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MIGRATION AND THE JOURNEY TO WORK

IN TORONTO'S COMMUTER SHED

MIGRATION AND THE JOURNEY TO WORK IN TORONTO'S COMMUTER SHED

By

JEFFREY J. AXISA, B.A. (HONS.)

A Thesis

Submitted to the School of Graduate Studies

In Partial Fulfillment of the Requirements

For the Degree

Master of Arts

McMaster University

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ABSTRACT

This thesis examines the relationship between migration, residential location, and commute distance within Toronto's commuter shed. The study utilizes data from the master file of the 2006 Canadian Census. This master file contains the previous residential locations of recent migrants, thus allowing migrants to be disaggregated by duration of residence. Multivariate regressions indicate that living in the most accessible rural areas and being a recent migrant are significantly associated with longer commutes. Furthermore, the Canadian Census distinguishes between those who migrated in the year immediately prior to the Census, and those who migrated one to five-years prior to the Census date. Findings demonstrate that the commute distance of very recent migrants (those who migrated in the year immediately prior to the census) have the longest commute distances. As residential duration increases, commute distance decreases.

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CHAPTER FOUR: Conclusions

PREFACE

This thesis is organized as a compendium of related articles. It is comprised of the following two chapters:

Chapter 2: Factors Influencing Commute Distance: A Case Study of Toronto's Commuter Shed

Submitted to the *Journal of Transportation Geography*

Chapter 3: Migration, Urban Growth, and Commuting Distance in Toronto's Commuter Shed

Submitted to *Regional Studies*

While the two journal articles have been co-authored with the research supervisors, the content of each chapter was the responsibility of the thesis author. This includes establishing research objectives, reviewing literature, organizing and analyzing data, computer programming, specifying and estimating models and interpreting results. The supervisors' contributions include suggestion of the research topic and methods, discussion of the empirical results, and critical evaluation and editorial advice prior to journal submission.

CHAPTER ONE: Introduction

1.1 THE RESEARCH PROBLEM

Non-metropolitan population growth was first observed in the United States by Beale (1975) in the early 1970s. Around the same time, similar trends began appearing in other developed countries, including the United Kingdom and Canada (Champion, 1989). As a result, many large metropolitan areas saw substantial population losses not only to urban sprawl, but to real growth in rural areas (Richter, 1985). Specific to North America, these decentralizing population trends are commonly attributed to preferences towards lower density living or more space (Frey, 1987), an increase in personal affluence and changing personal values, advancements in both communication and transportation technologies, along with declining transport costs (Wardwell, 1980).

Population decentralization has altered urban form by allowing individuals to live farther from work, in previously inaccessible locations (Harris, 2004). As a result, population decentralization facilitated urban sprawl (Harris, 2004; Maoh and Kanaroglou, 2007), and rapid growth in both peri-urban (the fringe area that separates the suburbs from the countryside) (Bourne et al., 2003; Bryant and Charvet, 2003) and rural hinterlands (i.e., Mathew et al., 2005; Simmons and Bourne, 2007). Non-metropolitan population growth has also increased the demand for urban services outside of urban areas and conflict between urban and rural dwellers, consequently accelerating the loss of agricultural land (Champion et al., 2008). Concurrently, home and work are becoming increasingly separated as local labor markets in rural communities do not provide a sufficient supply of jobs at desired occupational levels (Green, 1999), thus increasing the number of long-distance commuters (Champion et al., 2008).

Commuting, or the regular journey-to-work trip from ones usual place of residence, is well known to Canadians. For instance, the median commute distance in Canada increased by nearly 8.5%, rising from 7.0 km in 1996 to 7.6 km in 2006 (Statistics Canada, 2007). While concurrently, the average Canadian commuter spent 63 minutes a day making the round trip between their place of residence and workplace in 2005, up from 59 minutes in 1998 and 54 minutes in 1992 (Statistics Canada, 2006). Residents in metropolitan Toronto had the longest commute times (79 minutes round-trip), while Calgary and Montreal posted the fasted gains in average commute times. Moreover, workers residing in peri-urban or rural areas often commute farther than their urban and suburban equivalents (Boyle et al., 2001; Champion et al., 2008).

Yet, regardless of the warnings that indicate longer commutes contribute to changing urban form (Behan et al., 2008), the relationships between residential location, migration and commute distance are not well understood in the Canadian context. This is surprising, considering it is well known that most people undergo at least one residential migration during their lives and that recent migrants have longer average commutes when compared to long-term residents (Boyle et al., 2001; Champion et al., 2008; Findlay et al., 2001; Green, 1999). This knowledge is vital for the successful development and implementation of transportation and housing policy, along with community sustainability.

1.2 RESEARCH OBJECTIVES

The goal of this research project is to determine whether there is a relationship between residential migration and commute distance, using Toronto's commuter shed as an example. The specific objectives of this research are as follows:

I. Evaluate the relationship between migrations and commute distance by examining the journey-to-work distance of all recent migrants compared to that of the long-term residents.

II. Evaluate the relationship between residential locations within the urban-rural continuum and commute distance.

III. Evaluate the relationship between migration statuses (how recently the migrant migrated) and commute distance by examining the journey-to-work distance of different migrants groups compared to that of the long-term residents.

IV. Evaluate the relationship between distance migrated and commute distance.

V. Evaluate the relationship between type of migration (urban to rural, rural to rural, etc.) and current commute distance.

VI. Identify the socio-economic and socio-demographic characteristics that contribute to commute distance, particularly amongst recent migrants.

Meeting these objectives will contribute to the existing body of literature surrounding migration and commuting. First, it will fill a major research gap regarding how migration impacts commute distance within Canada. This knowledge will allow Canadian planners and policy makers to better understand the factors that influence commuting distance, specifically within Toronto's commuter shed. Secondly, it will fill a research gap identified by Champion et al. (2008), who question how the commuting behavior of recent migrants will change as residential duration increases. To the author's knowledge, this is the first study to utilize cross-sectional data in order to address this research gap. These findings will contribute to the understanding of the factors that influence commute distance while concurrently providing insight into policy and planning implications surrounding future settlement patterns within this region.

1.3 THESIS OUTLINE

Including this introduction, this thesis consists of four chapters. Chapters 2 and 3 consist of two stand-alone research papers, and Chapter 4 briefly summarizes the findings and conclusions.

Chapter 2 examines the factors that influence commute distance, while focusing on the commuter shed surrounding Toronto, Canada. The findings from multiple linear regression models indicate that being a recent migrant and/or living in the most accessible rural areas of Toronto's commuter shed substantially increases commute distances. At the same time, employment type, sex, and age are also found to have significant effects on commute distance.

Chapter 3 examines the relationship between migration, residential location, and commute distance within Toronto's commuter shed. Multivariate regressions indicate that living in the most accessible rural areas and being a recent migrant are significantly associated with longer commutes. Furthermore, the Canadian Census distinguishes between those who migrated in the year immediately prior to the Census, and those who migrated one to five years prior to the Census date. Findings demonstrate that the commute distance of very recent migrants (those who migrated in the year immediately prior to the Census) have the longest commute distances. Although, as residential duration increases, commute distance decreases.

In Chapter 4, the findings and research contributions are reviewed. This is followed by a discussion of the limitations of this research. This thesis concludes with recommendations for future research.

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CHAPTER TWO: Factors Influencing Commute Distance: A Case Study of Toronto's Commuter Shed[1]

2.1 INTRODUCTION

Suburbanization has been occurring in Canada since the start of the 20th century. However, suburbs built after World War II are located farther from central cities and occupy significantly larger areas than those built prior to the war. By 1960, the automobile was the overwhelming mode of choice for commuting to work, allowing individuals to live farther from work, resulting in urban sprawl and lower densities (Harris, 2004). Decentralization of population and employment, along with increased automobile dependency have changed Canada's urban landscape – that is, cities are now polycentric in form (Maoh and Kanaroglou, 2007). The shift from monocentricity has created a complex set of employment nodes and has given rise to "edge" cities (Garreau, 1991; Gordon et al., 1989a, 1989b), thus decreasing the importance of the Central Business District. This shift has altered commuting patterns as the relationship between home and work has changed (Clark et al., 2003).

Additionally, urban-to-rural population shifts have stimulated rapid growth in both peri-urban (the fringe area that separates the suburbs from the countryside) (Bourne et al., 2003; Bryant and Charvet, 2003) and rural hinterlands (i.e., Mathew et al., 2005; Simmons and Bourne, 2007). This growth, particularly since the mid-1980s, has increased the demand for urban services in rural areas, has accelerated the loss of agricultural land, and has increased the number of long-distance commuters from rural areas (Champion et al., 2008). This is because home and work are becoming increasingly separated as local labor markets in rural communities do not provide a sufficient supply of jobs at desired occupational levels (Green, 1999).

[1] Axisa, J.J., Scott, D.M., Newbold, K.B. Factors Influencing Commute Distance: A Case Study of Toronto's Commuter Shed. Submitted to the *Journal of Transport Geography*.

Changes in urban form, especially population and employment decentralization, are well known to Canadians, having a direct impact on commuting distances. For instance, the median commute distance in Canada increased by nearly 8.5%, rising from 7.0 km in 1996 to 7.6 km in 2006 (Statistics Canada, 2007). At the same time, average (round trip) commute time increased from 54 minutes in 1992 to 63 minutes in 2005 (Statistics Canada, 2006). Moreover, workers in peri-urban or rural areas often have longer commute lengths than their urban and suburban counterparts (Boyle et al., 2001; Champion et al., 2008).

Changes in commuting patterns and increasing commute lengths are associated with the intensified use of the single-occupant vehicle, which leads to increased energy consumption, deterioration of air quality (Scott et al., 1997), and increased traffic congestion (Behan et al., 2008), with concurrent implications for local environments and pollution. Yet, despite concerns surrounding increased commuting distances attributed to changing urban form (Behan et al., 2008), the relationships between residential location, migration, and commuting are not well understood in the Canadian context. Although this knowledge is currently available in the United States and the United Kingdom, it is not sufficient for use in Canadian policy development. At the same time, this knowledge is vital for Canadian policy makers to successfully develop transportation policy to deal with the demands placed on the transportation system, and to fully consider the role of community sustainability. In addition, the ability to provide statistical evidence on commuting behavior is helpful in allowing the importance of one aspect of the "carbon footprint" to be weighed alongside other environmental, economic, and social aspects associated with planning agendas.

Focusing on Toronto's commuter shed, this research therefore seeks to better understand the determinants of commuting distance and behavior. The remainder of this paper consists of

four sections. Section 2 briefly reviews the literature surrounding population decentralization, migration, residential location, and commuting behavior. Section 3 outlines the data and methods used in this study. Section 4 discusses the results, while section 5 presents the conclusions and identifies areas for future research.

