Modelling Migration Flows in Canada beneath the Provincial Level

by

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An essay submitted to the Department of Economics

in partial fulfillment of the requirements for

the degree of Master of Arts

Queen's University

Kingston, Ontario, Canada

Jan 2010

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ACKNOWLEDGEMENTS

I would like to extend my sincere appreciation to Dr. Charles Beach for his continued efforts in motivating me to complete this research work. While he may, at times, have believed that there would be no completion date, he persistently encouraged me to keep moving forward. I would also like to thank my parents for their unwavering support throughout my *extended* academic career. Patience is something that they both possess, in spades. Finally, I would like to thank a fellow Queen's student and great friend, HwaYoung Lee for bringing me back to the path of productivity whenever I strayed. She has been a tremendous source of inspiration.

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1.0 MOTIVATION

The historical volatility of the Canadian dollar to U.S. dollar exchange rate, coupled with dependence of the Canadian economy on the purchasing behaviour of its Southern neighbour, requires that the Canadian economy be adaptable and dynamic. The appreciation of the Canadian dollar since 2003 necessitates the transformation of the national economy, as sectors such as manufacturing strain to maintain viability in the face of severely compressed margins. This type of economic environment produces a need for flexible domestic markets. One such market, the domestic labour market, is relied upon heavily to change as the economic environment it services evolves. As such, examining the flexibility (and any possible inflexibilities) of Canada's national labour market is important to understanding what limitations, if any, may exist that reduce the Canadian economy's ability to adapt to the world with which it interacts.

Understanding the factors that drive and inhibit aggregate migration flows provides valuable insight into the national economy's ability to absorb adverse macroeconomic shocks. Although research intending to understand and explain these factors is abundant, Canadian migration literature, to date, has focused mainly on understanding inter-provincial flows. This analysis is limited by the fact that only 20 per cent of migration (when defined as moves between economic regions[1]) involves movement between provinces, while the other 80 per cent occurs within provincial borders.[2] Perhaps provincial borders are significant barriers to labour mobility and therefore to the national labour market's ability to quickly and efficiently evolve in the face of changes in the national, North American and global economies. If so, this effect has been, to date, underestimated and under-analyzed especially in terms of empirical analysis related to flows of labour resources within Canada.

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[1] Provinces (and Territories) in Canada are divided into Economic Regions by Statistics Canada for Census purposes. Economic Regions are comprised of smaller and more widely recognized blocks called Census Divisions. See Table 1 for more information.

[2] Statistics are based on data from the 2001 Census (http://www40.statcan.gc.ca/l01/cst01/demo56a-eng.htm). For the five years encompassed by the census 4,482,775 people migrated within Canada from one Economic Region to another. Of those migrants, 3,577,105 (79.8 per cent) moved within their original province with remaining people moving to a new province.

I propose to use 2001 Canadian Census data in an attempt to model aggregate migration flows within Canada (between Canadian economic regions) and, in doing so, begin the investigation into the effects of potential barriers such as provincial borders on these aggregate migration flows. I hypothesize that the populations of different regions of Canada are somewhat connected to their region and that this connection impacts significantly on the migration decision of individuals. One such connection is a person's attachment to the province in which they reside, such that modeling that person's decision to migrate without considering this bond ignores an important component of that individual's decision-making process. This translates, at the aggregate level, into omitting important variables necessary for explaining flows of migrants between regions of Canada. A basic starting point, therefore, in an empirical analysis of aggregate migration would be an indicator variable for interprovincial flows (i.e., flows between regions that are in different provinces), which one would expect to find inversely related to the size of the flow. Hopefully, this estimation will provide insight into some of the inflexibilities of the domestic labour market, such as those that result from the individual's loyalty to his or her home region, and help explain why large variations in real incomes have persisted between and within provinces in Canada for decades despite advancements in access to information that would be expected to facilitate labour mobility and reduce labour market performance gaps. I hope that this study will provide a solid first step, from which future research can build, in examining less understood barriers to human capital resource reallocation in Canada and, consequently, in examining some of the reasons why large disparities in economic performances of different regions of the country persist.

Specifically, using the traditional gravity model framework for modelling flows between areas, this work will focus on flows between sub-provincial regions, defined by Statistics Canada as economic regions, in order to gain insight into barriers, which cannot be examined by considering flows between provinces. An initial foray into investigating whether regional characteristics such as population composition and language differences along with invisible barriers such as provincial borders impact significantly on these aggregate flows is to be undertaken. Beginning to understand inflexibilities in the national labour market that have been, for the most part, ignored in previous Canadian research is the goal of this research work.

2.0 CONTEXT

Differences in natural resource endowments and patterns of industrialization create regional disparities in economic growth and labour market performance across regions and nations. According to Williamson (1965), regional disparities in real per capita personal incomes and unemployment rates in Canada were more severe than most of its industrialized world counterparts in the 1950s. Despite the fact that over the next 30 years, significant convergence in per capita income and labour productivity occurred (see Coulombe, 1999), today, significant regional disparities in real income levels and unemployment rates still exist across and within provinces.

Recently, asymmetries in regional business cycles in Canada have created significant gaps in provincial growth trends. The rapid rise in energy prices has led to a boom in Western Canada, whereas the appreciation of the Canadian dollar (partially driven by higher commodity prices) has depressed activity in areas of Canada where the manufacturing sector is prevalent. According to the classical migration models, "migration is the equilibrating mechanism through which regions achieve adjustment, as, for example, when people move from regions with high unemployment to regions where unemployment is low" (Stillwell, 2005). Estimates for 2006 show Alberta and Newfoundland's respective net migration numbers moving in opposite directions as strong economic activity, and subsequently low unemployment rates, in Alberta attracts labour from regions in Newfoundland characterized by high levels of unemployment.[3] Similar surges in migration flows are visible in past years and correspond again to asymmetries in regional business cycles driven often by commodity price shocks.

While these recent trends in migration support the notion of convergence, the Canadian labour market continues to exhibit large regional disparities in performance. For 2006, provincial unemployment rates

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[3] Source: Statistics Canada (http://www.statcan.gc.ca/pub/91-215-x/2009000/t251-eng.htm).

ranged from a high of 14.8 per cent in Newfoundland to a low of 3.4 per cent in Alberta. Within Newfoundland, variations between economic regions ranged from 22.2 per cent for the South coast-Berin Peninsula to 11.9 per cent for the Avalon Peninsula.[4] Over the past 25 years, these inter-regional variations have continued to persist largely irrespective of the relative performance of provincial markets or the overall strength of the national economy, suggesting certain rigidities in the labour market that are yet to be fully understood. It is the intentions of this research work to examine flows of labour in Canada from the fresh perspective of movement between economic regions so as to bring new insights into possible barriers, such as provincial borders, regional loyalties and language or cultural groupings that may induce these persistent asymmetries in economic performances of Canadian areas. While it is suggested often that Canada's labour market is adequately flexible, the disparity in unemployment rates and other economic indicators that persist between different areas of Canada is puzzling. It is quite possible that, for instance, people tend to consider regions within their home province when looking to make a move in search of work opportunities rather than moving to another part of the country.

[4] Source: Statistics Canada (http://www40.statcan.gc.ca/l01/cst01/labor36a-eng.htm).

3.0 MIGRATION LITERATURE, THE GRAVITY MODEL AND THE CANADIAN CONTEXT

There is an abundance of literature available giving a synopsis of the research that has been done to date on migration (see Greenwood, 1997, Stillwell, 2005, and Zimmermann and Bauer, 2002). The research that focuses on modelling aggregate migration flows predominantly begins with the gravity model as its base. Previous work done within the context of migration flows in Canada is no exception.

3.1 THE GRAVITY MODEL AND MODIFIED GRAVITY MODEL

Modelling aggregate migration flows has typically been done using models of the 'gravity type', meaning: migration is hypothesized to be directly related to the size of the origin and destination populations, and inversely related to distance.[5] In other words, migration is driven by features of both origin and destination regions, as well as the links between them.

Subsequent to the first gravity models developed, models have since become known as "modified" gravity models because of the inclusion of variables intended to add behavioral content to the model as well as variables expected to influence the migration decision (Greenwood, 1997). Recent models have included behavioral variables such as unemployment rates, income, and other variables describing the relative characteristics of the origin and destination regions.[6] According to Flowerdew and Amrhein (1989), any

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[5] The origin of this theory is found in Ravenstein's 1885 work, "The Laws of Migration" which developed the idea that with migration, most migrants move short distances and tend to be attracted to major cities. Lee's (1966) work, "A Theory of Migration" is considered the classic study that molded Ravenstein's laws into the "gravity laws" used for modelling migration patterns today.

[6] In the case of the origin region, variables such as the degree of urbanization and median age are included that are intended to be proxies for characteristics of the population from which migrants are drawn. For the destination region, similar variables are included to reflect the attractiveness of the area.

work attempting to explain migration flows empirically should use the gravity model as its starting point given the fact that the size (population) and distance variables are easily the most effective for explaining variation in the size of migration flows. Below is the general form of the gravity model, taken from Greenwood (1997) –

$$\ln M_{ij} = \beta_0 + \beta_1 \ln D_{ij} + \beta_2 \ln P_i + \beta_3 \ln P_j + \beta_4 \ln Y_i + \beta_5 \ln Y_j + \sum_{n=1}^{m} \beta_{in} \ln X_{in} + \sum_{n=1}^{m} \beta_{jn} \ln X_{jn} + e_{ij}$$

In the above equation, *M* refers to the net number of migrants, *i* refers to the origin region, *j* to the destination region, *D* to distance, *P* to population, *Y* to income, *X* to added variables such as unemployment rates and housing market variables and *e* is an error term.[7]

Dependent Variable: In the simple gravity model, net migration from the origin to destination region is used (see Helliwell, 1997). In the modified gravity model, the dependent variable is often transformed into a proxy for the probability of moving from the origin to the destination region by dividing the gross migration flow to the destination region by the origin population.[8] For the purposes of this research work, the dependent variable will remain as the total flow of migrants from origin to destination with the only manipulation being the consideration of limiting the flow to migrants of specific age segments.

