An Exploration of Middle Class Dynamics in Canadian Cities

by

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ABSTRACT

A strong middle class contributes to a healthy democracy, economic growth, and political stability. As of 2011, approximately 81% of Canadians live in cities, rendering studies at the metropolitan level essential. This paper provides a large scale and comparative quantitative study focused on the middle class in Canadian cities. Utilizing census data from 1996, 2006, and 2016 at the Census Metropolitan Area and Census Agglomeration levels, I estimate bivariate and dummy variable OLS models to explore middle class dynamics across Canadian cities. Spatially, results appear to show a negative trend westward in the middle class in the 21st century that is largely driven by regional effects of the resource boom. Key findings regarding possible drivers of the differences in middle class shares across cities center around secondary industry and knowledge-intensive business services. Secondary industry has a positive relationship with the middle class, while knowledge-intensive business services have a negative relationship with the middle class. The results of this study seem to fit previous theoretical frameworks such as the deindustrialization and routinization hypotheses relating to the drivers of inequality and provide a starting point for future studies of the middle class.

CHAPTER 1: INTRODUCTION

The election platform for the Liberal party of Canada in 2015 was, "Growth for the Middle Class". Following the party's election in October 2015, each successive budget presented by the liberal government has been focused on the middle class, with titles such as: "A New Plan for a Strong Middle Class" (2016), "Building a Strong Middle Class" (2017), and "Equality and Growth: A Strong Middle Class" (2018). There can be no doubt that the topic of the middle class is a hot-button political issue today in Canada, as in many other countries, and how the middle class fares is an important benchmark for political success (Alini, 2017).

Before continuing, a quick note on the definition of the term "middle class" is necessary. When referring to the "middle class" throughout this study, I am referring to the population occupying the middle part of the income distribution (see Section 2.2 for a further discussion). Middle class issues are discussed at every level of government across contemporary North America. In the past few years, the Pew Research Center has published two major reports about the American middle class at the national and metropolitan scales. Media outlets such as CNN, the Associated Press, and National Public Radio (NPR) in the United States covered their findings documenting a hollowing out of the middle class extensively (Luhby, 2015; NPR Staff, 2016; Rugaber, 2016). Similarly, the media in Canada is now paying close attention to middle class issues, with prominent articles and op-eds featured in publications such as *The Globe and Mail*, *Global News*, and the *National Post* (Alini, 2017; Florida, 2017; Freeland, 2015).

With all of the political and media attention the middle class receives, one may ask themselves why having a strong middle class is so important in the first place? In a seminal study, Thurow (1984) argues that a healthy middle class is necessary for a healthy democracy. More recently, studies in the field of inequality have begun to look more closely at how a more

unequal distribution of income and the hollowing out of the middle class can impact other aspects of social life. These studies have shown, for instance, that the income distribution matters for economic performance, and a large middle class contributes to economic growth and social and political stability (Dabla Norris et. al., 2015; Pressman, 2007). Therefore, politicians and governments have strong economic and social reasons to be invested in how the middle class is doing.

Given its importance for economic, social, and political reasons, there is a long tradition of studying middle class dynamics, at the heart of which lies the question of how we define the middle class. Findings indicate that politicians use the term "middle class" because the majority of people believe themselves to be in this category even if they are not, and neither economists nor sociologists have been able to establish a definitive and widely accepted measure of the middle class (Alini, 2017; Foster and Wolfson, 2010). Sociologists tend to define the middle class by how a person makes their money (i.e. based on occupations), while economists tend to define the middle class by adopting income based measures and thresholds of various kinds (Hout, 2007). For this study, the definition of the middle class will be based upon household median income and the general framework set out by Foster and Wolfson (2010). In this framework, the latter researchers clearly identify the steps to be considered when defining the middle class, which consist of (i) choosing the "space", (ii) defining the middle, (iii) fixing the range, and (iv) aggregating the data. This framework will be expanded upon in the Methodology chapter.

While a consistent definition of the middle class has yet to be established, studies of this group have been published in Canada and the United States for decades. During the 1980s researchers in the United States noticed that the middle class appeared to be declining in size and

relative affluence, which prompted a number of studies on the middle class in the United States (Foster and Wolfson, 2010). Additionally, the late 1980s saw the beginning of a middle class research literature in Canada, with an important national-level study published by Myles et. al. (1988), as well as a number of other studies produced by the Analytical Statistics Branch of Statistics Canada (Foster and Wolfson, 2010).

Results from previous studies show that income inequality is on the rise at both the national and subnational level (defined mainly by provinces) in Canada, and this increase in inequality is only outdone by a greater increase in wealth inequality (Brozozowski et al., 2009; Heisz, 2007; Macdonald, 2014). Within this trend of growing inequality, studies also show that there has been labor market polarization in Canada through at least the year 2009, partly as a reflection of the hollowing out of the middle class (Beach, 2016; Green and Sand, 2015). Increases in inequality have indeed been shown to have a negative impact on middle class happiness and income satisfaction (Winkelmann and Winkelmann, 2010). The Pew Research Center (2016) also found a clear link between inequality and the middle class, and while studies of inequality often focus on the dispersion of the income distribution rather than the middle specifically, they can provide valuable insights to studies surrounding the middle class.

While there have been studies of the middle class in Canada at the national level, including a fairly recent study by Employment and Social Development Canada (2013), there is clearly a gap in the literature regarding the temporal and spatial aspects of the middle class at the metropolitan scale. There have been a few specific case studies addressing changing middle class dynamics in cities such as Toronto, Montreal, and Vancouver (see Hulchanski, 2010; Ley and Lynch, 2012; Rose and Twigge-Molecy, 2013), but, to the best of the author's knowledge, no study has yet to take a broad comparative look at how middle class shares vary across cities in

Canada. From a spatial perspective, previous studies point to the existence of a distinct regional aspect to inequality and wage polarization across Canada, both at the metropolitan and provincial scales (Breau, 2015; Fortin and Lemieux, 2015). This spatial variation has also been exacerbated with the resource boom in western Canada after the year 2000 (Green and Sand, 2015). Furthermore, studies show that inequality is greater in cities than rural regions (Breau, 2015). There is thus a distinct need for a spatial approach to examining the middle class at the metropolitan scale.

The aim of this project is to explore middle class dynamics across Canadian cities through statistical analysis. Cities will be defined as Census Metropolitan Areas (CMA) and Census Agglomerations (CA) for which data is available in the 1996, 2006, and 2016 censuses. In order to explore middle class dynamics across Canadian cities, the following research questions are posed.

(i) What is the state of the middle class across Canadian cities today and has it changed since 1996?

(ii) Is there spatial variation in the distribution of the middle class across Canadian cities? If so, why does this spatial variation occur?

(iii) What are possible drivers of differences in middle class shares across Canadian cities?

   i. Do these drivers have a positive or negative effect on the middle class?

   ii. Why do these drivers affect the middle class?

Findings of the project show that across all cities in Canada the percentage of middle class households decreased from 1996 – 2016. Spatially, results appear to show a negative trend westward in the middle class in the 21st century that is largely driven by regional effects of the

resource boom. Key findings regarding possible drivers of the differences in middle class shares center around industry mix and occupational categories. Occupations considered knowledge-intensive business services (e.g. management, finance, real estate) display negative relationships with the middle class. Conversely, secondary industry (e.g. manufacturing) shows a positive relationship with the middle class. Finally, the results of this study seem to corroborate previous findings in the inequality literature and fit previous theoretical frameworks, such as the deindustrialization and routinization hypotheses, relating to the drivers of inequality and polarization (see Chapter 5).

The thesis is organized as follows. Chapter 2 presents a literature review examining studies relating to inequality and the middle class across and within countries, with a special focus on Canada and the United States. Chapter 3 outlines the methodology and project design utilized for this research study; it also provides a short discussion of the limitations of the study. Chapter 4 discusses the results of the descriptive and statistical analyses of the middle class across Canadian cities over time and space. Chapter 5 provides a further discussion of the results of the statistical analyses, and postulates ideas for further research. Finally, Chapter 6 summarizes the research project and provides a conclusion.

CHAPTER 2: LITERATURE REVIEW

This chapter begins with a review of inequality studies with a cross-country perspective before reviewing studies on inequality and the middle class at the national and sub-national levels in Canada and the United States. To provide a conceptual framework for the variable selection in the Methodology chapter, there is a short discussion of possible explanatory factors of the middle class. Finally, the last two sections of the chapter discuss the definition of the middle class and the gap in the literature this project fills.