2.2 LITERATURE REVIEW

The literature encompassing population decentralization, residential location, and commuting is limited, particularly within Canada. This is quite surprising since more than 35 years have passed since non-metropolitan population growth was first observed in the United States by Beale (1975). Around the same time, non-metropolitan population growth or counterurbanization, as it was known, began to appear in other developed countries, including the United Kingdom and Canada (Champion, 1989). Although rural Canada's net migration rate fluctuated between 1971 and 1996, cumulatively rural Canada saw a net migration rate of 0.8%, while rural Ontario saw a net migration rate of 8.0% during the same time period (Rothwell et al., 2002). More specifically, Toronto's commuter shed, which corresponds closely to the Greater Golden Horseshoe (GGH) region of Ontario, saw substantial growth between 2001 and 2006. The GGH region grew by 8.4%, accounting for 84% of Ontario's population growth and 39% of Canada's population growth. In comparison, the City of Toronto experienced very marginal growth (0.9%) during the same time period (Statistics Canada, 2007).

Commuting behavior is associated with strong ties between employment and residential location decisions. Green (1999) argues that many rural residents have longer than average commute times because most rural areas lack specialized, high-skilled and non-manual jobs, forcing individuals to seek employment in larger labor markets, while preferring to reside in areas that are less expensive or provide rural/small-town ideals. As a result, rural residents in the

United Kingdom travel on average 65% farther than urban residents when commuting to work (Boyle et al., 2001; Champion et al., 2008).

More specifically, the relationship between residential location and commute distance is far from clear cut. Several studies indicate that the longest commutes belong to those workers living in the most accessible rural areas (Banister and Gallent, 1998; Green and Owen, 2006). Accordingly, workers living in urban and remote rural areas are significantly more likely to have shorter commutes (Banister and Gallent, 1998; Coombes and Raybould, 2001; Green and Owen, 2006). Conversely, Champion (2009) and Champion et al. (2008) argue that as rural remoteness increases, so does commuting length. Thus, the longest commutes belong to those workers living in the most rural areas. Meanwhile, Boyle et al. (2001) argue both sides, stating that the longest commute times belong to both the most and least rural areas, although they do acknowledge that there are relatively few commuters from the most rural areas.

Until recently, few studies have examined the relationship between migration status and commute distance. The results of such studies indicate that recent migrants to rural areas often have longer average commutes when compared to long-term residents living within the same area (Boyle et al., 2001; Champion et al., 2008; Findlay et al., 2001; Green, 1999). This is largely due to the fact that migrants often see commuting as an outcome of relocation that is dealt with after the fact (Breheny, 1999). Zax (1994) argues that given positive relocation costs (likely if moving from urban/suburban to rural), individuals are unlikely to change both place of work and place of residence simultaneously. Subsequently, increases in commuting times are the typical outcome (Green, 1999; Green et al., 1999). Results from England indicate that only 26% of long-term residents and local movers (those who moved 15 km or less) commute more than 15 km, while 50% of recent in-migrants commute more than 15 km (Findlay et al., 2001).

Moreover, rural in-migrants are at least 60% more likely to commute a minimum of 20 km when compared to long-term rural residents (Boyle et al., 2001; Champion et al., 2008).

In addition, the commuting literature utilizes many control variables in order to better understand commuting behavior. Numerous variables have been tested over the years with differing degrees of success. Some of the most utilized include labor market variables such as occupation, employment status (full-time vs. part-time), and education, along with demographic and household variables such as age, income, and marital status. However, the single most utilized and consistent variable in relation to commuting behavior is sex. Over the past 30 years, commuting studies comparing the differences between men and women have consistently found that women commute shorter distances than men (Clark et al., 2003). Hanson and Pratt (1991, 1995) propose that the difference in commute distance can be explained by a woman's need to balance paid work with domestic responsibilities and child care. However, recent studies suggest that the difference in commuting distances between men and women may actually be converging, but only for a limited number of demographic groups, such as race/ethnicity and age. Thus, when analyzing sex alone, males still typically commute farther than females (Crane, 2007; Crane and Takahashi, 2009).

2.3 DATA AND METHODOLOGY

2.3.1 Defining Geography

This research examines factors that influence commute distance. As noted previously, the geographic context of residential location (i.e., location of residence along the urban-rural continuum), not to mention migration, has a profound impact on commuting behavior. As a result, several geographical terms unique to Canada are used throughout this study. Table 1 defines and explains briefly these terms.

Table 1: Definitions of Geography

Census Subdivisions (CSDs) are the root geographical aggregation of both Large Urban Center (LUCs) and Rural and Small Town (RST) areas. CSDs are simply municipalities (determined by provincial legislation) or their equivalent (i.e., Indian reserves or settlements and unorganized territories). CSDs can differ immensely in terms of both geographic size and population size. Geographically, CSDs can range from the vast areas of the unorganized territories found in the northern reaches of many provinces to less than one square kilometer for a small rural town. CSDs can also range in population size from 2 million plus in the case of the City of Toronto, to only a few residents in more remote regions (Harris et al., 2008).

Large Urban Centers (LUCs) are composed of at least two CSDs and are divided into two main Statistical Area Classifications (SACs): Census Metropolitan Areas (CMAs) and Census Agglomerations (CAs).

- **CMAs** are defined as having an urban core population of at least 50,000 and a total population of at least 100,000, which includes all neighboring CSDs where at least 50 percent of the working population commutes to the urban core of the CMA (Beshiri and He, 2009).
- **CAs** are defined as having an urban core population of at least 10,000 and a total population between 10,000 and 99,999, which like CMAs, includes all neighboring CSDs where at least 50 percent of the working population commutes to the urban core of the CA (Beshiri and He, 2009).

Rural and Small Town (RST) areas refer to the population living in CSDs outside of LUCs (Beshiri and He, 2009). RST Canada has less access to labor markets, but not all RST areas are the same. Consequently RST areas are divided into four Statistical Area Classifications (SACs) known as Metropolitan area and census agglomeration Influenced Zones (MIZs).

- **Strong MIZ:** CSDs where 30% or more of the employed labor force commutes to any LUC
- **Moderate MIZ:** CSDs where 5% to 29.9% of the employed labor force commutes to any LUC
- **Weak MIZ:** CSDs where 0.1% to 4.9% of the employed labor force commutes to any LUC
- **No MIZ:** CSDs that have a employed labor force of less than 40 individuals and where 0% of the employed labor force commutes to any LUC

2.3.2 Data and Study Area

The 2006 Census of Canada Master File[2] was used in this study to examine the determinants of commuting distance within Toronto's commuter shed[3], which corresponds closely to the Greater Golden Horseshoe (GGH) region of Ontario. The GGH is the most heavily populated and urbanized region in Canada. In 2006, the region was home to more than 8.1 million people, or nearly one quarter of all Canadians. The GGH is also one of the fastest growing regions in North America, projected to reach 11.5 million people by 2031, accounting for more than 80% of the population growth in Ontario and nearly 40% nationally (Statistics Canada, 2007).

The data were restricted to those individuals aged 15 years and older on census day who reported paid employment in the week prior to census day and lived within the study area (i.e., Toronto's commuter shed). The extent of the study area surrounding the City of Toronto can be seen in Figure 1. Specific attention is focused on the peripheral census subdivisions (CSDs) surrounding the City of Toronto. Although our study region is based on the provincially-defined GGH, we modified it in two ways. First, the central city and several adjacent employment-rich CSDs (i.e., Mississauga, Brampton, Vaughan, Markham, Richmond Hill, Newmarket, and Aurora) were excluded as they exhibit very different commuting patterns from the rest of the study area. Second, all aboriginal CSDs, most of which are very small, were also eliminated as they do not accurately represent the population. These modifications, although slight, were necessary as this study aimed to encompass Toronto's commuter shed exclusively.

[2] The 2006 Census of Canada Master File represents the full 20% of the population that completed the census long-form as compared to 3% in the Public Use Microdata Files (PUMF), thus providing a larger sample size. It also contains a larger set of variables and greater category detail for many variables as compared to the PUMF.

[3] For this study, Toronto's commuter shed is defined as all census subdivisions (CSDs) surrounding the city where a minimum of 10% of the working population commutes into any of the eight employment-rich CSDs of the GGH (see Figure 1).

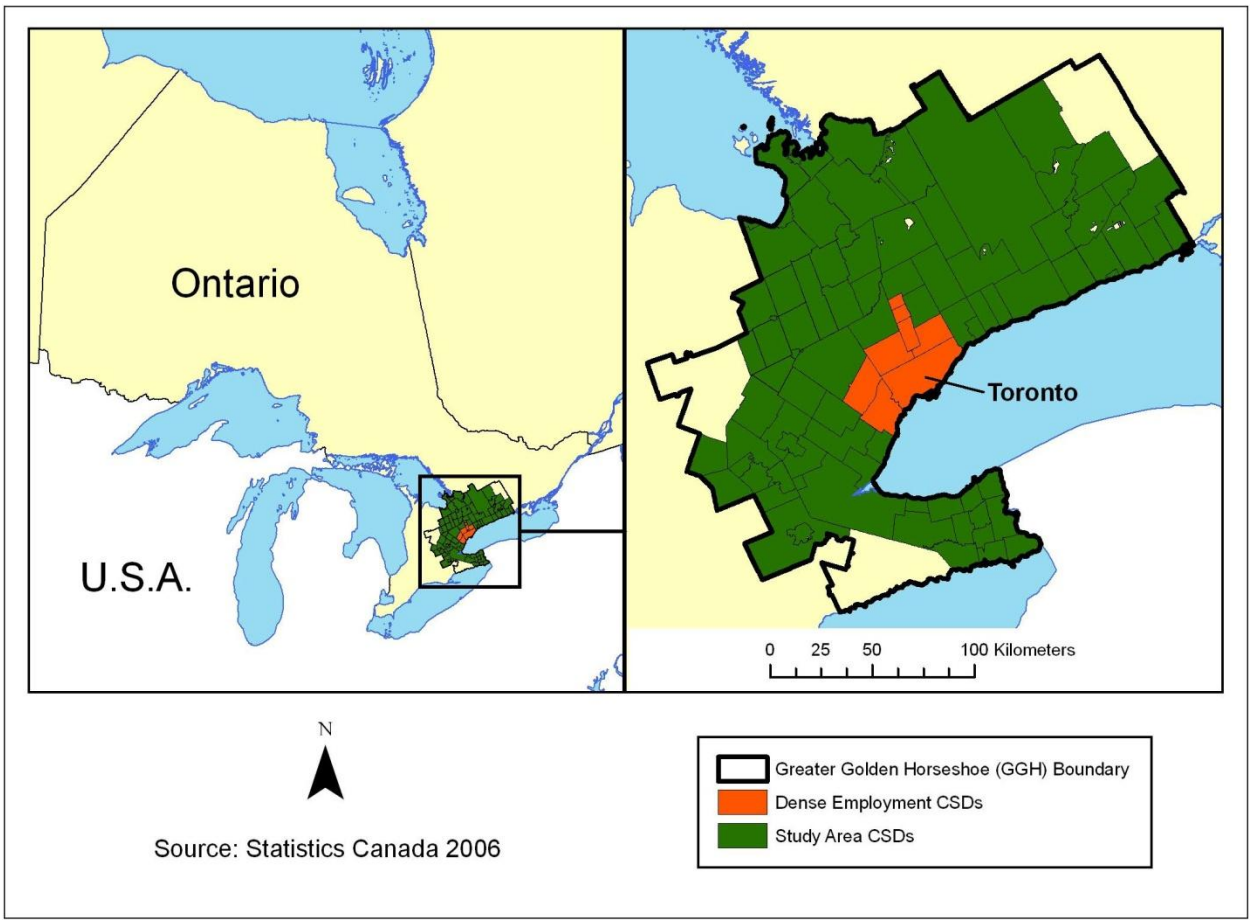

Figure 1: Study Area

2.3.3 Methodology and Model Specification

This study begins with a descriptive analysis of commute distance within Toronto's commuter shed. Specifically, the mean commute distances of several indicator variables (independent variables) are compared to findings elsewhere in the literature. The second part of this study uses multivariate linear regression models to quantify the impact of migration status and geographic context of residential location on commute distance while controlling for a variety of demographic, household, and employment variables. The model is specified as

