The Effects of Capital on Interprovincial Migration:

A Nova Scotia Focused Assessment

Abstract: This paper examines the issue of interprovincial migration and its potential relationship to capital expenditure. This paper estimates and reviews the relationship between several variables and their effects on interprovincial migration; one of its main contributions is to analyze the effect of capital expenditure on net interprovincial migration. This issue was examined from a Nova Scotia perspective through both literature and an empirical model. A time-series cross sectional regression model found both median income and GDP per capita to be significant; both are influential explanatory variables. Capital expenditure was found to be statistically significant, but negatively related and negligible. Based on these findings and the literature review, four recommendations are proposed: continue with the status quo, incentivize return migration, provide a tax break for out of province commuters, and establish a system to expedite accreditation.

Authors: Amir Ahmadi Rashti, Adrian Koops, and Spencer Covey

1. Introduction

Migratory flows are not only a key issue in demographic change, but are an important policy consideration for any Canadian province. Provincial migration flows have implications for labour markets as they may affect the available labour pool and productivity of a region (Phyne, Harling-Stalker, Atlantic Metropolis Centre, 2012). Migration may also be affected by the implementation of various social assistance programs. Programs such as healthcare and unemployment insurance may influence regional migratory flows by incentivizing or disincentivizing individuals (Finnie, 2004). Furthermore, regional resources may be affected by fluctuations in migration, because resources are affected by an individual's net contribution to regional growth. Regardless of the adopted approach to provincial migration policy, it will always involve attraction and retention of people to provincial areas.

In this paper the authors study the aggregate determinants of net interprovincial Canadian migration, focusing on the influence that capital investment has on net Canadian migration flows. Principally, weighted interprovincial net migration data and a time-series cross sectional regression model are used to help evaluate capital investment as a significant determinant of interprovincial Canadian migration. A trend analysis assessing Nova Scotia's historical out-migration patterns is explored in conjunction with a brief analysis of literature relating to the determinants of aggregate interprovincial Canadian migration. Based on these findings, a series of policy recommendations are proposed.

The rest of the paper is structured as follows. Section 2 provides the demographic context for which this paper is based. Section 3 provides a trend analysis assessing Nova Scotia's historical out-migration patterns. Section 4 briefly examines the literature relating to interprovincial Canadian migration. Section 5 describes the statistical model used to test the relationship that capital investment has on interprovincial Canadian migration and reviews the data employed within this model by providing descriptions for selected variables. Section 6 provides the findings discerned from this model. Section 7 presents a discussion based on key findings. Section 8 states the limitations of this study. Section 9 proposes policy recommendations based on this research. Section 10 gives a brief opinion from the authors based the findings. Appendix A presents a case study that explores the causal relationship of

two capital investment projects within New Brunswick. Appendix B provides a list of all variables examined within the statistical model.

2. Demographic Context

Historically, migration within Atlantic Canada – with the exception of the First Nations – dates back to the 1700s and has resulted in cultural diversity and economic prosperity (Phyne *et al*., 2012). However, current migratory trends within Nova Scotia are contributing to serious demographic challenges for the province (OneNS Report, 2014). Largely, Nova Scotia faces a declining population and a shift in the complexion of age groups within the population (OneNS Report, 2014).

Recent estimates place Nova Scotia's population on a downward trajectory, projecting a population decline from 948,000 in 2011 to 926,000 by 2038 (OneNS Report, 2014). Out-migration has played a large role in this decline. From 1971 to 2012, the province had a persistent negative trend in net interprovincial out-migration (OneNS Report, 2014). Specifically, the province has had an average net loss of 1,472 people per year, from 2001 to 2011, due to interprovincial migration (Statistics Canada, 2014). In 2012, Nova Scotia recorded a net population loss of 0.5% solely due to interprovincial migration (Bendiner, 2013). Moreover, the median age for Nova Scotia is rising. In 2011, 16.5% of Nova Scotia's population was over the age of 64, 2.1% higher than the national average (Employment and Social Development Canada, n.d.). This aging population may be partially linked to the increased propensity of youth cohorts to migrate compared to their older counterparts (Bernard *et al*., 2008). Projections within the One Nova Scotia report estimate that from 2009 to 2034 the cohort aged 20 to 64 will decrease by 21%, while the cohort aged 64 and over will increase by 41% (OneNS Report, 2014). These shifting demographic figures amount to Nova Scotia's projected available labour pool declining by 20% by 2036 (OneNS Report, 2014). This potential distortion to the labour market could widen the gap between needed and available skills, and will be felt strongest within vulnerable economic sectors (Papademetriou, 2006).

Given these demographic projections, Nova Scotia cannot grow or sustain its population. As a result, current provincial living standards are in jeopardy because prosperity in employment, commerce, and public services depend on a dense and growing population (OneNS Report,

2014). This suggests that decisive policy is needed to address these demographically centred problems in order to enhance the province's likelihood of improved economic stability. Inaction may lead to greater economic instability and potential economic decline.

3. Interprovincial Migration in Nova Scotia

Historically, migration within Atlantic Canada – with the exception of the First Nations – dates back to the 1700s and has resulted in cultural diversity and economic prosperity (Phyne *et al*., 2012). However, current migratory trends within Nova Scotia are contributing to serious demographic challenges for the province (OneNS Report, 2014). Largely, Nova Scotia faces a declining population and a shift in the complexion of age groups within the population (OneNS Report, 2014).