2.1: Income Inequality, the Middle Class, and Labor Markets

2.1.1: The International Perspective

There have been a variety of studies surrounding income inequality and the middle class across OECD countries in the last 10 years or so. By and large, these studies show that income inequality negatively affects growth (Cingano, 2014; Ostry, Berg, & Tsangarides, 2014). Recent evidence also shows that the composition of the income distribution matters for economic growth as well (Dabla-Norris et. al., 2015). Indeed, findings from Dabla-Norris et. al. (2015) suggest that when the income-share of the top 20% increases, GDP declines over the medium term, in contrast to an increase in the income share of the bottom 20%, which is typically associated with higher economic growth. Such evidence corroborates the findings of Cingano (2014), who argues that the shape of the income distribution matters and that greater income disparity in the bottom and lower-middle parts of the distribution will lead to a greater negative impact on economic performance. Dabla-Norris et al. (2015) found that this relationship holds for the middle class as well, and thus the poor and middle classes influence economic growth the most.

The negative effects of income inequality also extend to the middle class, as Winkelmann and Winkelmann (2010) have provided empirical evidence that the middle class is adversely affected by income inequality, with higher levels of income inequality leading to lower levels of middle class income satisfaction. Pressman (2007) also finds that a large middle class contributes to economic growth and social and political stability. His study shows that there was a decline of the middle class over the 1970s and 1980s across several countries, and that this decline appeared to result more from households falling into the lower class than from rising into the upper class. In a more recent study surrounding the global middle class, the Pew Research Center (2015b) found that there was no correlation between a decline in poverty seen from 2001-2011 and an increase in the middle class. The findings of the study also indicate that increases in the middle class have a spatial element, as these increases tend to be very region dependent.

2.1.2: The North American Outlook

It is now well documented that income inequality has been on the rise in both Canada and the United States since the late 1970s and early 1980s (Chakravorty, 1996; Myles, 2003). In Canada specifically, income inequality has risen particularly substantially since the mid-1990s (Brzozowski et al., 2009; Heisz, 2007). The rise in wealth inequality has been even more pronounced (Macdonald, 2014). In addition, Yalnizyan (2010) states that no previous generation of Canadians has taken as much of the gains in economic growth as the top 1% now. While earlier work by Winkelmann and Winkelmann (2010) shows that increases in income inequality have a negative impact on the middle class in Switzerland, there is surprisingly little research surrounding this issue in the North American context.

The literature that does exist shows a hollowing out of the middle class in the United States and Canada. In addition, this hollowing out is not the result of people solely moving from middle to high income brackets, as studies have shown that there is no more likelihood for middle income households to move into high income brackets as low income brackets (Employment and Social Development Canada, 2013; Pew Research Center, 2015a). In the United States, the highest and lowest income brackets have shown the most growth since the 1970s, leading to greater income polarization (Pew Research Center, 2015a; see Figure 2.1). The Pew Research Center study found that the "winners" since 1970 by socio-demographic characteristics include older Americans and those who are married, while "losers" included younger Americans and those without a college degree. The study also found that jobs were increasingly concentrated in higher skilled and lower skilled occupations, and that those in higher skilled occupations experienced a rise in income status.

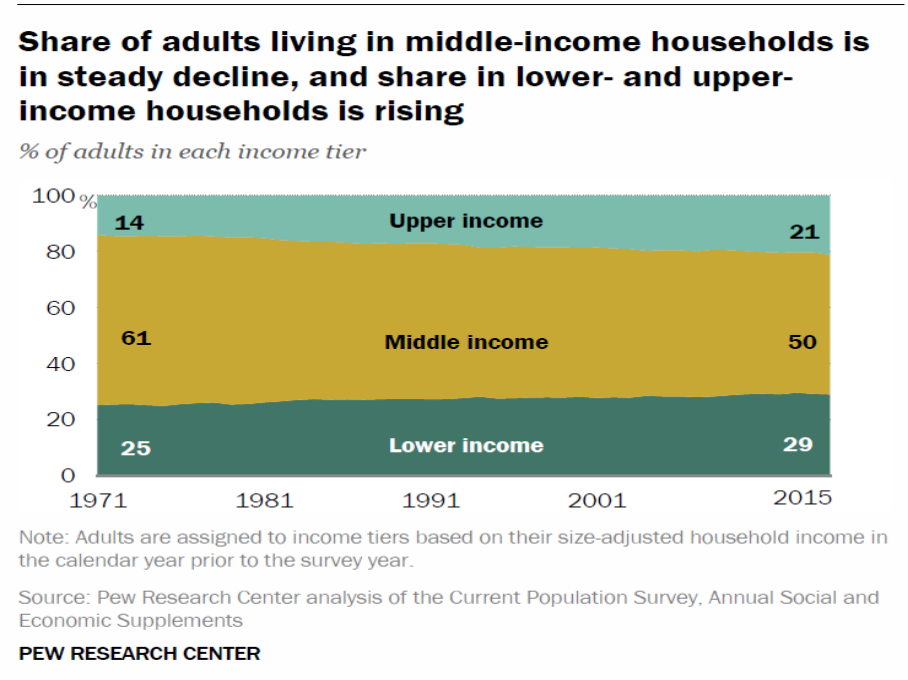

Figure 2.1. The shrinking American middle class.
Source: Pew Research Center (2015)

Beach (2016) has reported the upskilling and downskilling of jobs in Canada from 1970-2000. Interestingly, Beach also finds that between 2000 and 2015, upskilling continued to increase simultaneously with an increase in the number of higher-income families, while downskilling stagnated. The study also has similar findings to that of the Pew Research Center (2015a) in terms of socio-demographic variables, as the older generation in Canada has substantial wealth while younger Canadians have net negative wealth. Beach (2016) also finds significant labor market polarization with the hollowing out of the middle class that continues through 2008-2009 (see Figure 2.2). Green and Sand (2015) also investigate labor market polarization in Canada, and largely corroborate the findings of Beach (2016). Furthermore, Beach (2016) reviews multiple hypotheses as to why there is a hollowing of the middle class, which are the routinization hypothesis, the off-shoring hypothesis, and institutional and policy related factors such as free trade agreements. The study concludes that the drivers of changes in incomes across Canada come largely from the demand side of labor markets.

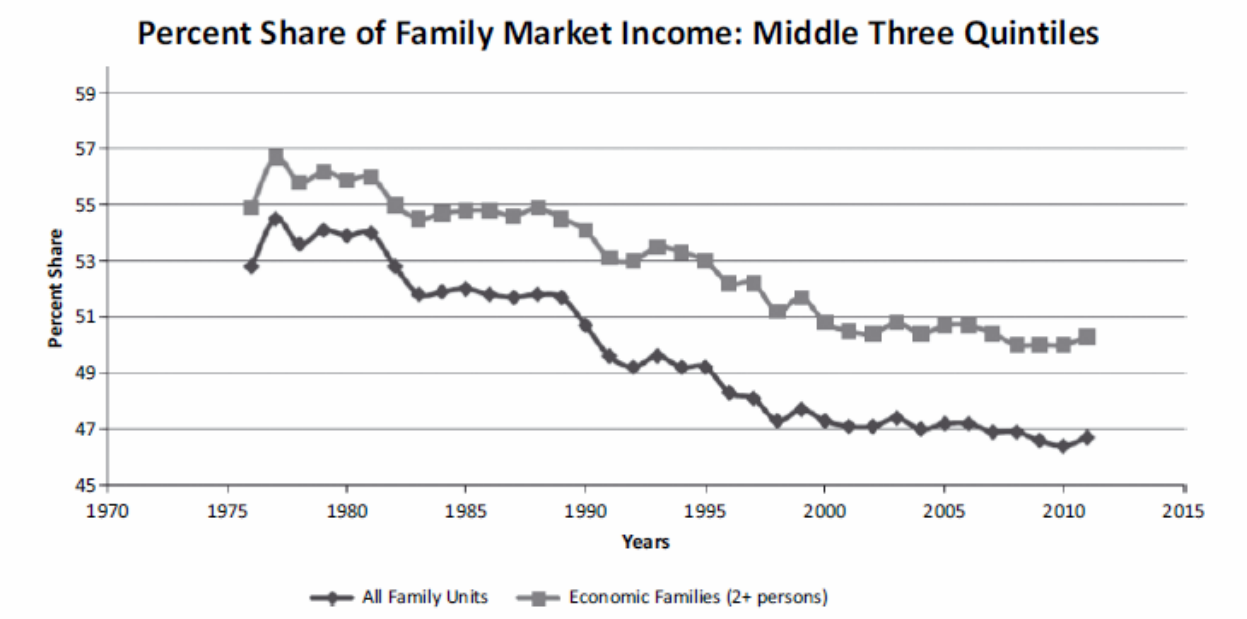

Figure 2.2. The decrease in the percent share of family market income in the middle three quintiles in Canada using data from the Statistics Canada CANSIM series.
Source: Beach (2016)