$$\mathbf{T} = \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\varepsilon}$$

where $\mathbf{T}$ is a $n \times 1$ vector with elements t_i representing the commute distance (km) for individual i (i = 1, 2, 3, …, n). $\mathbf{X}$ is a n x K matrix of (K – 1) variables that reflect migrant status,

geographic context, labor market, and demographic and household characteristics for individual i. $\boldsymbol{\beta}$ is a K x 1 vector of parameters to be estimated by the model. $\boldsymbol{\varepsilon}$ is a n x 1 vector with elements ε_i representing the unobserved error in i. Typically, the error terms ε_i are independent and follow a normal distribution (Bailey and Gatrell, 1995). Consequently, the above model can be estimated using the Ordinary Least Squares (OLS) method. Finally, in order to avoid artificially inflating the t-values, the original weight variable (equal to Canada's total population excluding institutional residents) was scaled so that the sum of the scaled weight variable was equal to the sample size.

2.3.4 Dependent Variable

The dependent variable used in this study is commute distance. Statistics Canada measures commute distance as a one-way, Euclidean (straight-line) distance from an individual's usual place of residence to their usual place of work. This distance is measured for all modes of transportation and is capped at 200 km. All commutes longer than 200 km are aggregated and reported as 201 km. For the purpose of this study, individuals with commute distances exceeding 100 km were excluded to avoid including weekly (long-distance) commuters. This cutoff point was deemed acceptable as it reduced the overall sample by only 1.58%.

2.3.5 Independent Variables

A suite of independent variables were used in both the descriptive analysis and in the model specification (Table 2). These variables were selected based on the findings of previous commuting studies (e.g., Boyle et al., 2001; Champion et al., 2008; Green and Owen, 2006), and data availability. This study is particularly interested in the roles of migration and geographic context of residential location on commute distance. In regards to the former, migration is

Table 2: Independent Variables Used in the Empirical Analysis

Variable	Definition	Sample percent (weighted)	Mean commute distance (km)
Migration status			
Long-term resident	1 if respondent has lived in the same CSD for the past 5 years; 0 otherwise	79.0	13.7
Migrant	1 if respondent moved between CSDs in the past 5 years; 0 otherwise	21.0	20.0
Geographic context			
CMA	1 if respondent lives in a Census Metropolitan Area; 0 otherwise	87.2	14.5
CA	1 if respondent lives in a Census Agglomeration; 0 otherwise	5.8	15.2
Strong MIZ	1 if respondent lives in a Strong MIZ; 0 otherwise	6.6	21.0
Moderate MIZ	1 if respondent lives in a Moderate MIZ; 0 otherwise	0.5	20.5
Labor market			
Employment status			
Full-time	1 if respondent works full-time (≥ 30 hours per week); 0 otherwise	69.9	16.6
Part-time	1 if respondent works part-time (< 30 hours per week); 0 otherwise	30.1	11.5
Education			
Bachelors degree or higher	1 if respondent has a bachelor's degree or higher; 0 otherwise	18.9	16.9
Does not have bachelors degree	1 if respondent has less than a bachelor's degree; 0 otherwise	81.1	14.6
Occupation type			
Management	1 if respondent has a management occupation; 0 otherwise	10.8	19.2
Science	1 if respondent has a natural or applied sciences occupation; 0 otherwise	5.6	21.5
Sales and service	1 if respondent has a sales or service occupation; 0 otherwise	25.8	11.0
Primary	1 if respondent has a primary industry occupation; 0 otherwise	2.4	9.0
Other employment	1 if respondent has an occupation different from the above; 0 otherwise	55.5	15.7
Demographic and household			
Age			
Age	Age in years	100.0	15.0
ln Age	Natural logarithm of Age		
Sex			
Female	1 if respondent is female; 0 otherwise	50.8	12.9
Male	1 if respondent is male; 0 otherwise	49.2	17.2
Household income			
Income	Respondent's household income in dollars x 10^{-4}	100.0	15.0
ln Income	Natural logarithm of Income		
Household structure			
Single parent	1 if respondent is single and has a dependent child; 0 otherwise	13.6	10.7
Married parent	1 if respondent is married and has a dependent child; 0 otherwise	33.3	16.8
Single person	1 if respondent is single and has no dependent children; 0 otherwise	22.6	14.5
Married person	1 if respondent is married and has no dependent children; 0 otherwise	30.4	15.4

Table 2: Continued

Variable	Definition	Sample percent (weighted)	Mean commute distance (km)
Marital status			
Married	1 if respondent is married/common law; 0 otherwise	63.7	16.1
Single	1 if respondent is single/living alone; 0 otherwise	36.3	13.1
Age of youngest child			
No child	1 if respondent does not have dependent children (0 to 18); 0 otherwise	53.0	15.0
Child 0-4	1 if respondent's youngest child is 0 to 4 years of age; 0 otherwise	12.4	17.4
Child 5-9	1 if respondent's youngest child is 5 to 9 years of age; 0 otherwise	9.7	15.8
Child 10-14	1 if respondent's youngest child is 10 to 14 years of age; 0 otherwise	12.3	14.3
Child 15-18	1 if respondent's youngest child is 15 to 18 years of age; 0 otherwise	12.6	12.9

Notes: All variable definitions are in reference to the week (Sunday to Saturday) prior to census day (May 16, 2006). The weighted sample population was calculated based on a weight provided by Statistics Canada. The percentages shown may not sum to 100 due to rounding.

defined as a residential movement across a CSD boundary[4] between 2001 and 2006. Individuals who moved within a single CSD were considered local movers and were therefore combined with long-term residents. All individuals who remained within the same CSD for more than five years (since 2001) were considered to be long-term residents. An individual's geographic context represents his/her statistical area classification (SAC) of residence on census day (SACs are defined in Table 1).

The impact of migration and geographic context of residential location on commute distance is only lightly commented on in the literature. Although limited, commuting studies that consider migrant status note that recent migrants commute longer distances than long-term residents – that is, increased commute distance is often an outcome of residential relocation that is dealt with after the fact (Breheny, 1999). This is expected as recent migrants have had little time to adjust to their new residential location. Degree of rurality is also important, although findings are far less cohesive. Given that the study area of this investigation does not contain any of the most rural zones (weak MIZ and no MIZ – see Table 1 for definitions), it is expected that as rural remoteness increases, so too will commute distance.

Additionally, labor market, household, and demographic variables were selected to control for the other attributes that impact commuting behavior. The three variables selected to describe labor markets are: employment status, education, and occupation type. It is expected that full-time employment (employment status), possession of a bachelor's degree (education), or occupying a management or science-related job (occupation type) will all have a positive influence on commuting (i.e., longer commute distances). The six variables that describe

[4] A residential move is considered a migration when, and only when, an individual leaves their current housing and labor market and relocates to a new one (Zax, 1994). The CSD level was deemed appropriate as it is the finest level of aggregation Statistics Canada provides for an individual's previous residential location.

household and demographics are: age, sex, household income, household structure, marital status, and age of youngest child. Increasing age (age), being female (sex), having children, especially children 0-4 and 5-9 (age of youngest child), or being a single parent (household structure) are expected to have negative influences on commuting (i.e., shorter commute distances) while increasing household income (household income) or being married (marital status) are expected to have a positive influence on commuting.

2.4 RESULTS AND DISCUSSION

2.4.1 Descriptive Analysis

Table 2 summarizes the mean commute distance for each independent variable employed in this study. First, the average commute distance for workers in the study area is 15.0 km. In terms of migrant status, individuals who migrated in the five years prior to the census experienced longer commute distances (20 km) compared to long-term residents (13.7 km), a finding similar to that found elsewhere (e.g., Boyle et al., 2001; Champion et al., 2008; Findlay et al., 2001). Geography also plays an important role in commute distance, with the longest commutes (21 km and 20.5 km) belonging to those individuals living in the most accessible rural areas (strong MIZ and moderate MIZ, respectively), echoing findings by Green and Owen (2006) and Banister and Gallent (1998).

Age and sex (see Table 2) are some of the most commonly used variables in the literature and are thus excellent benchmarks for comparison. First, individuals between the ages of 30-44 have the longest commute distances (17.1 km). This trend coincides with the findings made by other authors (e.g., Champion et al., 2008; Green and Owen, 2006) who state that middle-age workers have the longest commutes. In terms of sex, females commute shorter distances (12.9 km) than men (17.2 km) on average. Again, these results support the claims by numerous authors

including Champion et al. (2008), Clark et al. (2003), Green and Owen (2006), and Hanson and Pratt (1991, 1995) who have all indicated that females commute shorter distances than males.

Income and household structure are also linked to commute distance (Green et al., 1999; Prillwitz et al., 2007). As household income increases, so too does commuting distance. Households with young children (aged 0-4 and 5-9) also typically have longer commute distances (17.4 km and 15.8 km, respectively) as compared to households with no children (15.0 km). More generally, it appears that as the child's age increases, commute distance decreases, potentially reflecting the movement out of cities amongst households seeking locations that are more conducive to raising young children, but that also comes with longer commute distances. Overall, the variables within Table 2 exhibit trends similar to those found previously in a variety of developed countries and regions abroad (e.g., England, Wales, United States, and Germany), suggesting a striking similarity in factors influencing commute distance.

2.4.2 Model Results

Multiple linear regression models are estimated to identify and understand factors that influence commute distance, focusing specifically on migration status and geographic context of residential location. The estimation results are presented in Table 3. Model 1 is the base model and as such was estimated using only variables that had direct effects on the dependent variable (commute distance). Model 2 builds on Model 1 by removing the general "household structure" variable and adding two additional variables ("marital status" and "age of youngest child") that further dissect household structure[5].