Explanatory Variables:

Population – The population variable for the origin region is a proxy for the pool of potential movers. As such, debate surrounds whether the population variable is best served to be the working age population or the total population (see Greenwood, 1997). Generally, seniors move based on a different set of

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[7] For further examples of the simple gravity model see Haynes and Fotheringham (1984), McCallum (1995) and Andrienko and Guriev (2003).

[8] Some debate regarding the denominator of the dependent variable arises over its proper form. The best proxy for the pool of potential migrants should be used. The population of the origin region measured at the beginning or the end of the migration period is most often used (Greenwood, 1997).

conditions and, as such, may not fit the model very well. Inclusion of a population variable for the destination region is used to proxy the "pull" of this region. This comes from the gravity laws of migration whereby migrants tend to move to highly populated areas (urban centres).

Distance –This variable is intended to be a proxy for the costs associated with migration.[9] There are several different ideas regarding what form the distance variable should take in the gravity model. For example, Stillwell (2005) suggests different measures of distance such as Euclidian distances between zone centroids, road mileage distances or network-weighted distances. It can be somewhat misleading to use zone centroids because the centre of a region (especially a large one) may not be representative of the zones which movers tend to move to and from. Also, straight-line distances may not account for circumstances that increase the costs of moving between two regions (e.g., mode of travel). Road mileage may be misleading because of the forms of transportation associated with more lengthy moves. Helliwell (1997) uses the straight-line distance between principal cities in the respective regions. Flowerdew and Amrhein (1989) use the distance between the geographical centroids of the relevant census divisions. Mueser (1988) concluded that the distance variable should be segmented; that the coefficients for the distance variable tend to change when he separates distance into categories (i.e., 0 to 250 miles, 250 to 1000 miles and over 1000 miles).[10]

Labour productivity measure – The probability of realizing a higher income is also related to the possibility of finding a higher wage rate (Coulombe, 2006). Coulombe postulates that this probability might vary across regions due to the agglomeration effect of human capital (see Lucas's endogenous growth model, 1988). The productivity of labour should be positively related to the aggregate level of human capital and wealth at the regional level (Coulombe, 2006). Helliwell (1997) uses a per capita

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[9] For a list of the different costs associated with moving, see Greenwood (1997).

[10] Mueser also found that the distance variable differs in importance according to both origin and destination regions and that these differences can be traced to location characteristics.

personal income differential as his productivity measure to capture this agglomeration effect. It is also worth noting that poverty can play a predominant role in limiting migration from many regions, such that as income levels rise in these poorer regions, out-migration actually increases (see Andrienko and Guriev, 2003).

Employment variable – Migration between regions is also expected to be driven by the probability of realizing a higher income, which is closely linked to the probability of finding a job. The unemployment rates of both regions are often incorporated to proxy the difference in the probability of achieving employment between the two regions. While many theorize that higher unemployment regions will see a higher amount of out-migration, an alternative hypothesis posed by Hughes and McCormick (1985) is that migration from such areas is limited by housing price differentials and tenure constraints of mobility. In this case, higher unemployment in a region may coincide with lower out-migration from that region. Indeed, Flowerdew and Amrhein (1989) find that the rate of unemployment in a region is negatively related to both in- and out-migration rates for that region. In other words, a region with a higher unemployment rate relative to another region both attracts a lower number of in-migrants and generates a lower number of out-migrants.

In terms of the attractiveness of a given region, some debate has arisen over what is the best measure of the "pull" of a region in terms of job availability. Unemployment rate differentials remain the most widely used measures (see Helliwell, 1997, and Coulombe, 2006). However, several authors have postulated that variables such as employment growth and job turnover rates may indeed be better proxies for capturing the availability of employment. While Flowerdew and Amrhein (1989) find that unemployment rates have a stronger correlation with migration than does employment growth, Hunt and Mueller (2004) find the opposite.

Housing market variables – A better probability of finding employment and of gaining a higher wage have often been found not to be sufficient for an individual deciding to migrate. Osberg et al. (1994) suggest that the perceived benefits of higher wages may be discounted due to other pecuniary uncertainties, such as cost of living and social assistance benefits. Papers focused on the United Kingdom (Hughes and McCormick, 1985, Henley et al. 1994, and Henley, 1998) and the European Union (Barcelo 2003) have placed additional emphasis on the financial aspects of housing, both the home as a store of wealth and, in some situations, as an ongoing financial obligation. According to Oswald (1996), the residence is usually an individual's largest store of wealth and, as such, the decision to migrate is affected by the expected gain or loss from the sale of this asset. Costs associated with selling a home may act as a deterrent for out-migration and high relative housing costs in a region may deter in-migration. Housing price indexes may be included to capture the effect of high relative prices as deterrents for in-migration. Relative vacancy rates may be used to proxy the ease of finding housing (Stillwell, 2005). Stillwell also states that new housing starts are a determinant of migration, relating information about the quality of the overall housing stock.

Other possible variables – While the above mentioned variables represent the most commonly identified variables used in gravity model estimation to represent characteristics of origin and destination regions, there are several other possibilities that, given an adequate data set, could also be considered for inclusion in the regression equation. For instance, differences between tax rates of regions would certainly impact on the individual's migration decision. It is likely that, for example, the higher average income tax paid by Quebec residents would serve as a disincentive to move into Quebec from another province (though the lower cost of daycare probably offsets this somewhat in this specific case). Additional differences in the generosity of provincially administered social programs are also likely to affect the migration decision. As such, variables intended to capture these and other differences between regions can also be included in the migration regression equation.

Fixed effect variables – These variables are included to capture differences in geographic, institutional, cultural, and policy variables. Coulombe's (2006) analysis of migration flows in Canada between provinces produced several key results regarding regional effects. Rural provinces such as Manitoba and

Saskatchewan produced higher out-migration, even after accounting for unemployment rate and labour productivity differentials, as did Quebec. In the Maritimes, however, while there is a significant increase in out-migration for the 18-24 age group, all other age categories actually have positive fixed effects on net migration. Helliwell (1997) included dummies for common language, adjacent regions and all migration to and from Quebec, and found them all to be significant. Flowerdew and Amrhein (1989) found that French mother tongue is negatively related to both in-migration and out-migration rates, and also included a contiguity variable for adjacent regions.

3.2 THE GRAVITY MODEL AND CANADIAN MIGRATION

There is a considerable amount of migration literature attempting to understand and predict migration behaviour in Canada and its role in the macroeconomic adjustment process. Canada is characterized by a large amount of domestic migration in comparison to other industrialized nations. Coulombe (2006) offers three reasons for this: (1) the homogeneity of the provinces (with the exception of Quebec) in terms of institutional, political and cultural context, (2) the high levels of asymmetries in provincial business cycles, and (3) the large amount of regional disparities in real per capita incomes and unemployment rates. It is therefore no surprise that the issue of migration, its determinants and its consequences, have been given substantial attention in the Canadian literature. Below, I focus on the most relevant research for my paper, studies related to aggregate migration flows in Canada and the determinants of these flows: Helliwell, 1997, Flowerdew and Amrhein, 1989 and Coulombe, 2006.

Helliwell (1997) uses a gravity model of interprovincial and international migration (flows *to* Canadian provinces *from* U.S. states) to estimate the national border's effect on migration. The independent variables in his model include population and distance variables, per capita real personal incomes, (intended to capture the incentive to move), and a border variable. Initially Helliwell added long-run averages of unemployment rates of both origin and destination regions but found that they added no explanatory value to the model. Interestingly, earlier work by Helliwell (1996) found previous net interprovincial migration equations suggested relative unemployment rates were significant to explaining migration flows. An important conclusion of the author's 1997 work is that results strongly support the use of a gravity model of migration which includes explanatory variables related to characteristics of the origin and destination regions and fixed effects variables such as the one in his study for the national border effect.

Flowerdew and Amrhein's (1989) study is one of the few Canadian works to probe migration flows beneath the provincial level; they consider flows among the 260 census divisions that makeup the Canadian provinces.[11] Flowerdew and Amrhein use tax file data and a modified gravity model in which they include variables such as unemployment rates, percentage of population for whom French is the mother tongue, percentage of households living in rental accommodations and mean household incomes.[12] In addition, the inclusion of a contiguity variable, used to capture excess flow between adjacent regions, ends up being an important addition to their model. They conclude there are major differences in the migration experience between regions within the same province such that the provincial unit is insufficient for serious migration study. However, analysis of flows among census divisions proves to be somewhat problematic and, consequently, the fit of their best model is, by their own assessment, less than adequate. They contend they may be including short distance movers, whose migration decision is based upon different factors than is the case for long distance movers.[13,14]

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[11] For another example of a work that looks at flows beneath provincial level, see Simmons (1980).

[12] They then use a form of multiple regressions where the dependent variable is considered to have a Poisson distribution. For a reference on the regression techniques used, see Flowerdew and Aitkin (1982).