Figure 1: Net interprovincial migration in Nova Scotia
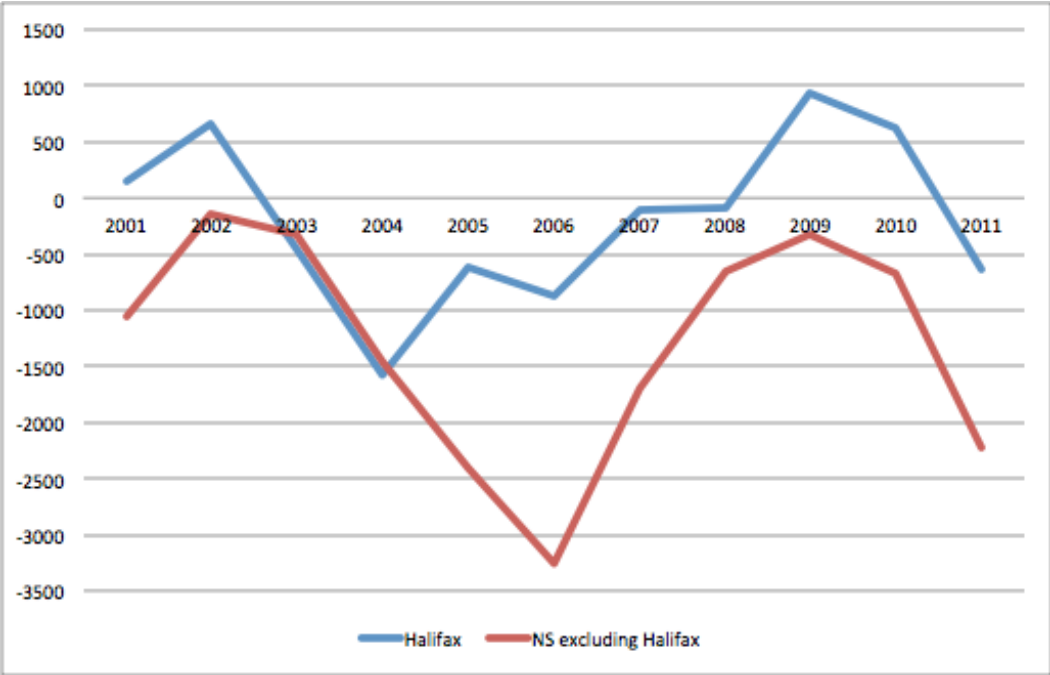
(Statistics Canada, Table 111-0029)

Figure 1 illustrates the differences in net interprovincial migration between Halifax and the rest of Nova Scotia. Halifax has had periods of positive interprovincial migration, the most recent occurring from 2008 to 2010, while the more rural areas of Nova Scotia have had negative interprovincial migration from 2001 to 2011.

Figure 2: Net migration for NS excluding Halifax
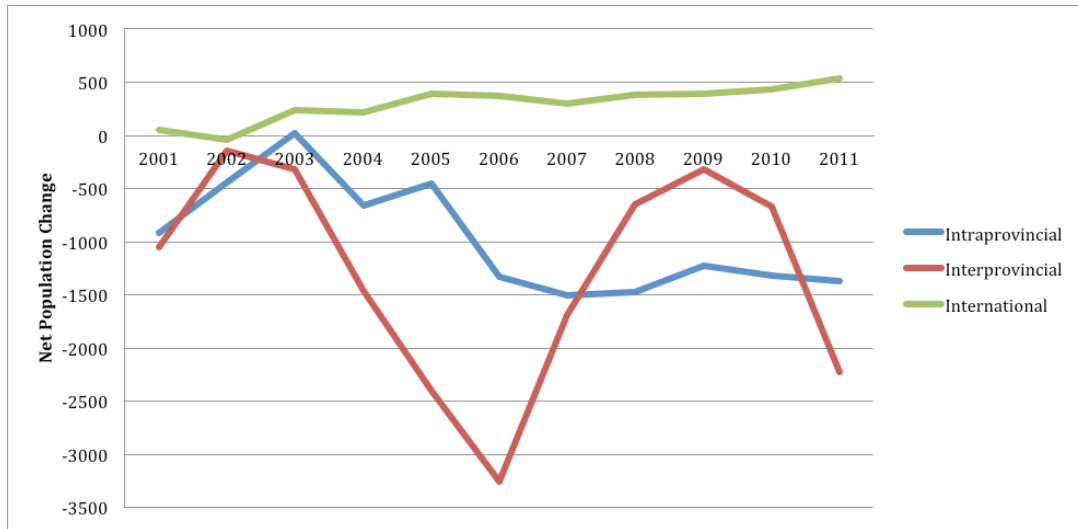
(Statistics Canada, Table 111-0029)

Figure 2 shows the net population change due to migration for Nova Scotia, excluding migration in Halifax. As evidenced in the figure above, the more rural areas of Nova Scotia have a continuous exit of migrants to more urban areas of the province, in addition to large out-migration to other provinces.

## Figure 3: Net migration for Halifax
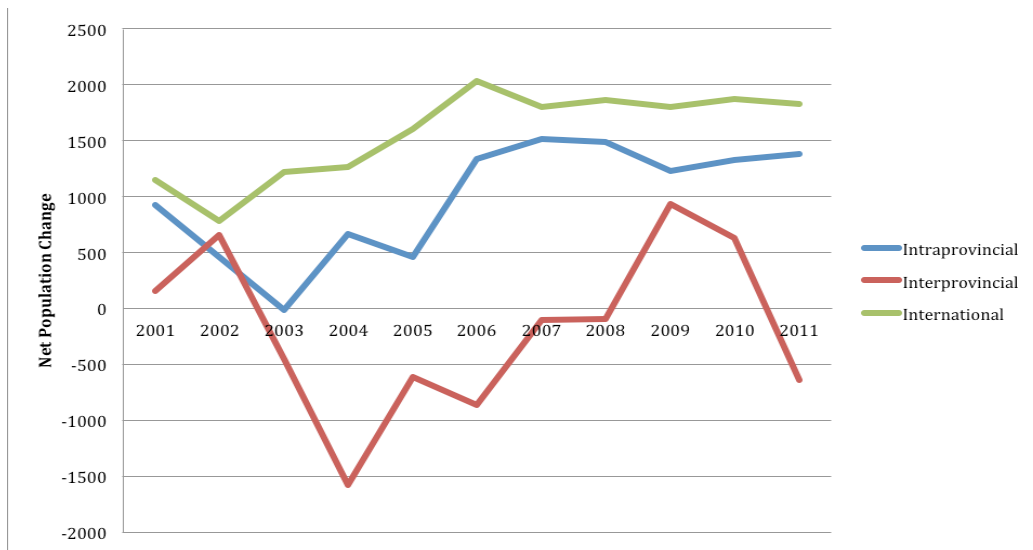
(Statistics Canada, Table 111-0029)

Figure 3 shows the net migration for Halifax. Halifax has experienced, at times, negative interprovincial migration with the most significant period of out-migration from 2004 to 2006. Halifax has a large number of individuals every year moving from rural areas to elsewhere in Nova Scotia.

