WHERE IS ALL THE TALENT? A STUDY OF THE MIGRATORY PATTERNS OF POST-SECONDARY GRADUATES IN NEW BRUNSWICK

by

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Abstract

The migration of human capital impacts several aspects of the demographic composition of the Canadian Provinces. Moreover, provinces such as New Brunswick are particularly impacted by the interprovincial migration of recent post-secondary graduates, because due to a high dependency ratio and out-migration rates, the retention of human capital is a core component for economic stability and growth. This paper explores the key demographic factors (i.e., age, sex, marital status) that has been shown to impact migration, along with the specific ‘type’ of human capital recent post-secondary graduates acquire (e.g., field of study), in order to determine the foundational components of migration in New Brunswick. By using the Maritime Provinces Higher Education Commission’s Graduate Survey on 2007 post-secondary graduates, logistic regression results indicate that recent graduates with degrees in the Arts and Engineering are most likely to leave after completing their degree. Conversely, graduates with degrees that match current labour market demand (i.e., Education and Health) tend to remain in the region. The out-migration of human capital in New Brunswick is highest among young, skilled graduates and is influenced by international and interprovincial migration and current regional labour market demands.
Dedication

For my husband Ryan, to whom I give my deepest expression of love and appreciation for his support, love, and encouragement.

For my daughter Chloe, who has shown me the true meaning of love, self-sacrifice, and grace.

For God.
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1.0 Introduction

Migration has long been a driving force of economic development and population growth in Western civilizations. Because of this, many researchers have sought to understand the causes and the implications of such movement at both the place of origin and the destination. In the late 1900s, Canada experienced high population growth and was otherwise achieving prosperity in terms of economic development and employment (Delisle & Shearmur, 2010). Furthermore, migration to the major urban centres was propelled by international and interprovincial migration. Although the provinces and territories did experience out-migration during this time, continued labour market opportunities ensured that the rural areas of Canada experienced population growth and sustainability (Delisle & Shearmur, 2010). However, by the late 1990s, Canada’s economic structure changed such that labour market opportunities began to decrease and individuals living in the peripheral regions of the country started to explore other means of obtaining employment. This involved relocating to the major urban centres in Canada, whereby employment opportunities were believed to be less scarce.

Many researchers have described the Canadian landscape as a core-peripheral dichotomy whereby some parts of the country are sparsely settled and located far away from major urban centres (Polese & Shearmur, 2003, 2005). Peripheral regions are areas in Canada that have a small population and are located outside of areas with major labour markets. In contrast, core regions are areas that are densely populated and have an urban centre. In Canada, the peripheral or rural areas have continued to experience a rapid decline in population, while the core regions of the country are experiencing population growth (Polese & Shearmur, 2005). Moreover, individuals that choose to migrate out of
core regions relocate to other urban centres, which results in minimal population growth in the rural areas of the country.

The impact of the interprovincial migration of Canadians has become a particular concern for policy makers seeking to understand and provide insight to current demographic shifts. Many existing theories attempt to provide a general explanation for what motivates human migration; however, there is no universal consensus of the specific reasons why people migrate. Individuals may choose to leave a province for many reasons; however, economic considerations are often at the forefront of migration (Burbidge & Finnie, 2000; Day & Winer, 2012; Delisle & Shearmur, 2010; Ravenstein, 1885). Moreover, individuals choose to relocate to urban centres due to the expectation of better employment opportunities (Finnie, 2000, 2004; Harris & Todaro, 1970; Todaro, 1969; Trovato, 2009; Ravenstein, 1885). However, many theories incorporate the personal attributes as well as the life circumstances of an individual into the decision-making process that occurs when individuals are contemplating relocation (Day & Winer, 2012; Tilley, 2007). There is a high personal cost associated with human migration that may affect migratory flows, such as the loss of established support networks. Therefore, individuals make the choice to migrate when the benefit of relocating to the destination outweighs the costs of leaving the place of origin (Lee, 1970, 1966).

Migratory trends in Canada have not changed since the late 1990s in terms of the movement of people to large urban centres. The interprovincial migration of Canadians plays an important role in the demographic composition of each province and territory in Canada. Migration not only affects the population size of a given province, but it can also affect the social structure, the cultural makeup, and the economic composition
(Burbidge & Finnie, 2000; Hou & Bourne, 2006). Furthermore, the impact of out-migration can be extreme for the provinces that are experiencing sustained population decline and low fertility rates (Bernard et al. 2008). Due to the low national fertility rate, Canadians are not producing enough children to sustain the current population. Therefore, the country is increasingly dependent on internal and international migration in order to promote population growth. Consequently, the peripheral provinces in Canada such as the Maritimes and Newfoundland and Labrador, have experienced little to no population growth over the past 20 years due to low fertility, high levels of out-migration, and low levels of in-migration (Bernard et al, 2008). International migrants continue to choose one of the three major cities in Canada (i.e., Montreal, Toronto, and Vancouver) as their preferred destination, and those that migrate to another Canadian city, tend to relocate within five years. Furthermore, the retention rate for immigrants that are destined to the Atlantic Provinces is 43 percent over five years (Okonny-Myers, 2010).

The study of post-secondary graduates, particularly those that graduate in areas that are experiencing population decline and out-migration, is thought to be key to sustaining and developing human capital in these areas. The migration of post-secondary graduates determines the human capital composition of Provincial labour markets. Therefore, it is important to examine and understand the migratory patterns of recent graduates in order to implement and initiate relevant policies that seek to address population decline in the region.

Overall, the Atlantic Provinces are struggling to keep young, skilled individuals from leaving. The rate of out-migration among individuals between the ages of 18 and
24 has been steadily increasing in the Atlantic region since the late 1970's. Individuals in other age groups are leaving the region as well; however, a sizable proportion of out-migration comes from this age group (Coulombe, 2006). This indicates that a large majority of individuals with high human capital are leaving the region at a high rate. Because the distribution of human capital is key to local innovation and growth, the Atlantic Provinces face challenges due to population decline and the migration of young, skilled graduates.

Examining the interprovincial and international migration of post-secondary graduates from the Atlantic Provinces is crucial because of the high out-migration of human capital in the region. The Atlantic Provinces continue to invest the resources that are needed to educate young individuals with the expectation that they will contribute to the regional labour market. However, as young, skilled workers leave in search for opportunities elsewhere, the provinces do not yield any return on their investment. In light of current migration trends, it is important to examine current policies and initiatives, and explore how the problem of out-migration can be counter balanced using the relevant data that is available.

New Brunswick faces particular challenges as the region continues to experience low fertility rates, moderate international migration, and high levels of out-migration (Beale, 2008; Edmonston, 2009). The most likely population that would migrate is recent post-secondary graduates because of the urgent need to find employment. Consequently, New Brunswick experiences a net loss of recent graduates primarily because of the limited labour market and the desire to relocate to provinces that have a high concentration of particular skills (Burbidge & Finnie, 2000).
The primary focus of my analysis will be the province of New Brunswick due to its unique demographic profile: the high number of older individuals (16.5% of the population is 65 or older), the rural to urban ratio (50% of the population is urban, 50% is rural), and the language composition (New Brunswick is the only bilingual province in Canada) (Statistics Canada, 2012, 2006). Moreover, my research will address the problem of interprovincial and international migration in New Brunswick by taking a deeper look at the contributing factors that impact migration among post-secondary graduates. Using the data collected by the Maritime Provinces Higher Education Commission on 2007 post-secondary graduates, I will seek to answer the following question: What factors shape a graduate’s decision to stay or to leave New Brunswick once they have completed their post-secondary degree?

Recent graduates make several decisions before and during their post-secondary degree that potentially impact their migratory decisions once they graduate. A key factor is the field of study an individual chooses to pursue, as the decision impacts whether or not he or she has the qualifications that are needed to acquire employment (Finnie, 2000; Finnie & Frenette, 2003). Consequently, if an individual does not have the educational credentials to obtain relevant employment, then he or she may be faced with the decision to seek opportunities elsewhere. Key demographic factors also impact the migration of graduates, such as age, gender, marital status, and language (Burbidge & Finnie, 2000; Delisle & Shearmur, 2010; Finnie, 2004; Robinson & Tomes, 1982; Trovato, 2009).

I hope that my research will be able to contribute to the understanding of migration in New Brunswick and furthermore, stimulate discussion concerning how the region can sustain current population levels given the high rate of migration among
young, skilled workers and, whether or not the province is providing graduates with enough incentive to remain in the region.

In general, I hope to contribute to the current understanding of interprovincial migration in Canada by combining both sociological and demographic theories and insights, but more specifically, providing a better understanding of why individuals in provinces with high rates of out-migration, particularly New Brunswick, choose to relocate. My hope is that the outcomes of my research will provide relevant stakeholders with information pertaining to the issue at hand in order to stimulate further research and investigation.

In order to understand the various theoretical models and theories underlying migration, relevant literature is explored in chapter 2. This chapter contains several areas of migration to enable the reader to understand the underlying concepts concerning the traditional theoretical models of migration as well as the various forms of migration. The methodology and procedures used to gather and analyze the data are presented in Chapter 3. In order to provide the reader with the necessary background of post-secondary graduates in New Brunswick, Chapter 4 explores the overall demographic composition of 2007 graduates. The results of the analysis and findings that emerge from the study are contained in Chapter 5, while chapter 6 contains the discussion of the said findings and recommendations for further study.

The findings indicate that the migration of recent post-secondary graduates in New Brunswick is propelled by several key factors. Most notably, the likelihood of migration is greatest among graduates that lived outside of the province prior to enrolling in their degree. Graduates that lived in another Canadian province are significantly more
likely to be living outside of New Brunswick within two years after the completion of their degree; international graduates are slightly less likely than interprovincial migrants but still leave at a high rate. The findings reveal that young, skilled males leave at higher rates than their female counterparts, while French-speaking graduates are less likely to leave after completing their degree. The field of study that a graduate chooses impacts migration flows. Graduates in the fields of engineering, fine and applied arts, and mathematics and physical sciences are significantly more likely to be living outside of the province within two years of graduation than graduates in other fields of study. Overall, the findings indicate that the migration of human capital is largely impacted by regional labour markets and the availability of relevant employment. Moreover, young, skilled graduates that are unable to find adequate employment after earning their credentials, are seeking out opportunities elsewhere.
2.0 Review of the literature

Demographic changes in Canada have coincided with the country's overall economic development. Moreover, migration is regarded as a core component in shaping Canada's population landscape and, consequently, is an important stimulant to economic activity (Anderson, 1966, Trovato, 2009). Canada’s population has increased substantially over the past century. According to the 1901 census, the total Canadian population was 5,371,315 (Basavarajappa & Ram, 2008). In 2011, the census reported that the Canadian population at 33,476,690, a respective increase of 523 percent (Statistics Canada, 2012a). As the Canadian population has increased, the demographic composition of the country has also changed due to the accompanied migration of both the Canadian-born population and the foreign-born population. The most significant change has been the redistribution of individuals from the rural areas of the country to the urban city centers (Anderson, 1966; Bryant & Joseph, 2001). Other factors have contributed to the redistribution of the Canadian population, most notably the birth and death rate. The Canadian birth rate has decreased substantially since the end of the baby boomer period of 1946-1967. This decrease has been due largely to the increase in women in the labour market (Bernard et al, 2008; Trovato, 2009; Zelinsky, 1971). The death rate has also decreased, which has resulted in an increasing aging population that will have major implications on the Canadian demographic profile in the future. Although the birth rate and death rate have impacted the demographic profile of Canada, migration is the core component that influences the composition of the Canadian provinces and territories.
The study of migration began with the proposed *Laws of Migration* by Ernst Ravenstein in 1885 in response to the increasing surge of economic development that was occurring in the late 1800’s (Arango, 2000). Ravenstein’s laws consist of general statements pertaining to the migratory relationship between the source and the destination. Accordingly, Ravenstein argues that migration is inherently economical, whereby the distance between two locations and the respective population densities, are the driving factor behind human movement. Most notably, rural dwellers tend to be more likely to migrate and overall migratory flows are directed towards city centres. Economic considerations are key to all migratory movement, whereby various characteristics impact the propensity to move including technology, urban development, and gender. Although Ravenstein’s seven laws are simplistic, his observations of migratory movement have been consistent since their development in the late 19th century.

In recent years human capital\(^1\) has been recognized as a crucial aspect of the decision-making process concerning migration. Accordingly, human capital migration theories take into account the personal assets that affect migration, such as the skills and the education of migrants, which are crucial aspects in determining whether or not an individual will migrate. Due to the diverse acquisition of skills that are obtained by individuals, there are differences in the calculated gain of migrating. Therefore, each individual will calculate and expect a different return on their migration investment (Becker, 1962; Sjaastad, 1962). The migration of human capital has important implications for various facets of society, such as social programs, health care, and

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\(^1\) Human capital is a term originally coined by A. W. Lewis (1954) while doing research in the field of economic development. Human capital is seen as the knowledge and personal attributes that are obtained by an individual. Human capital is thought to arise out of any activity that is able to raise the individual’s productivity.
unemployment. In addition, migration affects public investments, such as education and training, due to the migration of trained professionals (Finnie, 2004).

2.1 International and internal migration

The economic development of Canada and its associated effects, have not been evenly distributed among the Canadian provinces and territories. Moreover, the accumulation of human capital and physical capital, along with technological development, has varied from province to province (Coulombe, 2006). Internal and international migration has long been a driving force behind the economic development of the country, and as a consequence, has resulted in the redistribution of the Canadian population.

The migration of individuals to Canada exists in order to fulfill the country’s national objectives concerning the social, economic, and cultural development of the territory (CIC, 2011). International migrants are “people who change their country of abode (i.e., the country in which they spend most of their sleeping hours over the course of a year)” (Trovato, 2009). In Canada, there are classes of international migrants, which can be broken down into two categories: permanent and temporary. Each year, a large number of international migrants are admitted to Canada under the temporary category as students.