[13] My study will focus on flows between economic regions which should be large enough to significantly reduce the inclusion of short distance movers but small enough to allow us to test the provincial border effect. Consider the economic region of Ottawa which includes the following five census divisions: 1) Lanark County, 2) Leeds and Grenville United Counties, 3) Stormont Dundas and Glengarry United Counties, 4) Prescott and Russell United Counties and 5) Ottawa Division. Movement between census divisions

Coulombe (2006) considers inter-provincial migration flows in Canada to determine whether they are influenced by long-run structural economic disparities between provinces, cyclical asymmetries in provincial business cycles, or both. He concludes that migration flows in Canada are likely related to the degree of short-run asymmetries at the business cycle horizon as well as to the degree of structural asymmetries in productivity or income and unemployment rates across the provinces. He finds that the reaction of migrants to cyclical economic shocks is mainly seen in the 18 to 24 age group and that the majority of movement is more related to long-run structural differences between provinces. He concludes that intra-regional migration flows are more sensitive to productivity and unemployment differentials since they are not hampered by institutional and political differences, and that as data at the sub-provincial level becomes more available, its use in future research should provide new insights into migrants' response to economic imbalances.

within this economic region may, for instance, reflect the desire to change homes rather than a response to the full set of economic factors included in the gravity model.

[14] They also saw clear evidence that migration flows in northern parts of several provinces did not fit their models very well.

4.0 PROPOSED METHODOLOGY

Building on the works of Flowerdew and Amrhein (1989) and Helliwell (1997), this research work will fit a modified gravity model to flows of migration between the 73 economic regions which make up the ten Canadian provinces. Using data from the 2001 Census, I will put together a model intended to explain the migration between economic regions over the five-year period leading up to 2001 (the 1996-2001 intercensal period). This is the main point of this research: to consider modelling migration flows at a level (the economic region) that allows for consideration of issues such as interprovincial versus intraprovincial migration, but maintains a size of region that diminishes the bias of including too many short distance movers (whose decision is not generally based only on economic incentives) relative to longer distance ones. This is very similar both in form of data set and general model to Andrienko and Guriev's (2003) research on interregional mobility in Russia.[15]

This is a reasonable point to discuss, somewhat, some of the limitations of this proposed work due to both the data set, which is being used and the intentions of this paper. Data, which will serve as the bulk of the explanatory variables, comes from the 2001 Public Use Microdata File ("PUMF") data set made available by Statistics Canada. As such, this work is somewhat limited in that it will use 2001 data points for variables such as unemployment rates, population sizes, median ages, average rent payments and others. Certain indicator variables are constructed from this data set as well (e.g., a visible minority dummy). The dependent variable, migration flows (potentially limited to certain age groups) from origin economic region to destination economic region between 1996 and 2001, is constructed by manipulating individual responses to the 2001 Census into these aggregate flows inside the research data centre at the University of Ottawa. Also, the distance variable has been constructed using Google maps, where the

[15] Andrienko and Guriev (2003) use the gravity model framework to study the determinants of internal migration between 77 regions in Russia and use a panel data set.

distance between each region corresponds to number of kilometres required to drive from the centre point of the largest urban center – based on population count – of the relevant origin economic region to the center point of the largest urban center of the relevant destination economic region as determined by *Google maps*. For information on which urban city represents the economic region's centre, see Table 1.

These facts lead to the necessity of mentioning some caveats to the subsequent analysis performed on this data. Firstly, since all data points correspond to 2001, this means that the following analysis on migration flows, which have occurred *at some point* between 1996 and 2001 – the five year intercensal period – will attempt to explain these flows based on values of explanatory variables following the migration. This is certainly not ideal. The decision to migrate, at the individual level, would be based on an information set which was gathered at the point in time where the decision to migrate was made. That is to say that, as an example, an individual deciding to move from Northern Ontario to Toronto because of a job opportunity in the fall of 1998 would be considering the cost of living of both regions *at that time* along with all other relevant economic and non-economic factors. The individual can, to a certain degree, be expected to be a forward-looking agent meaning that they would anticipate somewhat the future levels for these variables such that 2001 levels are not completely unreasonable. Nevertheless, it is necessary to admit the likelihood that these 2001 values for dependent variables are not necessarily ideal. In future work, where richer data sets may be available, it would be very useful to investigate the use of more appropriate proxies for the *pushes* of origin regions and the *pulls* of destination regions such as average values for the five year intercensal period. Also, as described regarding previous literature in previous sections, different variables have been postulated to be appropriate for proxies of these pushes and pulls. This research work is limited, in that for the most part, the 2001 PUMF data set gives only one or two options for variables that could be used. For instance, in trying to obtain an appropriate proxy for a labour productivity measure, this data set's best offering is likely the region's 2001 median total income. Obviously, this measure will have its limitations in terms of offering a true picture of the difference in actual labour productivity between regions, but is the best option available.

Owing to the above, it will be important to keep in mind these and other limitations of the data set when performing the analysis and, ultimately, when making conclusions based on the analysis. All of the variables used, as well as their respective forms and limitations, will be discussed in more detail below.

4.1 THE MODIFIED GRAVITY MODEL

The general form of the model used in this study will be as follows,

$$\ln M_{ij} = \beta_0 + \beta_1 \ln D_{ij} + \beta_2 \ln P_i + \beta_3 \ln P_j + \beta_4 \ln Y_i + \beta_5 \ln Y_j + \beta_6 Border + \sum_{n=1}^{m} \beta_{in} \ln X_{in} + \sum_{n=1}^{m} \beta_{jn} \ln X_{jn} + \varepsilon_{ij}$$

where ln is the natural logarithm, *M* is net migration between the origin *i* and destination *j* regions (such that i≠j), *P* refers to population, *Y* to income, *Border* is my provincial border dummy representing interprovincial movement (though in reality it is a *set* of dummy variables intended to capture different pulls between regions as well as disconnects between regions), and *X* is a matrix of *m* variables such as unemployment rates, degree of urbanization, linguistic composition and other behavioural variables corresponding in the first summation to the origin region *i* and in the second summation to the destination region *j*.[16] ϵ_{ij} is an additive random error term. Andrienko and Guriev (2003)'s Y variable is per capita real income while the variables they include in the X component from the equation above include, along with already mentioned unemployment rates, such regional characteristics as poverty level, crime rate, development of housing market, provision of public goods, and public transportation . Variables to be included in our model are discussed in turn below.

[16] For further examples of the simple gravity model see Haynes and Fotheringham (1984), McCallum (1995) or Andrienko and Guriev (2003).

Specific variable forms:

Dependent Variable: The total flow of migrants from origin region *i* to destination region *j* in logarithmic form will be used as the dependent variable for the gravity model equation. Consideration will be given to the relevant population segmenting it based on age. Initially, the analysis will be performed on the total flows between regions for migrants of all ages. Subsequently, the analysis will consider the possibility of limiting those migrants included in the flow variable to either those beneath the age of 65 or only those to be considered as working age (i.e., 15 to 64 years of age). This is intended to reflect that only migrants of working age – and possibly those beneath working age who are moving as a result of the decision of a household member's migration decision – should be included in an equation which attempts to explain migration flows based on economic variables related to employment opportunities.

Population: As with the dependent variable, the analysis will begin by considering total populations of both regions. After this, the population variables will be adjusted to mimic the changes in the dependent variable such that we will have three different forms of both population variables and the dependent variable, migration flow. Along with total population we will construct population variables for both working age people and also all people less than 65 years of age. Prior to each estimation, a discussion of the possible implications of the applicable choice will be briefly discussed.

Distance: A major implication of the gravity model is that migration between regions declines as the distance between the two regions increases. According to Greenwood (1997), this can be attributed to several factors, among them: (i) distance proxies costs of moving; (ii) opportunity costs in the form of longer moving time translating into increases in earnings foregone; and, (iii) information costs rise with distance. In existing literature, different calculations have been used for determining actual distances between regions. Mapping the straight-line distance between major urban areas of regions has been used often (see Helliwell, 1997). However, it has been postulated that this does not properly proxy the actual costs associated with the trip from one region to another. Instead, in this work, road distances calculated using *Google maps* between the centers of the major metropolitan area of the relevant economic regions will be used. Given the remoteness of many areas of Canada and the large distances that these areas can be from airports, this seems the most appropriate measure. While consideration into segmenting the distance variable was given based on previous literature, this will not be done in this study. Future literature intending to build on this work could investigate this option.

Labour Productivity: Ideally, the variable used here would be the best proxy of a region's per capita real income. With the available data, the best option available is the median total incomes of individuals of both origin and destination regions. It would be very useful to have, based on its repeated mentions in past literature, a measure for the incidence of poverty in both areas. No such variable is available from our data set, but future literature should attempt to incorporate such a measure.

Employment Variable: The majority of the evidence from previous work suggests that unemployment rates are the best readily available proxies for the probability of finding work in the destination region and the *push* away from the origin region that results from a lack of opportunity to find work. As such, the regression equation will include the unemployment rates of both origin and destination regions.

Housing Market Variables: The data set will include two variables, which could be used as proxies for the cost of housing in both regions. Consideration will be given to using one of either the "average owner's major payment" for a mortgage or the "average gross rent" for those rental units in the relevant region. It is, however, possible that after further analysis, neither variable may be included, as much of the existing literature has ignored this region characteristic.