Based on the migration trends in Nova Scotia, it is important to recognize the difference in out-migration between Halifax and Nova Scotia excluding Halifax. The decreasing populations of rural areas has been well documented in other provinces as well as other developed countries worldwide. Rural areas of Nova Scotia (Nova Scotia excluding Halifax in the data) have had negative interprovincial and intra-provincial data in the years examined from 2001 to 2011.

Figure 4: Destination for NS out-migrants
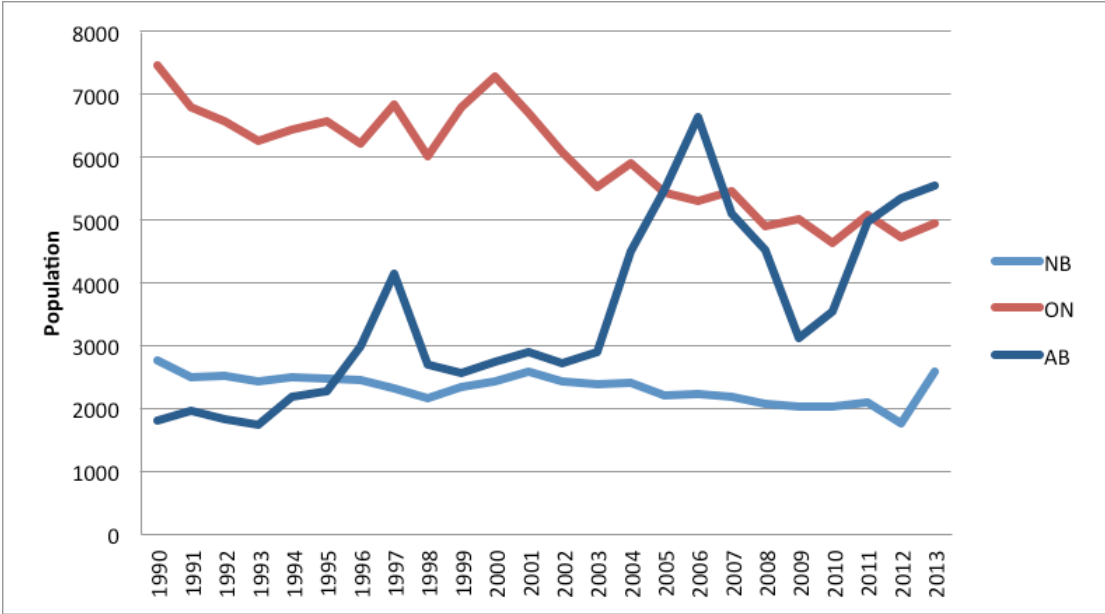
(Statistics Canada, Table 051-0019)

Figure 4 shows the destination for migrants originating from Nova Scotia. The three provinces shown in Figure 4 are the three most popular destinations for Nova Scotia residents. The number of people leaving to New Brunswick (NB), Ontario (ON), and other provinces has remained relatively stable in comparison to the number of people moving to Alberta (AB). The standard deviation of migrants moving to Alberta (1,425) is nearly double the standard deviation of migrants moving to Ontario (838). The variability in migrants leaving for Alberta

can be attributed to both a historic trend of migration to Alberta as well as the more recent development of the oil sands. Figure 4 shows the declining number of Nova Scotians moving to Ontario and the increasing popularity of Alberta as a destination.

Table 1: Interprovincial migration trends since 1971

	1971 - 2000	2001 - 2013
Out-migration to other provinces	19,008	16,811
In-migration from other provinces	18,925	15,128
Average net migration	-83	-1,683

(Statistics Canada, Table 051-0018)

Since 1971, Nova Scotia has averaged a net interprovincial migration loss of 567 people per year. Table 1 shows the difference in interprovincial migration between 1971 to 2000 and 2001 to 2013. Out-migration to other provinces has decreased over the last twelve years while in-migration from other provinces has decreased more substantially.

4. Examination of the Literature

The empirical literature examining the determinants of intra-Canadian migration is divided into micro and macro examinations. Micro examinations focus on what influences the decision-making process when a migrating entity (individual or group) is determining whether to remain in a location, and, if they choose to move, which destination they choose to move to (van der Gaag, van Wissen, Rees, Stillwell & Kuposzewski, 2003). The micro determinants of the decision-making process are often attributed to the characteristics of an individual, group, and destination. For example, age, marital status, family size, and individual labour market opportunities (relative unemployment rates, relative earnings) are just of few of the identified indicators in micro examinations of migration (van der Gaag et al., 2003; Finnie, 2004; Finnie, 1999).

Finnie's (2004) use of panel logit probability on data from 1982 to 1995 provides a recent Canadian analysis for some micro influences of interprovincial migration. Finnie indicates that

language is shown to have a large effect on migration through his examination of the relatively low rates of Francophone out-migration. Age is also related to mobility, with younger individuals more likely to migrate than older individuals (Finnie, 2004). Persons who are married and/or have children, are significantly less likely to migrate (Finnie, 2004). Finnie also indicates that mobility is positively related to whether an individual is the recipient of unemployment insurance. It should be noted that these findings are nuanced and hold various age and gender exceptions for each variable.