[5] A series of interaction effects were also tested, including interactions between "marital status" and "age of youngest child." However, these interaction effects yielded results that are not statistically significant, and are therefore not presented.

Table 3: Regression Models of Commute Distance

Variable	Model 1	Model 2
Constant	-53.775***	-52.755***
Migration status		
Long-term resident		
Migrant	5.677***	5.620***
Geographic context		
CMA		
CA	1.564***	1.570***
Strong MIZ	6.644***	6.656***
Moderate MIZ	7.433***	7.442***
Labor market		
Employment status		
Part-time		
Full-time	1.801***	1.834***
Education		
Less than a bachelors degree		
Bachelors degree or higher	-0.416***	-0.455***
Employment type		
Primary		
Management	7.953***	7.947***
Science	9.765***	9.752***
Sales and Service	3.212***	3.227***
Other Employment	5.985***	5.980***
Demographic and household		
Age		
Age	-0.604***	-0.589***
ln Age	22.601***	22.143***
Sex		
Male		
Female	-3.559***	-3.547***
Household income		
Income	-0.015***	-0.014***
ln Income	2.374***	2.400***
Household structure		
Single person		
Single parent	-0.359**	
Married person	-0.235**	
Married parent	-0.569***	
Marital status		
Single		
Married		-0.347***

Table 3: Continued

Variable	Model 1	Model 2
Age of youngest child		
No child		
Child 0-4		0.257
Child 5-9		-0.385***
Child 10-14		-0.528***
Child 15-18		-0.548***
Summary Statistics		
r^2	0.087	0.087
Adjusted r^2	0.087	0.087
F Statistic	1900.07***	1713.15***

Notes: *n* = 357,164 non-institutional individuals aged 15 years and over who reported paid employment the week (Sunday to Saturday) prior to census day (May 16, 2006). The estimates for categorical variables are relative to the reference variables shown in italics. Significance levels: *** = 0.001, ** = 0.01, * = 0.05.

Model 1 presents the direct effects associated with commuting distance. As expected, having migrated within the past five years considerably increases commute distance by 5.7 km when compared to long-term residents. The model results also suggest that as residential location becomes more rural (CMA → CA → Strong MIZ → Moderate MIZ), commute distance increases (0.0 km → 1.6 km → 6.6 km → 7.4 km, respectively). This finding is likely due to the fact that urban areas house the majority of jobs, especially the more specialized and higher paying ones (Champion et al., 2008).

As anticipated, the model also suggests that labor market characteristics play an influential role on commute distance. First, full-time employment increases commute distance by 1.8 km. Individuals are more willing to commute longer distances for full-time jobs compared to part-time ones (Green et al., 1999). Seemingly, more hours equates to more money, thus making full-time jobs more cost effective and justifying longer commute distances. Next, managerial or scientific employment significantly increase commute distance (8.0 km and 9.8 km,

respectively). Having a managerial or scientific job tends to indicate jobs of higher skill and pay (Champion et al., 2008; Green and Owen, 2006), again justifying longer commute distances. Surprisingly, the model indicates that possession of a bachelor's degree marginally decreases commute distance (-0.4 km). It is possible that many of the traditional lower-paying (non-degree requiring) jobs are being occupied by degree holders, forcing non-degree holders to travel farther to find employment.

Four sets of demographic and household characteristics are used in Model 1. First, both age and the natural logarithm (ln) of age are estimated since age has a non-linear effect on commute distance (Mercado and Páez, 2009), with a characteristic inverted U-shape relationship between age and commute distance. Initially, as age increases so too does commute distance, although commute distance begins to decrease beyond age 38. Similar to age effects, household income and the natural logarithm of household income are estimated, to determine whether household income also has a non-linear effect on commute distance. In this case, household income has a concave down, monotonically increasing relationship with respect to commute distance. More generally, as household income increases, so too does commute distance, but at a declining rate. This is driven by the idea that households with lower incomes often have unskilled jobs that are more plentiful and geographically diverse, while higher paying jobs are often more scarce.

As expected, women commute shorter distances (-3.6 km) than men. This result is most often attributed to a woman's need to juggle paid work with domestic responsibilities and child care (Hanson and Pratt, 1991, 1995). Similarly, parents, both single and married, commute shorter distances (-0.4 km and -0.6 km, respectively) than individuals without children. Similar

to women, this is likely a result of a parent's need to balance work, domestic, and child-care responsibilities.

Model 2 replaces "household structure" with "marital status" and "age of youngest child." Overall, results similar to those reported for Model 1 are identified. Marital status, for instance, indicates that single individuals commute longer distances (0.3 km) than those who are married. This finding is surprising and likely indicates that other variables within the Model (such as "age of youngest child") have captured this relationship. Finally, parents with very young children (age 0-4) have marginally longer commutes (0.3 km) than individuals without children and parents with older children. As indicated in the descriptive results, this trend may be the result of young families moving away from urban areas as they look for residential locations more conducive to raising young children.

2.5 CONCLUSIONS

This study has evaluated factors associated with commute distance using Toronto's commuter shed as the case study. Overall, this study's main finding echoes results found in the United Kingdom (Boyle et al., 2001; Champion et al., 2008; Findlay et al., 2001), which point to the fact that recent migrants commute longer distances when compared to long-term residents. Subsequently, a second key finding from this study again echoes results by Champion et al. (2008) who found that residential location along the urban-rural continuum is also strongly linked to the propensity to commute long distances. That is, commute distances tend to be longer, on average, amongst recent migrants and households that reside in accessible rural areas. More specifically, results indicate that migrants to rural areas commute an additional 13 km (one-way) as compared to long-term residents of CMAs. In addition, variables including

household income, sex, age, marital status, and presence of children are important determinants of commute distance.

The impact of geographic location of residence and migration status on commute distance raises interesting policy issues. For example, given continued decentralization and urban sprawl, (that characterize the Toronto commuter shed and most other metropolitan areas), questions regarding the long-term sustainability of these practices must be raised. Will continued growth in the periphery lead to longer and longer commute distances and increased congestion, with the concomitant environmental effects of pollution? In the future, how can such patterns be mitigated? Without considering migration status and residential location along the urban-rural continuum, policy makers will struggle to make appropriate decisions regarding transportation and housing policy.

Now that these two major, but general findings have been verified in both the Canadian and Toronto context, one must carry on with additional research in order to truly understand how migration status and the geographic context of residential location affect long distance commuting within this region. This could be accomplished by subdividing migration status in order to see how recently the migration took place. Was the migration within the past year? Or was it two to five years ago? And, what effect does this have on commute distance? The further division of migration status will provide substantial insight into the adjustment period after which commute distances will eventually decrease as identified by Breheny (1999).

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CHAPTER THREE: Migration, Urban Growth, and Commuting Distance in Toronto's Commuter Shed[6]

3.1 INTRODUCTION

It is commonly understood that commuting behaviors and patterns have strong associations with employment and residential location decisions. However, studies have only recently identified the relationship between migration status and commuting, with studies noting that recent migrants typically have longer average commutes when compared to long-term residents living within the same area (Green, 1999; Boyle et al., 2001; Findlay et al., 2001; Champion et al., 2008; and Axisa et al., 2011). This phenomenon likely occurs because migrants often see commuting as an outcome of relocation that is dealt with after the fact (Breheny, 1999). Zax (1994) argues that given an increase in overall utility (an increase in earnings or a reduction in living costs); individuals are less likely to change their place of work and residence concurrently, at least for shorter distance movements. Thus, either a single residential or employment change occurs, often causing an increase in commuting distance (Green, 1999; and Green et al., 1999). As a result, increased demand is placed on road infrastructure and vehicular carbon emissions continue to rise.

Although this finding is significant, little else is known about the relationship between migration and commuting. Are, for example, the longer commuting distances of recent migrant's short term, with commute distances decreasing as duration of residence increases? Given that the Canadian census distinguishes between those who migrated in the year immediately prior to the Census, and those who migrated one to five years prior to the Census date, it is possible to further understand the relationship between migration and commuting behavior. The paper

[6] Axisa, J.J., Newbold, K.B., Scott, D.M. Migration, Urban Growth, and Commuting Distance in Toronto's Commuter Shed. Submitted to *Regional Studies*.

therefore extends previous research related to migration and commuting by addressing the relationship between migration timing and commuting length.

This paper focuses on the commuting behaviors of recent migrants in Toronto's commuter shed, an area that includes the Toronto Census Metropolitan area, Canada's largest city. More specifically, Objective 1 will investigate the mean commute distance for groups of individuals based on migrant status, geographical context, labor market, demographic, and household variables. Objective 2 will seek to understand whether the relationship between migration and commuting changes over time. Objective 1 will be accomplished using descriptive statistics. Objective 2 will be accomplished by modeling commute distance while controlling for several groups of independent variables including migration status, geographical context, labor market, and demographic and household characteristics.

The remainder of this paper is organized into four sections. Section 2 reviews the literature related to migration and residential location relative to commuting. Section 3 discusses the data and methods. Section 4 presents and discusses the results and Section 5 concludes the paper.

3.2 MIGRATION AND COMMUTING

The research linking residential migration and commuting is quite limited, particularly within Canada. This is somewhat surprising considering most people will undergo at least one (and typically more) residential migration at some point during their lives. Generally, a migration is seen as an investment that will only take place if the anticipated utility of the new residential location is higher than that in the current place of residence. Additionally, migrants will choose to locate where the anticipated utility is at its maximum (Roseman, 1971; Shields and Shields, 1989), although life-course characteristics, specifically age and the presence of children, also

play an important role in determining utility and consequently explaining residential preferences. Rossi (1955), for instance, proposed that life-cycle changes, such as marriage, the growth of the family, and declining health, would drive residential relocation decisions through changing housing requirements (typically space), with changes in the life-cycle 'stage' prompting relocation, while residential location decisions reflect needs, social aspirations, income, and the role of institutions including real estate agents and banks. Related literature notes the importance of the demographic makeup of households and the impact on residential choices (i.e., Miron 1993). For instance, central living is preferred by the youngest and oldest individuals (Lindberg et al. 1992), while 25 to 30 year olds tend to prefer child-friendly neighborhoods (Niedomysl, 2008). Not surprisingly, individuals with children living at home tend to live farther away from the city (Lindberg et al. 1992) and closer to nature and recreational opportunities (Kim et al. 2005). That being said, van Ommeren et al. (1997) argue that commuting distance plays only a limited role when determining whether a migration increases overall utility. Thus, if the migration does in fact increase overall utility, an increase in commuting distance is often deemed acceptable.