Fixed Effect Variables: I will consider using several indicator and interaction variables as they are a significant impetus for this research work. The main idea behind modelling migration at the economic regional level is to consider hypothetical barriers, many of which cannot be investigated when modelling migration at higher levels. The main one to consider is the indicator variable for migration between provinces. It is likely that the decision to migrate to another region within a given province is somewhat different from the decision to move to another province or another part of Canada. The provincial borders as theoretical barriers to migration have not been adequately explored by existing literature addressing migration in Canada. By including dummy variables for provincial borders I will be able to quantify their effect by direct comparison to variables such as my distance or income variables. Furthermore, it will also be possible to examine the effects of adjacent regions on migration. This dummy variable will be particularly important as very short moves that occur at the borders of economic regions are based on completely different decisions, often times, as are moves of greater distances. That is to say that it is quite likely that, in our total flow from region *i* to region *j* where the two regions are side by side, there would be included individual movers who simply changed addresses, but did not move based on any significant economic incentive such as a new job opportunity. An interaction variable will be included to account for migration that occurs within the Quebec border and that which occurs outside of this provincial border. Literature abounds which discusses the significance of Quebec as an outlier for migration in Canada. Those inside its border are significantly more likely to move to another region within Quebec than to outside of Canada, and the opposite is true for Canadians of the remaining nine provinces (they are less likely to move into Quebec than to move to another province). Finally, visible minorities in Canada tend to limit their migration to cities that have an established level of ethnic population. As such, a dummy variable will be included that identifies when moves are made between regions with visible minority populations above a certain threshold.[17]

Regression Equation Form:

According to Greenwood (1997), modified gravity models tend to be estimated in double logarithmic form because this form tends to produce the highest adjusted R-squared values and coefficients can be

[17] After a limited analysis of the visible minority population variable, I decided to set the threshold for the population level of visible minorities to 10 percent. If more than 10 percent of the population of a region were visible minorities and this was the case for both regions, the dummy variable for movement between these regions was set to equal 1. The decision rule was rather crude and based solely on a visual analysis of the data points. Future work could take a more measured approach to this effect.

interpreted as elasticities.[18] This will be discussed in more detail after a more detailed discussion of the data set.

[18] Schultz (1982) argues against the double-log form and argues instead for a nonlinear maximum likelihood logit model.

5.0 DATA

Data to be used in the subsequent analysis comes predominantly from the 2001 Canadian Census.[19] Census data offers information regarding inter-regional migration necessary for tabulating the dependent variable in my regression equations. As such, work has been completed in the research data centre at Ottawa University in order to take account of each individual mover, as denoted by differences in responses regarding their census division of residence for 1996 and 2001. From these responses, the individual's economic region of residence for both 1996 and 2001 were constructed and all individuals' migration paths were categorized and aggregated. In the end, there are flows for each of the 73 economic regions to each of possible destination economic region. Migrants who moved to or from the Yukon, the Northwest Territories or Nunavut were excluded from the analysis, as are any respondents who stayed within the same economic region from 1996 to 2001. This resulted in 5256 ($73^2 - 73$) separate migration flows, and the model's dependent variable is expressed in three forms based on age of population restrictions discussed previously. The majority of the required independent variables will be obtained from the previously mentioned PUMF data set.

The distance variable used has been calculated, by the author, using Google`s online service *Google maps*. This allows for the calculation of the length of trip from the economic center of the origin economic region to the economic center of the destination economic region.[20] There are half as many distances to calculate as flows between economic regions as the flow from origin region *i* to destination region *j* coincides with the same distance value as does the flow from origin region *j* to destination region *i*.

[19] See Table 2 for more information on each of the variables used in this paper's empirical analysis.

[20] See Appendix A to see the city considered the economic center of each relevant economic region and the population of both the economic region and the city.

Population data are available for different age groups leading to estimation both with working age population, total population under the age of 65 as well as with total population. Further information regarding the populations of each economic region relates to language, minority status, Canadian versus foreign born and religion that may be used to examine possible ties between regions that could further explain flows between them. In this particular analysis, the only population component that has been used to supplement the analysis is the variable corresponding to the visible minority population of each region, from which an indicator variable has been constructed. Future work should certainly take advantage of other population characteristic variables that are available to better explain the migration flows between economic regions.

Economic variables available to be used in the PUMF data set include the unemployment rate and median family income.

Housing market variables that are available in the PUMF data set include the total number of both rented dwellings and owner-occupied dwellings along with the average gross monthly rent payment for rented dwellings and average monthly payment for an owner-occupied dwelling. Both of the measures of housing costs will be considered for inclusion in the regression equation.

6.0 ESTIMATION

Estimation of the gravity model will, once again, be based on the following regression equation.

$$\ln M_{ij} = \beta_0 + \beta_1 \ln D_{ij} + \beta_2 \ln P_i + \beta_3 \ln P_j + \beta_4 \ln Y_i + \beta_5 \ln Y_j + \beta_6 Border + \sum_{n=1}^{m} \beta_{in} \ln X_{in} + \sum_{n=1}^{m} \beta_{jn} \ln X_{jn} + \varepsilon_{ij}$$

The equation is in double-log form as past research work (see Greenwood, 1997) has shown that this form leads to the best fit. As such, coefficients of variables will be interpreted as elasticities in all instances with the exception of indicator and interaction variables. Note once again the $i \neq j$ and *m* represents the number of variables intended to represent characteristics of the origin and destination regions included in the estimation (e.g., the unemployment rate or origin region *i* and of destination region *j*).

The first consideration undertaken regarding estimation was to determine whether a firm conclusion could be made regarding the appropriate population base for the dependent variable and the two explanatory variables representing populations of origin and destination economic regions. Whether flows and explanatory variables related to total populations or either of the smaller segments of the population, regression results did not change significantly. The overall fit of the model increased slightly, regardless of what other explanatory variables were included in the regression, when working age populations were used for both population variables and for construction of the dependent migration flow variable. This is as expected, given the fact that these are the people who generally decide to move or not to move for economic reasons. In any event, the increase in the fit of the model was quite muted such that there is no striking result to point to, which would be used to determine the most appropriate measure. As such, given that there is a solid theoretical basis for considering only a subset of the population to be best described as making their migration decision based on a higher weighting of economic incentives – that segment being the working age population – this segment was chosen as most appropriate for further analysis.

With the migration flow of people of age 15 to 64 (in logarithmic form) as the dependent variable, the first regression run included as explanatory variables, the populations of both origin and destination regions, the distance between the two regions, the unemployment rates of both regions and four dummy variables. Aside from the dummy variables, these explanatory variables (each in logarithmic form as well) are the most commonly accepted variables for inclusion in gravity models intended to explain labour migration. In addition, the four dummies included are as follows: (i) an interaction variable set to equal one if both origin and destination regions were regions of Quebec or if both regions were regions outside of Quebec (i.e., within the same language area); (ii) an interprovincial indicator variable set to equal one if the origin region was located in a different province than the destination region; (iii) an adjacent region indicator variable set equal to one if the origin and destination regions bordered each other by land (i.e., the economic region of Prince Edward Island was not adjacent to any region); and, (iv) a visible minority population indicator variable that was set to equal one if more than 10 percent of the populations of both origin and destination regions were visible minorities.[21]

OLS regression results show that all coefficients are highly significant and have the expected sign in all cases. However, interpretation of these results should be tempered as the hypothesis of normally distributed errors is rejected after STATA's standard Skewness/Kurtosis test (command sktest) for normality yields a p-value of 0.0263, though the hypothesis of constant variance in the error terms is accepted after the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity yielded a p-value of 0.0828 percent. The adjusted R-squared value of the estimated equation is 0.759.

While this equation includes the most commonly seen variables of gravity models intended to model migration flows, additional variables, which have been described in previous sections, are available and

[21] Given the fact that the adjacent region indicator variable is supposed to capture the movement of individuals very short distances that are not related to economic incentives such as increases in job opportunities, it seems appropriate to consider movement such that from Prince Edward Island to another region in New Brunswick or Nova Scotia as not movement to an adjacent region.

have the theoretical backing to warrant inclusion in the regression. As such, variables for the median age of the populations of both regions can be added as well as variables to proxy the cost of housing in both origin and destination regions. Two such variables are available; one which represents the average total rent payment for rented dwellings in the region and the other which represents the average total mortgage payment for owner-occupied dwellings. After running regressions with both, the average total rent payment variable offers a more significant increase in the fit of the model, and the coefficients of both the average total rent payment for the origin and destination regions are found to be highly significant. Here again, the hypothesis of constant variance is not rejected indicating that the model does not suffer from heterogeneity. Also, the hypothesis of a normally distributed error term is not rejected, once again using STATA's sktest command to produce the test statistic.

7.0 RESULTS

As mentioned above, the final model includes, along with a dependent variable in logarithmic form representing flows of working age migrants between origin and destination economic regions, variables representing working age populations, distance between regions, unemployment rates, median ages of total populations and average total rent payments of both regions, all in logarithmic form, as well as four indicator and interaction variables. This differs from the base model only in that it additionally includes the median age of each region's populations and the average total rent payments for both regions. The results of both the base model and final model's OLS regressions can be found in Tables 3 and 4, respectively, of the Appendix.[22] In both the base model and the final model, the dependent variables explain more than 75 percent of the variation in the dependent variable. The main focus of the following will be the results of the final model, though some comparison will be made to the base model results.