2.1.3: The Sub-national Level

While there have been multiple studies regarding inequality at the national level in both Canada and the United States, there are comparatively few sub-national studies specifically focusing on the middle class. In terms of inequality and the middle class at the regional and metropolitan levels in the United States, Holmes and Berube (2016) found that local conditions and dynamics are important in terms of mobility of the economic poor. In addition, income trends in cities tend to reflect wider changes affecting the metropolitan economies in which these cities are located. In terms of the middle-income part of the distribution, a recent study by the Pew Research Center (2016) found that 203 of 229 metropolitan areas surveyed in the United States showed a decrease in the share of middle-income adults within the metropolitan area from 2000 to 2014. Furthermore, the study found that many of the labor market forces that affected the middle class at the national scale also affected the middle class at the metropolitan scale. For example, metropolitan areas with high tech economies and those that were financial and commercial centers had the highest shares of high-income individuals. Interestingly, the study also found that the 10 metropolitan areas with the highest shares of middle class adults were more rooted in manufacturing, while at the same time metropolitan areas with the greatest losses of middle-income adults occurred in locations with a greater than average reliance on manufacturing.

Likewise, the literature surrounding inequality at the regional and metropolitan level in Canada has paid little attention to the middle class question. The prevailing thinking is that the drivers of inequality at the metropolitan level in Canada are labor market shifts, deindustrialization, and declining rates of unionization (Bolton and Breau, 2012; Breau, 2015; Walks, 2013). Deindustrialization and skill-biased technological change appear to be key drivers of inequality, and are related to trade and technological advancements that have contributed to

job polarization and the reduction of middle-income occupations (Breau, 2015; Fong, 2017; Green and Sand, 2015; Walks, 2013). Furthermore, this increase in inequality has been accompanied by large increases in the upper part of the income distribution at the metropolitan scale (Fong, 2017; Walks, 2013). While these findings have largely been corroborated by national level studies in Canada (see Beach, 2016), there also appears to be a distinct spatial aspect to the drivers of inequality at sub-national scales.

At the provincial level, Fortin and Lemieux (2015) found that wages in Alberta, Saskatchewan, and Newfoundland and Labrador increased faster than the rest of Canada and this was likely due to the extractive resources sector. The authors also found that while there is a national increase in wage polarization, there are specific locational effects. For example, in Quebec there is little change in either the level or dispersion of wages (Fortin and Lemieux, 2015). Similarly, Breau (2015) found both an urban/rural and East/West divide across Canada relating to rises in inequality. Fong (2017) explores the urban/rural divide in inequality at the metropolitan scale, and the findings indicate that income inequality in Canada is almost exclusive to cities. Further city-level studies also found regional shifts in income inequality across Canada, leading to the conclusion that regional forces influence inequality (Bolton and Breau, 2012; Walks, 2013). Possibly the most significant reason for this regional variation is the resource boom in the West after 2000, which Green and Sand (2015) also discuss in their study of job polarization in Canada.

2.1.4: Labor Market Forces

Labor market forces have an impact on income inequality in both the United States and Canada (Beach, 2016; Breau, 2015; Pew Research Center, 2015a, 2016; Walks, 2013). The regional

aspect of labor market changes at the metropolitan scale has been further explored in the United States. Mulligan et al. (2014), for instance, created a typology of metropolitan labor markets in the United States to assess the current performance of labor markets and the change in performance over time with metropolitan areas grouped into 10 different labor market categories. The study found that the nation's worst performing clusters of metropolitan areas were uniformly small and unhealthy, and tended to concentrate in a few regions. The unhealthiest labor markets were dispersed east of the Mississippi River, with the notable exception of the Northeast. In contrast, the healthiest labor markets were spread more evenly across the national landscape and were able to generate a strong tax base to attract high growth industries and young, skilled workers.

A specific aspect of the labor market that has been studied in depth in both the United States and Canada is occupational structure. Throughout the 1980s and 1990s, researchers observed a pattern of job polarization in the United States and Canada (Autor et al., 2006; Green and Sand, 2015). Job polarization occurs when there is higher growth in high-skill and low-skill jobs relative to middle-skill jobs. Before 2000, Canada and the United States experienced similar trends in polarization of employment (Green and Sand, 2015). In the United States, these trends can be explained by skill-biased technical change combined with a slowdown of growth in the supply of college workers and eroding labor market institutions (Autor et al., 2006). In Canada, these trends can also be explained by technological change, and reflect the outcome of an outward supply shift rather than a demand shift. An interesting change occurs after the year 2000 in Canada as a result of the resource boom in the West. Thus, movements in employment and the wage distribution have a strong regional element after 2000 (Green and Sand, 2015).

2.1.5: Possible Drivers of the Middle Class

Previous literature on inequality and the middle class has provided a variety of findings surrounding the potential drivers of income inequality and the middle class. Across studies, these drivers coalesce into two broad categories, which are labor market forces and socio-demographic characteristics. Labor market forces represent demand-side factors (as discussed above), while socio-demographic characteristics represent supply-side factors (Breau, 2015). As previously noted, much of the literature reviewed has focused on the topic of inequality and the increased dispersion of incomes. Although these studies are not explicitly focused on the middle class, their findings provide a conceptual framework that can be utilized to determine possible drivers of the middle class. This is especially true at the metropolitan scale, as metropolitan areas with higher increases in income inequality experience higher decreases in the middle class (see Figure 2.3).

Demand-side variables such as industrial mix and occupational categories are possible drivers of the middle class. The impact of different industrial sectors is prevalent throughout the literature and is particularly important due to the decline in the manufacturing sector and the development of the mining and oil industry in Western Canada post-2000 (Breau, 2015; Green and Sand, 2015; Pew Research Center, 2016). Occupational structure, unemployment rate, and median income are also important variables to investigate, all have an effect on either income inequality or job polarization, and studies have recorded income increases in the upper part of the distribution (Beach, 2016; Bolton and Breau, 2012; Breau, 2015; Green and Sand, 2015). In terms of occupational structure, the job distribution has changed since the 1990s, as jobs have increasingly concentrated in high-skilled and low-skilled occupations, thus resulting in increased job polarization. This increased job polarization has an impact on the middle class, as middle-

skilled and middle-income jobs are declining (Beach, 2016; Pew Research Center, 2015). Therefore, occupational categories and industrial mix are both important labor market forces to examine when studying the middle class.