The retention of new immigrants is particularly challenging for provinces that have lower population counts and that are economically stagnant (Newbold, 1996). Although immigrants do establish in regions with lower populations, many do not remain at their original destination, and tend to move to the large urban centres in Canada. Consequently, the propensity for international migrants to relocate after arriving in
Canada is high for areas such as the Atlantic Provinces. Accordingly, immigrants that arrive in the region are significantly more likely to be living in another Canadian province within five years (Okonny-Myers, 2010).

Interprovincial migration is a mechanism that allows individuals to respond to the changing economic opportunities that are available in other provinces or territories. That said economic considerations are not the only factors that influence the migration across administrative boundaries. Other factors such as age, gender, marital status, and educational attainment impact migration flows. However, most researchers attribute the internal migration of individuals to the interaction of the mentioned factors with economic growth and development (Anderson, 1966; Polese & Shearmur, 2005).

Accordingly, a common assumption of migration is that people move from one region to another in order to improve their overall welfare, which typically correlates with higher employment outcomes (Coulombe, 2006). Ultimately, labour market mobility is thought to be the main underlying factor that determines interprovincial migration in Canada (Osberg et al, 1994).

Whether or not an individual chooses to relocate to another province or territory in order to seek out employment opportunities depends on the respective cost-benefit of doing so. Neo-classical models of migration emphasize that the migration to urban centres does not only depend on the expected income at the destination, but also depends on the probably of achieving employment (Harris and Todaro, 1970; Todaro, 1969). Furthermore, other factors such as the perceived opportunity costs, the costs of travelling, temporary unemployment and underemployment, and the psychological costs, are weighted against the potential income gains (Harris & Todaro, 1970). Therefore,
migrants are rational actors that perform a cost-benefit analysis. Consequently, individuals will migrate to other areas if the perceived economic benefits outweigh the personal and practical costs associated with relocating (Harris & Todaro, 1970; Trovato, 2009).

The educational credentials of an individual play a significant role in migration. The probably that an individual will migrate to another Canadian province is positively linked to the level of education he or she has. The association between the level of education and interprovincial migration is thought to be due to current labour demand for highly skilled individuals (Brown et al, 2010; Burbidge & Finnie, 2000; Osberg et al, 1994). Therefore, as an individual’s decision to migrate to a given region is driven by the opportunities at the destination, provinces that have a limited labour market may loose highly skilled individuals to other provinces and territories. Notably, the most susceptible population would be university and college graduates as the skills they acquire while attending school impact their employment opportunities. The migration of human capital impacts provinces in the Atlantic region significantly. As skilled workers migrate to other provinces in search for adequate employment that matches their skill set, the Atlantic Provinces experience a decline in highly skilled labour.

Although the labour market is major factor in the migration of a given population, there are also various demographic characteristics that impact the migration of human capital. Age is a strong predictor of migration, such that it is correlated with an individual’s stage in the life-cycle (Anderson, 1966; Finnie, 2004; Trovato, 2009). Accordingly, young individuals tend to migrate at higher rates than older individuals (Finnie, 2004; Greiner, 2008; Robinson & Tomes, 1982; Grant & Vandercamp, 1976).
This is largely due to the fact that younger individuals are more willing to relocate in order to find better employment (Bernard et al, 2008; Osberg, 1994). Older individuals however, are more likely to consider the associated psychological and economic costs that are associated with moving, and reflect on the decrease in future benefits as they are farther along in the life cycle (Finnie, 2004).

Historically, gender has been a key factor in understanding the migratory trends of the Canadian population. Moreover, the migratory patterns evidenced by men and women differed significant at the beginning of the 1900s, whereby women did not tend to migrate, and if so, only short distances (Ravenstein, 1885). However, roles have shifted since this time, and gender is thought to play a less significant role on migration (Trovato, 2009). This shift is attributed to fact that more women are now obtaining an education that provides them with the skills that are needed to actively participate in the labour market. Furthermore, women today are delaying the childbearing years in order to seek employment opportunities, and on average, tend to have fewer children than in the past (Myers et al, 2009). The migration patterns for men and women in Canada are relatively similar. Although some areas of Canada receive more males than females, the difference between males and females is relatively small (Bernard et al, 2008). Interestingly, research indicates that more men migration from Prince Edward Island, Nova Scotia, New Brunswick, British Columbia, and the Yukon, while other provinces lose more women (Trovato, 2009). Therefore, the balance of in- and out-migration results in little difference between men and women concerning interprovincial migration.

There are notable differences pertaining to the family status of the individual and the associated effect on migration. Moreover, being married or common-law,
particularly in families with children, has a negative impact on migration (Bernard et al, 2008; Finnie, 2004). This negative impact on migration is largely attributed to the increased cost of migrating. Moreover, married individuals are more likely to do a cost-benefit analysis of an associated move, and weigh the costs heavier (Harris & Todaro, 1970; Trovato, 2009). Consequently, the family status of an individual is closely related to an individual’s age. Migration is found to be the mostly likely to occur in early adulthood when individual’s are experiencing key transitions, such as attending a post-secondary institution, entering the labour market, and during the beginning of family formation (Dion & Coulombe, 2008). However, once an individual completes these stages in the life cycle, the tendency migrate decreases considerably. Therefore, individuals that are married or living common-law tend to be older, and furthermore, tend to be less likely to migrate (Dion & Coulombe, 2008).

The economic and demographic characteristics of migration in Canada have been shown to be similar for both international migrants and the Canadian-born. It is not surprising then that the three ‘gateway’ cities of Montreal, Vancouver, and Toronto continue to be the top three preferred destinations for individuals migrating in Canada (Haan, 2008; Hou & Bourne, 2006; Hum & Simpson, 2000; Massey, 1988; Nogle, 1992). Moreover, the migration to the larger urban centres in Canada are mostly found among young, educated individuals that move in search of employment opportunities. Conversely, individual’s that have children are the least likely to migrate to these areas, and furthermore, are the most likely to out-migrate from one of the gateway cities to an outlying CMA (Hou & Bourne, 2006; Turcotte & Vezina, 2010).
2.2 Repeat/return/onward migration

Repeat migration usually occurs shortly after the initial move due to poor outcomes at the destination, and is likely to be an unplanned decision (Grant & Vanderkamp, 1986; Newbold & Cicchino, 2007). Ultimately, repeat migration has two outcomes: return to the original location of residence or move onwards to another location in search of better outcomes (Grant & Vanderkamp, 1986, 1984; Newbold & Liaw, 1990; Newbold, 2005). Migratory patterns in Canada tend to be directional such that individuals move east to west in search of opportunity and, consequently, individuals that relocate to the west have a low propensity to out-migrate.

Onward migrants are often highly educated and skilled compared to return migrants, and are more willing and able to persevere in search of better outcomes (Newbold & Cicchino, 2007). Moreover, age has a significant impact on whether or not an individual will migrate onward or return to their previous residence. Younger individuals are likely to move onward rather than return. This is due to the lack of familial responsibilities and because younger individuals are likely to have moved several times already (Grant & Vanderkamp, 1984; Newbold & Cicchino, 2007; Newbold, 2005).

International migrants also experience return migration, and in most cases immigrants either return to their original country of residence, or move on to another Canadian province or territory. Educated immigrants tend to be the most mobile among international movers, a trend that has increased in recent years due to the advancement of the world market (Aydemir & Robinson, 2008). Consequently, the rate of out-migration among immigrants is most notably composed of young, working age immigrants that
have the credentials to pursue opportunities in other regions (Aydemir & Robinson, 2008).

Given that young, skilled individuals are more likely to migrate onward after an initial move, it is expected that graduates that moved to New Brunswick to pursue a degree are more likely to migrate once they graduate. Moreover, since out-of-province students have already migrated once, they are likely to be more willing to migrate after the completion of their degree. Given that New Brunswick post-secondary institutions receive individuals from other Canadian provinces and territories, and other countries, I hypothesize two migratory trends: (1) international students that attend an institution in New Brunswick are likely to migrate onward after the completion of their degree, and (2) out-of-province students from Canada that attend an institution in New Brunswick are more likely to return to their original province of residence or migrate onwards once they have completed their degree.

2.3 Human capital migration

Numerous studies have been done concerning the benefit of the accumulation of human capital; however, much less research looks at the mobility of human capital, particularly at the provincial level. Moreover, a vast array of literature exists that focus on the ‘amount’ of human capital an individual possesses and the respective benefits and returns. However, only recently have researchers begun to investigate the specific type of human capital that an individual possesses (i.e., skills obtained by majoring in a particular field of study) and the associated benefits (Finnie & Frenette, 2003). Although various studies look at the provincial disparities among individuals with a particular type
of human capital, little research has been done concerning individual outcomes by field of study at the provincial level.

Given the limited amount of research done in the area of human capital migration, it is difficult to determine the mobility patterns of recent graduates that major in a particular field of study across provinces. For example, existing literature does not provide information concerning whether or not an individual that graduates from an institution in New Brunswick, with a degree in the Social Sciences, is more or less likely to migrate out of the region than a graduate with a degree in a different field. However, multiple studies exist that explore the concentration of post-graduates with a particular skill set across provinces, by looking at labour market outcomes and earnings. Therefore, it is possible to predict whether or not a graduate from New Brunswick, with a particular skill set, is likely to move after graduation due to similar graduates having higher earnings at a given destination.

The distribution of post-secondary graduates by field of study varies slightly by gender, but overall has been consistent over time. Males tend to be oriented towards the fields of Agricultural and Biological sciences, Commerce and Administration, and the Social Sciences. In contrast, females gravitate towards the Social Sciences, Education, and the Fine and Applied Arts (Finnie & Frenette, 2003). The only major difference over time is among females, which in recent years have begun to gravitate heavily towards the Social Sciences and Commerce and Administration. This is indicative of a growing trend

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3 Helliwell & Helliwell (2001) did a study of the migratory patterns of post-secondary graduates in British Columbia. Although the authors analyzed particular bachelor and graduate degree holders (i.e., Bachelor of Science graduates compared to Bachelor of Arts graduates), the authors did not analyze migratory trends by field of study.
in labour market demand and moreover, an individual’s commitment to choosing a field of study best suited for their careers (Finnie, 2001; Finnie & Frenette, 2003). Overall, females tend to be overrepresented in the fields of education, the fine and applied arts, the social sciences, and the health professions. Moreover, females tend to be underrepresented in economics, engineering, the computer sciences, and mathematics and physical sciences (Finnie, 2001).

Given that migratory flows in New Brunswick suggest that more men migrate out of the region than females, it is expected that male concentrated fields of study will positively predict migration. Since more men are represented in the fields of Agricultural and Biological sciences, Engineering, and Mathematics and Physical Sciences, it is expected that individuals that graduate in these fields are more likely to migrate.

The respective earnings of post-secondary graduates differ substantially by field of study; however, earnings have been consistent over time. Overall, graduates in the fields of Health, Engineering and Computer Science, Commerce and Administration, and Mathematics and Physical Sciences have the highest earnings after completing their degree. Low earning fields are the general Arts and Humanities, Agricultural and Biological Sciences, and the Social Sciences, while graduates in Education have average outcomes (Finnie & Frenette, 2003). Given the earning distribution by field of study, it is expected that graduates that obtained degrees in lower paying fields of study, and that live in a province where their particular skill set doesn’t match with the current labour market, will search elsewhere for relevant employment. Graduates with low paying degrees are more likely to move because the associated skills are found across all provinces, and on average, most individuals experience low earnings. Therefore, a
individual that obtains a degree in a low paying field of study, will migrate in order to seek out better opportunities and higher paid employment.

It is expected that individuals with an education degree are the least likely to migrate after the completion of their degree for three reasons: (1) the demand for education graduates is found across all provinces and territories, with no region experiencing labour market shortages; (2) education is a provincially regulated entity, therefore, education graduates are more likely to seek out employment opportunities in the province that they graduated in because of familiarly with the provincial education structure and process; (3) education graduates experience average earnings across all provinces and territories, therefore, there is no expected benefit of seeking out opportunities elsewhere.

Although there has been little research done concerning the migration of post-secondary graduates by field of study, it is possible to expect some trends based on the research that has been done of the overall population, the earnings of recent graduates, unemployment rates, and the skill match of individuals. Overall, graduates with a degree in the fine and applied arts, the humanities, and agricultural and biological sciences have had the highest unemployment rates. Individuals that acquire an education degree, or a degree in the health professions tend to have low unemployment rates, while all other disciplines experience mixed rates (Finnie, 2001). This suggests that recent graduates in fields that have high unemployment rates, may seek out employment opportunities elsewhere.

Recently, researchers have begun to examine the skill match of post-secondary graduates with their current employment. Graduates in the fields of education, commerce
and administration, the health professions, and engineering tend to have the highest education to employment skill match. Conversely, graduates in the fine and applied arts, the humanities, the social sciences, and agricultural and biological sciences have the lowest skills match (Finnie, 2001). This indicates that graduates in these fields struggle to find employment that their educational skill set qualifies them for. Moreover, graduates in the fields of education, commerce and administration, the health professions, and engineering have a higher rate of return to their particular form of human capital (Finnie, 2001).

2.4 Post-secondary graduates in New Brunswick

According to 2011 census data, 751,171 people reside in New Brunswick (Statistics Canada, 2012). Roughly 15.4 percent of individuals aged 15 years or older that live in New Brunswick hold a post-secondary degree at the bachelor’s level or above. The top degrees earned by individuals that have a university degree are: Education (22.4%), Commerce and Administration (19.2%), Health (15%), the Social Sciences (11.9%), and the Humanities (11%). Few New Brunswickers have degrees in Engineering (7.1%), the Physical and Life Sciences (6.3%), Mathematics and Information Sciences (3.4%), Agriculture and Biological Sciences (2%), Visual and Performing Arts (1.4%), and Personal and Transportation Services (0.2%) (Statistics Canada, 2013).

New Brunswick faces particular challenges, largely due to the provinces below national average fertility rate, moderate international migration, and high level of out-migration to other provinces (Edmonston, 2009). In order for New Brunswick’s population to increase or stay at par in the future, the low level of fertility has to be offset
by increases in international or interprovincial migration. In order for this to happen, New Brunswick would have to double its current in-migration rate (Edmonston, 2009).