When analyzing commuting distance, the geography of one's current residential location must be examined. The relationship between residential location and commute distance is well documented, but the specific relationships are far from unanimous. Although drawn largely from the UK literature, several studies indicate that workers living in the most accessible rural areas have the longest commutes (Banister and Gallent, 1998; and Green and Owen, 2006). Accordingly, workers living in urban and remote rural areas are significantly more likely to have shorter commutes (Banister and Gallent, 1998; Coombes and Raybould, 2001; and Green and Owen, 2006). Conversely, Champion (2009) and Champion et al. (2008) argue that as rurality

increases, so does commuting length. Thus, the longest commutes belong to those workers living in the most rural areas. Meanwhile, Boyle et al. (2001) find evidence that agrees with both arguments, stating that the longest commute times belong to both the most and least rural areas. While relatively few people commute from the most remote rural areas, those that do are forced to travel long distances on the whole.

Looking more specifically at recent migrants, the role of previous residential locations may impact commuting distance. Evidence from both Canadian and American studies suggest that individuals moving from urban to rural areas tend to keep many of their 'urban' characteristics. Accordingly, these non-traditional rural residents tend to maintain strong social and economic connections with the urban area (Green and Meyer, 1997). Findlay et al. (2001) refer to this as a 'dual existence' where the individual 'belongs' to the countryside, but sees his/her commute as a part of his/her wider 'identity'. Similarly, evidence from England suggests that there is a positive (almost linear) relationship between the size of the urban place moved from and the odds of commuting more than 20 km. For example, Champion et al. (2008) noted that rural to rural migrants increased their odds of commuting more than 20 km by only 12%, while migrants who moved from 'large urban' and 'other urban' areas to rural areas had their odds increase by about 40%, and migrants from 'major urban' areas are more than twice as likely to commute at least 20 km when compared to long-term rural residents (Champion et al. 2008).

As was identified previously, recent migrants have longer average commute times than long-term residents living within the same area (Green, 1999; Boyle et al., 2001; Findlay et al., 2001; Champion et al., 2008; and Axisa et al., 2011). Results from England indicate that only 26% of long-term residents and local movers (those who moved 15 km or less) commute more than 15 km, compared to 50% of recent in-migrants who commute more than 15 km (Findlay et

al., 2001). Moreover, rural in-migrants are twice as likely to commute in excess of 20 km when compared to long-term rural residents (Boyle et al., 2001). However, in order to capture more specific commuting details, recent in-migrants must be broken down into a series of groups based on specific characteristics of their migration.

While analyzing migration distance, Champion et al. (2008) find that recent migrants who moved 'medium' distances (between 15 km and 99 km) are approximately two-and-a-half times more likely to commute at least 20 km when compared to long-term residents. Conversely, these authors also find that migrants who moved between 5 km and 14 km are not statistically different from long-term residents, while migrants who moved more than 100 km are only 50% more likely to commute at least 20 km when compared to long-term residents.

While evidence from the UK suggests that recent migrants experience longer average commutes, evidence based on North American data is limited. Consequently, this paper further explores the relationship between migration and commuting behaviors.

3.3 DATA AND METHODOLOGY

The data used for this study are drawn from the 2006 Census of Canada master file. The Census master file represents the full 20% of the population that completed the Census long form (as compared to 3% in the Public Use Microdata Files (PUMF)), providing a larger sample size. It also contains a larger set of variables and greater category detail for many variables as compared to the PUMF. For example, the 2006 PUMF does not include previous (2005/2001) place of residence at the Census Sub Division (CSD) level (only province of residence).

This study focuses on the commuting distance in Toronto's commuter shed[7], which corresponds closely to the Greater Golden Horseshoe (GGH) region of Ontario. The data were constrained to include only those aged 15 years and older at the time of the census that reported paid employment in the week prior to Census day and lived within the study area (Figure 1). The study area was designed based on the existing Greater Golden Horseshoe (GGH) region developed by the Government of Ontario. The GGH is the most heavily populated and urbanized region in Canada. In 2006, the region was home to more than 8.1 million people – nearly one

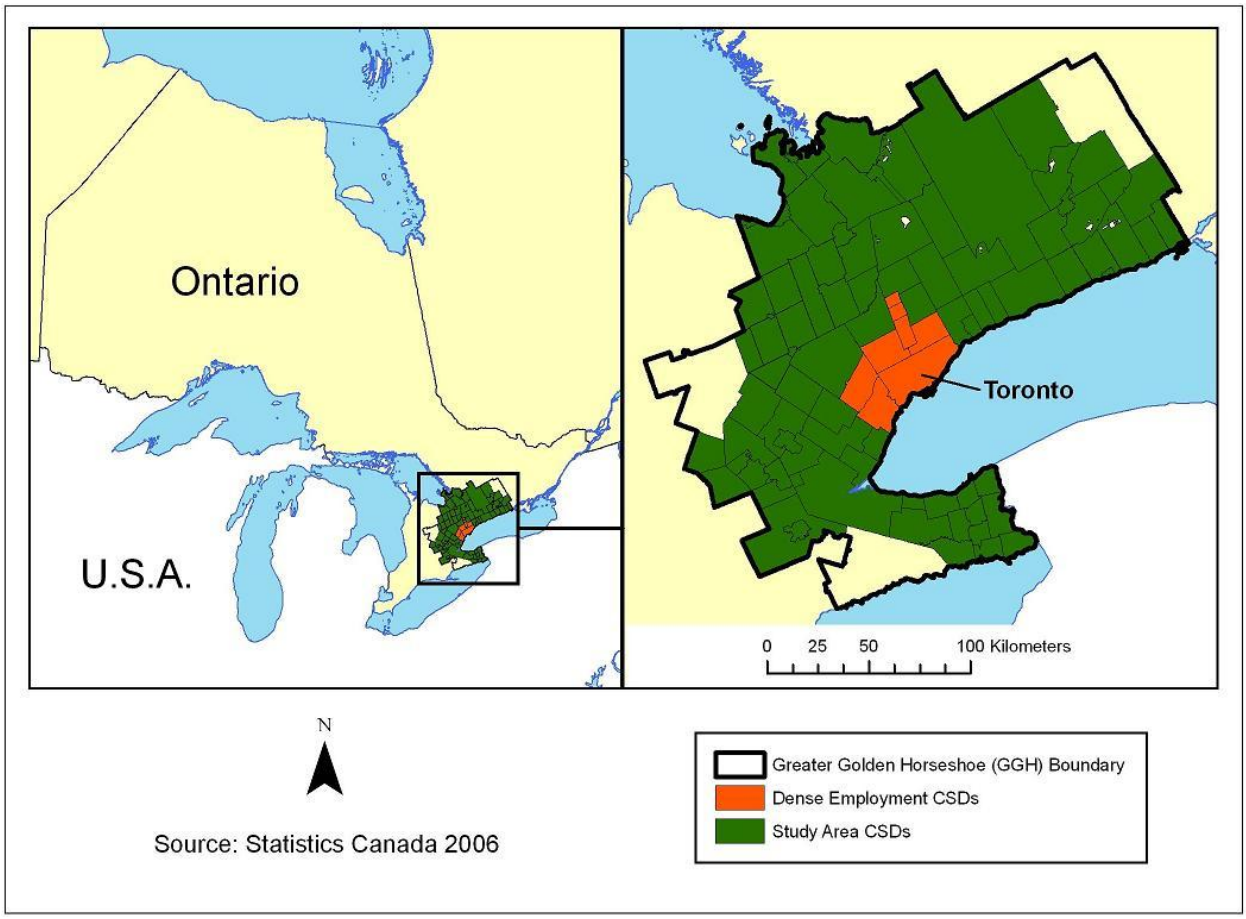

Figure 1: Study Area

[7] Toronto's commuter shed is defined as all census subdivisions (CSDs) surrounding the city where a minimum of 10% of the working population commutes into any of the eight employment-rich CSDs of the GGH (see Figure 1).

quarter of all Canadians. The GGH is also one of the fastest growing regions in North America, projected to reach 11.5 million people by 2031, accounting for more than 80% of the population growth in Ontario and nearly 40% nationally (Statistics Canada, 2007).

Attention is focused on the peripheral CSDs that surround the City of Toronto, making up Toronto's commuter shed. As a result, the City of Toronto proper, and several of its adjacent employment-rich CSDs (including Mississauga, Brampton, Vaughan, Newmarket, Aurora, Richmond Hill and Markham) were excluded as they tend to exhibit very different commuting patterns from the rest of the study area. Finally, any CSD located outside of Toronto's commuter shed was also excluded. Similarly, all aboriginal CSDs, most of which are very small, were removed from the study area as they do not accurately represent the population in this region. These revisions to the GGH region, although minor, were necessary as this study aims to encompass Toronto's commuter shed exclusively.

A residential migration is defined as an individual who changed his/her CSD of residence[8] either one year or five years prior to census day. Individuals who moved within a single CSD are considered local movers and were therefore combined with long-term residents. Individuals who remained within the same CSD over the five year census period (2001-2006) are considered to be long-term residents (stayers).

Descriptive statistics are used to address Objective 1, which investigates the mean commute distance for groups of individuals based on migrant status, geographical context, labour market and demographic and household variables. This objective also evaluates the change in mean commute distance as residential duration increases for subsets of the previous groups.

[8] A residential move is considered a migration when, and only when, an individual leaves their current housing-and-labor market and relocates to a new on (Zax, 1994). The CSD level was deemed appropriate as it is the finest level of aggregation Statistics Canada provides for an individual's previous (2001, 2005) residential location.

Objective 2 utilizes multivariate regression to quantify the relationship between migration status and residential location with commute distance while controlling for a variety of demographic, household and employment variables. Thus, the model is specified as:

$$\boldsymbol{T} = \boldsymbol{X\beta} + \varepsilon$$

where $\boldsymbol{T}$ is an N x 1 vector with elements T_i representing the one-way commute distance (km) for individual on a typical day. $\boldsymbol{X}$ is a N x K matrix of (K – 1) variables that reflect migrant status, geographical context, labor market, and demographic and household characteristics for individual i. is a K x 1 vector of parameters to be estimated by the model, and is a N x 1 vector with elements representing the unobserved error in i. Typically, the error terms ε_i are independent and follow a normal distribution (Bailey and Gatrell, 1995). Consequently, the above model can be estimated using the Ordinary Least Squares (OLS) method. Finally, in order to avoid artificially inflating the t-values, the original weight variable (equal to Canada's total population excluding institutional residents) was scaled so that the sum of the scaled weight variable was equal to the sample size.

Statistics Canada measures the commute distance as one-way, Euclidean (straight-line) distance from an individual's usual place of residence to their usual place of work. This distance is measured for all modes of transportation and is capped at 200 km. All commutes longer than 200 km are aggregated and reported as 201 km. For the purposes of this study, individuals with commute distances in excess of 100 km were excluded to avoid including weekly (long-distance) commuters. This cutoff point was deemed acceptable as it reduced the overall sample by only 1.58%.