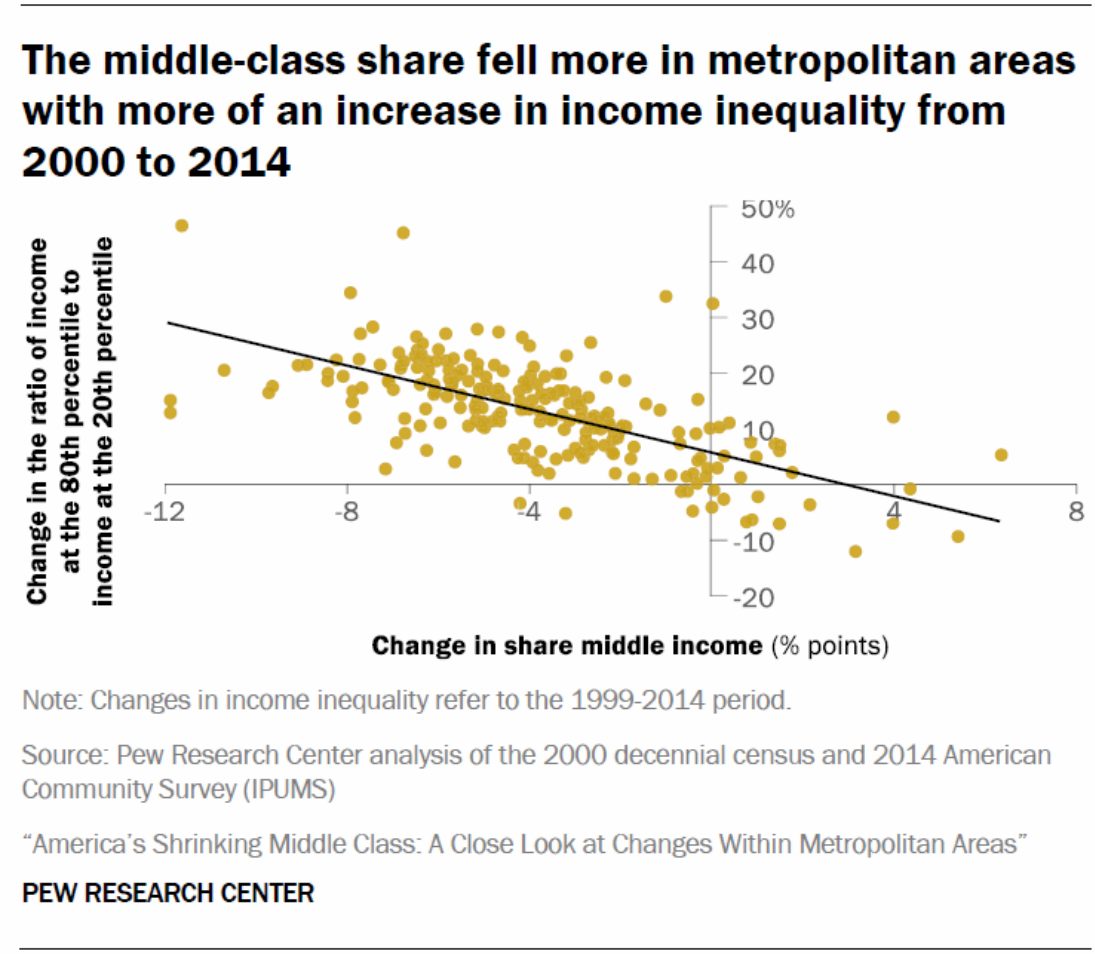

Figure 2.3. Correlation between the change in the middle-class share and the change in the 80/20-income ratio. The correlation coefficient is -0.64.
Source: Pew Research Center (2016)

Possible supply-side drivers of the middle class, represented by socio-demographic characteristics, include variables such as educational attainment, population age distribution, and visible minority population, all of which have an impact on inequality. Advanced economies increasingly reward those with job skills, and college graduates have an economic advantage (Green and Sand, 2015). In terms of population age, there is some evidence that an aging

population relative to the number of workers leads to increasing inequality (Bolton and Breau, 2012). Additionally, the age group with the largest increases in upper income households in the United States since 1971 is people over age 65, and this was the only age group that experienced growth in the middle-income tier (Pew Research Center, 2015a). Conversely, young adults have slipped down the income ladder in the United States since 1971, a finding similar to the state of this age group in Canada, where younger age groups have net negative wealth (Beach, 2016; Pew Research Center, 2015a). Finally, there is evidence that the percentage of a city's population that is visible minorities contributes to income inequality, thus rendering this variable important to middle class studies as well (Bolton and Breau, 2012).

2.2: How is "Middle Class" Defined?

The definition of the middle class is debated extensively in the literature, and there is no singular and uniform definition of the middle class. There appears to be two main schools of thought in regards to approaches to define the middle class, which are from (i) sociological and (ii) economic viewpoints. From a sociological point of view, the definition of class is based upon the concept of how a person makes their money (Hout, 2007). Based on this framework, the most widely adopted measure of the middle class is defined largely through the lens of class dynamics using an occupational structure of some sort (López-Calva and Ortiz-Juarez, 2011; Savage et al., 2013). For instance, Goldthorpe's approach defines seven different social classes based upon occupations and employment positions, instead of the incomes of the people in those positions (Savage et al., 2013).

Multiple recent studies have proposed new definitions of the middle class from a sociological standpoint. In their 2014 paper, López-Calva and Ortiz-Juarez postulate a new

definition of the middle class by using a vulnerability approach. Through this approach, the middle class is defined as the level of income that allows individuals to protect themselves from falling into poverty over time. In contrast to this vulnerability approach, Savage et al. (2013) define a new set of social classes, and split the middle class into the established middle class and the technical middle class. The authors define the established middle class as individuals with a broad occupational range who are comfortably well off, but do not have the extreme wealth of the elite. The technical middle class is defined as scientifically and technically oriented people who are a prosperous group with a secure economic position in society. The main difference between the established middle class and the technical middle class is that the established middle class is more socially connected than the technical middle class. Thus, both of these sociological approaches to the middle class incorporate a range of variables not limited solely to income in order to define the middle class.

In contrast to the sociological approach to the middle class, the view taken in the economic literature focuses on the stratum of the income distribution rather than an analysis of class (Hout, 2007; López-Calva and Ortiz-Juarez, 2011). Foster and Wolfson (2010) provide the most in depth discussion of the measurement of the middle class from an economic perspective. In their paper, the authors discuss definitions of the middle class through three studies done previously and construct an index of polarization. This index of polarization can be expressed as a function of the "between-group" inequality minus the "within-group" inequality as measured by the Gini coefficient (Foster and Wolfson, 2010). In terms of the three previous studies, the authors critique the definitions of the middle class used by Thurow (1984), Blackburn and Bloom (1985), and Levy (1987). For instance, Foster and Wolfson (2010) find that any symmetric distribution will have the same "size" of the middle class using Levy's approach. The

approaches in these three studies all conform to a general framework proposed by Foster and Wolfson (2010). This framework proposes that there are four distinct steps to consider when measuring the middle, which are choosing the "space", defining the middle, fixing the range, and aggregating the data.[1]

The middle class as defined by Levy (1987) was determined using "people space". In this case, the middle class was defined using percentage of total income that was held by the middle 3/5th of families, or those within the range of the 20th percentile of income and the 80th percentile of income. Foster and Wolfson (2010) detail a critique of this approach in their paper, and find that any symmetric distribution will have the same "size" of the middle class using Levy's approach. They state that this approach misses out on the spread of the distribution, and argue that Levy's index actually measures the skewness of the middle class instead of the size and that results using this measure do not actually say much about the middle class. Thus, it appears that using "income space" to define the middle class yields more robust results than using "people space".

The main critique of the studies done by Thurow (1984) and Blackburn and Bloom (1985) is that their definition of the middle class is arbitrary. However, as there is no uniform definition of the middle class, Pressman (2007) points out that any definition of the middle class will be arbitrary. Both Thurow and Blackburn and Bloom used "income space", however Thurow defined the middle class as incomes between 75% and 125% of the median, while Blackburn and Bloom defined the middle class as incomes between 60% and 225% of the median. Foster and Wolfson (2010) also give many examples of studies that have used "income space" to define the middle class with conflicting results (i.e. Horrigan and Haugen, 1988; and

[1] Although the general framework proposed by Foster and Wolfson (2010) is used to establish a definition of the middle class for this project, due to the structure of the dataset, none of the specific indices discussed in this section are used for this project.

Kosters and Ross, 1988). Although it appears that different definitions of the middle class yield different results, as to date, an arbitrary definition is the only definition available for studies of the middle class.

2.3: The Need for a Metropolitan Level and Spatial Approach

To date, there has not been a large scale and comparative quantitative study focused on the middle class in Canadian cities. While there have been studies of the middle class in specific Canadian cities (see Hulchanski, 2010; Ley and Lynch, 2012; Rose and Twigge-Molecy, 2013), this paper attempts to fill the gap in the literature through a quantitative and spatial approach to examining the middle class at a large scale across Canadian cities. There is a need for this spatial approach due to the regional disparities in the Canadian economy and geography. Breau (2015) has identified widening geographical divides in terms of regional inequality in Canada. Regions in the western provinces have relatively high and rapidly growing inequality, while regions in the eastern provinces have relatively low and stable inequality. In addition, the post-2000 resource boom had a significant impact on the Canadian economy, especially in Alberta, Manitoba, and Saskatchewan, and any analysis must take this regional element into account. Thus, there is a need for a spatial approach to the study of the middle class to address these regional disparities.