New Brunswick has significant inflows of individuals that come to the province in order to pursue a post-secondary degree at one of the province’s seven institutions. However, after graduation, New Brunswick experiences a net loss of graduates largely due to the limited labour market and the migration of individuals to provinces that have a concentration of particular skills (Burbidge & Finnie, 2000). The major industries in the provinces that are experiencing employment growth, and therefore are likely to attract and retain recent graduates are forestry, fishing, mining, and oil, and agriculture. However, industries such as professional, scientific, and technical services (i.e., engineers), and business, building, and other support services have experienced large employment losses (GNB, 2013). Therefore, recent post-secondary graduates with related degrees may leave the province in search for opportunities elsewhere.

Overall, individuals that leave New Brunswick tend to have greater earnings than those than did not migrate. Furthermore, the difference in earnings is more predominant among younger individuals (Bernard et al., 2008). Individuals that left New Brunswick seeking employment experienced an 8.5 percent difference in earnings in the first year compared to a non-migrant, and a 28.8 percent difference in three years (Bernard et al., 2008).

2.5 Conclusion

The phenomenon of migration has long been studied by academics in various fields including demography, sociology, and geography in order to advance our understanding of the determinants and outcomes of human movement. Although the

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4 Also known as the ‘brain drain.’
migratory patterns of internal and international migrants have similar determinants and outcomes, the impact of each has varying affects. Moreover, internal and international migration plays an important part in the demographic composition of the Canadian Provinces and Territories, and affects various forms of social structures, including education. The internal and international migration of individuals that attend a post-secondary institution has become a concern for each Province, but particularly regions that are experiencing stagnate population growth. Moreover, provinces such as New Brunswick are continuously relying on the internal and international migration of post-secondary graduates to promote and initiate economic growth in the region. It is therefore important to study the migration of this group, the respective determinants and outcomes, and how such regions can retain human capital.

2.6 Hypotheses

Several key factors have been linked to the migration of the Canadian population. However, very little research has been done on the underlying components that impact the migratory flows of post-secondary graduates at the provincial level. Moreover, there is a significant gap in the research concerning how a specific type of human capital that an individual possesses can affect an individual’s propensity to move. Given that recent post-secondary graduates are keen on entering the labor market, and furthermore, are unlikely to have any significant employment experience, the ‘type’ of human capital that he or she possesses is key for obtaining employment.

I have chosen the province of New Brunswick as the region for analysis for two reasons: (1) the region has one of the highest dependency ratios in Canada, indicating that young, skilled graduates are key to sustaining current labour markets; (2) the region
attracts a large number of individuals pursuing a post-secondary degree in the region, but has one of the highest out-migration rates among the young population in Canada (Edmonston, 2009; Hou & Bourne, 2006; Statistics Canada, 2012). Based on the research has been done on post-secondary graduates at the national level, the following hypotheses will be tested for recent graduates in New Brunswick:

1) Individuals that move from outside of Canada to pursue a post-secondary degree in New Brunswick are more likely to leave after they graduate than their Canadian-born counterparts. I predict that international students will follow the same migratory trends as their international counterparts: migrate to a large urban centre after completing their degree in New Brunswick, or return to their original country of residence as they now have the educational credentials to pursue opportunities elsewhere.

2) Individuals that move from another Canadian province or territory to pursue a degree in New Brunswick are more likely to leave than graduates originally from the province. I anticipate that individuals that moved from another Canadian province are likely to migrate onward after completing their degree because such individuals have experience migrating and are therefore, more willing to migrate again. Moreover, they now have the educational credentials to seek out opportunities elsewhere.

3) I hypothesize that several demographic characteristics will play a role in whether or not a individual chooses to stay in New Brunswick:

a. Gender: men will be more likely to leave the province after the completion of their degree because migratory trends indicate that more skilled men migrate out of New Brunswick than females.
b. Age: younger graduates are more likely than older graduates to leave New Brunswick after the completion of their degree because they are more willing to relocate in search for better employment outcomes. Furthermore, I predict that as age increases, the propensity to migrate decreases due to the change of life circumstances and responsibilities.

c. Marital status: I anticipate that single graduates are more likely to migrate in search for opportunities elsewhere as migration is most likely to occur during early adulthood. Moreover, as marital status is often correlated with one's age, it is expected that young, single graduates are the most likely to migrate as they are just entering the labour market and at the early stages of familial formation and commitment.

4) Given that migration is a largely a response to the labour market composition of a particular region, I predict that there are two underlying migratory trends among post-secondary graduates in New Brunswick:

a. Individuals that receive degrees in Education, and the health professions are the most likely to stay in New Brunswick after the completion of their degree. A large percentage of individuals in the provincial labour market, that acquire a post-secondary degree, graduated in the fields of education and health. Furthermore, education and health degree holders tend to have the lowest unemployment rates. This indicates that the demand and opportunities for graduates in these fields is high in the province, suggesting that they are less likely to migrate in search for employment.
b. Individuals that receive degrees in the Fine and Applied Arts, the Social Sciences, the Humanities, and Engineering are more likely to leave the province after the completion of their degree to search for adequate employment. I predict that Fine and Applied Arts, Social Science and Humanities graduates struggle to find adequate employment in New Brunswick because the skill set they possess does not directly relate to labour market opportunities. Therefore, they are more likely to migrate outside of the province in search for adequate, high paying employment.

c. Although Engineering graduates tend to have a high education-to-employment skill match, I predict that they are likely to leave the province after graduation due to the decrease in opportunities the industry in New Brunswick in recent years. Moreover, because the skills that Engineers acquire are in demand in other provinces and territories, I predict that these graduates will move after graduation due to the lack of available employment in New Brunswick.
3.0 Research Methodology

This project is motivated by a combination of sociological and economic based principles and theories. Although migration is often primarily thought of as an economic principle, many classical sociological theorists have examined the phenomenon of migration in order to explain the motivations and consequences of human behavior. Karl Marx, for example, in his theory of history, explores how the rise in Capitalism over feudalism led displaced individuals into the city in order find employment. Emile Durkheim in *The Division of Labour in Society*, focused on the break up of rural solidarity and how the consequences of this were population growth in confined areas that in turn leads to increased social interaction and communication. Moreover, as the study of migration has evolved into being a largely economic phenomenon, sociologists are still concerned with how the movement of individuals affects the social structure of the sending location, as well as the destination. Furthermore, sociologists are concerned with how migratory patterns affect individuals, families, communities, and the overall organization of society.

The literature that I used for the formation of this research is influenced by the theoretical development and research done by academics such as Ross Finnie, John Burbidge, Michael Haan, Bruce Newbold, Barry Edmonston, and Marc Frenette. A large majority of the academic articles and works used are economically based; however, they focus on cause and consequences of human migration and behavior. All academic journals, books, conference papers, and government publications are found through the University of New Brunswick’s online resource and library. Other resources such as
Statistics Canada and Citizenship and Immigration Canada data publications are found on the respective institutions’ online websites.

3.1 Population and Sample

The overall purpose of this project is to explore the migration patterns of post-secondary graduates in New Brunswick. In order to understand the factors that influence the migration of graduates in New Brunswick, I have used Maritime post-secondary graduate sample data collected by the Maritime Provinces Higher Education Commission (MPHEC) that provides information about 2007 graduates.

Since 1996, the Maritime Provinces Higher Education Commission has been collecting information on the post-graduation experiences of Maritime university graduates on the behalf of the governments of New Brunswick, Nova Scotia, and Prince Edward Island. The purpose for the collection of this data is to provide the provinces with information concerning post-secondary graduates’ experiences while at school, their overall qualifications, and their post-graduation outcomes. Moreover, this allows the Provinces to compare different graduation cohorts, monitor the trends of skilled individuals, and provide an evidence-based model that can help shape policy and government initiatives.

I will use the latest graduate survey for the purposes of this research, which looks at the outcomes of the 2007 graduating class two years following graduation. The participants graduated from various Maritime institutions including: Acadia University, the Atlantic School of Theology, Cape Breton University, Dalhousie University, Mount Allison University, Mount Saint Vincent University, Nova Scotia Agricultural College, Nova Scotia College of Art and Design, Saint Mary’s University, St. Francis Xavier
University, St. Thomas University, Université de Moncton, Université Sainte-Anne, University of King’s College, University of New Brunswick, and the University of Prince Edward Island.

In the graduate follow-up survey of 2007 in 2009, the participants were contacted approximately two years after the completion of their degree. At this time, a telephone survey was conducted, asking the participants about their demographic characteristics, as well as several questions concerning their overall university experience and current employment outcomes. In particular, the participants were asked several questions concerning where they lived before their degree, where they completed their post-secondary education, and where they currently reside.

At the time of data collection, the participants were informed of the objective of the study, the proposed use of the information, how the data is going to be protected, and the data sharing agreements that are in place. All information concerning the identity of the participants (i.e., name, address, and telephone number) is excluded from the data. Access to the data is governed by a confidentiality agreement and a data sharing agreement concerning the security of the data with Dr. Michael Haan, which I am included as a researcher. After I have completed the analysis, the Director of Research and Analysis screened all data, and a disclosure analysis was conducted in order to ensure that all measures of confidentiality have been adhered to for the release of data. Furthermore, as outlined in the MPHEC Standard for Maintaining Confidentiality, only aggregate data is released in order to ensure the confidentiality of all the individual participants.
For the purposes of this research, I have chosen several demographic characteristics to analyze including the place of residence before enrollment and after graduation, the province of graduation, level of degree, field of study, age, gender, language, marital status, employment status, and parental education. The total unweighted sample consists of 3,519 graduates. The total weighted sample is 16,021.\(^5\)

In order to determine what factors impact the migratory trends of post-secondary graduates from New Brunswick, Nova Scotia and Prince Edward Island graduates are dropped from the sample for the descriptive analysis in Chapter 4, and the regression analysis in Chapter 5. The unweighted sample for New Brunswick graduates is 1,181, with a weighted sample of 4,890.

### 3.2 Data Analysis

Two primary forms of data analysis are done in order to give context to and address the overall research question: what factors shape a graduate’s decision to stay or to leave New Brunswick once he or she have completed their post-secondary degree? In order to assess the overall demographic profile and migratory trends of New Brunswick Graduates (Chapter 4), I have conducted a descriptive analysis using the population counts for each unit of analysis that is assessed. The counts are presented in percentages. Lastly, a logistic regression analysis is performed for graduates from New Brunswick, using various predictors in order to address each hypothesis (Chapter 5).

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\(^5\) Myself and another researcher, as part of a separate research project for the Maritime Provinces Higher Education Commission, created the weights that are used in the analysis. In order to align the data collected in the 2007 Graduate Survey, the weights were created by comparing the graduate survey to data collected by the Post-secondary Student Information System. PSIS is a national survey that collects up to date information on enrollment and graduation of Canadian public post-secondary institutions. MPHEC graduate data was compared to PSIS data across four fields: age, sex, province of graduation, and field of study. The associated outcome is a population weight that can be applied to the 2007 Graduate Survey that accurately reflects post-secondary graduates from Prince Edward Island, Nova Scotia, and New Brunswick.
There are numerous demographic and social indicators that can explain the migratory patterns of post-secondary graduates in New Brunswick. In order to explain the relationship between an individual’s post-secondary education and their respective migration choices, I have chosen several indicators from the Maritimes Provinces Higher Education Commission’s graduate survey of 2007 graduates in 2009. The choice of what predictors to use is based on previous literature that has identified several key contributors to migration. The 2009 dataset includes several underlying constructs that could be used to explain the migratory patterns of recent graduates; however, only a select few are used for the purposes of this project. Specifically, variables such as employment experience before university, overall university experience, financing of post-secondary degree, and previous employment experience are not explored. Instead, I focus on the key demographic and educational factors that impact the migratory trends of post-secondary graduates. This decision is largely due to the lack of information found in the dataset, as well as data quality.

3.2.1 Statistical technique and analysis

To determine what characteristics have the biggest impact on the propensity to migrate after graduation, I will perform a logistic regression analysis. I have chosen a logistic regression as the method of analysis largely due to the nature of the data and the research question under investigation. Furthermore, logistic regression allows researchers to analyze data that has an outcome variable that is binary (Warner, 2008). Therefore, the outcome variable does not have to be normally distributed. Due to the less restrictive assumptions of binary logistic regression, this form of analysis is an appropriate method for this research, as migration is not measured as a continuous
quantitative outcome. Instead, migration is a phenomenon whereby the outcome is that an individual moves or does not move in a given time period. For the purpose of this research, the primary objective is to determine the relevant predictors and their associated impact on the migration of post-secondary graduates. Therefore, the outcome is whether or not someone has moved after the completion of his or her degree.

The outcome variable for logistic regression is in the form of a “logit” which is a log of odds (or if a researcher chooses, a log of a ratio of odds for two different conditions) (Warner, 2008). The odds of given predictor is obtained by dividing the number of times an outcome occurs by the number of times it does not occur. For example, if the outcome of interest is whether or not a graduate has moved (0=did not move, 1=did move), with a sample size of 20 and 8 moved (12 did not move), then the odds of migration is the total number that moved (8) divided by the total that did not move (12): 8/12 = .667. In contrast, we can also calculate the odds that someone will not move: 12/8 = 1.5. Therefore, we can conclude that the odds of a graduate moving after graduating is less than one, or that the odds of a graduate not moving after graduation is greater than one.

There are four underlying assumptions concerning logistic regression: (1) the outcome is dichotomous, (2) the scores on the outcome variable must be statistically independent, (3) the model should only include relevant predictors, and (4) the outcome variable is mutually exclusive, i.e., each individual in the study is part of only one group, not both (Warner, 2008). In order to adhere to the underlying assumptions of the model, the data are analyzed and recoded to align with the research hypotheses.
The data are analyzed using the statistical software Stata version 11. Tests of significance are conducted at the p<0.05 levels. That said, it is noted if the level of significance is at the p<0.01 or p<0.001 levels. Logistic regression provides several types of significance testing. The Wald chi-square test of significance is the most common and is the type used in this analysis. Because logistic regression has a logit outcome variable, the interpretation of a slope is different than a linear model. Moreover, the slope in a logistic regression represents how many units the log odds ratio increases for a respective one unit increase in the score of the predictor variable, on a logarithmic scale (Warner, 2008). By dividing the slope coefficient by its standard error and then squaring the ratio, we obtain the Wald chi-square statistic. The result is a statistical significant value (or p-value) similar to a linear model and is represented as significant at the 0.05 level.