Conversely, aggregate examinations of migration attempt to objectively study the linkages between macro variables (i.e. unemployment and population differentials) with migratory flows (van der Gaag, et al., 2003). Within Canada, the literature examining aggregate migration often compares provincial data using gravity models with a variety of variables. Principally, the differentials in unemployment, earnings, and moving costs are strongly related to migration within Canada (Coulombe, 2006; Amirault, D., & de Munnik, D., & Miller, S., 2012; Day & Winer, 2006; Foot & Milne, 1984). While the preceding variables may be intuitive, recent Canadian literature has examined variables with a less apparent relationship, which are important for policy makers to understand.

For policy practitioners, the work of Day and Winer (2006) add to the literature by examining the influences of public policy within Canadian interprovincial migration. Using 1974 to 1996 aggregate data, Day and Winer conclude that public policy has a small impact on interprovincial migration. They state that the combined elimination of regional variations in unemployment insurance, personal income taxes, social assistance, and provincial and federal spending would raise the volume of migration between 0.5% and 5% (Day & Winer, 2006). However, two instances (the election of separatists in Quebec and the closing of the Atlantic cod fishery) were analyzed and assessed as causing a meaningful regional shift in interprovincial migration, which established that marginal policy changes and large policies changes must be distinguished (Day & Winer, 2006). Day and Winer's findings are a part of a growing body of literature that counters earlier findings that indicate the strong effects of policy-induced migration (Day & Winer, 2006; Shaw, 1986). If policy formulation is used as a means to intervene with current migratory flows, the absence of conclusive empirical findings on the effectiveness of policy-induced migration needs to be stated.

The work of Coulombe (2006) better situates the effect of market forces by examining how structural and cyclical asymmetric shocks relate to interprovincial migration. His results conclude that there is no meaningful relation between asymmetric shocks and the business cycle (Coulombe, 2006). This finding is an important consideration in policy formulation given the volatility of short-term business cycles in many Canadian regions (Coulombe, 2006). Coulombe concludes that the real drivers of interprovincial migration are structural and related to rural urban structures, and long-run differentials in unemployment and labour productivity.

Amirault et al. (2012) explore Canadian migration by using intra-provincial data (not common in the literature). Using a gravity model, the authors substantiate past results by finding that differences in employment rate, household income, and language are important in explaining migration (Amirault et al., 2012). More significantly for policy formulation, the authors found that provincial borders pose a statistically significant obstruction to interprovincial mobility, with the predominance of Canadian migration occurring intra-provincially (Amirault et al., 2012). Depending on the region, intra-provincial movements may be 10% to 98% higher than interprovincial movements (Amirault et al., 2012). Additionally, the authors found that the meaningful determinant of distance has been decreasing over time, indicating that individuals are more willing to move to regions further away (Amirault et al., 2012). For policy practitioners, the diminishing importance of distance is an important finding because regional competition for labour is less restricted to a region's surrounding provinces.

Much of the literature for capital investment does not present a meaningful assessment of its relation to interprovincial Canadian migration. Rather, the literature situates itself within the Keynesian theory, which states that capital investment is a crucial variable when assessing changes in aggregate unemployment (Stockhammer, 2011). This notion is rooted in the principle that investment expenditures are a more important determinant of unemployment than labour market institutions (Stockhammer, 2011). A debate still remains regarding the degree to which capital investment determines unemployment, but there is consensus that it has an important effect. Thus, studies on interprovincial Canadian migration often position capital investment as a component of unemployment, but do not directly test for its effects.

What emerges from scanning the literature is that although both micro and aggregate forms of inter-Canadian migration are being examined in a variety of important ways, the authors are

not aware of a recent Canadian study that focuses on testing the relationship of capital investment directly with interprovincial Canadian migration. While studies such as Day and Winer (2006) include measures of capital expenditure, they are narrow and do not utilize recent Statistics Canada data.

5. Econometric Model, Data and Indicators

In order to understand the effect that capital investment has on interprovincial Canadian migration, it is necessary to attempt to predict and measure migration and its various determinants. Without a model of migration, predicting behaviour and proposing recommendations regarding capital investment is limited. This section explains the econometric model used to test the effect capital investment has on interprovincial Canadian migration.

The authors were unable to proceed with the intended gravity model structure that is common in the literature for macro studies of interprovincial migration. This exclusion was due to time and data constraints. For example, compiling the approximate distances necessary for the gravity model would have required using satellite software, such as Google Maps, to measure all distances between all Canadian regions. This is a time intensive process that would take longer than the time allotted for this study. Due to this and other data and time limitations, the authors did not examine migration regionally and instead took a solely interprovincial approach. This approach was dependent on Statistics Canada's annual provincial data. The relatively simple nature of an interprovincial examination was suited to Ordinary Least Squares regression techniques.

The selected test was a time-series cross-sectional regression (TCSCREG), using SAS Enterprise Guide 6.1 (SAS Institute Inc, 2013). This test was adopted after a simple linear regression revealed significant positive auto-correlation between errors for the year and province variables. Auto-correlated errors revealed a violation of the independence assumption of simple linear regression. The TSCSREG procedure in SAS was used to deal with the panel data set consisting of time series observations (years) on each of several cross-sectional units (provinces) (SAS, 2014). By adjusting for these two dimensions, time-series cross sectional regression can help mitigate potential unobserved heterogeneity issues (Amirault *et al.*, 2012).

5.1 Data and Indicators

Table 2 presents the indicators used in the chosen econometric model, as well as a description of the indicator and the reason for its inclusion. The indicators were chosen as a result of the literature review and their availability. Other indicators were considered, but were excluded due to multicollinearity, data accessibility, or time feasibility.