There is also a need to study the middle class at the metropolitan scale. There is a distinct divide in inequality levels between urban and rural areas, and urban areas have the highest levels of inequality (Breau, 2015; Fong, 2017). Approximately 81% of the Canadian population lives in urban areas as of 2011, and thus inequality affects the great majority of the Canadian population (Statistics Canada, 2011). Furthermore, studies have shown that regional inequality is multiscalar in nature, and sources of inequality are sensitive to scale (Wei, 2015). This information can be

analyzed in conjunction with the results of studies at the international level that found the income distribution itself matters for economic growth and studies at the national level in Canada that the middle class is shrinking (Dabla-Norris et al., 2015; Employment and Social Development Canada, 2013). Thus, there is a need for an approach at the city-level that is focused on the middle part of the income distribution.

CHAPTER 3: METHODOLOGY

This chapter begins with a discussion of the data sources for the project, and then details how the middle class is defined, data management and calculations, and techniques used in Arcmap. Subsequent sections discuss the variables chosen for analysis and models estimated for the project. The chapter then concludes with a short discussion of the limitations of the project.

3.1: Data Sources

The primary source of data for this project is the Statistics Canada Census Program. The study utilizes census data at the Census Agglomeration (CA) and Census Metropolitan Area (CMA) scales from the years 1996, 2006, and 2016. Using these scales provides for both a spatial and temporal analysis of the middle class, and the data allow for comparative analysis at 10-year intervals. Data was also available for 2001 and 2011, allowing for analysis at 5-year intervals as well. However, due to the quality of the data from the 2011 National Household Survey, a conscious decision was made to omit this dataset (see Smith, 2015). Furthermore, this decision disallows the use of the 2001 dataset, as it is not possible to provide data at a 5-year interval between 2006 and 2016. Thus, in order to ensure temporal consistency, the study only uses data at 10-year intervals. In terms of the actual sources, data from the 1996 census was obtained from the *Profile of Census Metropolitan Areas and Census Agglomerations, 1996 Census*. The data from the 2006 census was obtained from the *Profile of Census Metropolitan Areas and Census Agglomerations, 2006 Census*. Finally, the data from the 2016 census was obtained from a variety of different tables.[2]

[2] Document numbers for tables from the 2016 Census are as follows: Household Income – 98-400-X2016097 Unemployment Rate - 98-400-X2016287, Population Age - 98-400-X2016001, Visible Minority - 98-400-X2016190, Industry - 98-400-X2016290, Education - 98-400-X2016241.

Statistics Canada defines a Census Metropolitan Area (CMA) or Census Agglomeration (CA) based upon adjacent municipalities (census subdivisions) that are centered on a population center, known as the core. A CMA must have a minimum total population of 100,000, with a core population of 50,000. It should be noted that even if the population of a CMA falls below these thresholds, it is still retained as a CMA in future censuses. In order to be classified as a CA, the geographic area must have a minimum core population of 10,000. If the population drops below 10,000, the CA is retired from the census for that particular year. Therefore, in terms of this study, any CA that did not meet this threshold in all census years (1996, 2006, and 2016) was dropped from the analysis, which resulted in a sample of 126 CMAs and CAs.

Geographic areas delineated by CMAs and CAs are used due to both the scale they represent and their purpose. According to Statistics Canada, CMAs and CAs represent areas that are economically and socially integrated, which is particularly important when attempting to model different economic and social characteristics and their effect on the middle class. CMAs and CAs are also statistically comparable over space and time because they are delineated in the same way across Canada. Such delineation ensures spatial consistency and robust results when analyzing spatial trends across Canada. Finally, the historical comparability rule maintains historical comparability for CMAs and those CAs with census tracts in the previous census by retaining census subdivisions in the CMA or CA even if their commuting flow falls below the minimal commuting flow threshold. Thus, the historical comparability rule is helpful when analyzing changes across different time periods (Census of Population Dictionary, 2016).

Spatial data was obtained from Statistics Canada to represent locations of the CAs and CMAs. Using this spatial data, I was able to create a visual representation of the findings of the project. The shapefile of Canada used in the maps for this project is the cartographic boundary

shapefile, which depicts boundaries using only the shorelines of the major land mass and coastal islands of Canada. Cartographic boundary files differ from digital boundary files in that digital boundary files include the coastal water area (Boundary Files Reference Guide, 2017). The projection of the cartographic boundary file is North American Datum of 1983 (NAD83).

3.2: Definition of the Middle Class

As shown in the literature review chapter, there is no clear consensus regarding the definition of the middle class. This study conforms to approaches most frequently used in the economic literature, as it is concerned with the income distribution of the CMAs and CAs being examined, and follows the general framework proposed by Foster and Wolfson (2010). The space, therefore, is defined as income space, in which annual private household income is the indicator of welfare. A private household is defined by Statistics Canada as a person or group of persons who occupy the same dwelling and do not have a usual place of residence elsewhere in Canada or abroad. Total household income refers to monetary receipts from certain sources of all household members, before income taxes and deduction, during a specified reference period.[3] Although after-tax income is often considered a better gauge of living standards, total income is often used in inequality studies (see Sarlo et. al., 2017), and after-tax income data is not available for the 1996 census.

In terms of the definition of the middle, this study uses the median income of each Census Metropolitan Area and Census Agglomeration. Since the focus of this study is changing middle class dynamics at the city level, the decision to use the median income of each CMA and CA was taken to ensure consistency in spatial scales. Consistency in spatial scales ensured that

[3] See the 2016 Census of Population Dictionary for full listing of the definition of "monetary receipts"; http://www12.statcan.gc.ca/census-recensement/2016/ref/dict/pop123-eng.cfm.

regional disparities did not go overlooked in the analysis, and allowed for the spatial distribution of incomes to be considered jointly with calculations of the middle class.

Following the definition of the middle, the study determined the range around the middle, which identifies the area of the income distribution defined as middle class. Due to the structure of the publically available census dataset, there were significant constraints in the ability of the study to define the range around the middle. The household income data publically provided through the Canadian census program was only available for the number of households within specific income brackets of $10,000 (i.e. $9,999 – $19,999). Thus, instead of defining the middle class using percentiles, the definition of the middle class was determined by income bracket. The middle class consists of the number of households in three income brackets, which are the income bracket that contained the median income of the CMA or CA and those income brackets immediately greater than and less than that specific median income bracket. For example, the median income of St. John's, Newfoundland in 2016 was $79,750. Thus, the middle class is defined as the number of households in the income brackets $60,000 to $69,999, $70,000 to $79,999, and $80,000 to $89,999. Based on previous studies detailed in Foster and Wolfson (2010), this definition of the middle class could be considered narrow. A narrow definition of the middle class encompasses those who are significantly removed from poverty, but who are also not among the highest reaches of the income distribution (Pew Research Center, 2015b).

Although no index for the middle class was developed for this study, the middle class population in different CMAs and CAs was compared using percentages. This relative measure of the middle class allowed it to be analyzed over both space and time, as it accounted for differences and changes in the number of households and inflation of incomes.

3.3: Data Management and Calculations

I downloaded the data used in this study from the Statistics Canada Census Program website in Microsoft Excel format. Due to the format of the website, the data from each table was downloaded individually for each Census Agglomeration and Census Metropolitan Area, and then compiled into one large Excel document. The data was then filtered to only include those Census Agglomerations that had data available for each of the census years 1996, 2006, and 2016. Once all of the data was compiled for the requisite CAs and CMAs into one Excel document, I then further filtered the data to exclude those variables that would not be relevant to the project, such as the number of native language speakers of languages other than English or French.

Once the dataset was filtered and cleaned to the required level, I performed calculations of the middle class for each CMA and CA. First, the number of households was summed in the income bracket of the median income with the number of households in the income brackets immediately above and below the income bracket of the median income. This number was then divided by the total number of households in the CMA or CA multiplied by 100 to find the percentage of middle class households for each CMA and CA. When computing the percentage of households that were middle class for the 2016 census, there were multiple CAs and CMAs that had median incomes that were above $100,000. Thus, higher income brackets of $100,000 – $125,000, $125,000 – $150,000, and $150,000 – $200,000 provided in the 2016 census data were used to achieve an accurate computation of the percentage of middle class households.

After calculations with the higher income brackets, for 2016, there were two CAs for which the median income was too high to compute the middle class using the income brackets provided, as any calculation would have also included the upper class. In 2016, the median

income of Wood Buffalo, AB in 2016 was $193,511, and the median income of Yellowknife, NWT was $142,616. Respectively, these values were 80% and 33% higher than the next highest median income value of $107,091 in 2016. Therefore, Wood Buffalo, AB and Yellowknife, NWT were both considered outliers and dropped from the analysis due to their extremely high median income values and the inability to compute a representative figure.