As expected based on the theory behind gravity modelling and in line with results of previous research, the coefficients of both population variables as well as the coefficient of the distance variable are found to be highly statistically significant, with the population sizes being positively related to total migration flows and the distance between regions being inversely related to the number of working age migrants. This is the case for both the base and final model. As seen in Table 4 of the Appendix, which again refers to the final model specification, a 1 percent increase in the distance between two regions leads to a 0.58 percent decrease in migration from the origin region to the destination region, all else being equal. Conversely, a 1 percent increase in the population of the origin region leads to a 0.52 percent increase in migration, while the same relative increase in the population of the destination region leads to a 0.45 percent increase in the inflow of migrants. The values of the coefficients corresponding to these explanatory variables in the base model specification are very similar.

[22] Also included in the Appendix, are the results of OLS regressions for base and final models using the other two forms of dependent variable (total migrants of all ages and migrants under the age of 65). For these, see Tables 5,6,7 and 8.

A major *pull* of the destination region and *push* of the origin region are their respective labour markets. If the destination region has a relatively higher number of job opportunities, all else being equal, it is expected that there will be a flow from the lower job opportunity area to the more appealing region. In order to capture this effect, the gravity model estimated includes the unemployment rates of both regions. Both variables are found to be highly significant and also have the expected signs. The unemployment rate of the origin region is directly related to the migration flow out of that region to the destination region and the relationship between the unemployment rate of the destination region and the flow into it from the origin region is an inverse relationship. That is to say that the higher the unemployment rate in an area, the higher the migration outflow while the higher the unemployment rate of the destination region, the lower the inflow into that area. Specifically, a 1 percent increase in the unemployment rate of the origin area coincides with a 0.22 percent increase in the flow of people from that region to the destination region, while a 1 percent increase in the destination region's unemployment rate corresponds to a .09 percent decrease in migration into that region from the origin region. Once again, the values of these coefficients are very similar to the ones reported in Table 3, corresponding to the unemployment rates of the origin and destination regions in the base model regression results. Relative work opportunities in the two relevant regions, reflected in the unemployment rate variables, do indeed impact on migration patterns. This is in line with past literature (see Coulombe, 2006).

The only coefficient in the final equation that is not found to be statistically significant is the coefficient corresponding to the origin region's median age (in logarithmic form). Perhaps this is not that surprising a result as a higher median aged population for a given region does not necessarily reflect that there is not a sizeable subset of the population willing and able to migrate, under the right conditions. Conversely, the median age of the destination region is found to be significant at the 1 percent level and median age is negatively correlated with migration flows, as would be expected. That is to say, the higher the median age of the population of the destination region, the less the *pull* is to this region. This could be reflective of the fact that centres with higher levels of economic activity tend to be populated by younger, working age people while lower activity areas tend to be populated with a higher proportion of retirement age people. Specifically, based on the results of the regression, a 1 percent increase in the median age of the population of the destination region leads to a 0.56 percent decrease in the migration flow of the working age population into that region.

The average monthly rent payment of the origin region and the destination region are both found to be directly correlated with migration flows. This is indicative of the fact that urban centres tend to have both higher rents and higher levels of both inflows and outflows of workers. While in the individual's decision to move, higher relative housing costs may act as a deterrent to migration into a giving region, as mentioned above, it is evident that moves tend to occur into higher activity regions where average rents are higher. A 1 percent increase in the average monthly rent payment of the origin region increases the total migration flow away from that region to the destination region by 0.85 percent. In comparison, a 1 percent increase in the average monthly rent payment of the destination region translates to a 1.74 percent increase in the migration flow from the origin region into this region.

Finally, we consider the indicator and interaction variables included in the regression equation. In all four cases, their coefficients are found to be highly statistically significant and have the expected sign. The interaction variable included to capture flows between regions inside of Quebec and flows between regions outside of Quebec has an extremely high t-value. A move either between regions inside of Quebec or outside of Quebec leads to a 1.42 percentage point increase in migration flows. As expected, this infers that natives of Quebec are more likely to move to another region that is still in the province of Quebec while those outside of the province are more likely to move within the rest of Canada than to move into Quebec.

The interprovincial movement indicator variable was also found to be highly significant. This variable, which is of considerable importance to the motivation behind this research work, is intended to capture the invisible barrier to migration that exists as a result of people's connection to the province in which they live. For a possible host of reasons, it is hypothesized that people, at times, move to another region within their home province in their search for employment rather than moving to another part of the country where the financial incentives may be stronger. Indeed, if the origin and destination regions are in different provinces, it infers a 1.26 percentage point decrease in the size of the migration flow between those two regions, all else being equal.

Next, the adjacent region indicator variable has been constructed such that if the relevant origin and destination regions are adjacent to one another and connected by land then the variable is set to equal 1. This is an important variable in that it captures migration that results from those who live near the border of the two regions and simply relocate rather than migrate in search of new employment or based on a more standard economic decision. The adjacent dummy is, as expected, highly significant and positively related to the dependent variable. If the origin and destination regions are adjacent, as defined above, there is a 0.95 percentage point increase in the migration flow from the origin region to the destination region.

Finally, included in the regression equation is an indicator variable, which is intended to capture the additional pull to a region where there is a significant visible minority population from a region that also has a significant visible minority group. The threshold that has been used is 10 percent; if both the origin and destination regions have a visible minority population of more than 10 percent, then the variable is set to equal 1. It is well understood that minorities tend to migrate to areas where there is an established population base of the same ethnicity. Once again, this variable is found to be highly statistically significant and to have the expected sign. Flows between these regions are higher than would be explained by the other variables in the equation. Specifically, if both origin and destination region populations are each at least 10 percent visible minorities, this corresponds with a 1.75 percentage point increase in the flow from the origin region to the relevant destination area.

8.0 CONCLUSION AND RECOMMENDATIONS

The intention of this research work is to begin exploring migration modelling in Canada between economic regions in order to gain additional insight into possible barriers to migration, which have not, to date, been adequately measured in empirical works pertaining to migration between Canadian provinces. The motivation for determining the significance of these barriers is to illuminate inflexibilities in the national labour market, which serve to explain the gaps in economic performance that persist between regions of Canada.

For the most part, existing literature, which employs the gravity model framework to conduct empirical investigations of labour migration in Canada, has considered flows between provinces. The fact that approximately 80 percent of migration within Canada involves movement within provincial borders implies that modelling flows between provinces excludes the majority of movers. As well as capturing these additional movers, modelling migration between economic regions also allows for consideration of a host of additional factors, which are important factors in determining the choice destination in the migration decision. Along with issues such as ethnic composition of major urban areas and language of origin and destination area pairings, this paper's main impetus for working at the level of economic region is to begin to characterize the provincial border effect on migration patterns. It should also be mentioned that work has been done at the census division level; see Flowerdew and Amrhein (1989). It is the position of this paper that modelling at this level leads to inclusion of a considerable number of migrants whose migration decision is not led by the same set of considerations as those for travelling to a new area in search of work (rather they are simply changing addresses).

The model described above has been estimated in double logarithmic form, and includes, along with the essential population and distance variables, certain other explanatory variables intended to proxy the *pull* of destination areas and the *pushes* of origin regions as well as indicator variables included to account for additional connections and disconnections between areas.

Results from regression estimation in this paper are consistent with theoretical underpinnings. Estimated coefficients have the expected signs and are highly statistically significant for all included variables (the one exception being the median age of the origin region's population). The distance and population variables, which compose the foundation of the gravity model, capture the intended forces of attraction. More highly populated areas, all else being equal, are characterized by larger flows between them. Also, regions that are closer to one another than others tend to have higher flows between them than regions that are separated by larger distances, all else being equal.

Median age of the destination region is inversely related to migration inflow, reflecting the fact that high economic activity areas tend to be populated by younger working age people while older people tend to populate areas with a higher median age. Average monthly rent payments for both regions are directly related to migration flows between them. Urban areas of high economic activity are densely populated and tend to have more expensive housing. With this is mind, the result is as expected. In including variables to account for the work opportunities in both regions, results show that a higher unemployment rate in the origin region increases migration outflow while a lower unemployment rate in the destination region increases the migration inflow.

Finally, each of the indicator and interaction variables included improved the fit of the gravity equation. All were found to be highly statistically significant. The indicator variable representing moves that occurred between regions inside Quebec and moves that occurred between regions outside of Quebec shows the expected barrier that exists, which diminishes flows out of Quebec to other areas of Canada as well as flows into Quebec from other areas of Canada. This is a result that can be observed by modelling migration at the level of economic region, and lends credibility to the argument that important information on migration flows is lost when considering only flows between provinces. Also, the indicator variable for interprovincial flows captures the impediment to migration that is the provincial border. Migrants are less likely to move into another province in Canada than would be the case if the national labour market was completely open and flexible. The adjacent region variable, which should be included in any gravity model study to capture short distance moves that somewhat artificially augment flows between bordering regions, is, as expected, directly related to the dependent variable. Finally, the visible minority population indicator variable, which proxies the additional attraction between two regions when each region has an established minority population, is also found to be directly related to our dependent variable. While the rule by which the variable has been created is rough, the result is as expected. Minority migrants tend to move to areas where there exists an established community of their ethnic background.

It is important to take this work as an introductory effort into modelling migration at the level of economic region. Subsequent work should be undertaken to take the next steps in better modelling these flows. Panel data employing multiple intercensal periods would likely be fruitful. Richer data sets with additional potential explanatory variables should add significantly to the explanatory power of the model. Different variable forms and estimation techniques (such as logit estimation) can be incorporated into any subsequent empirical study. A few possibilities are mentioned below.