A summary and the definitions of the independent variables used within the modeling component of this study are provided in Table 1. Since this study is particularly interested in the

Table 1: Independent Variables Tested Against Commute Distance

Variable	Definition	Sample per cent (weighted)	Mean commute distance (km)
Migrant status			
Migration Status			
Long-term resident	1 if respondent has lived in the same CSD for the past 5 years; 0 otherwise	79.0	13.7
Migrant	1 if respondent migrated to a different CSD in the past 5 years; 0 otherwise	21.0	20.0
Migration Status			
Long-term resident	1 if respondent has lived in the same CSD for the past 5 years; 0 otherwise	79.0	13.7
<1-year migrant	1 if respondent has migrated to a different CSD in the past year; 0 otherwise	5.9	21.4
≥1 and <5-year migrant	1 if respondent has migrated to a different CSD 1-5 years ago; 0 otherwise	15.1	19.4
Labor market			
Employment status			
Full-time	1 if respondent is working full-time (≥30 hours per week); 0 otherwise	69.9	16.6
Part-time	1 if respondent is working part-time (<30 hours per week); 0 otherwise	30.1	11.5
Employment type			
Management	1 if respondent has a management occupation; 0 otherwise	10.8	19.2
Science	1 if respondent has a natural or applied sciences occupation; 0 otherwise	5.6	21.5
Sales and Service	1 if respondent has a sales or service occupation; 0 otherwise	25.8	11.0
Primary	1 if respondent has a primary industry occupation; 0 otherwise	2.4	9.0
Other Employment	1 if respondent has an occupation different from the above; 0 otherwise	55.5	15.7
Education			
Bachelors degree or higher	1 if respondent has a bachelor's degree or higher; 0 otherwise	18.9	16.9
Does not have bachelors degree	1 if respondent has less than a bachelor's degree; 0 otherwise	81.1	14.6
Demographic and Household			
Sex			
Female	1 if respondent is female; 0 if respondent is male	50.8	12.9
Male	1 if respondent is male; 0 if respondent is female	49.2	17.2
Household Income			
HH income	A continuous variable that represents a respondent's household income x 10^{-4}	100.0	15.0
Ln HH income	The natural logarithm of the continuous variable: HH income		

Table 1: Continued

Variable	Definition	Sample per cent (weighted)	Mean commute distance (km)
Age			
Age	A continuous variable that represents a respondent's age, 15 years of age or older	100.0	15.0
Ln age	The natural logarithm of the continuous variable: Age		
Household structure			
Single parent	1 if respondent is single and has a dependent child; 0 otherwise	13.6	10.7
Married parent	1 if respondent is married and has a dependent child; 0 otherwise	33.3	16.8
Single person	1 if respondent is single and has no dependent children; 0 otherwise	22.6	14.5
Married person	1 if respondent is married and has no dependent children; 0 otherwise	30.4	15.4
Geographical context			
Residential location			
CMA	1 if respondent lives in a Census Metropolitan Area; 0 otherwise	87.2	14.5
CA	1 if respondent lives in a Census Agglomeration; 0 otherwise	5.8	15.2
Strong MIZ	1 if respondent lives in a Strong MIZ; 0 otherwise	6.6	21.0
Moderate MIZ	1 if respondent lives in a Moderate MIZ; 0 otherwise	0.5	20.5

Notes: All variable definitions are in reference to the week (Sunday to Saturday) prior to Census Day (May 16, 2006). The weighted sample population was calculated based on a weight provided by Statistics Canada. The percentages shown may not sum to 100 due to rounding.

role migration plays on commuting distance, we examine the geographical context[9] of recent migrants' residential location and how commute distance changes over time, both with respect to recent migrants in general, and specific to their demographic and household characteristics.

Independent variables were selected based on the findings of previous commuting studies (e.g., Axisa et al., 2011; Boyle et al., 2001; Findlay et al., 2001; Champion et al., 2008; and Green and Owen, 2006), and data availability. This study is particularly interested in the role of migrant status and geographic context of residential location on commuting distance. Although limited, the commuting studies that consider migrant status note that recent migrants are expected to commute longer distances than long-term residents (stayers). That is, increased commuting distance is often an outcome of residential relocation that is dealt with after the fact (Breheny, 1999). This is expected as recent migrants have had little time to adjust to their new residential location. Degree of rurality is also important, although findings are far less cohesive. Urban / rural areas are defined according to the Statistics Canada hierarchy of Census Metropolitan Areas (CMAs, or urban areas with populations in excess of 100,000); Census Agglomerations (CAs, or urban areas with populations between 10,000 and 99,000), and 'strong' and 'moderate' Metropolitan Influence Zones (MIZ), which identify the degree of interaction between a rural area and an urban area. The current study area does not contain any of the most rural zones (weak MIZ and no MIZ). It is expected that as degree of rurality increases, so too will commute distance.

Additionally, labor market, and household and demographic variables were selected to control for the other attributes that impact commuting behavior. The three variables selected to describe labor markets are: employment status, education, and occupation type. It is expected

[9] An individual's geographic context represents their Statistical Area Classification (SAC) of residence on census day. For additional details please see Axisa et al. (2011).

that full-time employment (employment status), possession of a bachelor's degree (education), or occupying a management or science related job (occupation type) will all have a positive influence on commuting (i.e. longer commute distances). The six variables that describe household and demographics are: age, sex, household income, household structure, marital status, and age of youngest child. Increasing age (age), being female (sex), having children, especially children zero to four and five to nine (Age of youngest child) or being a single parent (household structure) are expected to have a negative influence on commuting (i.e. shorter commute distances). While, increasing household income (household income), or being married (marital status) are again expected to have a positive influence on commuting.

3.4 RESULTS AND DISCUSSION

3.4.1 Descriptive Results

Table 1 provides the weighted sample percent and mean commute distance (km) for each of the independent variables used within this study. Overall, recent migrants (individuals who migrated in the past five years) commute longer distances (20.0 km) than long-term residents (13.7 km)[10]. Disaggregating by the timing of migration, more recent migrants (i.e., those who migrated in the year immediately prior to the census) have somewhat longer (and statistically significant, $p < 0.05$) commute distances (21.4 km), while less recent (1 to 5-year) migrants also exhibit longer commute distances (19.4 km) as compared to stayers (13.7 km), reinforcing claims by Breheny (1999) who suggests that commute distance is often a temporary outcome of residential relocation that is dealt with at a later stage. However, given that the reduction in commute distance was only 2 km over the one to five year period, results also suggests that some

[10] While seemingly short commute distances, Statistics Canada reported that the median commute distance increased by nearly 8.5%, rising from 7.0 km in 1996 to 7.6 km in 2006 (Statistics Canada, 2007).

individuals see long distance commuting as a strategic decision. That is, households are forced to strategize commuting and residential location choices around family, work, and residence location, while labour markets continue to regionalize and specialize, thus making the home-work relationship ever more complex (Sandow and Westin, 2010).

The remaining variables found in Table 1 all exhibit similar commuting patterns previously found by a variety of authors. For instance, commute distances are greatest for those aged 30 to 44 (17.1 km), with generally decreasing distances with increasing age. Women typically commute shorter distances (12.9 km) than men (17.2 km), while commute distance increases as household income increases. Lastly, individuals with higher skilled employment types such as managerial or science related occupations commute longer distances (19.2 km and 21.5 km respectively) than individuals with less skilled employment.[11]

Table 2 reports the relationship between distance of migration and commute distance. First, individuals who migrated the longest distances (100+ km) have a mean commute distance (14.9 km) only slightly longer than long-term residents (13.7 km). Consistent with Niedomysl (2010), long-distance migrations are likely motivated by employment-related decisions. Thus, long-distance migrations coupled with short commute distances seem to suggest a simultaneous employment and residential relocation. Similarly, individuals who migrated the shortest distances (1 to 14.9 km) also have short commute distances (15.6 km). Niedomysl (2010) states that short-distance migrations are usually motivated by housing-related decisions. Therefore, short-distance migrations suggest exclusive residential relocations, although since migration distance is short (<15 km), the mean commute distance increases only marginally compared to long-term residents. Finally, migrants who migrated intermediate distances (30 – 99.9 km) have

[11] For additional details regarding these remaining independent variables, please see Axisa et al. (2011).

the longest commutes (see Table 2). Niedomysl (2010) indicates that intermediate-distance migrants are most often motivated by social reasons, such as being close to friends and family. Accordingly, middle-distance migrations made for social reasons also seem to be dominated by exclusive residential moves. However, because these migrants have relocated over reasonably long distances, longer commute distances are not surprising.

Table 2: Commute Distance versus Migration Distance

Migration Distance	Mean Commute Distance (km)
Long-term resident	13.7
Migrated 1-14.9 km	15.6
Migrated 15-29.9 km	19.1
Migrated 30-44.9 km	23.1
Migrated 45-59.9 km	24.9
Migrated 60-74.9 km	26.5
Migrated 75-89.9 km	26.8
Migrated 90-99.9 km	23.6
Migrated 100+ km	14.9

Table 3 breaks down recent migrants using origin-destination pairs and again compares them to mean commute distance. As expected, rural to urban migrations result in the shortest commute distances (15.3 km), while urban to rural migrants have the longest commute distances (25.7 km). Conversely, both urban-to-urban migrants and rural-to-rural migrants have similar commute distances, 19.9 km and 20.3 km respectively.

Table 3: How Commute Distance Varies by Type of Migration

Type of Migration	Mean Commute Distance (km)
Long-term resident	13.7
Urban → Rural	25.7
Urban → Urban	19.9
Rural → Urban	15.3
Rural → Rural	20.3

3.4.2 Multivariate Regression Results

The descriptive results discussed in the previous section provide extensive insight into the relationship between commute distance and migration. However, these results were only able to

capture the direct effects between migration characteristics and the remaining independent variables. As a result, the second objective of this study uses multivariate regression models to better understand the characteristics that lead recent migrants to commute longer distances while controlling for a variety of socio-economic, demographic and employment variables. The estimation results for seven models are presented in Table 4. Model 1 estimates commute distance, distinguishing by migrant status (migrated in the previous five years or not) and uses only direct effect variables. Model 2 builds on Model 1 by dividing migration status into < 1-year migrants and ≥ 1 and < 5-year migrants and uses direct effect variables only. Model 2 is the base model for the remaining models. Models 3 to 6 build on the base model by introducing an interaction variable which combines migration status (divided by duration of residence) with a household or demographic variable. Finally, Model 7 simultaneously estimates the four interaction variables utilized in the previous models.

The estimates provided by Model 1 coincide well with the literature presented earlier. For example, Model 1 finds that being a recent migrant significantly increases commute distance. Additionally, increasing rurality (CMA → CA → Strong MIZ → Moderate MIZ), is associated with increasing commute distances. Relative to residents living in CMAs, for instance, average commute distance is only 1.6 km longer for residents of Census Agglomerations (CAs). For residents of moderate MIZ areas, commute distance increases to 7.4 km. The Model also indicates that as age increases, initially so too does commute distance, but at age 38 this trend inverts and commute distance begins to decrease. Finally, the model also indicates that as household income increases commute distance also increases, albeit monotonically in nature.