In terms of descriptive statistics, the mean, minimum, maximum, range, and coefficient of variation for both the median income and percentage of middle class households were calculated across CMAs and CAs for the years 1996, 2006, and 2016. The percentage point change in middle class households was then computed at ten-year intervals between 1996 and 2006 and 2006 and 2016, and also the 20-year interval between 1996 and 2016. To do so, the percentage of middle class households in the previous census was subtracted from the percentage of middle class households in the more recent census. For example, the percentage of middle class households in St. John's, Newfoundland in 1996 was 34.48%, and in 2006 was 26.97%. Thus, the percentage point change in the middle class for the 10-year interval from 1996 to 2006 was -7.42%.

When preparing the data for visualization in ArcMap, the variables representing the percentage of middle class households, the latitude and longitude, and population for each CMA and CA were compiled into one sheet of an Excel document. This allowed me to import the values computed into ArcMap to visualize them spatially and classify them by the percentage of middle class households and population. In order to prepare the data for analysis in Stata, data transformations on the original census data in Microsoft Excel format were required. Many of the variables chosen for use in the Stata models, which will be elaborated upon in the "Variables and Definitions" section below, were given in absolute numbers. In order to compare these

values both across CMAs and CAs and over time, the relative values of these variables were computed.

3.4: ArcGIS

In order to display this data spatially, ArcMap was used to create a map of the CMA and CA locations as point data. This task was performed using the "Display XY" tool with the latitude and longitude coordinates of each CMA and CA used to plot them on the coordinate system. The data could then be exported as points in a shapefile. As I wanted to display the data such that the point size would correspond to the population of the CMAs and CAs, CMAs and CAs were classified into three categories based upon their population as of the 2016 census. These groups were defined as those CMAs and CAs with a population less than 100,000, those with a population between 100,000 and 1,000,000, and those with a population greater than 1,000,000. The point data was then exported based upon these three different categories to acquire shapefiles that only contained the points in the specific population category. This process was completed three times, once for each of the 1996, 2006, and 2016 data respectively.

After changing size of the points in order to reflect the population size of each city, I changed the color of the points to reflect the percentage of middle class households in each CMA and CA using quintiles. Cities assigned to the lowest 20% of middle class households were given the color red, whereas cities with the highest 20% of middle class households were colored in dark blue. All cities were assigned colors between red and blue based on which quintile their percentage of middle class households lied within (the maps are presented in Chapter 4). This process was again completed three times, for each of the 1996, 2006, and 2016 data respectively. Finally, I mapped the CMAs and CAs based upon the change in percentage of middle class

households over time, and for each the change between 1996 and 2006, 2006 and 2016, and 1996 and 2016. Here, the color of the points was changed to reflect the percentage change in middle class households using quintiles. The colors assigned to these intervals were the same colors used to designate the percentiles of middle class households above.

3.5: Variables and Definitions

As noted in the Literature Review (Chapter 2), findings from the literature coalesce into two broad categories, which are labor market forces (economic characteristics) and socio-demographic characteristics. The variables selected in regards to economic characteristics were industrial sectors, occupational categories, the unemployment rate, and median income. The variables selected in regards to socio-demographic characteristics were educational attainment levels, age of the population, and percentage of visible minorities in each CMA and CA. Additionally; the variable population was included due to previous findings that cities with higher populations had greater inequality (Bolton and Breau, 2012).

The census data provided information regarding the number of persons 15 years or older in the labor force that were employed in each industrial sector. The 1996 census used the 1980 Standard Industry Classification (SIC), the 2006 census used the North American Industry Classification System (NAICS) of 2002, and the 2016 census used the NAICS of 2012. The major shift in industry classifications occurred in 1997 with the creation of NAICS to replace the SIC due to rapid changes in both the United States and world economies. Due to this shift, it was difficult to maintain consistency between the 1996 census data and the 2006 and 2016 census data. Therefore, industry classifications were amalgamated into three broader categories, which were primary, secondary, and tertiary industry and were based upon information from the Bureau

of Labor Statistics.[4] Primary industry included industries such as agriculture, forestry, fishing, hunting, mining, and oil and gas extractions. Secondary industry included industries such as manufacturing and construction. Finally, tertiary industry included all other industries such as finance and insurance, professional, scientific and technical services, and management of companies and enterprises, among others.

Census data provide information regarding the number of persons 15 years or older that are employed in each occupational classification. The 1996 census used the 1991 Standard Occupational Classification, the 2006 census used the National Occupational Classification for Statistics 2006, and the 2016 census used the National Occupation Classification 2016. Information about the unemployment rate was provided as well, and this variable is calculated as the percentage of persons 15 years of age or older who were without paid work the week prior to Census Day and had either actively looked for work in the past four weeks, were on temporary lay-off and expected to return to their job, or had definite arrangements to start a new job in four weeks or less.

Socio-demographic variables selected were educational attainment, age distribution of population, and percentage of visible minorities. Educational attainment was calculated as the percentage of the population with a Bachelors degree or higher. The age distribution of the population was split into two variables: the percentage of young people and percentage of seniors. The percentage of young people was defined as the percentage of people 15 years of age or younger, and the percentage of seniors was defined as the percentage of people 65 years of age or older. The percentage of visible minorities variable was calculated by taking the number of individuals considered a visible minority and dividing that number by the total population.

[4] Further information can be found at: https://www.bls.gov/iag/tgs/iag_index_naics.htm.

3.6: Model Specifications

In order to analyze which variables had an effect on the middle class, Stata was used to perform correlation analyses and develop regression models to explain the variation in middle class shares across CMAs and CAs. As stated above, I removed the Census Agglomerations of Wood Buffalo, AB and Yellowknife, NWT, as their median incomes were too high to calculate an accurate percentage of middle class households. In terms of correlation analysis, scatter plots were created to visualize the relationship between the middle class and different variables and ensure that each independent variable had a linear relationship with the percentage of middle class households. It appeared the relationship between population and percent middle class was not linear. Therefore, I computed the natural log of population to include the variable in the models (see Bolton and Breau, 2012 for example of log of population).

In order to explain the variation in the middle class across CMAs and CAs, a number of regression models were estimated. The first set of models consists of simple bivariate OLS regression models that investigate the determinants of the size of the middle class one by one. This benchmark model is specified as:

$$y_{it} = \alpha + \beta X_{it} + \varepsilon_{it}$$

Eq. (1)

where y_{it}, the dependent variable, is defined as the percentage of middle class households for CMA or CA *i* at time *t*; X_{it} is defined as a vector of the labor market and socio-demographic characteristics of CMA or CA *i* at time *t*; and ε_{it} is the error term carrying the usual assumptions. Recall that dependent variable y_{it} is defined according to the definition of the middle class outlined in the "Definition of the Middle Class" section of this chapter, and the characteristics of

the CMA or CA defined as X_{it} were derived from the variables described in the "Variables and Definitions" section of this chapter.

The second and third sets of models consist of multiple regression models involving dummy variables in order to estimate the regional effects of different variables on the middle class. Canada was separated into four macro-regions, which were Atlantic Canada (Newfoundland and Labrador, Nova Scotia, Prince Edward Island, and New Brunswick), Central Canada (Quebec and Ontario), the Prairies (Manitoba, Saskatchewan, and Alberta), and Western Canada (British Columbia and Yukon Territory).[5] In order to create the benchmark model, I created $k - 1$ dummy variables, where $k = 4$, in order to omit one category to avoid multicollinearity. Since the Central Canada region had the most observations, this variable was omitted. The benchmark model without a continuous variable is specified as:

$$y_{it} = \alpha + \gamma D_1 + \gamma D_2 + \gamma D_3 + \varepsilon_{it}$$

Eq. (2)

where y_{it}, the dependent variable, is defined as the percentage of middle class households for CMA or CA *i* at time *t*; γD_1 is defined as Atlantic Canada; γD_2 is defined as the Prairies; γD_3 was defined as Western Canada; and ε_{it} is the error term carrying the normal assumptions.