Certain modified gravity models incorporate a different form of dependent variable. For instance, the dependent variable is often times calculated as the flow from origin region to destination region divided by the origin region's total population (see Greenwood, 1997). The rationale for this is that the dependent variable in the gravity model is meant to be a proxy of the probability of migration from the origin region. There is some debate surrounding which population variable should be used in calculating the dependent variable. If the population of the origin region at the beginning of the migration period is used (1996 population in this case), then it will include those people who die during the migration period and are therefore not potential migrants in a sense. If the population of the origin region at the end of the migration period is used (2001 population), then it will include people who migrated to the region during the migration period and therefore may also not be potential migrants in some sense. Future research should consider the transformation of the dependent variable to proxy this probability of migration from the origin region to the relevant destination region.

The distance variable also warrants future consideration. In this work, *Google Maps* has been used to calculate the driving distance between the centres of each region's largest urban city (based on population). Other works could use straight line distances between these areas or segment distances such that moves of, for example, less than 500 kilometres would be treated differently than moves of more than 500 kilometres. There are many different calculations that have been used to create distance variables in gravity modelling literature, which could be entertained for use in future research.

Consideration of provincial borders as an impediment to migration also leads to the consideration of other invisible barriers, which impact significantly on the migration decision. For instance, as discussed in the motivation section of this work, Canada's population exhibits certain regional tendencies that likely impact on migration flows. Habitants of the Maritime Provinces (or, alternatively, the Atlantic Provinces) are often considered to have a degree of loyalty to the region, which could certainly lead to higher migration within the region instead of out of the region than would otherwise be explained by economic incentives. This may also be the case in the Prairies or in British Columbia. These, as well as other, regional characteristics could also be examined in future work based on migration between economic regions.

The provincial border indicator variable used in this empirical work is, admittedly, a modest beginning. Ideally, the indicator variable used or, conversely, the set of variables used to proxy differences between Canadian provinces should best reflect the relative differences between provincial characteristics such as tax rates, social program generosity, education opportunity, among other things. As such, a starting point may be a set of dummy variables used to indicate each different provincial pairing such that each interprovincial move is defined for the specific two relevant provinces. This can be extended to include a set of variables reflecting the relative differences in the two provinces' characteristics.

Also, while gravity models are frequently estimated in double log form (the approach used in this work), Schultz (1982) criticises that form and instead uses nonlinear maximum likelihood logit methods. His idea is that non-migration is spuriously correlated with origin population size and land area. As such, it would be interesting to consider modelling these flows between economic regions using this estimation technique.

The above few paragraphs are intended to promote further investigation into analysis of migration flows between economic regions in Canada. This research work explores these flows by considering the traditional variables inserted into gravity equations along with ones included to account for non-standard barriers present in Canada affecting migration decisions of Canadians. Based on the estimation completed herein, it is evident that provincial borders are important to migrants when considering moving in search of new opportunities, that language and ethnic compositions of the populations of regions also affect migration patterns and that other barriers, not considered in this work, such as regional loyalties likely also significantly alter the shapes of migration flows.

Significant gaps in economic performances in different regions of Canada have persisted despite suggestions of economic theories surrounding convergence given certain national economic characteristics such as a flexible labour market. This suggests that certain impediments exist that are not sufficiently understood, which combine to limit redistribution of resources from lower to higher activity areas and to stunt potential economic growth. This research work attempts to shine light on a small segment of these less understood barriers to migration by modelling flows of movers at a more appropriate level for the analysis of these frictions. Results show that there are connections and disconnections between certain regions in Canada, which also affect the migration decisions of movers. More work should be undertaken in order to further flush out these ties and to better understand how they create inflexibilities in our national labour market.

REFERENCES

Andrienko, Yuri and Sergei Guriev. (2003). Determinants of interregional mobility in Russia: Evidence from panel data. *Economics of Transition*, Volume 12 (1), 1–27.

Barceló, C. (2003) Housing tenure and labour mobility: A comparison across European Countries. *Centro de Estudios Monetarios Y Financieros,* Working Paper No. 0302.

Coulombe, S. (1999) Economic growth and provincial disparity—A new view of an old Canadian problem. Commentary 122. Toronto, Canada: C.D. Howe Institute.

--- (2006). Internal Migration, Asymmetric Shocks, and Interprovincial Economic Adjustments in Canada. *International Regional Science Review*, Vol. 29, No. 2, 199-223.

Courchene, T. (1981). A Market Perspective on Regional Disparities. *Canadian Public Policy*, Autumn 1981, pp. 506-518.

Dickie, M. and Gerking, S. (1998). Interregional Wage Disparities, Relocation Costs and Labour Mobility in Canada. *Journal of Regional Science*, Vol. 38, pp. 61-87.

Dupuy, R., Mayer, F. and Morissette, R. (2000). Rural Youth: Stayers, Leavers and Return Migrants. *Statistics Canada Research Paper*, No. 152.

Finnie, R. (2001). The Effects of Inter-Provincial Mobility on Individuals' Earnings: Panel Model Estimates for Canada. *Statistics Canada Research Paper*, No. 163.

Flowerdew, R. and Aitkin, M. (1982) A method of fitting the gravity model based on the Poisson distribution. *Journal of Regional Science*, 22: pp.191-202.

Flowerdew, R. and Amrhein, C. (1989) Poisson Regression Models of Canadian Census Division Migration Flows. *Papers of the Regional Science Association*, Vol. 67, 1989, pp. 89-102.

Gardner, J., Gaelle, P. and Oswald, A. (2001). Moving for Job Reasons. University of Warwick, Manuscript.

Greene, William H. (2003). *Econometric Analysis* (Fifth Edition). Prentice Hall, pp. 283-334.

Greenwood, M. J. (1997). Internal Migration in Developed Countries. *Handbook of Population and Family Economics*, eds. M.R. Rozenweig and O. Stark, Elsevier Science.

Guillemette, Yvan. (2006). "Misplaced Talent: The Rising Dispersion of Unemployment Rates in Canada. C.D. Howe Institute e-brief. July 19, 2006.

Haynes, K.E. and Fotheringham, A.S. (1984). Gravity and Spatial Interaction Models. *Sage Publications*.

Helliwell, J. (1996). Convergence and Migration Among the Provinces. *The Canadian Journal of Economics* Vol. 29, April 1996, pp. 324-330.

--- (1997). National Borders, Trade and Migration. National Bureau of Economic Research. Working Paper 6027.

--- (1998). How Much do National Borders Matter? The Brookings Institution, Washington, D.C.

Henley, A. (1998). Residential Mobility, Housing Equity and the Labour Market. *The Economic Journal*, Vol. 108 (March), pp. 414-427.

--- , Disney, R. and Carruth, A. (1994). Job Tenure and Asset Holdings. *The Economic Journal*, Vol. 104 (March), pp. 338-349.

Hughes, G.A. and McCormick, B. (1985). Migration Intentions in the UK: Which Households Want to Migrate and Which Succeed? *The Economic Journal*, Vol. 95, pp. 113-23.

Hunt, J. and Mueller, R. (2004). North American Migration: Returns to Skill, Border Effects, and Mobility Costs. *The Review of Economics and Statistics*, November 2004, 86(4): pp. 988-1007.

Kwon, G and Spilimbergo, A. (2005). Russia's Regions: Income Volatility, Labor Mobility, and Fiscal Policy. *International Monetary Fund Working Paper,* No. 185.

Lee, E. (1966). A theory of migration. Demography 3:47-57.

Lin, Z. (1998). Foreign-Born vs. Native-born Canadians: A Comparison of Their Inter-Provincial Mobility. *Statistics Canada Research Paper*, No. 114.

Lucas, R. (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics* 22, pp. 3-42.

McCallum, J. (1995). National Borders Matter: Canada-US Regional Trade Patterns. *American Economic Review*, 85, 615-23.

Millimet, Daniel L. and Thomas Osang (2005). Do State Borders Matter for U.S. Intranational Trade? The Role of History and Internal Migration. Southern Methodist University. August 2005.

Mueser, P. (1988). The Spatial Structure of Migration: An Analysis of Flows Between States in the USA Over Three Decades. *Regional Studies*, Vol. 23(3).

Murphy, K., Riddell, W.C. and Romer, P. (1998). Wages, Skills and Technology in the United States and Canada. *National Bureau of Economic Research*. Working Paper No. 6638.

Osberg, L. and Gordon, D.V. (1991). Inter-Regional Migration and Inter-Industry Labour Mobility in Canada: The Role of Job Availability and Wage Differentials. Employment and Immigration Canada.

--- , Gordon, D. and Lin, Z. (1994). Interregional Migration and Interindustry Labour Mobility in Canada: a Simultaneous Approach. *The Canadian Journal of Economics*, February 1994, pp. 58-80.

Oswald, A. (1996). A Conjecture on the Explanation for High Unemployment in the Industrialized Nations: Part I. *Warwick Economic Research Papers*, No. 475.

Ravenstein, E.G. (1885). The Laws of Migration. *Journal of the Statistical Society of London*, Vol. 48, No. 2, pp. 167-235.

Schultz, T.P. (1982). Lifetime migration within educational strata in Venezuela: estimates of a logistic model. *Economic Development and Cultural Change*, 30: 590-593.

Simmons, J.W. (1980). Changing Migration Patterns in Canada: 1966-71 to 1971-76. *Canadian Journal of Regional Science*, 3: pp. 139-62.