Based on the literature, the authors hypothesize that differentials in cost of living, economic growth, income, and capital investment between provinces will be significant indicators in predicting interprovincial migration.

Table 2: Model Indicators with brief description and rationale

Indicator	Description	Reason for Inclusion
Interprovincial Migration	The interprovincial net migration as a proportion of provincial population (referred to as 'weighted' throughout the remainder of this document)	Included as a direct indicator for interprovincial net migration, accounting for differences in province size
Unemployment Rate	Percentage of the total labour force that is unemployed but actively searching for work	Included as a potential indicator of labour market activity
Participation Rate	Proportion of people aged 15 and over who are employed over each province's overall population size	Included as a potential indicator of labour market activity
Labour Productivity	Amount of goods or services produced by one hour of labour	Included as a potential indicator of economic growth
GDP/Capita	Total output per person of each province. Transformed to log$ for model	Included as a potential indicator of relative economic growth and individual prosperity

Consumption Tax	Tax on goods and services spending	Included as a potential indicator of tax burden and cost of living
Consumer Price Index (CPI)	Market price level of a basket of goods and services purchased by households	Included as a potential indicator of changes in consumer prices and as a measure of cost of living
Median Total Income	Income that divides the income distribution of a province into two equal groups. Transformed to log$ for model	Included as an indicator of income prosperity
Capital Expenditure	Total construction, and machinery and equipment expenditure. Transformed to log$ for model	Variable of interest

5.2 Time Series Cross-sectional Regression

The following equation was developed using the indicators selected. The model is an Ordinary Least Squares Regression with net inter-provincial migration as the dependent variable.

Equation 1: Time-series cross sectional model equation

$$Y_{it} = B0 + B_1X_{1it} + B_2X_{2it} + \dots B_{10}X_{10it} + v_i + e_t + E_{it}$$

i = 1,...10 is the individual (province) index, t = 1,...10 is the time (year) index

Y_{it} = outcome for *weighted net inter-provincial migration*

B0 = parameter estimate for the *intercept*

B_1X_{1it} = parameter estimate of the effect on *Participation Rate*

B_2X_{2it} = parameter estimate of the effect on *Labour Productivity*

B_3X_{3it} = parameter estimate of the effect on *Consumption Tax*

B_4X_{4it} = parameter estimate of the effect on *Unemployment Rate*

B_5X_{5it} = parameter estimate of the effect on *CPI*

B_6X_{6it} = parameter estimate of the effect on *Population*

B_7X_{7it} =parameter estimate of the effect on *GDP/Capita (log$)*

B_8X_{8it} = parameter estimate of the effect on *Median Total Income (log$)*

B_9X_{9it} = parameter estimate of the effect on *Capital Expenditure (log$)*

v_i = cross-sectional variance component

e_t = time series variance component

E_{it} = error variance component

Estimation method: RanTwo

6. Findings: Model and Coefficient Estimates

R-Square: 0.50

Y_{it} = -.860 + 0.133 (Median Income [log$])$_{it}$ + -0.001 (CPI) $_{it}$ + 0.086 (GDP/Capita [log$]) $_{it}$ + -0.004 (Total Capital Expenditure [log$])$_{it}$

Table 3: Time-series cross sectional regression explanatory variables

Variable	Anticipated Result*	Actual Result*	Coefficient Estimate
Participation Rate	Not significant	Not significant (p > 0.551)	-0.0002

Labour Productivity	Not significant	Not significant (p > 0.352)	0.0001
Consumption Tax	Not significant	Not significant (p > 0.593)	0.0002
Unemployment Rate	Significant	Not significant (p > 0.192)	0.0003
CPI	Significant	Significant (p > 0.000)	-0.001
GDP/Capita (log$)	Significant	Significant (p > 0.035)	0.086
Median Total Income (log$)	Significant	Significant (p > 0.000)	0.134
Total Capital Expenditure (log$)	Significant	Significant (p > 0.049)	-0.003

*All results were considered at the 95% significance level

The coefficient estimate for *Participation Rate* (-0.0002) was negatively related to weighted interprovincial net migration, but statistically insignificant and close to zero. This result suggests that the ratio between the labour force and the overall size of the provincial population was not a significant determinant of interprovincial net migration.

The coefficient estimate for *Labour Productivity* (0.0001) was positively related to weighted interprovincial net migration, but statistically insignificant and close to zero. This result suggests that the amount of goods and services produced within an hour, as an indicator of economic growth, were not a significant determinant of interprovincial net migration.

The coefficient estimate for *Consumption Tax* (0.0002) was positively related to weighted interprovincial net migration, but statistically insignificant and close to zero. This suggests that

differing amounts spent on tax of goods and services was not a determinant of interprovincial net migration.

The coefficient estimate for *Unemployment Rate* (0.0003) was positively related to weighted interprovincial net migration, but statistically insignificant and close to zero. This suggests that the percentage of total labour force unemployed, but actively seeking employment, was not a significant determinant of interprovincial net migration.

The coefficient estimate for *CPI* (-0.001) was statistically significant and negatively related to weighted net interprovincial migration, but close to zero. This suggests that changes to the average price of a basket of goods between provinces will have a significant and inverse effect on interprovincial net migration. However, the coefficient estimate is close to zero and therefore has reduced practical application in this scenario.

The coefficient estimate for the log of *GDP/Capita* (0.086) was significant and positively related to weighted interprovincial net migration. This suggests changes in GDP per capita, as a measure of individual standard of living, will have a significant positive effect on interprovincial net migration. The coefficient estimate, in this case, appears large enough for it to have a meaningful effect on interprovincial net migration.

The coefficient estimate for the log of *Median Total Income* (0.134) was significant and positively related to weighted net interprovincial migration. This suggests that increasing median total income was positively related to increasing interprovincial net migration. The coefficient estimate was the largest in the model, both before and after accounting for differences in variable units, which suggests that a one unit change in median total income will have the largest effects on interprovincial net migration.