We further explore the role of migration (Model 2) by differentiating migration status by the timing of the move (one or five-years prior to the census). Essentially, as residential duration

Table 4: Estimation Results for Commute Distance

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Constant term	-53.775***	-54.180***	-54.410***	-53.273***	-51.799***	-54.307***	-54.038***
Migrant status							
Migration Status							
Long-term resident							
Migrant	5.677***						
Migration Status							
Long-term resident							
<1-year migrant		7.430***	5.853***	5.774***	30.491***	5.598***	43.193***
≥1 and <5-year migrant		5.010***	4.702***	2.986***	-17.044***	3.433***	-8.520*
Labour market							
Employment status							
Part-time							
Full-time	1.801***	1.793***	1.791***	1.780***	1.822***	1.797***	1.813***
Employment type							
Primary							
Management	7.953***	7.955***	7.978***	7.980***	7.950***	7.953***	7.985***
Science	9.765***	9.752***	9.799***	9.775***	9.778***	9.757***	9.833***
Sales and Service	3.212***	3.212***	3.241***	3.233***	3.203***	3.215***	3.246***
Other Employment	5.985***	5.980***	5.999***	6.002***	5.990***	5.985***	6.015***
Education							
Does not have bachelors degree							
Bachelors degree or higher	-0.416***	-0.430***	-0.440***	-0.424***	-0.408***	-0.463***	-0.438***
Demographic and Household							
Sex							
Male							
Female	-3.559***	-3.561***	-3.833***	-3.559***	-3.544***	-3.551***	-3.851***
Female x <1-year migrant			3.080***				3.220***
Female x ≥1 and <5-year migrant			0.604***				0.762***

Table 4: Continued

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Income							
HH Income	-0.015***	-0.015***	-0.015***	-0.005	-0.015***	-0.014***	-0.006
HH Income x <1-year migrant				-0.048***			-0.044***
HH Income x ≥1 and <5-year migrant				-0.061***			-0.060***
Ln HH Income	2.374***	2.396***	2.400***	2.127**	2.363***	2.383***	2.165***
Ln HH Income + x <1-year migrant				1.077***			0.894***
Ln HH Income + x ≥1 and <5-year migrant				1.291***			1.016***
Age							
Age	-0.604***	-0.605***	-0.608***	-0.601***	-0.602***	-0.601***	-0.619***
Age x <1-year migrant					0.357***		0.501***
Age x ≥1 and <5-year migrant					-0.121***		-0.033
Ln Age	22.601***	22.705***	22.833***	22.537***	22.018***	22.814***	23.050***
Ln Age x <1-year migrant					-10.198***		-16.588***
Ln Age x ≥1 and <5-year migrant					7.427***		3.271*
Household structure							
Single person							
Single parent	-0.359**	-0.291**	-0.283*	-0.318**	-0.403***	-0.305*	-0.367**
Single parent x <1-year migrant						0.546	-0.460
Single parent x ≥1 and <5-year migrant						-0.648*	-0.155
Married person	-0.235**	-0.230**	-0.239**	-0.238**	-0.135	-1.006***	-0.782***
Married person x <1-year migrant						3.565***	2.709***
Married person x ≥1 and <5-year migrant						2.859***	1.569***
Married parent	-0.569***	-0.515***	-0.519***	-0.518***	-0.477***	-1.047***	-0.948***
Married parent x <1-year migrant						2.298***	3.121***
Married parent x ≥1 and <5-year migrant						2.161***	2.119***
Geographical context							
Residential location							
CMA							
CA	1.564***	1.564***	1.570***	1.564***	1.540***	1.569***	1.555***
Strong MIZ	6.644***	6.632***	6.631***	6.621***	6.603***	6.621***	6.594***
Moderate MIZ	7.433***	7.456***	7.450***	7.435***	7.401***	7.463***	7.405***

Table 4: Continued

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Summary Statistics							
R^2	0.087	0.088	0.089	0.089	0.089	0.089	0.090
Adjusted R^2	0.087	0.088	0.089	0.088	0.089	0.089	0.090
F Statistic	1900.07***	1817.37***	1652.85***	1507.41***	1513.90***	1397.36***	1010.37***

Notes: n = 357,164 non-institutional individuals aged 15 and over who reported paid employment the week (Sunday to Saturday) prior to Census Day (May 16, 2006). The estimates shown are all relative to the reference variable (shown in italics). Significance levels: *** = 0.001, ** = 0.01, * = 0.05.

increases, commute distance decreases. However, all migrants commute substantially longer distances when compared to long-term residents. The following four models (Models 3 to 6) utilize interaction variables in order to identify whether certain demographic and household characteristics of recent migrants influence commute distance, and if so, does this relationship change as residential duration increases. The main effect estimates found in all four interaction Models closely resemble those produced by Models 1 and 2, despite the addition of interaction terms.

Model 3 interacts 'sex' with 'migration status', with results indicating that both women and men will commute roughly the same distances (5.1 km and 5.9 km respectively) if they migrated one year prior to the census. However, it also indicates that as residential duration lengthens (1 to 5 years), commute distance drops substantially for women (5.1 km to 1.5 km), but only marginally for men (5.9 km to 4.7 km), although both are statistically significant.

Model 4 interacts 'household income' and 'migration status'. In general, increasing household income is positively correlated with greater commute distance, while increasing residential duration is also associated with shorter commute distances [Figure 2(a)]. For example, individuals who moved in the year prior to the census and earn $30,000 to $79,999 commuted an average of 19.7 km. Individuals who had migrated one to five years prior to the census and who received the same income commuted an average of 17.4 km, both longer distances than non-migrants. Figure 2(a) indicates that that the majority of income groups behave the same, although lower income households (< $30,000) tend to reduce their commute distance faster than households with higher incomes.

Model 5 interacts 'age' and 'migration status'. For the most part, this variable behaves as expected. Commute distances are shortest amongst youth/young adults, potentially reflecting

residential preferences; within the city, and close to work and entertainment. With increasing age, marriage, and growth of the family, commute distances tend to increase, with middle-aged migrants having the longest commutes (peaking at 38 years old) followed by a decline in propensity both as age increases and decreases [Figure 2(b)]. Figure 2(b) also indicates that older individuals (aged 50 and over) who are very recent (< 1-year) migrants have some of the longest commutes, but also experience the largest reduction in mean commute distance. Therefore, it would appear that older migrants commute long distances for a short period of time only, possibly reflective of pre-retirement migrations where long distance commuting is known to be short lived and thus not factored into the move's overall utility. As such, very little (if any) consideration is given to commute distance as it would be known to be very temporary.

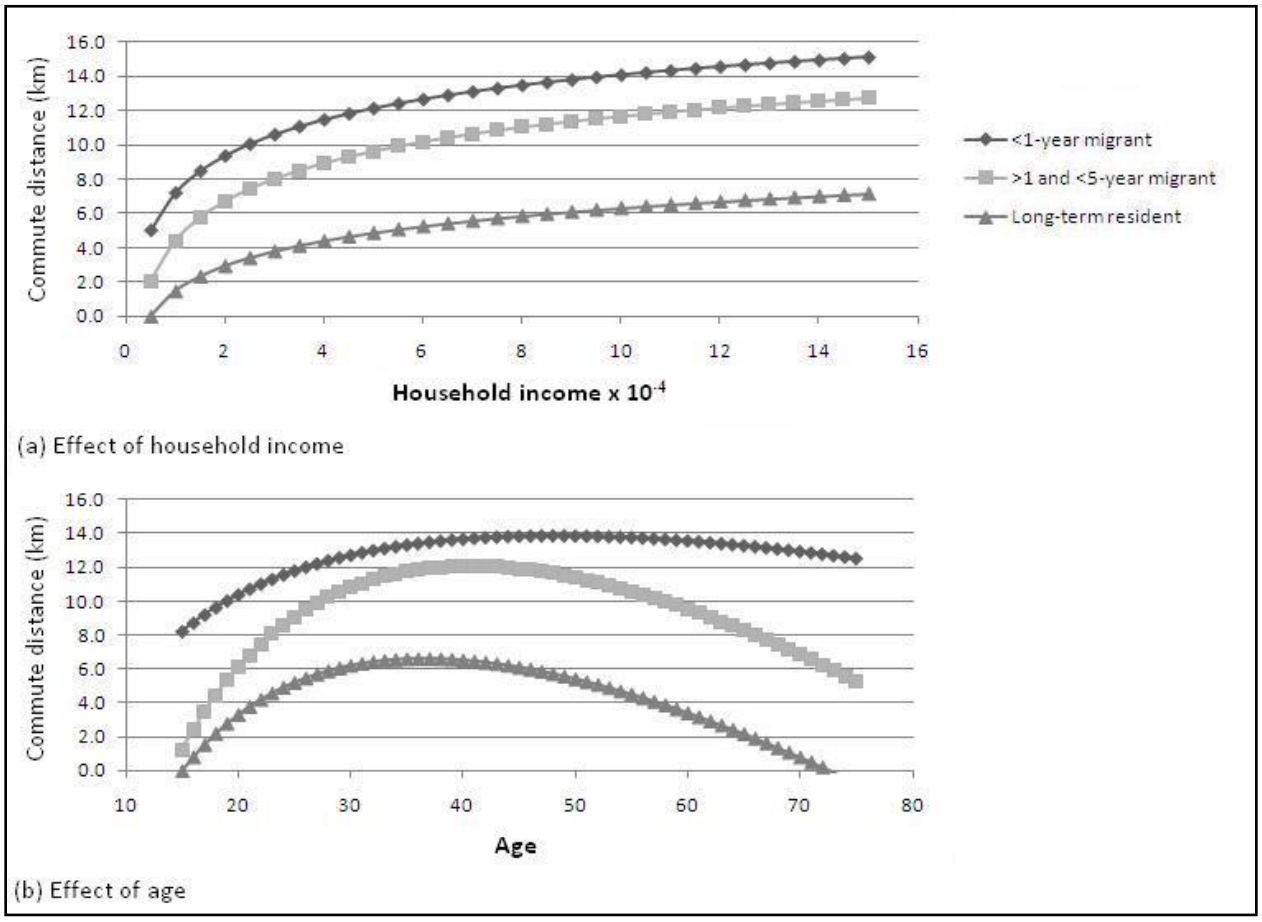

Figure 2: Estimated Commute Distance by Migration Status for Household Income and Age

Model 6 interacts 'household structure' with 'migration status', with results indicating that married migrants have the longest commutes, regardless of duration of residence or the presence of children. Conversely, single parent households who migrated within the last year[12] have the shortest commute distance (5.8 km) while also having the largest reduction in commute distance (5.8 km to 2.5 km), a statistically significant decline. Single parent migrants are likely to reduce their commute distances as quickly as possible because of their need to balance paid work, with domestic responsibilities and child care.