The benchmark model including a continuous variable is specified as:

$$y_{it} = \alpha + \beta X_{it} + \gamma D_1 + \gamma D_2 + \gamma D_3 + \varepsilon_{it}.$$

Eq. (3)

[5] See https://www.canada.ca/en/immigration-refugees-citizenship/corporate/publications-manuals/discover-canada/read-online/canadas-regions.html for further information on Canada's regions.

Eq. (3) is similar to Eq. (2) with the exception of X_{it} which is added to reflect the characteristic of CMA or CA *i* at time *t*.

3.7: Data Limitations

The most significant data limitation in this study is that the data do not reflect the exact incomes of each household, but rather the income brackets in which they fall. In the vast majority of studies that define the middle class using "income space", the definition is comprised of the number of people or households between certain income percentiles (e.g. Thurow (1984) defined the middle class as between 75% and 125% of the median income). Since the data were only available in income brackets, the middle class had to be defined based upon these brackets instead of income percentiles. While I was still able to provide a definition of the middle class for this study, it is likely that the results are not as precise as they could be when using micro-data files instead.

Another limitation of this study is that I could not control for household size. The census provided data regarding household size, however these data were not linked to the number of households in each income bracket. Therefore, it could not be used to control for household size. Previous studies surrounding the middle class using household income as a measurement have controlled for this difference. This is done because a household with more persons will have a tighter budget constraint with the same amount of income than a household with fewer persons. In addition, without controlling for household size, demographic changes such as a decrease in the number of persons per household over time would mean ignoring a loosening household budget constraint (Pew Research Center, 2015a, 2016). Thus, this data limitation may have significant impacts on the results.

Finally, this study does not account for regional variation in costs of living. Past studies have accounted for this variation in costs of living due to the difference in the prices of goods and services in metropolitan areas. Through this adjustment, the incomes of those living in expensive areas are adjusted downward, while those living in relatively cheaper areas are adjusted upward (Pew Research Center, 2016). Statistics Canada provides price indexes for CMAs, but not CAs. Thus, the closest approximation available for all CMAs and CAs is provincial level price indexes. While this may partially assist in accounting for regional cost of living differences, I made a conscious decision to omit these price indexes. This is due to the variation in costs of living within each province, which could skew the calculations of the middle class for some CMAs and CAs. Thus, the study continued without accounting for regional cost of living differences.

CHAPTER 4: RESULTS AND ANALYSIS

The first part of the chapter focuses on the middle class using descriptive statistics and maps. Findings indicate that there is an overall decrease in the middle class at the metropolitan level, and that there appears to be spatial variation to the middle class across the Canadian urban hierarchy. The chapter continues to discuss results using analytical statistics to investigate possible drivers of middle class dynamics across space and time in Canadian cities.

4.1: Descriptive Results and Analysis

4.1.1: Descriptive Statistics

As described in the Methodology chapter, the definition of the middle class is premised on the variable median income. At the household level, median income across Canadian cities have experienced significant change between the years 1996 and 2016. Median income is correlated with the size of the upper and lower income tiers (Pew Research Center, 2016). Therefore, cities with higher median incomes will have a larger upper income tier, and according to Walks (2013), those cities with an increase in incomes at the top also experience increased inequality and polarization, leading to a hollowing out of the middle.

The findings in this thesis show that median incomes in CMAs and CAs across Canada are increasingly dispersed and heterogeneous from 1996 to 2016. To document such a trend, two measures of dispersion were used: the range and the coefficient of variation. The range of household incomes across cities in Canada increased from $29,613 in 1996 to $64,707 in 2016. Corroborating these findings, the coefficient of variation increased from 15.8% in 1996 to 19.4% in 2016. It should be noted, as was done so above, that these calculations exclude the census agglomerations of Wood Buffalo, Alberta, and Yellowknife, NWT, which had much higher

median incomes than all other CMAs and CAs and thus would have only added greater range to the dispersion of values. Results from these calculations show an increase in the dispersion of incomes across Canadian cities, which align with the findings of Bolton and Breau (2012), and Walks (2013). Furthermore, although exact income values for each household would be necessary to compute income polarization, income polarization generally trends in the same direction as income inequality (see Walks, 2013), signifying an increase in income polarization based upon the results above.

Results show that the middle class has decreased across Canadian CMAs and CAs from 1996 to 2016. This finding reflects that of Employment and Social Development Canada (2013), which found a decrease in middle class households from 1993-2007. Interestingly, Beach (2016) found stagnation in the decrease of the middle three percentiles of the income distribution from 2000-2015, which is contrary to my results. The average change in percentage of middle class households across Canadian cities was -13.6% between 1996 and 2016, with a minimum change of -2.6%. This indicates that unilaterally across cities, the middle class is decreasing. As income inequality has been shown to be increasing in Canadian cities and is correlated to the middle class share, these results are not unexpected (Bolton and Breau, 2012; Pew Research Center, 2016).

4.1.2: Descriptive Spatial Analysis

There appear to be broad spatial trends in the percentage of middle class households across Canadian cities based upon the visualizations presented in the maps. Map 4.1 (see Appendix A) shows the percentage of middle class households for census year 1996. The symbols are weighted by population, and the colors represent the percentage of middle class households

divided into quintiles. The map appears to clearly show a higher percentage of middle class households across CMAs and CAs in Quebec and Atlantic Canada, while cities in Ontario, the Prairies, and the West showed a lower percentage of middle class households. This result for Atlantic Canada is not necessarily surprising, as earlier results showed less dispersion of median incomes in this region, with a coefficient of variation of 10.93% in relation to 15.76% nationally. Quebec having high levels of middle class households is also unsurprising, as the province has been noted to experience the lowest increase in inequality in recent years (Breau, 2015; Fortin and Lemieux, 2015). One factor that may have slightly skewed the results is that multiple CMAs and CAs in Atlantic Canada had median incomes on the upper end of a lower income bracket (i.e. the median income of Cape Breton, NS was $29,908), which due to the methodology used meant that a lower income bracket was used to calculate the percentage of middle class households, possibly having a level effect in terms of increasing the number of households considered "middle class". In any event, potentially the most surprising result is the number of CMAs and CAs in Ontario that have low percentages of middle class households. The decrease can possibly be explained by the decline in the manufacturing sector and the emergence of Toronto as the largest CMA and top commercial and financial center in Canada (Fong, 2017).

Upon visual inspection of Map 4.2 (see Appendix A), which shows the percentage of middle class households for census year 2006, there appears to be the beginnings of a negative shift westward. CMAs and CAs in Atlantic Canada and Quebec continue to have a higher percentage of middle class households than those in Ontario and Western Canada. In addition, those CMAs and CAs in the Greater Toronto Area continue to have low percentages of middle class households. The most significant shift appears to be in the western part of Canada, especially Alberta and British Columbia. Edmonton joined Calgary and Vancouver in the lowest

quintile of middle class households, and multiple other CMAs and CAs dropped at least one quintile in this region. It is likely that the resource boom in Western Canada beginning in the early 2000s drives this negative shift westward (Breau, 2015; Fortin and Lemieux, 2015; Green and Sand, 2015).

The 2016 map (see Map 4.3 of Appendix A) shows similar results to the 2006 map, with the exception of the province of Newfoundland and Labrador. The provinces of Saskatchewan, Alberta, and British Columbia largely show lower percentages of middle class households, with the greatest visual change in these provinces located in the Vancouver area. In the province of Newfoundland and Labrador, all three CMAs and CAs are in the bottom two quintiles after being in the upper quintiles in both 2006 and 2016. The one thing that all of these provinces, especially Alberta, Saskatchewan, and Newfoundland and Labrador, have in common is the impact of the extractive resources sector (Fortin and Lemieux, 2015). Therefore, there appears to be a natural resources story at work here (see also Breau et. al., 2018).

Tables 4.1 and 4.2 also support this natural resources hypothesis (see also Maps 4.4 and 4.5 of Appendix A). These tables show the bottom and top 10 CMAs and CAs in terms of change in percentage of middle class households from 1996 – 2016 (i.e. the largest and smallest decreases in middle class households, respectively). While there does not appear to be a spatial pattern of CMAs and CAs with the smallest decreases in the middle class, those with the largest decreases in the middle class appear to cluster in a few areas. Table 4.2 shows that 7 of the 10 CMAs and CAs with the largest decreases in the middle class are located in the provinces of Alberta, Saskatchewan, and Newfoundland and Labrador, which further points to the impact of natural resources and extractive industries on the middle class in Canadian cities.

Table 4.1 Cities with the smallest decrease in middle class shares from 1996 – 2016.