3.2.2 Data cleaning and recoding

To begin, I recoded relevant variables into either dichotomous or interval level variables for the purpose of analysis (Table 3.1).
Table 3.1

Variables used for logistic regression using Maritime Provinces Higher Education data on 2007 New Brunswick post-secondary graduates in 2009

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Coded</th>
<th>N</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Move (Dependent)</td>
<td>Dichotomous: 1=Move</td>
<td>1930</td>
<td>0.407</td>
</tr>
<tr>
<td></td>
<td>from province of study</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Independent predictors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Dichotomous: I=Male</td>
<td>1871</td>
<td>0.383</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 21</td>
<td>Reference category</td>
<td>662</td>
<td>0.134</td>
</tr>
<tr>
<td>Age 22</td>
<td>Dichotomous: I=Yes</td>
<td>1036</td>
<td>0.213</td>
</tr>
<tr>
<td>Age 23</td>
<td>Dichotomous: I=Yes</td>
<td>805</td>
<td>0.155</td>
</tr>
<tr>
<td>Age 24</td>
<td>Dichotomous: I=Yes</td>
<td>528</td>
<td>0.101</td>
</tr>
<tr>
<td>Age 25</td>
<td>Dichotomous: I=Yes</td>
<td>353</td>
<td>0.072</td>
</tr>
<tr>
<td>Age 26-29</td>
<td>Dichotomous: I=Yes</td>
<td>725</td>
<td>0.154</td>
</tr>
<tr>
<td>Age 30</td>
<td>Dichotomous: I=Yes</td>
<td>781</td>
<td>0.158</td>
</tr>
<tr>
<td>Marital Status</td>
<td>Dichotomous: I=Single</td>
<td>2464</td>
<td>0.526</td>
</tr>
<tr>
<td>Interprovincial move for school</td>
<td>Dichotomous: I=Yes</td>
<td>1370</td>
<td>0.289</td>
</tr>
<tr>
<td>International move for school</td>
<td>Dichotomous: I=Yes</td>
<td>514</td>
<td>0.108</td>
</tr>
<tr>
<td><strong>Field of study</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commerce and Administration</td>
<td>Reference category</td>
<td>879</td>
<td>0.18</td>
</tr>
<tr>
<td>Agricultural/Biological Sciences</td>
<td>Dichotomous: I=Yes</td>
<td>253</td>
<td>0.052</td>
</tr>
<tr>
<td>General Arts and Sciences</td>
<td>Dichotomous: I=Yes</td>
<td>57</td>
<td>0.012</td>
</tr>
<tr>
<td>Education</td>
<td>Dichotomous: I=Yes</td>
<td>905</td>
<td>0.185</td>
</tr>
<tr>
<td>Engineering</td>
<td>Dichotomous: I=Yes</td>
<td>415</td>
<td>0.085</td>
</tr>
<tr>
<td>Fine and Applied Arts</td>
<td>Dichotomous: I=Yes</td>
<td>73</td>
<td>0.015</td>
</tr>
<tr>
<td>Health Professions</td>
<td>Dichotomous: I=Yes</td>
<td>448</td>
<td>0.092</td>
</tr>
<tr>
<td>Humanities</td>
<td>Dichotomous: I=Yes</td>
<td>583</td>
<td>0.119</td>
</tr>
<tr>
<td>Mathematics and Physical</td>
<td>Dichotomous: I=Yes</td>
<td>248</td>
<td>0.051</td>
</tr>
<tr>
<td>Sciences</td>
<td>Employment Status</td>
<td>Degree type</td>
<td>Family Education</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------</td>
<td>----------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Social Sciences</td>
<td></td>
<td>First Professional degree</td>
<td>High School or less</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bachelor's degree</td>
<td>PSE below bachelor's degree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Graduate degree</td>
<td>Bachelor's degree or above</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reference Category</td>
<td>Reference Category</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dichotomous: 1=Yes</td>
<td>Dichotomous: 1=Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1=Employed</td>
<td>1=Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1029 0.210</td>
<td>897 0.189</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2029 0.669</td>
<td>3338 0.704</td>
</tr>
<tr>
<td></td>
<td></td>
<td>509 0.107</td>
<td>1615 0.350</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1972 0.427</td>
</tr>
</tbody>
</table>

\[N=4890\]

I created the dependent variable by coding all New Brunswick graduates that moved out of the province within two years of graduation as 'one', and all graduates that did not move out of the province as 'zero'. Therefore, each graduate is in either group and cannot be in both. The total weighted sample size for New Brunswick graduates is 4890; approximately 40.7 percent of graduates moved after the completion of their degree, and are therefore, coded as 'one'.

Several predictor variables are created in order to explain the migratory trends of New Brunswick graduates, or, said differently, to explain the total variation in the outcome variable. Gender, age, and marital status variables are created as control variables. For gender, males are coded as 'one' and females are coded as 'zero'. This is in response to hypothesis two, whereby I predict that male graduates are more likely to leave the province. Age is broken down into seven categories: 21 and under, 22, 23, 24,
25, 26 to 29, and 30 and above. The choice of these categories is twofold. First, many graduates complete their degree between the ages of 22 and 26; therefore, the variables are created to denote any difference in these age groups in terms of mobility. Second, a cluster of graduates is between the ages of 26 and 29, and over the age of 30 at the time of graduation. Very few graduates are under the age of 22 at the time of graduation; therefore, this variable is used as the reference category. The age category is based on the reported age at graduation. Lastly, graduates that are single (i.e., have never been married) are coded as ‘one’. This is to explore hypothesis two, whereby I predict that graduates that are single are more likely to migrate than married graduates. Marital status is based on the 2009 survey, not at time of graduation.

In the 2009 graduate survey, graduates are asked the following question: during the twelve months immediately before you enrolled, in what province/state were you living? I have recoded this question in order to identify any differences between graduates that moved to the Maritimes from outside of Canada versus graduates that moved from within Canada to complete their degree in the Maritimes. To capture international migrants, all individuals that reported to be living in a province or state outside of Canada are classified as international students. Therefore, I have coded these individuals as ‘one’. To denote the difference in international migration and interprovincial migration, all individuals that reported to be living in a province or territory within Canada but outside of New Brunswick, are classified as interprovincial migrants. Therefore, I have coded these individuals as ‘one’.

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6 All individuals that reported to be living in New Brunswick 12 months prior to enrolling in school are not included in the regression as they are coded ‘zero’ for both the internal and international migration variables.
To test hypothesis three, I have recoded the field of study for New Brunswick graduates into ten categories. Each field of study is created as a dichotomous variable, where ‘one’ represents all graduates that graduated with a degree in the respective field of study. Individuals that graduated with a Commerce and Administration degree are used as the reference category, for three reasons: (1) existing literature does not identify any major migratory patterns associated with this group; (2) many post-secondary graduates obtain a degree in this field across the Canadian provinces, and furthermore, it is common degree that is required in the labour market, and (3) the regional labour market in New Brunswick is geared toward Information Technology and other related business fields, therefore individuals are less likely to have to migrate in order to find relevant employment.

A variable is created that corresponds to the level of the degree that a graduate obtained. The information in the 2009 survey is recoded into dichotomous variables. The reference category are graduates that obtained a first professional degree, which includes a Doctor of Medicine, Doctor of veterinary medicine, doctor of surgery, pharmacy, master of arts in theology, and master of arts in divinity. Because these categories are not considered to be at the bachelor’s or graduate level, they are used as the reference group. The categories of interest include graduates that obtained a bachelor’s degree or a graduate degree. This variable is created in order to determine whether or not the completion of higher-level degrees impacts the propensity to migrate after graduation.

Lastly, several additional characteristics are explored. An employment variable is created in order to determine whether or not the employment status of a graduate two
years after graduation is related to their migratory status. Family education is a variable that is already located in the 2009 graduate survey. This variable is a combination of both the parental education of a graduates mother and father. This is included as an indicator because current literature notes that the educational credentials of graduates’ parents may impact whether or not an individual moves to attend university and any subsequent moves (Finnie & Mueller, 2008). The variable is recoded into dichotomous variables, whereby the reference category represents graduates that parents’ have a combined education of a high school diploma or less. The indicator variables include graduates with parents that have a combined education below the bachelor’s level, and whose parent’s have a post-secondary degree at the bachelor’s level or above.
4.0 Demographic outlook of post-secondary graduates in New Brunswick

The decision an individual makes concerning what university to attend, what degree to pursue, and what to do after the completion of a degree, impacts the demographic profiles of all the Canadian provinces (Bernard et al. 2008). Furthermore, post-secondary graduates are key to local innovation and growth particularly in New Brunswick, where population decline is expected to affect the overall demographic composition of the region. Therefore, it is important to examine the migratory patterns of post-secondary graduates before and after the completion of their degree in order to be able to design and implement relevant policies that seek to address the problem of population decline and retention in the region.

According to the Maritime Provinces Higher Education Commission’s 2007 survey of recent graduates, approximately 16,021 graduated from a post-secondary institution in the Maritimes. Accordingly, 64 percent graduated with a degree from an institution in Nova Scotia, while 31 percent graduated from New Brunswick, and only five percent graduated from Prince Edward Island. The average age among 2007 graduates is 25.9, and roughly two-thirds are women.

4.1 Attendance of a post-secondary institution

Overall, about one-in-two individuals that graduated in 2007 with a post-secondary degree from a Maritime university left their home province in order to obtain their credentials.
Table 4.1

Province of graduation by pre-school province of residence (percentages)

<table>
<thead>
<tr>
<th>Province of Graduation</th>
<th>PEI</th>
<th>NS</th>
<th>NB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prince Edward Island</td>
<td>54.4</td>
<td>26.2</td>
<td>19.4</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>--</td>
<td>91.9</td>
<td>7.2</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>--</td>
<td>17.2</td>
<td>81.9</td>
</tr>
<tr>
<td>Another Canadian Province</td>
<td>3.6</td>
<td>76.0</td>
<td>20.5</td>
</tr>
<tr>
<td>Outside of Canada</td>
<td>11.6</td>
<td>59.6</td>
<td>28.8</td>
</tr>
</tbody>
</table>

*Note:* "—" indicates that cell counts are too low to report.

For New Brunswick residents, less than 18 percent leave their home province to attend a post-secondary institution elsewhere in the Maritimes (Table 4.1). A majority of the individuals that do leave choose to attend an institution in Nova Scotia. Interestingly, very few individuals originally from Nova Scotia choose to pursue a degree in New Brunswick, while almost one-in-five New Brunswick graduates lived in Prince Edward Island before enrolling in their degree.

The majority of individuals that move from another Canadian province to attend a university in the Maritimes will attend an institution in Nova Scotia. Approximately 21 percent of New Brunswick graduates lived in another Canadian province before enrolling in their degree. New Brunswick receives a high percentage of Quebec residents, possibly due to the French/English language composition of the province.

Approximately 14.3 percent of 2007 post-secondary graduates in the Maritimes lived in another country 12 months prior to attending university. Nova Scotia receives a majority of international residents with 59.6 percent choosing to
attend an institution in the province. New Brunswick receives 28.8 percent of international students, where Prince Edward Island only attracts a minority (11.6%).

The top of fields of study for all individuals that graduate with a degree from New Brunswick is the Social Sciences (21%), Education (18.5%), and Commerce and Administration (18%) (Table 4.2). Graduates in New Brunswick are unlikely to choose degrees in the general Arts or Sciences, Fine and Applied Arts, Agricultural and Biological Sciences, or Mathematics and Physical Sciences, with only 13 percent of all graduates choosing to major in these fields. Moreover, for individuals that pursue a degree in New Brunswick that are originally from the province, the top fields of study are the Social Sciences (22.2%), Education (21.7%), and Commerce and Administration (17.4%). In contrast, for individuals that leave their home province to pursue a degree New Brunswick from another Canadian province, the top fields are the Social Sciences (23.5%), the Humanities (18.3%), and Commerce and Administration (14.6%). The top fields of study for individuals that move from outside of Canada to pursue a post-secondary degree in New Brunswick are Commerce and Administration (35.3%), Education (12.9%), and Engineering (12.4%).
Table 4.2

Field of study for New Brunswick graduates, broken down by pre-school residence (percentages)

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>All Graduates</th>
<th>NB Residents</th>
<th>Internal Movers</th>
<th>International Movers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural and Biological Sciences</td>
<td>5.2</td>
<td>5.1</td>
<td>4.7</td>
<td>6.5</td>
</tr>
<tr>
<td>Commerce and Administration</td>
<td>18.0</td>
<td>17.4</td>
<td>10.7</td>
<td>35.3</td>
</tr>
<tr>
<td>Education</td>
<td>18.5</td>
<td>21.7</td>
<td>14.6</td>
<td>12.9</td>
</tr>
<tr>
<td>Engineering</td>
<td>8.5</td>
<td>6.3</td>
<td>11.2</td>
<td>12.4</td>
</tr>
<tr>
<td>Health Professions</td>
<td>9.2</td>
<td>9.8</td>
<td>9.8</td>
<td>5.0</td>
</tr>
<tr>
<td>Humanities</td>
<td>11.9</td>
<td>10.5</td>
<td>18.3</td>
<td>5.0</td>
</tr>
<tr>
<td>Mathematics and Physical Sciences</td>
<td>5.1</td>
<td>4.6</td>
<td>5.4</td>
<td>6.4</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>21.0</td>
<td>22.2</td>
<td>23.5</td>
<td>10.8</td>
</tr>
</tbody>
</table>

Note: Graduates that obtained a degree in the general Arts and Sciences and the Fine and Applied Arts are excluded from the descriptive analysis due to a small unweighted sample size.

