian provinces, such as Prince Edward Island, Nova Scotia, and New Brunswick. As one of the most geographically disadvantaged provinces, residents in Newfoundland and Labrador often have limited access to social services and economic opportunities, due to long and expensive commuting from rural communities to urban centers (Greenwood & Pike, 2011). Consequently, staying in and returning to rural areas may be particularly challenging in Newfoundland and Labrador. Moreover, we find that men are less likely to out-migrate than women, although this difference is fully explained by education. As argued by Corbett (2007), this phenomenon may be reflective of women's perception that they need to seek PSE due to limited employment opportunities for women in rural communities. Regarding the factor of foreign-born status, however, its role on youth out-migration is suppressed by economic factors such as income and employment, potentially suggesting that foreign-born children are as likely as their native-born counterparts to move to urban areas, despite their economic challenges in rural settings. This finding may be explained by lack of cultural diversity in many rural regions in Canada (Jentsch & Simard, 2016).

We also find that parental resources, particularly parental education, are significantly associated with youth out-migration and return migration. For out-migration, respondents whose parents have a college–trade degree are more likely to move to urban areas than those whose parents have a high school diploma or less, although this difference is fully explained by respondents' human capital factors such as education and PISA reading scores. Informed by previous studies (Artz & Yu, 2011; Looker & Naylor, 2009), this result may point to a mechanism where parental education is indirectly important in explaining youth's out-migration to urban areas through their children's academic performance and educational attainment. Interestingly, however, the role of parental education on return migration is suppressed by human capital factors, particularly PISA reading scores. This result may reflect behavioral characteristics of these parents. The majority of Canadians do not live in rural areas after attaining degrees from post-secondary institutions. Yet, these parents decide to settle and stay in rural areas; therefore, their idea of rural life may be different from that of the majority of parents, who often perceive rural areas as lacking social and economic opportunities for their children (Auclair & Vanoni, 2017; Rothwell et al., 2002). It is possible that educated parents in rural areas expose their children to the benefits of rural life from early childhood through daily social interactions, potentially creating a unique environment to tackle social stigmas associated with returning to rural areas.

Familial factors are also significantly associated with youth out-migration and return migration. For example, youth with two biological parents have lower odds of moving to urban centres. While previous research highlights the importance of family connection (Bourgeois & Kirby, 2012; Demi et al., 2009; McLaughlin et al., 2014; von Reichert et al., 2014a), this result points to the heterogeneity of family relations in the context of youth migration. This observation may be explained by Mitchell (2006), who identifies that the probability of leaving their parental home is higher for children from non-intact families than those from intact families. In this context, out-migration may be a direct consequence of leaving their parental home and seeking employment and social opportunities in urban centers. In addition, the formerly married are more likely to return to rural areas than the never married. Marital disruption often creates an environment where individuals lack social support, economic security, and psychological wellbeing (Amato, 2010). Accordingly, it is possible that formerly married people move back to rural areas where social, economic, and psychological supports may be available from family and community resources.

Overall, the current study documents the losses of human capital in rural areas. Largely consistent with the literature, the 'leavers' are more educated with higher levels of employability and income than the 'stayers.' Importantly, we also observe that the 'returners' come back to rural areas as a result of economic constraints in urban areas. We find little evidence to suggest that returners in Canada are 'high fliers,' as suggested by Carr and Kefalas (2009), but do appear to resemble 'boomerangs' returning in the face of urban adversities. In this context, we provide several important policy recommendations. For one, it is likely that student migration for PSE accounts for much of the in-migration of human capital to urban centers where a high degree of human capital already exists. Therefore, student migration for higher education may be a crucial predictor when considering the dilemma of brain drain (Winters, 2011).

To attract highly educated individuals to stay, rural communities could use incentives similar to those used by provinces to entice youth who came there for PSE to seek employment and settle in their province. Another suggestion would be for these areas to establish satellite campuses and to develop bursaries to help rural students afford higher education, with an aim to draw students to return to rural areas for work (Corbett, 2009; Malatest et al., 2002). Moreover, as proposed by earlier studies (Artz & Yu, 2011; Corbett, 2009), we argue that rural communities need something to draw educated youth back in, such as striving to provide a variety of services, social opportunities, and good-paying jobs. For example, some rural communities have launched 'brain gain' campaigns to attract immigrants and encourage young people to return to their towns after PSE. Similarly, improving career opportunities is essential for making rural living more attractive. For instance, it may be helpful to provide greater opportunities for technical–trades training, to have local employers provide entry-level positions and summer employment for youth to fill, and to establish greater awareness of the career options available in rural schools and businesses (Robichaud, 2013). Finally, it is important to reduce the social stigma attached to staying in and coming back to rural areas. To address this concern, it may be equally useful to create opportunities for youth to learn the benefits of rural life within primary and secondary institutions as part of educational curriculum.

Nevertheless, there are several limitations to this study. Research shows field of study as a determinant of youth out-migration and PSE choices. Specifically, majoring in agriculture or life sciences is associated with higher odds of settling in rural locations, while those in liberal arts, sciences, and engineering are more likely to live in urban locations (Artz & Yu, 2011; Hango, Zarifa, Pizarro Milian, & Seward, 2019). Due to sample size issue, however, it is difficult to include a field of study variable to achieve appropriate statistical power in our analyses. In addition to field of study, the familiarity that comes from living in a small town is cited as a factor that may attract young people to stay in rural areas (Artz & Yu, 2011). However, we are not able to examine this relationship because the YITS does not have any variable that captures youth's sense of belonging in their hometown or community. Moreover, von Reichert and colleagues (2014b) found that returners usually spend a few years in urban areas before returning to rural areas, allowing them to obtain the educational and professional credentials required for employment in rural communities. Therefore, it is important to extend the length of our analysis to examine the return migration pattern. Unfortunately, due to a data limitation, we are only able to explore the five-year period (i.e., 2010 to 2015). Finally, as we employ a quantitative analysis, youth's lived experiences in relation to out-migration and return migration are not captured. Future research should adopt in-depth qualitative approaches to understand youth's reasons for moving to urban areas and returning to rural areas at the national level. Despite these limitations, this study is one of the few that explores youth's out-migration to urban areas and return migration to rural areas in Canada. This study reinforces educational, economic, and social opportunities as important predictors of youth's out-migration and return migration and adds to the plethora of evidence that underscores rural brain drain as a function of structural inequalities that largely derive from demographic, parental resource, familial, human capital, and economic characteristics.

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