Statistics Canada. Labour Force Characteristics Summary Tables. Retrieved on January 12, 2010. http://www40.statcan.gc.ca/l01/cst01/labor36a-eng.htm

Statistics Canada. Population 5 years and older Mobility Status Summary Tables. Retrieved on January 12, 2010. http://www40.statcan.gc.ca/l01/cst01/demo56a-eng.htm

Statistics Canada. Annual Estimates of demographic components, Table 4-12. Retrieved on January 12, 2010. http://www.statcan.gc.ca/pub/91-215-x/2009000/t251-eng.htm

Stillwell, J. (2005). Inter-regional Migration Modelling: A Review and Assessment. 45th Congress of the European Regional Science Association, Vrije Universiteit, The Netherlands, 23-27 August 2005.

Williamson, J.G. (1965). Regional inequality and the process of national development: A description of patterns. *Economic Development and Cultural Change*, 13: pp. 3-45.

Zimmermann, K.F. and Bauer, T.K. (2002). The Economics of Migration. Cheltenham: Edward Elgar (eds), (4 vols).

Table 1 – Urban Centers of Economic Regions

Province	City	Economic Region	2001 ER Pop.	2001 City Pop.	Province	City	Economic Region	2001 ER Pop.	2001 City Pop.
British Columbia	Victoria	ER 910	687,901	325,754	Ontario	Windsor	ER 570	609,655	307,877
	Vancouver	ER 920	2,283,125	1,986,965		Stratford	ER 580	286,341	29,676
	Kelowna	ER 930	465,042	147,739		Great. Sudbury	ER 590	551,672	155,219
	Cranbrook	ER 940	145,153	24,275		Thunder Bay	ER 595	234,771	109,016
	Prince George	ER 950	160,976	85,035	Quebec	Chandler	ER 410	96,924	3,004
	Terrace	ER 960	62,569	19,980		Rimouski	ER 415	200,630	47,688
	Smithers	ER 970	42,172	5,414		Quebec City	ER 420	638,917	169,076
	Fort St. John	ER 980	60,800	16,034		Thetford Mines	ER 425	383,376	26,323
Alberta	Lethbridge	ER 810	238,895	67,374		Sherbrooke	ER 430	285,613	153,811
	Lloydminster	ER 820	182,374	20,988		Drummondville	ER 433	218,502	46,599
	Calgary	ER 830	1,021,060	951,395		Longueuil	ER 435	1,276,397	128,016
	Canmore	ER 840	80,512	10,792		Montreal	ER 440	1,812,723	1,039,534
	Red Deer	ER 850	153,049	67,707		Laval	ER 445	343,005	343,005
	Edmonton	ER 860	975,477	937,845		Repentigny	ER 450	388,495	54,550
	Grand Prairie	ER 870	222,107	36,983		Saint-Jerome	ER 455	461,366	24,583
	Wood Buffalo	ER 880	101,333	42,602		Gatineau	ER 460	315,546	102,898
Saskatchewan	Regina	ER 710	271,123	192,800		Rouyn-Noranda	ER 465	146,097	36,308
	Moose Jaw	ER 720	104,255	33,519		Trois-Rivieres	ER 470	255,268	137,507
	Saskatoon	ER 730	285,380	225,927		Chicoutimi	ER 475	278,279	60,008
	Yorkton	ER 740	88,752	17,554		Baie-Comeau	ER 480	97,766	23,079
	Prince Albert	ER 750	197,394	41,460		Chibougamau	ER 490	38,575	7,922
	La Ronge	ER 760	32,029	2,727	New Brunswick	Miramichi	ER 310	169,880	18,508
Manitoba	Steinbach	ER 610	86,552	9,227		Moncton	ER 320	182,820	117,727
	Winkler	ER 620	52,126	7,943		St. John	ER 330	167,981	122,678
	Brandon	ER 630	103,020	41,037		Fredericton	ER 340	124,850	81,346
	Port. la Prairie	ER 640	47,389	20,617		Edmundston	ER 350	85,170	22,173
	Winnipeg	ER 650	621,451	619,544	Nova Scotia	Sydney	ER 210	147,454	105,968
	Selkirk	ER 660	82,365	9,752		Truro	ER 220	158,282	44,276
	Dauphin	ER 670	44,253	8,085		Kentville	ER 230	121,152	25,172
	Thompson	ER 680	83,116	13,256		Bridgewater	ER 240	121,936	7,621
Ontario	Ottawa	ER 510	1,119,141	774,072		Halifax	ER 250	1,267,190	359,183
	Kingston	ER 515	424,021	146,838	PEI	Charlottetown	ER 110	135,294	32,245
	Peterborough	ER 520	340,723	102,423					
	Toronto	ER 530	4,930,990	4,682,897	Newfoundland	St. John's	ER 010	242,875	99,182
	Kitchener	ER 540	1,053,891	414,284		Marystown	ER 020	43,741	5,908
	Hamilton	ER 550	1,274,833	662,401		Cornerbrook	ER 030	110,583	20,103
	London	ER 560	584,008	432,451		Grand Falls	ER 040	115,731	13,340

Table 2 – Variable Legend

Var. Name	Var. Description	Source	Obs.	Mean	Std. Dev.	Max	Min
flow15to64	The total flow of working age migrants from origin economic region to destination economic region	CD	5256	78.54	334.80	9838	0
flowunder65	The total flow of migrants under the age of 65 from origin economic region to destination economic region	CD	5256	92.86	392.98	12018	0
flowtotpop	The total flow of migrants of all ages from origin economic region to destination economic region	CD	5256	98.35312	421.10	13132	0
opop15to64	The working age population of origin economic region	PUMF	73	265698.65	438242.07	3404290	18745
dpop15to64	The working age population of destination economic region	PUMF	73	265698.65	438242.07	3404290	18745
opopunder65	The population of origin economic region under the age of 65	PUMF	73	339312.21	559881.60	4374870	30555
dpopunder65	The population of destination economic region under the age of 65	PUMF	73	339312.21	559881.60	4374870	30555
ototpop	The total population of origin region	PUMF	73	390467.99	636185.75	4930995	32025
dtotpop	The total population of destination region	PUMF	73	390467.99	636185.75	4930995	32025
our	The unemployment rate of the origin economic region	PUMF	73	11.22	6.90	30.36	1.99
dur	The unemployment rate of the destination economic region	PUMF	73	11.22	6.90	30.36	1.99
dist	The driving distance (in kilometres) between the centers of the major urban areas of the origin and destination economic regions	GM	2628	4834.74	1566.78	7397	110
omedage	The median age of the total population of the origin economic region	PUMF	73	41.39	21.33	176.97	22.10
dmedage	The median age of the total population of the destination economic region	PUMF	73	41.39	21.33	176.97	22.10
oavgmonrent	The average monthly rent of rented dwellings in the origin economic region	PUMF	73	523.99	86.81	864.76	334
davgmonrent	The average monthly rent of rented dwellings in the destination economic region	PUMF	73	523.99	86.81	864.76	334
interquedum	Interaction variable for moves between economic regions within Quebec and moves between economic regions outside of Quebec	AUT	5256	0.64	0.48	1	0
interprov	Indicator variable for moves between economic regions in different Canadian provinces	AUT	5256	0.88	0.33	1	0
adjdum	Indicator variable for moves between bordering economic regions	AUT	5256	0.05	0.22	1	0
vismindum	Indicator variable for moves between economic regions which both have visible minority populations which make up more than 10 percent of their total populations	AUT	5256	0.0080	0.089	1	0

Source legend: (i) AUT - Calculated by the author; (ii) CD - Census data obtained through a research data centre; (iii) GM - Calculated by the author using *Google Maps*; and, (iv) PUMF - Data from Statistics Canada's 2001 *Public Use Microdata File.*

Table 3 – Estimation Results for Base Model

Source	SS	df	MS			
				Number of obs	=	5256
Model	15035.86	9	1670.652	F(9, 5246)	=	1839.39
				Prob > F	=	0.0000
Residual	4764.756	5246	0.908265	R-squared	=	0.7594
				Adj R-squared	=	0.7590
Total	**19800.6194**	**5255**	**3.767958**	**Root MSE**	=	0.95303

Dependent Variable - Flow of working-age migrants

Expl. Variables	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
lnopop15to64	0.61678	0.01273	48.47	0.000	0.59183	0.64173
lndpop15to64	0.63152	0.01273	49.59	0.000	0.60655	0.65648
lndist	-0.50871	0.01748	-29.10	0.000	-0.54297	-0.47444
lnour	0.19731	0.02522	7.82	0.000	0.14786	0.24676
lndur	-0.13552	0.02523	-5.37	0.000	-0.18498	-0.08606
interquedum	1.67449	0.02914	57.46	0.000	1.61736	1.73161
interprov	-1.12117	0.05538	-20.24	0.000	-1.22974	-1.01260
adjdum	1.11764	0.07091	15.76	0.000	0.97863	1.25666
vismindum	1.84636	0.15186	12.16	0.000	1.54865	2.14408
_cons	-9.08868	0.28825	-31.53	0.000	-9.65376	-8.52360

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho:	Constant variance	Variables:	Fitted values of lnflow15to64
	chi2(1) = 3.01	**Prob > chi2 = 0.0828**	

Skewness/Kurtosis tests for Normality

Variable	Obs.	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
residual	5.30E+03	0.0222	0.1492	7.28	**0.0263**

Table 4 – Estimation Results for Final Model

Source	SS	df	MS			
				Number of obs	=	5256
Model	15456.2992	13	1188.946	F(9, 5242)	=	1434.62
				Prob > F	=	0.0000
Residual	4344.32015	5242	0.828752	R-squared	=	0.7806
				Adj R-squared	=	0.7801
Total	**19800.6194**	**5255**	**3.767958**	**Root MSE**	=	0.91036