The coefficient estimate for the log of *Total Capital Expenditure* (-0.003) was significant and inversely related to weighted net interprovincial migration, but close to zero. This suggests that changes to total capital expenditure will have an inverse effect on interprovincial net migration. However, due to the small coefficient, these changes do not appear meaningful.

Of the variables deemed significant within the model, CPI, Median Total Income, and GDP/Capita behave as expected, and in a manner supported by the literature. Within the

model, an increase in the CPI within a province results in higher out-migration. This suggests cost of living is a deciding factor for interprovincial migration. In contrast, an increase in total median income results in a substantial decrease in out-migration. Again, this aligns with the literature, and the intuitive notion that income and wage disparity play a significant role in migration. Out-migration and GDP per capita are inversely related in this model, therefore suggesting that as the relative standard of living increases in each province the level of out-migration decreases.

The primary variable of interest, Total Capital Expenditure, did not behave as expected. Expectations were of an insignificant-to-marginally positive effect on weighted migration. This is due to an expectation that many of the migration forces related to capital expenditure are more accurately captured in capital's effect on unemployment and wage differences. However, the model rejects unemployment as a significant determinant and suggests a negative relationship between weighted migration and capital investment. This result is contrary to empirical findings in the literature, suggesting unemployment rate is an important interprovincial determinant (Coulombe, 2006; Amirault, D., de Munnik, D., & Miller, S., 2012; Day & Winer, 2006; Foot & Milne, 1984).

7. Discussion

Both the literature (by omission) and the regression model suggest that focusing on capital as a means of retaining residents may be misplaced in comparison to the creation of high-income jobs. While large capital projects have the potential to create high-income jobs, the authors have found little evidence that large capital projects are efficient at creating long-term high-income jobs. Nova Scotia cannot compete with other provinces that offer significantly higher wages. The best way to retain these individuals may be to further develop the Nova Scotian economy by focusing on industries offering high wages.

Based on migration trends, Nova Scotia's rural areas will continue to see widespread out-migration to both Halifax and other provinces in search for employment (Statistics Canada, Table 111-029). Although Halifax also experiences out-migration, it does not experience out-migration at a rate similar to that of the rural areas of Nova Scotia (Statistics Canada, Table

111-029). Empirical studies within the literature have shown that individuals are attracted to urban centres, whether within the province or elsewhere (Amirault et al., 2012).

Throughout the literature there is no evidence that large capital projects have a significant impact on out-migration. This finding is consistent with the regression results showing that capital expenditures had no meaningful influence on migration patterns. The results show that capital had a small negative influence on migration compared to the larger positive influence of median income.

Nova Scotia should seek to alleviate barriers to both entry and exit. While this point may seem counter-intuitive, the lessening of provincial barriers may assist Nova Scotia in the long run, making migration to the province easier. Freer flows of migration between Nova Scotia and other provinces may also help to more efficiently address skills gaps in Nova Scotia's current and future workforce. To support interprovincial migration, Nova Scotia should conduct a wide-spread analysis of credentialing programs with a focus on trades and further recent work in recognizing credential equivalencies from other provinces.

Given the historical trend of migration in Nova Scotia, it is expected that when the median income is higher in other areas of Canada, and migration is easy, then residents will continue to migrate. Increasing the median wage in Nova Scotia through the development of high-income industries should be the goal of Nova Scotia. When other areas of Canada are offering higher wages, Nova Scotia can only retain these individuals by offering competitive wages.

8. Limitations

Several indicators had various omissions, estimations, and theoretical limitations. Limitations of omission include the limited availability of certain recent years and important aspects of areas such as cost of living, tax burden, and economic growth, which were not captured by the available indicators. For example, CPI and consumption tax were the only cost of living indicators in the final model. This means that housing indicators (ex. homeowner rate) and income tax are not included, despite their significance in the literature. These variables are more common in studies at the regional level, and assigning appropriate values provincially would not capture regional differences. Regarding tax burden, only consumption tax is

included, again omitting income and other taxes. Standard of living indicators, such as GDP per capita, do not necessarily align perfectly with standards of living. Economic growth indicators such as median income and productivity are included, but non-labour income is not available for the time periods of interest. Several of the financial indicators in the model could vary with the size of the underground economy in each province, a notoriously difficult cohort to estimate (Spiro, 1994). Education is not included within the model, due to difficulties comparing this variable across provinces. Distance is also omitted from the model; however, this is a function of the interprovincial focus as opposed to data availability.

Estimation is another potential issue. Data validity relies on Statistics Canada techniques in data collection, estimation, and prediction. As a result, the model and data may contain estimation issues. Caution must be taken in inferring causality as a result of significant relationships between the independent and dependent variables.

The design of the model may also have limited the validity of the results. Simultaneity and unobserved heterogeneity may contribute to endogeneity bias within the model. Accounting for both time-series and cross sectional dimensions within the regression will help to mitigate unobserved heterogeneity (SAS, 2014).

Many of the limitations in the model design arose due to a decision to use interprovincial data as opposed to regional data. Regional data is outside the scope of this project due to time constraints in collection of important indicators, such as distance. Lack of regional data precluded the use of model structures such as gravity models, which account for the draw of large urban centers and the barriers presented by factors such as distance. Reliable Canadian regional data is also only available through census data occurring every five years, while interprovincial data is collected on an annual basis. Assigning a single variable to a province resulted in a loss of regional variation. This loss of resolution may have obscured or exaggerated the effect of certain indicators.

9. Recommendations

The following recommendations attempt to address the macro determinants identified in both the literature and the model. While factors such as psychographic and demographic determinants may contribute significantly to interprovincial migration, they are outside the

scope of this report and will be minimally reflected in the recommendations. An attempt has been made to avoid reiterating the proposals established in the OneNS Report.