Finally, Model 7 includes all interaction terms. Overall, the trends found in Model 7 are very similar to those found in Models 3 to 6. While overall trends do not change, some interaction effects become insignificant, such as "Age x ≥1 and <5-year migrant, and "Single parent x ≥1 and <5-year migrant".

3.5 CONCLUSIONS

This research has attempted to advance the knowledge surrounding commuting behavior in Toronto's commuter shed by focusing on the relationship between migration status and commute distance. The initial research question sought to determine whether recent migrants commuted farther than long-term residents and local movers. The results indicate that recent migrants do in fact commute longer distances than long-term residents and local movers, a finding made previously by Axisa et al. (2011), Champion et al. (2008), Boyle et al. (2001), and Findlay et al. (2001). This result, coupled with a suggestion from Champion et al. (2008) lead to the development of the second research question: How does the commute distance of recent migrants change as residential duration lengthens? The results from this second research question

[12] Although the coefficient for the interaction term 'Single parent x <1-year migrant' is slightly insignificant, when combined with the significant coefficient of 'single parent', the two provide a meaningful result.

indicate that as residential duration increases, commute distance decreases. At first glance, this trend seems to suggest that long-distance commuting is a temporary solution to a recent migration. Although the overall reduction in commute distance with increasing duration of residence is rather minimal, the results suggest that there is a tradeoff between commuting distance and residential/work locations. That is, long-distance commuting becomes a strategic decision that accounts for lifestyle preferences, life-course, and household composition, whereby dual earner households may need to balance commute distance and times between partners (Sandow and Westin, 2010).

However, the reduction in commute distance varies substantially depending on the socio-economic and demographic characteristics of the migrant. For married individuals, increased commuting distance may simply be the byproduct of a necessary migration out of a crowded inner city as they require more space for their family. Additionally, suburban and exurban residential locations are often accessible to multiple employment nodes, albeit at the expense of increased commuting distance. Contrasting married households and single parent households reveals further differences, with single parent households seemingly much quicker to reduce commute distance than married households. In the latter, household duties relating to the care of children can be shared and/or adopted by one of the partners, given that migrations often benefit one individual over another (i.e., Cooke and Spears, 2005; Cooke et al., 2009). For example, Clark and Withers (2002) noted that migration reduced employment amongst married women by over 20% following migration, with the recovery to pre-migration employment levels taking approximately one year. Conversely, single parent families would have greater difficulty balancing long-distance commutes with family demands. Additionally, the relocation of older adults may reflect a preferred location for retirement, acknowledging that the increase in

commute distance will only be temporary. Therefore, life-course and household structure clearly appear as important determinants of commute distance.

It is understood that the majority of people undergo multiple residential moves during their life time, and this paper shows that recent migrants commute longer distances when compared to long-term residents. For these reasons, it is impossible to avoid an increase in long-distance commuters if cities/regions continue to grow using current planning practices. This type of growth is, and will continue to have vast implications for both the transportation network and the environment. As a result, the knowledge gained from this paper must be coupled with additional research into planning of Toronto's commuter shed. This future work hopes to uncover deficiencies within both the previous and current region planning policy in the hopes that it can not only be avoided but fixed in the future.

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CHAPTER FOUR: Conclusions

4.1 INTRODUCTION

This thesis has utilized a combination of descriptive statistics and linear regression models in order to provide new analytical insight into the relationship between residential migration and commute distance. Six objectives have been addressed by this research:

I. Evaluate the relationship between migrations and commute distance by examining the journey-to-work distance of all recent migrants compared to that of the long-term residents.

II. Evaluate the relationship between residential locations within the urban-rural continuum and commute distance.

III. Evaluate the relationship between migration statuses (how recently the migrant migrated) and commute distance by examining the journey-to-work distance of different migrants groups compared to that of the long-term residents.

IV. Evaluate the relationship between distance migrated and commute distance.

V. Evaluate the relationship between type of migration (urban to rural, rural to rural, etc.) and current commute distance.

VI. Identify the socio-economic and socio-demographic characteristics that contribute to commute distance, particularly amongst recent migrants.

This Chapter summarizes the findings of this thesis with respect to the above objectives. The summary of findings and research contributions will be followed by the limitation of this research. This Chapter will also highlight conclusions and recommendations for future research.

4.2 SUMMARY OF FINDINGS AND RESEARCH CONTRIBUTIONS

This thesis has evaluated the factors associated with commute distance in Toronto's commuter shed. Both Chapters 2 and 3 report similar findings regarding the relationship between commuting distance and a variety of socio-economic and socio-demographic variables. Findings very similar to those reported elsewhere in the commuting literature. More specifically, this

thesis was interested in the relationship between migration status and commute distance. Chapter 2 addresses Objectives I and II, while Chapter 3 addresses Objectives III, IV, V and VI.

Results from both Chapters 2 and 3 echo findings found throughout in the commuting literature in relation to commuting distance and socio-economic and socio-demographic variables. First, the geography of residential location significantly impacts commute distance. Individuals living in the most accessible rural areas (strong MIZ and moderate MIZ) have the longest commutes (Green and Owen, 2006; Banister and Gallent, 1998). Next, individuals between the ages of 30-44 (middle-age) have the longest commute distances (e.g., Champion et al., 2008; Green and Owen, 2006). In terms of sex, females commute shorter distances than men on average (Champion et al., 2008; Clark et al., 2003; Green and Owen, 2006; Hanson and Pratt, 1991, 1995). Income and household structure also seem to contribute to commute distance (Green et al., 1999; Prillwitz et al., 2007). As household income increases, so too does commuting distance. While, households with young children (aged 0-4 and 5-9) typically have longer commute distances as compared to households with no children at all.

Looking more specifically at the main objectives of this thesis, Chapter 2 reveals that recent migrants commute longer distances than long-term residents (Objective I). Although this result may seem intuitive, to the author's knowledge, it is the first time this finding has been confirmed in the Canadian context. Furthermore, Chapter 2 identifies that residential location within the urban-rural continuum substantially influences commute distance (Objective II). That is, as residential rurality increases, so too does commute distance.

Chapter 3 indicates that as a migrant's current residential duration increases, their commute distance decreases (Objective III). Although, the reduction in commute distance over time is minimal, suggesting that there is a tradeoff between commuting distance and

residential/work locations. To the author's knowledge, this is the first research project that has disaggregated migrants by the length of time since they migrated, as suggested by Champion et al. (2008). Next, Chapter 3 determines that migrants who migrated intermediate-distances (30 – 99.9 km) have the longest commutes (Objective IV). As indicated by Niedomysl (2010), intermediate-distance migrants are generally motivated by social factors, such as being close to friends and family. Accordingly, intermediate-distance migrations made for social reasons are dominated by exclusive residential moves. However, due to the reasonably long distance of these migrations, longer commute distances are often the result. As well, Chapter 3 found that the type of migration impacts commute distance (Objective V). As expected, urbanizing (rural to urban) migrants have the shortest commute distances (15.3 km), while counter-urbanizing (urban to rural) migrants have the longest commute distances (25.7 km). On the other hand, migrants who moved to a similar zone classification (urban-to-urban or rural-to-rural) have similar commute distances, 19.9 km and 20.3 km respectively. Finally, in relation to objective III, Chapter 3 indicates that different demographic and economic characteristics motivate migrants to adjust their post migration commute distances at varying speeds (Objective VI). For example; women, low income households (< $30,000), youth/young adults (aged 15-25), older individuals (aged 50 and over) and single parents tend to reduce their commute distances fastest.

4.3 RESEARCH LIMITATIONS

Minor data limitations were faced in both studies within this thesis. First, the use of Euclidean (straight-line) commute distance is somewhat problematic. Although Euclidean commute distance is generally accepted within the academic community, it does not do the greatest job in rural areas where the road network is more sparse (such as Kawartha Lakes, Erin and Brant County to name a few). Additionally, the study area (Toronto's commuter shed)

stretches around Lake Ontario in a U-shape, thus it is likely that several commute distances were derived across the lake. With more detailed residential and employment locations available, actual network distances could have been calculated, thus improving the accuracy of all calculations and models. Secondly, a migration was defined as a residential movement across a CSD boundary, as this was the finest level of aggregation provided by Statistics Canada. According to Zax (1994), a residential move is considered a migration when and only when, an individual leaves his/her current housing and labor market and relocates to a new one. That being said, our method classified localized movers at migrants if a CSD boundary was crossed, and long distances movers and stayers if the move was within a single large CSD (such as Caledon or Kawartha Lakes). Again, more detailed residential locations would have allowed for a distance cutoff to be utilized, similar to the 5 km cutoff Champion et al. (2008) deemed suitable because no rural settlement in England has a diameter larger than this. A similar yet appropriate distance could have been calculated for our study area specifically, thus further reducing the error within this thesis.

4.4 CONCLUSIONS AND FUTURE RESEARCH

Based on the descriptive statistics and models generated within this thesis, it is clear that migration status is a variable that needs to be seriously considered when attempting to fully understand commute distance. As a result, recent legislative pieces put out by the Province of Ontario (specifically the Greenbelt (2005) and Places to Grow (2006)) need to be re-evaluated as they both encourage growth in urban centers and rural settlement areas in the periphery of Toronto's commuter shed. As this thesis previously states, smaller urban centers and rural settlement areas lack specialized, high-skilled and non-manual jobs, forcing individuals to seek employment in larger labor markets. As a result, forcing many recent migrants to commute

longer distances in order to find suitable employment opportunities. Additionally, evidence from this thesis also suggests that more and more individuals are deliberately choosing peripheral residential locations. That is, long-distance commuting has become a strategic decision that accounts for lifestyle preferences, life-course, and household composition, whereby dual earner households may need to balance commute distance and times between partners. Therefore, without the incorporation of migration status, the successful development and implementation of transportation and housing policy, along with community sustainability will be jeopardized.

As outlined above, this thesis made several contributions to the commuting literature. From a Canadian policy and planning perspective, the most important contribution is the addition of the much needed Canadian content regarding migration status and commuting distance as well as how this changes as residential duration increases. Although, the research gap surrounding the adjustment period of recent migrants commuting patterns was analyzed using cross-sectional data. This type of data was the best available and did provide substantial insight into the adjustment period of recent migrants. Although the use of longitudinal data would allow future studies to access greater detail in understanding the motivations surrounding residential location decisions and commute distance, specifically with respect to an individual's adjustment period post-migration.

Additionally, this thesis focused only on one city: Toronto Canada. Although this thesis did establish that migration status does impact commute distance, we caution planners and policy makers that additional analysis of other Canadian cities will be needed in order to solidify this claim in the Canadian context. Consequently, this should be the main area of focus for additional attention from researchers in the future. Descriptive statistics and models similar to the ones produced in this thesis need to be produced for other Canadian cities in order to allow for a better

overall understanding of the relationship between migration status and commuting distance in Canada.

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