Dependent Variable - Flow of working-age migrants

Expl. Variables	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
lnopop15to64	0.52131	0.01570	33.21	0.000	0.49054	0.55208
lndpop15to64	0.45372	0.01571	28.88	0.000	0.42292	0.48452
lndist	-0.57701	0.01704	-33.86	0.000	-0.61042	-0.54360
lnour	0.21920	0.02443	8.97	0.000	0.17130	0.26710
lndur	-0.08801	0.02443	-3.60	0.000	-0.13591	-0.04011
lnomedage	-0.06018	0.06077	-0.99	0.322	-0.17931	0.05895
lndmedage	-0.55723	0.06077	-9.17	0.000	-0.67635	-0.43810
lnoavgmonrent	0.84722	0.09906	8.55	0.000	0.65302	1.04143
lndavgmonrent	1.74128	0.09906	17.58	0.000	1.54709	1.93548
interquedum	1.41915	0.03161	44.90	0.000	1.35718	1.48111
interprov	-1.25547	0.05394	-23.28	0.000	-1.36121	-1.14973
adjdum	0.94565	0.06832	13.84	0.000	0.81171	1.07958
vismindum	1.75368	0.14515	12.08	0.000	1.46913	2.03823
_cons	-19.22713	0.90395	-21.27	0.000	-20.99925	-17.45501

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho:	Constant variance	Variables:	Fitted values of lnflow15to64
	chi2(1) = 2.18		**Prob > chi2 = 0.1401**

Skewness/Kurtosis tests for Normality

Variable	Obs.	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
residual	5.30E+03	0.6482	0.3053	1.26	**0.5326**

Table 5 – Estimation Results for Base Model – Total Population

Source	SS	df	MS			
Model	15973.002	9	1774.778	Number of obs	=	5256
				F(9, 5246)	=	1790.77
				Prob > F	=	0.0000
Residual	5199.14731	5246	0.991069	R-squared	=	0.7544
				Adj R-squared	=	0.7540
Total	**21172.1493**	**5255**	**4.028953**	**Root MSE**	=	0.9955

Dependent Variable - Flow of migrants of all ages

Expl. Variables	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
lnototpop	0.6507545	0.0135824	47.91	0.000	0.6241274	0.6773815
lndtotpop	0.6617843	0.0135915	48.69	0.000	0.6351392	0.6884293
lndist	-0.5393182	0.0182651	-29.53	0.000	-0.5751253	-0.5035111
lnour	0.20474	0.0264777	7.73	0.000	0.1528327	0.2566473
lndur	-0.1155474	0.0264835	-4.36	0.000	-0.1674661	-0.0636287
interquedum	1.74902	0.0304072	57.52	0.000	1.689409	1.80863
interprov	-1.091135	0.0578293	-18.87	0.000	-1.204505	-0.9777659
adjdum	1.125661	0.0740729	15.20	0.000	0.9804473	1.270875
vismindum	1.791783	0.1585989	11.30	0.000	1.480863	2.102703
_cons	-10.111	0.3141952	-32.18	0.000	-10.72695	-9.495046

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho:	Constant variance	Variables:	Fitted values of lnflowallpop
chi2(1) = 11.58		**Prob > chi2 = 0.0007**	

Skewness/Kurtosis tests for Normality

Variable	Obs.	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
residual	5.30E+03	0.7138	0.2111	1.70	**0.4280**

Table 6 – Estimation Results for Final Model – Total Population

Source	SS	df	MS			
Model	16428.2025	13	1263.708	Number of obs	=	5256
				F(9, 5242)	=	1396.38
				Prob > F	=	0.0000
Residual	4743.94674	5242	0.904988	R-squared	=	0.7759
				Adj R-squared	=	0.7754
Total	**21172.1493**	**5255**	**4.028953**	**Root MSE**	=	0.95131

Dependent Variable - Flow of migrants of all ages

Expl. Variables	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Lnototpop	0.5436152	0.0166386	32.67	0.000	0.5109967	0.5762337
Lndtotpop	0.4774098	0.0166548	28.67	0.000	0.4447596	0.5100601
Lndist	-0.6115334	0.017813	-34.33	0.000	-0.6464543	-0.5766124
Lnour	0.226557	0.025592	8.85	0.000	0.176386	0.276728
Lndur	-0.0742235	0.0255946	-2.90	0.004	-0.1243997	-0.0240474
Lnomedage	-0.0632685	0.0634914	-1.00	0.319	-0.187738	0.0612011
Lndmedage	-0.5681524	0.0634883	-8.95	0.000	-0.692616	-0.4436888
Lnoavgmonrent	0.9548004	0.1027817	9.29	0.000	0.7533054	1.156295
Lndavgmonrent	1.782592	0.1027777	17.34	0.000	1.581105	1.984079
Interquedum	1.483261	0.0328164	45.20	0.000	1.418927	1.547595
Interprov	-1.229047	0.0562743	-21.84	0.000	-1.339369	-1.118726
Adjdum	0.9455082	0.0713749	13.25	0.000	0.8055837	1.085433
Vismindum	1.685909	0.1516519	11.12	0.000	1.388608	1.98321
_cons	-20.74746	0.9332241	-22.23	0.000	-22.57697	-18.91795

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho:	Constant variance	Variables:	Fitted values of lnflowtotpop
	chi2(1) = 9.57		**Prob > chi2 = 0.0020**

Skewness/Kurtosis tests for Normality

Variable	Obs.	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
Residual	5.30E+03	0.2115	0.1715	3.42	**0.1807**

Table 7 – Estimation Results for Base Model – Population under 65

Source	SS	df	MS			
				Number of obs	=	5256
Model	15766.9287	9	1751.881	F(9, 5246)	=	1783.46
				Prob > F	=	0.0000
Residual	5153.1004	5246	0.982291	R-squared	=	0.7537
				Adj R-squared	=	0.7533
Total	**20920.0291**	**5255**	**3.980976**	**Root MSE**	=	0.99111

Dependent Variable - Flow of migrants under 65

Expl. Variables	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
lnopopunder65	0.6486099	0.0135906	47.72	0.000	0.6219667	0.6752531
lndpopunder65	0.6625054	0.0135996	48.71	0.000	0.6358444	0.6891663
lndist	-0.5324167	0.0181757	-29.29	0.000	-0.560487	-0.4967848
lnour	0.2127828	0.0263505	8.08	0.000	0.1611248	0.2644408
lndur	-0.1173649	0.0263562	-4.45	0.000	-0.1690341	-0.0656957
interquedum	1.743252	0.0302868	57.56	0.000	1.683877	1.802627
interprov	-1.090486	0.0575883	-18.94	0.000	-1.203383	-0.9775886
adjdum	1.126998	0.0737376	15.28	0.000	0.9824415	1.271554
vismindum	1.780154	0.1579926	11.27	0.000	1.470423	2.089885
_cons	-10.01085	0.3110659	-32.18	0.000	-10.62066	-9.401027

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho:	Constant variance	Variables:	Fitted values of lnflowunder65
	chi2(1) = 7.67	**Prob > chi2 = 0.0056**	

Skewness/Kurtosis tests for Normality

Variable	Obs.	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
residual	5.30E+03	0.6970	0.3103	1.18	**0.5538**

Table 8 – Estimation Results for Final Model – Population under 65

Source	SS	df	MS			
Model	16181.7258	13	1244.748	Number of obs	=	5256
				F(9, 5242)	=	1377.07
				Prob > F	=	0.0000
Residual	4738.30331	5242	0.903911	R-squared	=	0.7735
				Adj R-squared	=	0.7729
Total	**20920.0291**	**5255**	**3.980976**	**Root MSE**	=	0.95074

Dependent Variable - Flow of migrants under 65

Expl. Variables	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
lnopopunder65	0.5480606	0.0168901	32.45	0.000	0.5149489	0.5811723
lndpopunder65	0.4818039	0.0169065	28.50	0.000	0.4486601	0.5149477
lndist	-0.6006103	0.0177965	-33.75	0.000	-0.6354987	-0.5657218
lnour	0.2318445	0.0255678	9.07	0.000	0.181721	0.281968
lndur	-0.0796252	0.0255703	-3.11	0.002	-0.1297537	-0.0294968
lnomedage	-0.0543148	0.0634171	-0.86	0.392	-0.1786387	0.0700091
lndmedage	-0.5791066	0.063414	-9.13	0.000	-0.7034244	-0.4547888
lnoavgmonrent	0.8702019	0.1038108	8.38	0.000	0.6666894	1.073714
lndavgmonrent	1.704183	0.1038071	16.42	0.000	1.500677	1.907688
interquedum	1.490658	0.0329705	45.21	0.000	1.426022	1.555293
interprov	-1.222876	0.0563189	-21.71	0.000	-1.333284	-1.112467
adjdum	0.9554258	0.0713482	13.39	0.000	0.8155536	1.095298
vismindum	1.694942	0.1516328	11.18	0.000	1.397679	1.992206
_cons	-19.81039	0.9382837	-21.11	0.000	-21.64982	-17.97097

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho:	Constant variance	Variables:	Fitted values of lnflowunder65
	chi2(1) = 6.60		**Prob > chi2 = 0.0102**

Skewness/Kurtosis tests for Normality

Variable	Obs.	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
residual	5.30E+03	0.2334	0.3608	2.25	**0.3243**