## 1.	Continue with status quo

Recognizing that out-migration will continue to occur, particularly in rural areas, the province of Nova Scotia should not try to directly implement policies aimed at retaining out-migrants. Rural areas of Nova Scotia will likely continue to experience high volumes of out-migration. Policies directly aimed at retaining out-migrants are likely to be inefficient and expensive to implement given their potential limited returns. In addition to rural interprovincial out-migration, there is also a rural to urban intra-provincial shift. With urban net migration being proportionately lower than rural, increasing the size of urban centers relative to rural ones potentially decreases interprovincial out-migration.

This policy recommendation will continue to allow out-migration unimpeded.

## 2.	Incentivize people to move back to Nova Scotia (return migrants)

In order to encourage people to move back to Nova Scotia after moving away, the province should develop a tax incentive aimed at return migrants. The tax incentive could be structured so that only individuals who have previously filed taxes in Nova Scotia in the previous ten years are eligible for the incentive. This tax incentive is designed to reduce the moving cost that individuals face.

This program could run the risk of not creating a new incentive for individuals to move back to the province and instead only reward individuals who have already made the decision to return to the province.

## 3.	Tax break for Nova Scotia residents who commute to work outside Nova Scotia

Recognizing that there are currently a large number of individuals working in other provinces, the province should seek to encourage these individuals to continue living in Nova Scotia during their non-working time. The province should offer a partial tax write-off for individuals for travel expenses (flights) that they incur for their commute to work. In order to be eligible for

this write-off, participants would be required to show proof of employment in another province as well as documented travel expenses.

Depending on the size of this benefit, individuals may continue to migrate at current levels without a change in behaviour.

4.   Speed up accreditation process for apprentices

In order to retain tradespeople within the province, Nova Scotia should create an intensive trades program aimed at reducing the amount of time necessary for tradespeople to gain accreditation. Currently tradespeople are leaving the province in order to gain the hours necessary for their accreditation. By offering an intensive trades program, individuals will be able to receive their training more quickly by completing the hours in Nova Scotia.

There is the potential that this program will result in Nova Scotia trained tradespeople having credentials that are not recognized by other provinces.

10. Conclusion

It is the authors' opinion that interprovincial net migration is an issue. However, out-migration is improving over time; therefore, the authors believe effective policy must focus on in-migration instead. Furthermore, the literature and the model do not support the use of capital expenditure as an efficient means to address either out-migration or in-migration.

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Appendix A: LNG and Point Lepreau Case Study

Between 2006 and 2012 the province of New Brunswick saw a large influx of capital investment driven by two capital intensive projects: Canaport LNG and the refurbishment of Point Lepreau Nuclear Generating Station.

In 2004, Irving Oil and Repsol YPF entered into a partnership to establish Canaport LNG and construct a $750 million (estimated) liquefied natural gas receiving and regasification terminal near Saint John New Brunswick (Atlantic Canada Opportunities Agency, 2007; Noia, n.d.). Initial construction for the project began in 2005 with formal construction occurring from 2006 to 2008 (Canaport LNG, 2005). Funding for the project was entirely private with the New Brunswick government agreeing to a 25 year hold on property taxes (Leckie & Shenker, 2008). Additionally, the refurbishment of the Point Lepreau Nuclear Generating CANDU-6 reactor began in 2008 and was completed in 2012 (NB Power, 2013). NB Power incurred the estimated $2.4 billion that was required to complete the refurbishment at a timeframe and budget that well exceeded initial projections (NB Power, 2013; Cbc.ca, 2012).

Both Canaport LNG and the Point Lepreau refurbishment represent significant instance of capital investment for New Brunswick with an estimated $3.1 billion of capital injected into their economy within 6 years. Moreover, the amount of capital invested relative to the provinces average real GDP of $26 billion from 2006 to 2012 and establishes these ventures as (chained 2007 dollars) a substantive component of the New Brunswick economy (Statistics Canada, Table 384-0038). As a result, this provides an opportunity to better understand the effects of capital investment in a province that has similar conditions to Nova Scotia.

Figure 5 illustrates the differences in the net change of interprovincial migration between New Brunswick and Nova Scotia from 2001 to 2011. Significant deviations in net provincial migration between the two regions occurred prior to 2006, with New Brunswick incurring a greater net loss for interprovincial migration at various intervals. However, during the construction of Canaport LNG and the refurbishment of Point Lepreau Nuclear Generating Station (2006-2012), disparities in net migration between the two regions were minimal.

Figure 5: Weighted Net Change of Interprovincial Migration for NS and NB
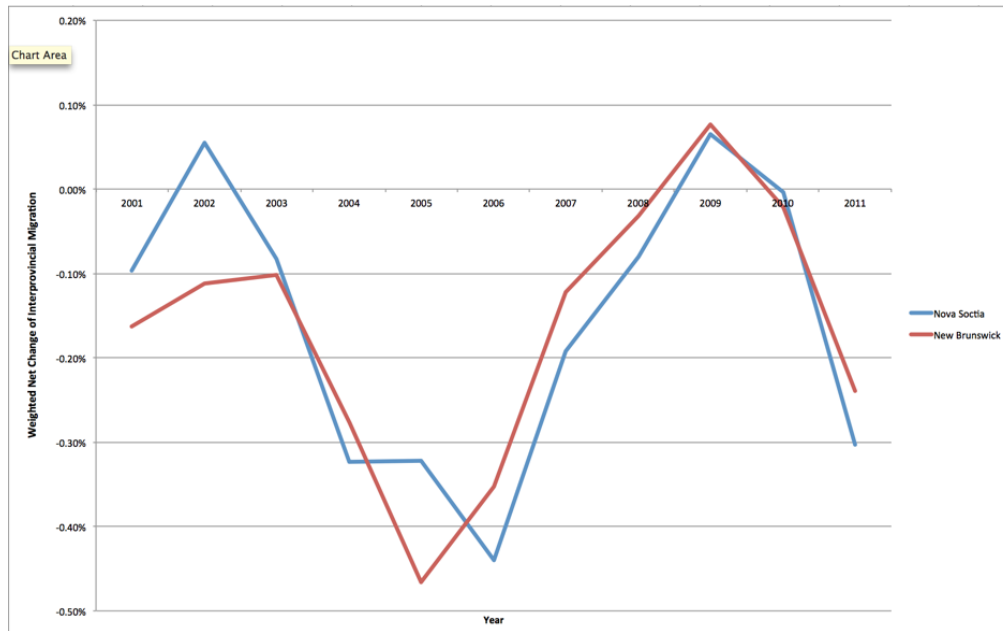
(Statistics Canada, 2014)