Overall, the fields of study choices of graduates are relatively consistent across all three cohorts: the Social Sciences, Commerce and Administration, Education, and the Humanities. Overall, international students that pursue a degree in New Brunswick graduate with similar degrees as Canadian-born residents. However, in comparison, over one-third chooses to pursue a degree in Commerce and Administration, which is significantly higher than New Brunswick graduates originally from Canada.

There are differences in the field of study for graduates that pursue an undergraduate degree and a graduate degree in New Brunswick. Approximately 70.4 percent of 2007 New Brunswick graduates obtained a degree at the bachelor’s level, while 11.7 percent received a degree at the master’s or doctorate level.\(^7\) The majority of individuals that graduate with an undergraduate degree do so with a degree in the

\(^7\) Percentages do not equal 100 due the exclusion of first professional degree holders.
Social Sciences, Commerce and Administration, the Humanities, and Education. In contrast, the majority of graduates from a Master’s or a Doctorate program obtain a degree in Education, Commerce and Administration, Engineering, and Mathematics and Physical Sciences. Compared to undergraduates, few graduate students pursue a degree in the Social Sciences. These differences could be attributed to several factors: there is a limited number of post-graduate programs available at institutions in New Brunswick and higher-level graduates making decisions based on perceived labour market trends and available employment opportunities (Finnie, 2004).

Moreover, undergraduates are forced into making a decision regarding what degree to major in and may not be knowledgeable about current labour market demands. Graduate students are likely to be more knowledgeable about their respective labour market outcomes and therefore, choose a degree accordingly.

4.2 Moving after graduation

A majority of 2007 graduates have positive early market outcomes such as obtaining a full-time job, receiving adequately high earnings, and otherwise making a smooth transition into the labour market. However, many graduates have to relocate to another province in order to obtain their ideal job and a job that their university degree qualifies them for. Whether a graduate chooses to move out of the region where they completed their degree depends largely on the field of study that they majored in, their home province, and gender. In addition, having moved to attend school influences whether or not a graduate will move after graduation.
The migratory trends of New Brunswick graduates differ depending on whether or not an individual is from the region, moved from within Canada, or moved from outside of Canada to complete their degree.

Table 4.3

*Percentage of New Brunswick graduates that did not move after graduation, and percentage of movers and their current province of residence*

<table>
<thead>
<tr>
<th>Non-Movers</th>
<th>Movers</th>
<th>current residence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Other Atlantic Province</td>
</tr>
<tr>
<td>Originally from New Brunswick</td>
<td>76.4</td>
<td>22.7</td>
</tr>
<tr>
<td>Internal migrants</td>
<td>19.1</td>
<td>26.7</td>
</tr>
<tr>
<td>International migrants</td>
<td>21.5</td>
<td>-</td>
</tr>
</tbody>
</table>

Approximately 58.5 percent of New Brunswick graduates lived in the province prior to pursuing their post-secondary degree: 23.6 percent will leave the province within two years of graduation (Table 4.3). The majority of graduates originally from New Brunswick that leaves after completing their degree choose to relocate to another Canadian province (67.1%), with a slight minority settling in Prince Edward Island or Nova Scotia (22.7%).

Most Canadian-born and international students that choose to complete a degree in New Brunswick will choose to leave the region. Many internal migrants will move onwards to another Canadian province or territory, while a majority of international migrants return to their original country of residence or to another country.
The retention rates of post-secondary graduates in New Brunswick vary considerably depending on the region in which they lived before pursuing their degree. Accordingly, graduates originally from New Brunswick are the most likely to remain in the province after completing their degree: 76.4 percent lived in the region two years after completing their degree. In contrast, graduates that migrated from another Canadian province have the lowest retention rates, with only 16.3 percent remaining in the region. Roughly 21.5 percent of international migrants choose to stay in the province after the completion of their degree. Overall, New Brunswick retains just over 50 percent of the province’s post-secondary graduates two years after graduation.

These numbers are not surprising given that low populated provinces have been struggling to retain both internal and international migrants. Moreover, the Maritime Provinces have long been struggling to retain immigrants due to stagnate economic growth (Okonny-Myers, 2010). The low retention rates of graduates from other Canadian provinces are not surprising given that the overall trend is for young, educated individuals to move to the country’s large urban centres (Hou & Bourne, 2006; Turcotte & Vezina, 2010).

A significant proportion of recent post-secondary graduates choose to relocate to other Canadian provinces. The top four destinations for New Brunswick graduates that leave the region two years after graduation are Ontario (52%), Alberta (12.3%), Quebec (14.%) and British Columbia (9.4%). Approximately 26.6 percent of graduates that move to Ontario chose to live in Toronto, while 22 percent move to Ottawa. The majority of graduates that move to Alberta choose to relocate to Calgary
(47.9%). Graduates that move to Quebec tend to relocate to Montreal (37.2%), while the top destination for graduates that move to British Columbia is Vancouver, with one-in-four relocating to the city.

The overall interprovincial migratory trends of New Brunswick post-secondary graduates are to be expected and are consistent with the Canadian population as a whole. Provinces with smaller population counts tend to lose new graduates to provinces with larger cities (Burbidge & Finnie, 2000). The majority of New Brunswick graduates choose to stay in the country after they complete their degree, with only five percent relocating outside Canada. Over the years, the number of graduates that move to the United States has increased, largely due to the competitive employment market (Collins, 2008; DeVoretz, 1999). That said, the outflow of human capital to the US has been quite small. Approximately 1.6 percent of New Brunswick graduates that leave the region move to the United States.

The likelihood of moving out of one’s province of graduation within the two years following graduation varies by gender. Roughly 53.6 percent of men and 43.1 percent of women chose to leave New Brunswick after graduation. Both male and female graduates are most likely to relocate to another Canadian province if they chose to move; a small minority of graduates moves to another Maritime Province once they complete their degree. Interestingly, male graduates are likely to migrate to Prince Edward Island within two years of completing their degree (5.3 versus 2 percent), while women graduates move outside of the country at higher rates than males (24.2 versus 19 percent). Overall, the migratory trends of post-secondary
graduates in New Brunswick are consistent with recent studies that suggest a higher number of males migrate from New Brunswick than females (Trovato, 2009).

Field of study plays a significant part in the migratory trends of New Brunswick post-secondary graduates. Moreover, individuals that choose to major in Engineering or Fine or Applied Arts are most likely to move out of their province of study: 71.8 percent of Engineering and 71.2 percent of Fine or Applied Arts graduates leave the province within two years of graduation. Graduates that complete degrees in Mathematics and Physical Sciences (55.6%), the Humanities (54.9%), and Agricultural and Biological Sciences (54.9%) are equally likely to leave. Graduates with degrees in Commerce and Administration (42.8%), Health (42%), and Education (33.3%) are the least likely to leave the region two years after graduation.

These findings are consistent with existing literature that explores the relationship between field of study and mobility. Moreover, previous research indicates that post-secondary graduates in the fields of the Fine or Applied Arts and Humanities have lower earnings and a high education-to-employment skill mismatch (Finnie & Frenette, 2003; Finnie, 2001). Therefore, graduates that obtain degrees in such fields may chose to leave the region to seek employment because their fields of study may be more directly related to labour markets elsewhere and may have better employment outcomes. Moreover, individuals that graduate with degree in Engineering may be unable to find employment due to the limited labour market in New Brunswick and therefore, migrate elsewhere in search for opportunities.

Graduates that obtain degrees in the Agricultural and Biological sciences, Fine and Applied Arts, and the Humanities tend to be the youngest, with a mean between
Furthermore, graduates with degrees in Health (28), Education (27.6), and the general Arts or Sciences (26.8) tend to be oldest at the time of graduation, which is the least mobile group across all three provinces. Therefore, it is not surprising that the fields of study with the highest rates of migration two years after graduation are the youngest while older graduates obtain degrees in fields with low rates of mobility: only 42 percent of health graduates, 33.3 percent of Education graduates, and 49.1 percent of general Arts and Science graduates choose to leave their province of graduation within two years.

These findings are consistent with existing literature that addresses the mobility patterns of post-secondary graduates that obtain degrees in particularly fields of study. Moreover, previous research indicates that graduates in the Fine or Applied Arts, Humanities, and the Social Sciences are the most mobile group in Canada (Finnie & Frenette, 2003).
5.0 Multivariate Results

Determining the migratory trends of a given population is challenging largely because of the dynamic nature of migration itself. As individuals move from one location to another, it is challenging to keep up to date information that enables researchers to obtain adequate information. Furthermore, how researchers phrase questions, and the participants understanding and recollection of events, has major implications for migratory research. For example, if a participant is asked “what city did you reside in one year ago”, the participant and researcher need to have a clear understanding of what a ‘city’ is. A participant may answer Vancouver, but really lived in Burnaby, a city that is part of greater Vancouver.

Tracing post-secondary graduates is further challenging, as they are one of the most mobile groups in Canada. Recent graduates may move several times after completing their degree, seeking out relevant employment that meets their expectations. However, it is prudent to gain as much information about this group as possible because where they choose to reside has implications for each province and territory in Canada. Every survey methodology is imperfect; however it is important to recognize this and gain as much insight into the results as possible.

The target population for my analysis is recent post-secondary graduates that obtained a degree in the province of New Brunswick. In order to gain insight into this group, I used data collected by the Maritime Provinces Higher Education Commission on 2007 post-secondary graduates in the Maritimes. Since New Brunswick is the unit of analysis, graduates from Prince Edward Island and Nova Scotia are excluded. The total weighted New Brunswick population is 4,890.
To capture the demographic trends and migratory patterns of New Brunswick post-secondary graduates, I conducted a logistic regression analysis that takes into account several demographic, migratory, and educational determinants. Each variable is analyzed independently, and then combined together to determine which has the greatest effect on New Brunswick post-secondary graduates’ propensity to migrate after the completion of their degree.

5.1 Demographic characteristics

For the purposes of this research, I have chosen several individual-specific determinants based on what previous literature has indicated as being important for migration. These include age, gender, language, marital status, and employment status (Table 5.1).

Table 5.1

<p>| Individual characteristics used in the analysis, and their associated means |</p>
<table>
<thead>
<tr>
<th>Variable name</th>
<th>Mean</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>0.383</td>
<td>Number of male graduates</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 21</td>
<td>0.134</td>
<td>Age 20 and 21 at time of graduation</td>
</tr>
<tr>
<td>Age 22</td>
<td>0.213</td>
<td>Age 22 at time of graduation</td>
</tr>
<tr>
<td>Age 23</td>
<td>0.155</td>
<td>Age 23 at time of graduation</td>
</tr>
<tr>
<td>Age 24</td>
<td>0.101</td>
<td>Age 24 at time of graduation</td>
</tr>
<tr>
<td>Age 25</td>
<td>0.072</td>
<td>Age 25 at time of graduation</td>
</tr>
<tr>
<td>Age 26-29</td>
<td>0.154</td>
<td>Age 26 to 29 at time of graduation</td>
</tr>
<tr>
<td>Age 30</td>
<td>0.158</td>
<td>Age 30 and above at time of graduation</td>
</tr>
<tr>
<td>Single</td>
<td>0.526</td>
<td>Individuals that are single at time of interview</td>
</tr>
<tr>
<td>Employed</td>
<td>0.669</td>
<td>Individuals that are employed at time of interview</td>
</tr>
</tbody>
</table>
I chose males as the unit of analysis because previous research indicates that males have a higher propensity to migrate than females. Accordingly, 38.3 percent of the sample is males.

Age is broken down into seven categories. The variable age21 represents graduates that were the age of 20 or 21 at the time of graduation, and is combined because very few individuals graduate at these ages. This variable is used as the reference category in the analysis because it represents a minority of graduates, and very few in this group have relocated after graduation. Graduates between the ages of 22 and 25 are created as independent groups since these ages are shown to be the key age groups for migration. These age groups make up approximately half of all New Brunswick graduates. Graduates between the ages of 26 and 29 are collapsed into one group and contains approximately 15.4 percent of the sample. Lastly, graduates 30 years of age or older are combined into one group because the propensity to migrate tends to decrease with age. Approximately 15.8 percent of the sample is over the age of 30; 10 percent is between the ages of 30 and 39 at the time of graduation.

The marital status of an individual plays an important part in the decision-making process of migration. Single individuals are used as the predictor because previous research indicates that single individuals are more likely to migrate than individuals that are married or common-law (Dion & Couloumbre, 2008; Myers et al, 2009; Trovato, 2009). All graduates that classified themselves as single at the time of the interview are used in the analysis, and comprised roughly half of all graduates.

The final individual-specific variable included in the analysis is employment status. Approximately 66.9 percent of New Brunswick graduates are employed two years
after graduation. This number is low likely due to the fact that approximately half of New Brunswick graduates went on to pursue higher education after the completion of their degree: 55.5 percent of these graduates were still enrolled in this program at the time of the 2009 interview.

5.2 Mobility

Two key mobility indicators are chosen for the analysis: the migration of individuals to New Brunswick from another Province or Territory to attend school and the migration of international students to New Brunswick. These groups are chosen simply because they are most mobile group in the province in regards to migration.

Previous research has found that individuals that make an initial move, are much more likely to make subsequent moves (Newbold & Cicchino, 2007; Newbold, 2005). Furthermore, in recent years, provincial governments have invested financial capital in the recruitment of individuals from other provinces and countries, in order to attract and retain new migrants. Post-secondary institutions have also invested time and money in pursuing university-bound individuals to attend their institution. Therefore, it is prudent to determine whether or not such individuals are choosing to stay in the region where they completed their degree. Since these groups are chosen for the analysis, individuals originally from New Brunswick that completed a degree in the province are the reference group. Interestingly, individuals originally from New Brunswick have the lowest rate of migration after the completion of their degree: only 23.6 percent of original New Brunswick residents left the region. In comparison, 78.5 percent of immigrants left, and 80.9 percent of individuals that moved from within Canada, left the region after graduation.
Approximately 1370 individuals moved from within Canada to New Brunswick to become part of the class of 2007. This group makes up approximately 28.9 percent of the 2007 graduating class. Individuals that moved to New Brunswick to complete a degree from another country, represents only a small minority (10.8%) of 2007 graduates. Accordingly, the majority of 2007 graduates in New Brunswick are originally from the province: 60.3 percent lived in the province before enrolling in university.

5.3 Education

The educational credentials of an individual plays a major role in post-graduation migration, because what field of study a graduate pursues and what level of education he or she obtains, determines what employment opportunities they are qualified for. Moreover, if a recent graduate is unable to find employment that they are qualified for in a given region, they are forced to seek opportunities elsewhere.

The educational characteristics of 2007 graduates are broken down into three areas: field of study, level of education, and family educational attainment (Table 2).
<table>
<thead>
<tr>
<th>Variable name</th>
<th>Mean</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field of study</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Agricultural and Biological Sciences</em></td>
<td>0.052</td>
<td>Individuals that graduated with an agricultural/biological degree</td>
</tr>
<tr>
<td><em>General Arts and Sciences</em></td>
<td>0.012</td>
<td>Individuals that graduated with a general arts degree</td>
</tr>
<tr>
<td><em>Commerce and Administration</em></td>
<td>0.185</td>
<td>Individuals that graduated with a commerce/administration degree</td>
</tr>
<tr>
<td><em>Education</em></td>
<td>0.180</td>
<td>Individuals that graduated with an education degree</td>
</tr>
<tr>
<td><em>Engineering</em></td>
<td>0.085</td>
<td>Individuals that graduated with an engineering degree</td>
</tr>
<tr>
<td><em>Fine and Applied Arts</em></td>
<td>0.015</td>
<td>Individuals that graduated with a fine or applied arts degree</td>
</tr>
<tr>
<td><em>Health Professions</em></td>
<td>0.092</td>
<td>Individuals that graduated with a health degree</td>
</tr>
<tr>
<td><em>Humanities</em></td>
<td>0.119</td>
<td>Individuals that graduated with a humanities degree</td>
</tr>
<tr>
<td><em>Mathematics and Physical Sciences</em></td>
<td>0.051</td>
<td>Individuals that graduated with a mathematics degree</td>
</tr>
<tr>
<td><em>Social Sciences</em></td>
<td>0.210</td>
<td>Individuals that graduated with a social science degree</td>
</tr>
<tr>
<td><strong>Degree type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>First Professional</em></td>
<td>0.189</td>
<td>Individuals that graduated with a first professional degree or a degree above or below the bachelor’s level</td>
</tr>
<tr>
<td><em>Bachelor</em></td>
<td>0.704</td>
<td>Individuals that graduated with a bachelor's degree</td>
</tr>
</tbody>
</table>
Graduate | 0.107 | Individuals that graduated with a master's degree
Family Education
High school or less | 0.223 | Parents combined level of education is a high school diploma or less
Some post-secondary education | 0.350 | One parent in the household has a post-secondary education
Bachelor's degree or above | 0.427 | Both parents in the household acquire a post-secondary degree at the bachelor's level or above

Approximately 1 out of 5 2007 post-secondary graduates in New Brunswick obtained a degree in the Social Sciences. Besides the Social Sciences, a large majority graduated with a degree in Education, Commerce and Administration, and the Humanities. Although a largely percentage (18%) graduated with a degree in Commerce and Administration, this category is used as the reference group for the reasons mentioned in chapter 3. Interestingly, only 42.8 percent of Commerce and Administration graduates left the province after the completion of their degree: 52.4 percent did so in order to pursue higher education. Few New Brunswick graduates obtain a degree in the general arts and sciences, the fine and applied arts, agricultural and biological sciences, and mathematics and physical sciences.

Level of education is created into an interval level variable, whereby the reference category is individuals with a first professional degree, and the categories of interest are
bachelor degree and graduate degree holders. Approximately 70.4 percent of 2007 graduates completed a bachelors degree, 10.7 graduated with a masters degree,\textsuperscript{8}

Lastly, family education is included at the end of the analysis in order to determine whether or not family structure has any impact on the migratory decisions of post-secondary graduates. Moreover, previous literature indicates that graduates with parents that obtained a post-secondary degree are more likely to move to attend school (Finnie & Mueller, 2008). As individuals are more likely to migrate again if they have already done so in the past, it is likely that such individuals will migrate after the completion of their degree. Approximately 42.7 percent of 2007 New Brunswick graduates, that have parents with a bachelors degree or above, moved out of the province after completing their degree. This is higher than graduates with at least one parent with a post-secondary degree (35%), or graduates with both parents possessing a high school diploma or less (22.3%).

5.4 Regression outputs

The primary objective of this research is to determine what factors impact a post-secondary graduates' propensity to move after the completion of their degree. The approach for this research is to create an overall model that seeks to address this, while controlling for various influences. All characteristics mentioned above are imputed into a logistic regression as independent predictors (Table 5.3).

\textsuperscript{8} The reference category includes graduates with a first professional degree, an undergraduate certificate or diploma, or a university graduate certificate or diploma because they do not fit into the traditional hierarchical structure of university post-secondary degrees (i.e., bachelor, masters, doctorate). Since the outcome is to determine whether or not individuals with a bachelor's degree or a graduate degree are more or less likely to move than another, other degrees are used as the reference category.
Table 5.3

*Logistic regression output with independent and control variables*

<table>
<thead>
<tr>
<th></th>
<th>Odds ratio</th>
<th>Coeff.</th>
<th>Std. error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 21 Reference category</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 22</td>
<td>0.676</td>
<td>(-.391)**</td>
<td>0.092</td>
</tr>
<tr>
<td>Age 23</td>
<td>0.712</td>
<td>(-.340)*</td>
<td>0.106</td>
</tr>
<tr>
<td>Age 24</td>
<td>0.410</td>
<td>(-.890)***</td>
<td>0.072</td>
</tr>
<tr>
<td>Age 25</td>
<td>0.499</td>
<td>(-.694)***</td>
<td>0.102</td>
</tr>
<tr>
<td>Age 26 to 29</td>
<td>0.415</td>
<td>(-.878)***</td>
<td>0.071</td>
</tr>
<tr>
<td>Age 30</td>
<td>0.224</td>
<td>(-1.497)***</td>
<td>0.047</td>
</tr>
<tr>
<td>Female Reference category</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1.310</td>
<td>(.270)**</td>
<td>0.128</td>
</tr>
<tr>
<td>Married Reference category</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>1.233</td>
<td>(.210)*</td>
<td>0.118</td>
</tr>
<tr>
<td>Original NB residents Reference category</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immigrant</td>
<td>4.315</td>
<td>(1.462)***</td>
<td>0.622</td>
</tr>
<tr>
<td>Interprovincial migrant</td>
<td>8.069</td>
<td>(2.088)***</td>
<td>0.819</td>
</tr>
<tr>
<td>Commerce and Administration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural &amp; Biological Sciences</td>
<td>1.544</td>
<td>(.434)*</td>
<td>0.320</td>
</tr>
<tr>
<td>General arts &amp; Sciences</td>
<td>1.841</td>
<td>(0.610)</td>
<td>0.966</td>
</tr>
<tr>
<td>Education</td>
<td>0.910</td>
<td>(-.094)</td>
<td>0.143</td>
</tr>
<tr>
<td>Engineering</td>
<td>2.126</td>
<td>(.754)***</td>
<td>0.454</td>
</tr>
<tr>
<td>Fine &amp; Applied Arts</td>
<td>3.260</td>
<td>(1.183)**</td>
<td>1.227</td>
</tr>
<tr>
<td>Health</td>
<td>1.252</td>
<td>(0.225)</td>
<td>0.297</td>
</tr>
<tr>
<td>Humanities</td>
<td>1.419</td>
<td>(.350)*</td>
<td>0.227</td>
</tr>
<tr>
<td>Mathematics &amp; Physical Sciences</td>
<td>2.624</td>
<td>(.965)***</td>
<td>0.573</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>0.924</td>
<td>(-.079)</td>
<td>0.129</td>
</tr>
</tbody>
</table>
Odds ratios and the coefficients are reported in the final model, along with standard errors and the associated level of significance. All results are based on the weighted sample in the data set, which includes 2,895 cases, and are reported as being significant at the p<0.05 level; significance level results are represented with asterisks. All control variables are included in the final model, including age, sex, marital status, and employment status. Consequently, the reported effects are influenced by the control variables mentioned above.

The largest effect reported in the model is interprovincial migration, with a coefficient of 2.088 (p<0.001). Immigrant status also has a high effect (1.462; p<0.001). Among the control variables, gender has the greatest effect (0.270; p<0.05), while all age variables are significant at the p<0.001 level, except for age 23 while is significant at the
p<0.05 level. Marital status, which is reported for single individuals in the model, has a significant effect (0.210; p<0.001) as well as employment status (0.232; p<0.001).

In terms of educational field of study, the fine and applied arts has the highest influence (1.183; p<0.01), while the general arts and sciences, education, health, and the social sciences has no significant effect. All other fields of study have a significant effect on the outcome variable and all have positive coefficients. The variables for level of degree are significant for both the bachelor's level (-.376; p<0.01), and the graduate level (.698; p<0.01).

Lastly, the dichotomous variables that represent family education are significant for parents that have an education of a bachelor's degree or above (0.698; p<0.001), while graduates with parent's that acquire some post-secondary education are found to be not significant on the outcome variable.
6.0 Discussion

New Brunswick post-secondary graduates come from various regions to pursue a degree in the province, including other Canadian provinces and territories, and countries. Furthermore, a majority of the province’s high school students continue to choose their home province as their location of study. However, many New Brunswick graduates choose not to stay after they complete their degree. The purpose of my research has been to determine and explain what factors shape a graduate’s decision to stay or to leave New Brunswick once they have completed their post-secondary degree.

6.1 Interprovincial and internal migration

To begin, I hypothesized that there are four main factors that impact New Brunswick graduates post-graduation migratory decisions. The first hypothesis suggested that individuals who move to the province from another country are more likely to leave after the completion of their degree. Overall, individuals that migrate into the province from outside of Canada to pursue a degree are likely to leave once they have completed. Accordingly, international migrants are 4.3 times more likely to leave the province after they complete their degree than their Canadian-born counterparts. These findings are not surprising given that most international migrants that come to Canada choose to migrate to another Canadian province after their arrival. Like the overall immigrant population in Canada, international students are drawn to the large urban centres. Moreover, international migrants have the highest rates of return migration, where many chose to return to their original country of
residence. Young, skilled immigrants are the most likely to move, as they have the educational credentials to seek out relevant employment.

For my second hypothesis, I predicted that individuals that moved to New Brunswick from another Canadian province or territory would be more likely to leave than graduates originally from New Brunswick. Overall, internal migrants are 8 times more likely to leave than graduates originally from New Brunswick. These results are consistent with my hypothesis, and are not surprising given that most interprovincial migrants view moving to school as a temporary relocation, and do not plan on staying after the completion of their degree. Because internal migrants have migratory experience and furthermore, now have the skills to obtain employment in other regions, it is not surprising that they are more likely to pursue opportunities elsewhere. Moreover, graduates originally from New Brunswick are likely to have family and friends in the region, and weigh the cost and the benefit of migrating heavier than someone that is already away from home.

Given that New Brunswick attracts a significant amount of individuals to the province to pursue a degree (39.7% of New Brunswick graduates come from another province or territory or from outside of Canada to study), it is interesting that these groups have a high likelihood of out-migration. This indicates that, although New Brunswick is performing well at attracting post-secondary students to the region, the province is struggling to retain recent graduates from that are originally from outside of the region.

The high rate of migration among post-secondary graduates that moved New Brunswick to pursue their degree is likely due to many factors. Migration itself is a
decision-making process with varying obstacles that ‘push’ or ‘pull’ an individual to or from a given destination. However, if these obstacles have been overcome by a previous move, they become less problematic for future moves. Therefore, it is not surprising that New Brunswick graduates originally from outside of the province, will choose to move after completing their degree. Moreover, now that they possesses the human capital that is required to seek out better employment opportunities, they are willing to either return to their home region or migrate onward.

6.2 Demographic characteristics

For my third hypothesis, I suggested that there are several underlying demographic characteristics that impact graduate mobility.

First, I suggested that male graduates are more likely to migrate out of the region after completing their degree because previous research indicates a westward trend among male residents in New Brunswick. My regression results indicate that male graduates in New Brunswick move at higher rates that female graduates: males are 31 percent more likely to move outside of the region within two years of graduation. This result is unsurprising given that males tend to be oriented towards degrees that are in high-demand in other provinces and territories, and moreover, have experienced industry decline in New Brunswick. This finding is particularly interesting given that male graduates make up only 38.3 percent of the weighted sample. Even though more women are graduating with post-secondary degrees in New Brunswick, male graduates are significantly more likely to leave the province.

Second, I suggested that as the age of an individual increases, the likelihood of migrating decreases because younger individuals are more willing to move
elsewhere to search for employment opportunities. According to my regression results, this is the case concerning New Brunswick post-secondary graduates. A graduate that is the age of 23 at the time of graduation is 28.8 percent less likely to move compared to a graduate that is not the age of 23. This is the highest rate of migration among graduates. This is likely due to the fact that the average age among graduates that obtained a bachelor’s degree is 23.9, a large majority of which would be seeking employment opportunities. For each increase in age at the time of graduation, the likelihood of migration decreases. Furthermore, a graduate that is the age of 30 or higher at the time of graduation is 77.6 percent less likely to move than graduates that receive their degree below the age of 30 (1-0.224=0.776).

The age results for 2007 New Brunswick graduates are consistent with existing research. Young, skilled individuals are willing to leave in search for better employment opportunities. Moreover, young graduates have less familial responsibilities than their older counterparts, and are therefore more apt to search for suitable employment elsewhere. Accordingly, 38.7 percent of New Brunswick graduates that received their degree at 30 years of age or younger are married or living with a common-law partner two years after graduation, compared to 74.8 percent over the age of 30. This suggests that graduates 30 years of age or older are more likely to have familial responsibilities that decrease the likelihood of migration.