Table 4 and Figure 6 compare the annual median income of families and individuals in New Brunswick and Nova Scotia. Table 4 shows the year-to-year difference in median income between the two provinces as minimal. Figure 6 examines the median income more broadly and shows how the two provinces have similar median income growth over time. During the construction of Canaport LNG and the refurbishment of Point Lepreau Nuclear Generating Station (2006-2012), there was no meaningful change in New Brunswick's net median income when compared to Nova Scotia.

Table 4: Median income for New Brunswick and Nova Scotia in Canadian Dollars

Year	Nova Scotia	New Brunswick
2001	46,900	45,200
2002	48,600	46,800
2003	50,000	48,000
2004	51,500	49,700

2005	54,000	51,500
2006	56,400	54,000
2007	59,200	56,930
2008	61,980	59,790
2009	62,550	60,670
2010	64,100	62,150
2011	66,030	63,930
2012	67,910	65,910

(Statistics Canada, Table 111-0009)

Figure 6: Median income for NB and NS
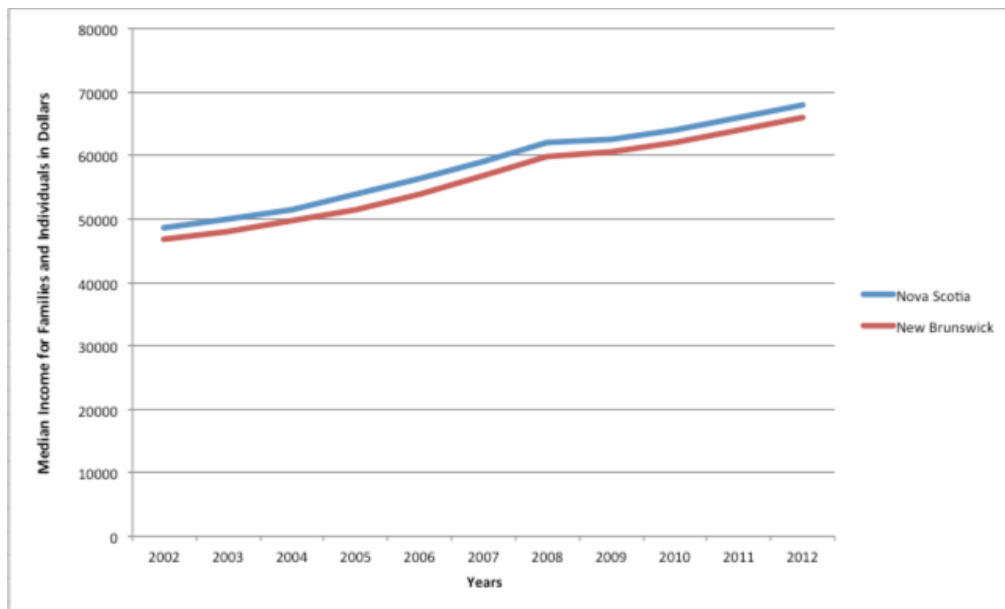
(Statistics Canada, Table 111-0009)

It should be noted that this case study does hold limitations. The Global Financial crisis (2007-2009) severely impacted the economic activity of all Canadian provinces. However, this reduced economic activity was not felt equally by all provinces and may result in distorted

migration and median income figures. Additionally, the Point Lepreau refurbishment and the creation of Canaport LNG are recent occurrences. Data assessing the long-run effects of these two capital-intensive projects cannot be determined, thus limiting the effectiveness of this case assessment. Finally, the Point Lepreau refurbishment and the creation of Canaport LNG are regional events that have the predominance of their economic activity occurring in Musquash parish, Simonds Parish, and surrounding areas. Both of these economic activities are significant provincial events; however, the lack of regional data assessing intra-provincial migratory flows and intra-provincial median income gains may inaccurately represent the effects of capital investment.

Appendix B: Full List of Indicators Examined

The following list is the complete list of indicators examined (brackets denote indicator used in the model)

Interprovincial Net Migration

Interprovincial Net Migration/Province Population (Weighted Interprovincial Net Migration)

Capital Expenditure (Total Capital Expenditure)

Capital Expenditure, Construction

Capital Expenditure, Mining Oil and Gas

Capital and Repair Expenditure, Total

Capital and Repair Expenditure, Construction

Capital and Repair Expenditure, Mining Oil and Gas

Capital Construction, Total

Capital Construction, Construction

Capital Construction, Mining Oil and Gas

Capital Machinery and Equipment, Total

Capital Machinery and Equipment, Construction

Capital Machinery and Equipment, Mining Oil and Gas

Population

Total Tax Filers

Total Families

Median Income, All Families ($) (Total Median Income)

Unemployment Rate (Unemployment Rate)

Participation Rate (Participation Rate)

Employment Rate

GDP, Investment in Inventories

GDP, Exports of Goods and Services

GDP, Less Imports of Goods and Services

GDP, Final Consumption Expenditure

GDP, Final Consumption Expenditure per Capita (GDP/Capita)

Consumption Tax (Consumption Tax)