Third, I suggested is that single graduates are more likely to leave the province than graduates that are married or living common-law. The data revealed that single graduates are 23 percent more likely to be living outside of New Brunswick two years after graduation, which supports my hypothesis. This is not
surprising given that an individual’s martial status is closely linked to age. Since a
large majority of post-secondary graduates in New Brunswick are under the age of
26, and are entering the labour force for the first time, it is not surprising that single
graduates are more likely to move. Graduates that are married tend to be older than
their single counterparts and have more familial responsibility. Moreover, married
graduates tend to weigh the associated monetary and psychological costs of moving
with the potential gains, heavier than single graduates.

6.3 Education

For my final hypothesis, I suggested that the field of study a graduate chooses
to obtain impacts overall migration trends because certain degrees are in higher
demand in other provinces and territories. Accordingly, I predicted two trends:
graduates with degrees in education and health are more likely to stay in the province
after obtaining their degree, and that graduates in the fine and applied arts, the social
sciences, the humanities, and engineering have a high likelihood of migration.

New Brunswick graduates that obtain a degree in the fine and applied arts are
the most likely (OR=3.3) to be living in another province two years after graduation.
This is expected given that individuals with an fine and applied arts degree do not
acquire a skill set that is directly related to the labour market in New Brunswick.
Graduates with degrees in Mathematics and the Physical Sciences are 2.6 times more
likely to be living outside the province after graduation, while engineering graduates
are 2.1 times more likely. Agricultural and Biological Sciences graduates are 70
percent more likely.
The likelihood of migration among engineering graduates is expected given that such individuals acquire a skill set that is in high demand in other province and territories, and the decrease in employment opportunities in the provincial labour market. That said, the high likelihood of migration among graduates that received degrees in Mathematics and the Physical Sciences, and Agriculture and the Biological Sciences, is unexpected considering that previous research indicates low migration among these groups. Current labour market trends in New Brunswick also suggest an increase in Agriculture in the region (GNB, 2013). Moreover, there has been an increase in the agricultural industry in New Brunswick year over year. This finding indicates that occupations that require the skills that are obtained by completing a degree in these fields are in less demand in New Brunswick. Furthermore, this may also indicate a skill mismatch between graduates obtaining an Agricultural degree and available employment.

Graduates that obtain a degree in the Humanities have a high probability of leaving after graduation. It is not surprising that graduates that obtain a degree in these fields choose to leave the province, because the skills that are acquired with these degrees do not tend to be directly related to employment. Graduates with a humanities degree are 42 percent more likely to be living outside the province two years after graduation. This trend is unsurprising given the findings for interprovincial migrants. The humanities are the top field of study for graduates that moved to New Brunswick from another Canadian province to earn their credentials. Since this group of graduates is the most likely to leave the province after graduation, it is not surprising that Humanities graduates are more likely to leave. On the other
hand, Social Science graduates are less likely to leave the province after graduation, however the results are statistically insignificant.

Graduates that obtained a degree in Health and in Education are less likely to leave the province; however, the findings are not statistically significant. Therefore, I cannot confidently state that the likelihood of migration is greater for individuals that obtained a degree in health or in education compared that those that did not. However, these results are not surprising given that health and education graduates are the least likely to be living outside of New Brunswick within two years of graduation.

The level of education that a graduate acquires is found to impact migration. Interestingly, individuals that obtain a graduate degree are 60 percent more likely to be living in another province after graduation. On the other hand, individuals that graduated with a bachelor’s degree are 31 percent less likely to migrate than an individual that graduated with another degree. This is consistent with previous research that indicates the post-graduate experiences of undergraduate degree holders are positive. Moreover, individuals with graduate degrees tend to face short-term problems with over qualification, and therefore, may migrate elsewhere to find immediate employment (Frenette, 2004). These findings suggest that the labour market in New Brunswick is more receptive to undergraduate degree holders that major in key fields of study.

Education is plays a significant role in migration, both at the individual level and at the family level. The parental education of graduates’ parents has been linked to overall migratory trends. Whether or not an individual will relocate to another
province to attend university largely depends on parental insight and financial capital (Finnie & Mueller, 2008). Since an initial move has been linked to subsequent moves, the educational attainment of graduates’ parents has been linked to post-graduation migration. In order to determine whether or not the educational capital obtained by graduates’ parents influences post-graduation migration, I incorporated a variable that represents parental education. New Brunswick graduates, with parents that have a combined education of a bachelor’s degree or above, are twice as likely to migrate than a graduate with parents that have an combined educational attainment below the bachelor’s level. This indicates that the migration of post-secondary graduates not only depends on the personal aspirations and attributes of an individual, but is also influenced by the environment around them. The cultural capital acquired by a graduate is something that needs to be explored further. Do parents with a post-secondary education impact whether or not a graduate will seek out better employment opportunities? Do graduates with parents that have a low education face a disadvantage in terms of employment outcomes compared to other graduates because they are less likely to move to obtain adequate employment?

Although it is difficult to determine what influenced a graduate’s decision to move after the completion of his or her degree due to the restrictions of the data, economic considerations have been found to be the dominant determinant of migration (Burbidge & Finnie, 2000; Day & Winer, 2012; Delisle & Shearmur, 2010; Finnie, 2001). Most Canadian graduates make a smooth transition into the labour market by obtaining full-time employment and adequate earnings. However, many graduates have to relocate in order to fulfill employment goals. Conversely, New
Brunswick graduates that relocated after the completion of their degree are 26 percent more likely to be employed than graduates that did not move.

Given the various factors that influence the migratory trends of post-secondary graduates, human capital is a crucial aspect in the migratory decision making process. Moreover, the personal assets such as education qualifications and skills are important to determining the underlying factors that influence the migration of a given population. Unmistakably, there are many factors that influence whether or not a New Brunswick graduate will relocate after they complete their degree, a with varying degrees of importance.

6.4 Limitations of the data

Many researchers are faced with the problem of reliability and validity in their research. No data collection procedures are immune to the consequences of human involvement in the research process. For the purposes of this project, I have chosen to rely on data that has been collected by others, which leads to data that is misaligned with the research question and the respective hypotheses. Several problems arose when dealing with the data collected by the Maritime Provinces Higher Education Commission.

The Maritime Provinces Higher Education Commission collects information about post-secondary graduates approximately every four years. Each graduate survey uses similar data collecting techniques, and provides an adequate methodology for capturing the population under study. However, the 2009 graduate survey of 2007 graduates has problems with sample size and representativeness of that sample. Longitudinal questionnaires are challenging to complete, and the reliability of the
data are always questionable. Nonetheless, the outcome of this type of analysis provides an abundant amount of information, particularly concerning graduate migration.

The 2009 survey collected information on approximately 20 percent of 2007 post-secondary graduates in the Maritimes. However, the original collected sample contains several problems with under and over representation of the population. To account for this, a frequency weight was created by myself and another researcher for the MPHEC and is used for the purposes of my research. This weight was created by comparing the 2009 data collected by the MPHEC with similar data collected by Statistics Canada from the Post-secondary Student Information System on 2007 graduates. PSIS is a national survey that collects enrolment and graduate information from all Canadian post-secondary institutions. It is real-time data that provides researchers with accurate post-secondary information. The graduate survey is compared to 2007 PSIS graduate data, and is adjusted for under or over-representation across four fields: age, gender, province of graduation, and field of study. The population weight is used in my analysis; however, there may still be some problems concerning representation, as only four fields are taken into account.

In the 2009 interview, the respondents were asked a series of questions pertaining to where they lived before and after completing their degree. However, no information was collected concerning the place of birth. Therefore, in order to create variables that represent internal and international students, I had to rely on the answer to the following question: “During the twelve months immediately before you enrolled, in what city were you living”. This is problematic for two reasons. First, a
respondent could have been living outside their province of residence for a specific

time before enrolling in their degree and, therefore, report a location that is not their

actual place of residence. Secondly, individuals that were born outside of the country

may have been living in another province before enrolling. Although such

individuals are non-permanent residents and, therefore, international immigrants, they

would be included in the internal migration variable. To account for this, I compared

the 2006 numbers on current post-secondary students with the 2009 data collected by

the MPHEC. Although there is a difference of three years, the numbers for internal

and international migration of post-secondary graduates in New Brunswick are

relatively comparable.

The migratory trends of post-secondary graduates are often explained by

economic factors such as employment opportunities. Although the 2009 graduate

survey does ask the question: “Thinking of your most recent move, what is the main

reason you relocated?” the response rate is small and otherwise unreliable. Therefore,

I cannot infer as to the reason why post-secondary graduates moved after the

completion of their degree, but can only look at the distinct characteristics of

individuals that did move.

6.5 Implications of the findings

These results indicate that the migration New Brunswick graduates is affected

by various factors: age, sex, interprovincial and international migration to attend

school, field of study, and the level of education they obtained.

Because individuals who move to attend a post-secondary institution in New

Brunswick are unlikely to remain in the region once they have earned their
credentials, there are major implications for governments and the respective institutions. The retention of young, skilled graduates is necessary for continued economic growth in New Brunswick. Furthermore, while post-secondary institutions continue to invest time and energy to recruiting individuals from other provinces and territories and from other countries, very few are choosing New Brunswick as their permanent place of residence after graduation. This is not an effective strategy for economic growth. The result is that New Brunswick is investing in bringing in students to the province, but not getting a satisfactory return on investment. Instead, other provinces are receiving the benefits. It is prudent, then, for the New Brunswick government to strive to understand the migration of recent graduates. As the population in the province continues to age, the working-age population is facing a heavy burden. Furthermore, as young, skilled workers continue to migrate to other provinces in search of employment, the burden becomes heavier. Government policies and initiatives that address population growth and retention need to be analyzed, and officials should strive to understand the empirical evidence concerning New Brunswick demographic trends.

The educational credentials of recent graduates plays an important part in the decision to migrate. Moreover, graduates that obtain credentials that are in high demand in other areas are more likely to seek out relevant opportunities. Given that graduates in seven out of the nine educational categories leave at high rates, there seems to be a mismatch in the skills that graduates obtain and the actual employment opportunities available. Therefore, it is important for government officials to know what the educational credentials of recent graduates are so that relevant policies
concerning job integration and creation can be better suited to the qualifications that job seekers acquire. For example, it may be better to focus on job creation for recent engineering graduates rather than focusing on how to integrate social science graduates into the labour market, because results indicate that engineering graduates are leaving the province at an alarming rate. Given that job creation provides economic stability and growth, it may be better for the province to invest the financial capital that is needed to help integrate recent graduates with skills that are in high demand.

This study has shown the need for communication between government and university institutions. There needs to be open communication and collaboration between relevant government officials that are concerned with demographic trends and post-secondary achievement, and university personnel and researchers that are able to provide evidence-based conclusions and recommendations. An evidence-based approach to understanding graduate’s mobility patterns and decisions is required to make data-driven decisions that lead to successful policies. Moreover, universities should be a resource that government policies makers seek out for relevant information and guidance concerning social change. Furthermore, researchers should be keen on using the available resources that the government has to offer to advance our understanding of New Brunswick society and culture. Only through the communication and co-operation between these two entities can relevant, evidence-based models be developed that can help shape the future of New Brunswick.
6.6 Recommendations for further research

The interprovincial and international migration of recent post-secondary graduates is an increasingly popular avenue of study for many researchers that are seeking to understand labour market disparities in Canada. However, very little research has been done on the Atlantic Provinces, particularly the province of New Brunswick. This is likely due to the fact that most graduates are concentrated in provinces with large urban centres, while provinces with low population counts are losing, rather than attracting skilled labour.

My research has shown that the interprovincial and international migration of individuals into the province to attend school impacts whether or not they will migrate after the completion of their degree. However, it is unclear what the reasons are for migration after graduation. Previous research would indicate that recent graduates are moving in search for better employment opportunities, but it is uncertain if this is the case for all New Brunswick graduates. This is an area that needs to be explored further: Are recent New Brunswick Graduates leaving in search for employment opportunities? If so, where are they going and what is the labour market composition at the destination?

The skills that a graduate obtains by earning his or her credentials have shown to play a major part in the likelihood of migration. However, very little research has been done that explores the specific type of human capital an individual possesses and how it affects migratory patterns. The particular field of study that an individual chooses to graduate in impacts their overall employment outcomes. But what is it about certain degrees that increase the likelihood of migration? Is it a labour market
shortage in New Brunswick, or are the current employment opportunities available not matching the skills of new graduates?

From a policy perspective, the in- and out-migration of post-secondary graduates in New Brunswick does not help the overall growth of the province. Although New Brunswick is doing well at attracting individuals to the province to attend a post-secondary institution, every time a recent graduate leaves, it creates a neutral effect. Therefore, the recruitment of individuals to the province is pointless unless they choose to stay and contribute to the provincial economy after they complete their degree. A key finding in this research is that individuals, who move to the province to pursue a post-secondary degree from outside of the country, are leaving at a very high rate. Furthermore, such individuals are most likely to move outside of Canada, rather than make an interprovincial move. Therefore, universities in the province should evaluate whether or not current recruitment policies are effect.

Is it an effect strategy to recruit individuals from other Canadian provinces? Or should policies be geared to recruiting individuals from other countries, and focus on integrating them into the New Brunswick labour market after graduation?

It is important for policy makers to address these issues, and implement relevant policies that seek to address the problem of graduate out-migration. Further studies need to be conducted, with the cooperation of New Brunswick policy makers, that seek to answer the following questions: Is the province providing new graduates with enough incentive to remain in the region? Is there a mismatch between what jobs are available and the specific human capital skills that a new graduate acquires?
If so, how can the province address this issue in order to prevent young, skilled workers from seeking employment in other provinces?
7.0 Conclusion

Since the time of Ravenstein's *Laws of Migration*, it has been understood that the migration of individuals from one location to another is precipitated by the expectation that there are better outcomes at the destination. Recently, research has begun to explore the migration of human capital in order to determine if the skills and qualifications that individuals possesses, impacts migratory trends in Canada. Overall, post–secondary graduates have been identified as being a key population to examine as they have the qualifications to seek out opportunities elsewhere.

In this study, I have examined the migratory trends of recent post-secondary graduates in New Brunswick. The goal of this study was to identify the key factors that influence New Brunswick graduates to migrate after they complete their degree, and whether or not the 'type' of human capital they possess, impacts migratory decisions.

By utilizing the Maritime Provinces Higher Education Commission’s 2009 Graduate Survey of 2007 post-secondary graduates in the Maritime Provinces, three underlying trends are found:

1. Individuals that moved to the province to pursue their degree are significantly more likely to leave the province after the completion of their degree. This true for both internal migrants and international migrants.

2. Young, male graduates leave the province at higher rates than older graduates. Furthermore, as the age of graduate increases, the likelihood of migration decreases. Being single increases the likelihood of migration, as unattached
graduates have less responsibility and are more able to seek employment elsewhere.

3. Graduates that complete degrees in the fine and applied arts, mathematics and physical sciences, the humanities, and engineering are the most likely to leave the province within two years of graduation. Graduates in education, the general arts and sciences, health, and the social sciences have insignificant results. This suggests that graduates in these fields are not significantly more likely to leave the province than graduates in other fields of study.

Overall, the findings are consistent with other studies that have explored the migration of post-secondary graduates. The most striking result however, is the high likelihood of migration among individuals that move to the region to pursue their degree. This suggests that New Brunswick graduates behave the same way as graduates in other provinces: migrating from provinces with smaller populations in order to seek out opportunities in one of the three gateway cities in Canada. This poses a problem for all of the provinces and territories in Canada; however, as New Brunswick has one of the highest dependency ratios in Canada, and corresponding high levels of out-migration (in the entire population), the province needs to retain human capital.

In recent years, the Government of New Brunswick has launched several initiatives to develop solutions to the problem of population decline in the region. Moreover, retaining human capital and creating relevant employment opportunities has been a key area of attention for government officials in recent years (GNB, 2007). Based on the findings in this study, it is prudent to address population growth and job
creation in the province by looking at the specific skills that post-secondary graduates acquire.

The study of post-secondary graduates in New Brunswick is an area that needs to be explored further. Given that the province faces challenges concerning population decline, retaining human capital is key. Moreover, given that the province invests time and financial resources in to educating post-secondary graduates, it is prudent to understand the factors that impact migration among this group. Furthermore, it is important to develop evidence-based strategies that are geared towards integrating recent graduates into the provincial labour market.
8.0 References


Appendix A

List of degrees by each field of study used in the analysis:

**Agricultural/Biological Sciences:**
- Agribiology: environment
- Agricultural business
- Agricultural science
- Animal science
- Aquaculture
- Aquaculture and fishery
- Biochemistry
- Environmental biology
- Environment science
- Family studies
- Food and nutrition
- Food science
- Marine biology
- Microbiology
- Other biology
- Plant science
- Veterinary medicine
- Veterinary sciences

**Arts or Science General**
- Arts – general
- Interdisciplinary
- Integrated studies
- Sciences – general

**Commerce and Administration**
- Accounting
- Business administration
- Commerce and management
- Electronic commerce
- Finance
- Financial services
- Health administration
- Hospitality/tourism
- Human resource management
- Information management
- Information technology
- International business
- Management
- Marine management
- Marketing – retailing
- Operations management
- Public administration
- Technology management

**Education**
- Adult, continuing education
- Art Education
- Curriculum specialization
- Education (general)
- Education foundations
- Educational administration
- Educational psychology
- Educational technology
- Elementary education
- Guidance and counseling
- Home economics education
- Kinesiology
- Leadership and schooling
- Music education
- Other elementary/secondary education
- Other non-teaching education
- Reading
- Recreation
- Secondary education
- Special education
- Teaching French as a second language
- Visual arts

**Engineering**
- Agricultural/biological engineering
- Architecture
- Biomedical engineering
- Chemical engineering
- Civil engineering
- Computer engineering
- Electrical engineering
- Engineering (general)
- Environmental engineering
- Environmental technology
- Forest engineering
- Forestry (other)
- Industrial engineering
Landscape horticulture  
Manufacturing technology  
Mechanical engineering  
Metallurgical engineering  
Mining engineering  
Surveying engineering

**Fine and Applied Arts**  
Art history  
Ceramics  
Communication design  
Costume studies  
Drama, theatre  
Fine arts in crafts  
Graphic arts  
Journalism  
Music performance  
Other fine arts  
Other music  
Photography  
Studio

**Health Professions**  
Anatomy  
Critical care nursing  
Dental hygiene  
Dentistry  
Diagnostic cytology  
Diagnostic medicine  
Epidemiology  
Human communication diagnostics  
Health information management  
Health services research  
Medical technology  
Medicine  
Music therapy  
Nuclear medicine (technology)  
Nurse practitioner  
Nursing (post RN)  
Nursing other  
Occupational therapy  
Other health professions  
Pathology  
Pharmacology  
Pharmacy  
Physiology and bio-physiology

**Humanities**  
Classics  
Film  
French language  
German  
History  
History of science  
Journalism (languages)  
Leadership studies  
Library sciences  
Linguistics  
Multimedia  
Other English language  
Other mass communications  
Philosophy  
Public relations management  
Religious studies  
Russian  
Spanish  
Theological studies  
Translation

**Mathematics and Physical Sciences**  
Astrophysics and astrology  
Chemistry  
Computer science  
Computer science – application  
Computer system development  
Earth sciences  
Environmental geochemistry  
Geology  
Information technology  
Mathematical statistics  
Mathematics – physics  
Other mathematics  
Oceanography  
Physics  
Meteorology

**Social Sciences**
Anthropology
Applied psychology
Asian studies
Atlantic Canada studies
Biodiversity
Canadian studies
Child study
Community studies
Contemporary studies
Criminal justice
Criminology
Development economics
Development studies
Early modern studies
Economics
Environmental design
Experimental psychology

Geography
Gerontology
Integrative science
International development
Law and jurisprudence
Management environmental studies
Neuroscience
Other area studies
Policy studies
Political science
Psychology
Regional/rural/urban studies
Resource management
Social anthropology
Social work
Sociology
Women’s studies
Appendix B

Report on Generating a Sample Weight for MPHEC's 2009 Graduate Survey

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September 9, 2013
Introduction

This report details the process behind how a sample weight was generated for the 2009 Graduate Survey of 2007 postsecondary graduates (GS) administered by the Maritime Provinces Higher Education Commission (MPHEC).

In 2000, Statistics Canada implemented the Postsecondary Student Information System (PSIS) that records total enrolment and collects graduation data from postsecondary institutions across the country (i.e., age, gender, field of study, etc). PSIS graduation data is a true representation of the population of graduates, since it collects information on all postsecondary graduates of a given year. For this reason PSIS can be used as a standard by which to judge the validity of other samples of graduates. In the case of the 2009 GS, it would be useful to compare the sample with PSIS data from the same graduating class in order to account for some possible errors in the sample, and furthermore, assure accuracy of the information provided in the GS. Since PSIS gathers real-time information for multiple characteristics, it is possible to compare the same characteristics collected in the GS in order to ensure that the sample is truly representative of the population.

Key Insights

On average, the four variables (age at graduation, gender, province of study, field of study) used in the 2009 GS are representative of the population. Most categories across the four dimensions do not deviate significantly from the total average weight.

Sampling strategy

The 2009 GS administered by MPHEC is a survey designed to gather pertinent information on postsecondary education graduates from New Brunswick, Nova Scotia
and Prince Edward Island. The data for the 2009 GS was collected via phone interviews approximately two years after graduation. An attempt was made to contact all graduates, so this can be thought of as a census. There was about a 20% response rate that composed the sample of individuals in the GS, which is normal for a census, as evidenced by comparing the total amount of graduates in PSIS to the GS.

In any sample there are bound to be some sources of error and biases due to the nature of the sampling strategy or data collection methods. The GS is not exempt from these errors and biases. It is subject to the usual sampling errors involved with self-reported data, as well as some possible systematic issues in its sampling strategy. Individuals may report misinformation that is either false, exaggerated positively or negatively, or that is due to forgetfulness, misunderstanding the questions asked, their mood at the time of the survey, and the social desirability bias. Since respondents in the GS were contacted about two years post-graduation it increases the likelihood of some of these errors. For example, some individuals may have been living in a different country when an attempt was made at contacting them. Moreover, certain groups of people may be more or less likely to respond via phone interview than others. These are systematic errors, and are the most likely problems in the GS. These errors can impact the overall reliability of the sample, particularly across characteristics that are difficult to control. As a hypothetical example, imagine a high percentage of young arts graduates from New Brunswick are represented in the GS sample, but a low percentage of young engineering graduates from New Brunswick are represented. Suppose the reason for this is due to a significant amount of engineering graduates being immigrants and the majority of them have moved back to
their home country since graduating, and therefore were difficult to contact for the GS. If this were true it would imply that engineering graduates are underrepresented due to a systematic error that is not possible to control. This is likely the case for some groups of people in the GS, resulting in some over-representation and under-representation.

Once these errors and biases are accounted for by using an adjusted sampling weight, the GS will provide more accurate information on graduates from the class of 2007. This sampling weight will help to make the sample accurately representative of the population that it is intended to represent. PSIS data will be used as a standard for comparison in order to identify any inconsistencies or errors. The sample weight will be created by using four common characteristics between the data collected by PSIS and the 2009 GS.

Methodology

STATA is the statistical software used to create the sample weight and analyze the results. The dimensions that are used for the sampling weight were chosen based primarily on which variables in the GS are easily comparable to those in PSIS. To begin, it was necessary to figure out which variables had the smallest amount of sampling errors. This was accomplished by observing which variables were proportionally similar among the GS and PSIS without any conditions imposed on either data set. With this criterion in mind, the four dimensions chosen to create the sample weight were age at graduation, sex, province of study, and field of study, which operate under the variable names “agegrad”, “gender”, “prov_u”, and “mfosgl1” in the GS. In order to create a sampling weight using the respective
variables, both PSIS and the GS need to have the same conditions imposed on the four dimensions. The first condition is that individuals must be between the age of 20 and 82 at the time of graduation. These age parameters are defined based on the assumption that information outside of these parameters is likely due to false information provided by respondents. The next condition is that all individuals must have a valid response for each of the four dimensions. Therefore, any individual that has no value or an unknown value is excluded. These conditions and exclusions are implemented in both the GS and PSIS, and resulted in deletion of less than 1% of the total number of observations in each data set. After these changes are applied, the total amount of observations in the GS amounted to 3334 and 15890 in PSIS (Table 1).

Secondly, a separate data set is created to generate the sample weight that will be applied to each individual across the four dimensions. This data set contains all possible combinations of the dimensions. There are fifteen age categories, two gender categories, three province categories, and 10 fields of study categories. When multiplied together it amounts to the 900 possible combinations of the four dimensions. The corresponding combinations and values are listed below:

- Combinations containing values for both the GS and PSIS are given a weight by dividing the amount of individuals in PSIS by the amount of individuals in the GS.
- Combinations containing values for the GS but no values for PSIS are given a weight of zero since they do not exist according to PSIS.
• Combinations containing values for PSIS but no values for the GS are given a weight of the exact values from PSIS. One observation will be added to the data set each time this combination occurs. That one observation needs to be assigned a weight that makes it representative, which is why the exact values from PSIS are used. As a hypothetical example, if there are five males in PSIS who are 50 years old and graduated from PEI with a degree in social sciences, the weight assigned to this combination of individuals in the separate data set will be five.

• Combinations containing no values for both PSIS and the GS are given a weight of zero since they do not exist in either the GS or PSIS.

The final step is to merge the separate data set with the original copy of the GS. Each weight given to all possible combinations of the four dimensions is appended to the GS upon merging along the four variables. After merging there are initially 3712 observations, 193 of which have weights of zero and do not exist in either the GS or PSIS, and therefore have to be dropped. 3519 observations remain in the data set. 185 of these observations are individuals that are part of PSIS but are not part of the GS. It is important to note that these individuals are not included as part of the un-weighted sample, but will be included in the weighted sample. Of the remaining 3334 observations, 3333 of them have values in the GS and PSIS.

**Conclusion**
The main objective of this project has been successfully accomplished. A sample weight has been generated for MPHEC’s Graduate Survey in order to properly account for under- and over-representation and reflect the true population of graduates from the class of 2007 using PSIS as a standard for comparison. This
report has detailed the process behind how the sample weight is created and provides a description of each source of error involved with this process. The sample weight that has been generated can now be applied to the 2009 Graduate Survey to measure all kinds of pertinent information regarding this graduating class.
Curriculum Vitae

EDUCATION

University of New Brunswick
Doctorate of Philosophy in Sociology September 2013 - current

University of New Brunswick
Master of Arts in Sociology September 2011 – October 2013
Thesis: “Where is all the talent? A study of the migratory patterns of post-secondary graduates in New Brunswick.”

University of New Brunswick
Bachelor of Arts in Sociology/Minor in Psychology May 2011
Honors Degree

EMPLOYMENT EXPERIENCE

Statistics Canada Research Data Centre, Fredericton NB
Statistical Assistant July 2013 – current
Duties include providing assisting with day-to-day operations in the Fredericton Research Data Centre and filling in when Data Analyst is not available.

University of New Brunswick, Fredericton, NB
Teaching Assistant September 2013 – current
Duties include providing assistance with tutorials, labs, or grading, working as editorial assistant on journals, conducting library searches, or other functions in support of the undergraduate program and/or faculty research.

University of New Brunswick, Fredericton, NB
Research Assistant – Dr. Michael Haan May 2011 – current
Past and present responsibilities include: assisting with the preparation of locating reviewers for the Canadian Journal of Sociology, conducting statistical analysis in the area of demography and migration, and helping with the preparation of presentations and reports.

University of New Brunswick, Fredericton, NB
Research Assistant – Dr. Ted McDonald
July 2012 – August 2012
Collaborated on a project associated with the Community Action Group on Homelessness in Fredericton concerning the demographic characteristics of individuals that experience homelessness in various regions in the province. My role consisted of corresponding with the direction of the Community Action Group
and conducting the statistical analysis required to answer the research question proposed.

CONFERENCE PRESENTATIONS

“The role of human capital in migration decisions: Evidence from Canada.”
Canadian Research Data Centre Network 2013 National Conference
Waterloo, Ontario October 2013 (Forthcoming)