City	*Middle Class (% Change)*
Fort St. John, BC	-2.60%
Grande Prairie, AB	-3.76%
Elliot Lake, ON	-5.36%
Chatham-Kent, ON	-6.08%
Matane, QC	-7.08%
Thompson, MB	-7.17%
Windsor, ON	-7.60%
Whitehorse, YT	-7.83%
Cowansville, QC	-8.24%
Sorel-Tracy, QC	-8.46%

Table 4.2 Cities with the greatest decrease in middle class shares from 1996 – 2016.

City	*Middle Class (% Change)*
Cape Breton, NS	-28.57%
Camrose, AB	-27.19%
Campellton, NB-QC	-23.17%
Medicine Hat, AB	-23.03%
Hawkesbury, ON-QC	-22.22%
Wetaskiwin, AB	-21.33%

Corner Brook, NL	-21.01%
Kelowna, BC	-20.79%
Swift Current, SK	-20.74%
Lethbridge, AB	-20.66%

4.2: Analytical Results and Analysis

Before embarking on this section of the chapter, it is necessary to state that this study is exploratory in nature, and one of the goals was to identify possible drivers of the middle class across Canadian cities. As such, there is no attempt made to propose multiple regression models to provide an explanation of differences in the middle class across CMAs and CAs. Therefore, the results presented below are exploratory more than confirmatory.

4.2.1: Cross-Sectional Bivariate OLS Regression

Variables included in the bivariate OLS regression models were split into four categories entitled macro-regional variables, industry variables, occupational variables, and socio-demographic variables. Results stemming from macro-regional variables, presented in Table 4.3, indicate slightly different aspects of the middle class story, as city size has been linked to inequality, median income is an indicator of the size of the upper and lower income tiers, and unemployment is a proxy for general economic conditions. An inverse relationship resulted from the models using median income and population as the independent variable in all three census years. Larger cities tend to be more unequal, so it is logical that that the larger the city is, the greater the income inequality, and the lesser the percentage of middle class households (Bolton and Breau, 2012; Fong, 2017). Median income results were also not surprising, as higher median

income is linked to higher numbers of households in the upper income tier (Pew Research Center, 2016). In addition, increased incomes at the top of the distribution lead to greater polarization, and there has been a consistent shift away from the middle of the income distribution to higher-income families since the 1970s in Canada, leading to a hollowing of the middle class (Beach, 2016; Walks, 2013).

Puzzlingly, the model exploring the relationship between unemployment and the percentage of middle class households returned a positive and significant relationship in 1996 and 2006. This is contrary to what was expected from the previous literature, as findings indicate that higher rates of unemployment lead to increased inequality (Bolton and Breau, 2012; Breau, 2015). In turn, I would expect higher levels of unemployment to lead to lower levels of the middle class. As unemployment is a proxy for general macroeconomic conditions, I can speculate that the economy in Canada was generally doing well in 1996 and 2006. It is also likely that higher unemployment rates reflect Canada's regional geographical differences as discussed earlier, with cities in Atlantic Canada having both larger shares of middle class and higher unemployment rates. However, in order to make any sort of conclusion regarding this variable further investigation is needed.

Table 4.3 Cross-sectional bivariate OLS results (macro-regional variables) for percentage of middle class households 1996 – 2016 (N = 124)

	1996	*2006*	*2016*
Macro-Regional Variables			
Population (ln)	-1.365212***	-1.498612***	-1.152197***
	(0.000)	(0.000)	(0.000)
Median Income	-0.000675***	-0.000475***	-0.000168***
	(0.000)	(0.000)	(0.001)
Unemployment Rate	0.500**	0.555**	0.154
	(0.006)	(0.003)	(0.381)

Notes: All models with single independent variables. Heteroscedasticity-robust p-values are reported in parenthesis, *, ** and *** indicate that coefficients are statistically significant at the .05, .01, and .001 levels, respectively.

Industrial mix is a demand-side factor that has been discussed in the previous literature concerning inequality, and the results from this study, presented in Table 4.4, align with this literature for the most part. Primary industry has an inverse relationship with the percentage of middle class households in 2006 only, and is not significant in 1996 or 2016. As establishments in fields such as oil and mining are included in this industry group, it is likely that the negative and significant coefficient in 2006 is the result of the resource boom after 2000 in Western Canada. The resource boom is cited as one of the reasons for increased inequality and increased job polarization, both of which lead to decreases in the middle class (Bolton and Breau, 2012; Green and Sand, 2015). It is, however, puzzling that primary industry is no longer significant in 2016 because the resource boom continued at full steam through 2015, when data collection for this census occurred. One potential hypothesis is that faster increases in wages after 2006 in Alberta, Saskatchewan, and Newfoundland and Labrador, locations with high levels of primary industry, contribute to the primary industry variable losing significance (Fortin and Lemieux,

2015). However, as will be seen in the dummy variable regression models, primary industry continues to have a negative and significant relationship to the middle class in the Prairies where Alberta and Saskatchewan are located.

Table 4.4 Cross-sectional bivariate OLS results (Industry variables) for percentage of middle class households 1996 – 2016 (N = 124)

	1996	*2006*	*2016*
Industry Variables			
Primary Industry	-0.0895 (0.394)	-0.238** (0.002)	-0.0523 (0.554)
Secondary Industry	0.00524 (0.940)	0.171** (0.007)	0.315*** (0.000)
Tertiary Industry	0.0289 (0.645)	-0.0399 (0.486)	-0.211*** (0.000)

Notes: All models with single independent variables. Heteroscedasticity-robust p-values are reported in parenthesis; *, ** and *** indicate that coefficients are statistically significant at the .05, .01, and .001 levels, respectively.

Secondary industry and manufacturing industry occupations are highly related, and thus I will discuss the results of both simultaneously. These variables both have a positive relationship with the percentage of middle class households in 2006 and 2016 (see Table 4.5 for manufacturing industry occupations results). Results from the two models align with studies on the middle class across American cities, as the common characteristic among the top 10 cities with the highest percentage of middle class individuals is that each is more rooted in manufacturing than the country overall (Pew Research Center, 2016). Similarly, in Canada, cities with higher levels of manufacturing often have lower levels of inequality, and deindustrialization leads to increasing levels of inequality and polarization (Bolton and Breau, 2012; Breau, Kogler, & Bolton, 2014; Walks, 2013). As manufacturing jobs are considered middle-skill and middle-

income occupations, a downward shift in demand for occupations within these industries, as has happened in Canada, leads to decreased levels of middle class households (Beach, 2016; Green and Sand, 2015). Although this positive relationship between manufacturing and the middle class has been found across the literature, it should be noted that this finding comes with a caveat. The top 10 American cities with the greatest losses in economic status also had a greater than average reliance on manufacturing, signifying manufacturing may not be all positive for the middle class (Pew Research Center, 2016).

Shearmur and Doloreux (2008) refer to the tertiarization of the Canadian economy. They argue that instead of making a distinction between manufacturing and services, a distinction should be made between knowledge-intensive and knowledge-poor industries. I will use this latter distinction presented by Shearmur and Doloreux (2008) in interpreting results relating to tertiary industry and those occupational categories that provide services. Results show an inverse relationship between tertiary industry and the percentage of middle class households in 2016. Interestingly, this variable is not significant for census years 1996 and 2006. One possible explanation is that occupations in the sales and services occupational category have a positive relationship with the percentage of middle class households in 1996 and 2006. These occupations are for the most part services in knowledge-poor industries that require less education, such as occupations in food service, wholesale trade, and retail trade. Through the definition provided by Shearmur and Doloreux (2008), these knowledge-poor services could be grouped into the same broad category as manufacturing, and may counterbalance the negative influence of knowledge-intensive occupations within the tertiary industry sector.

Table 4.5 Cross-sectional bivariate OLS results (Occupational variables) for percentage of middle class households 1996 – 2016 (N = 124)

	1996	*2006*	*2016*
Occupational Variables			
Management Occupations	-0.543	-1.195***	-1.324***
	(0.217)	(0.000)	(0.000)
Business, Financial, & Administration Occupations	-0.605**	-0.526***	-0.670***
	(0.002)	(0.001)	(0.001)
Natural and Applied Sciences Occupations	-1.838***	-1.349***	-0.864***
	(0.000)	(0.000)	(0.000)
Health Occupations	1.967***	1.892***	0.435
	(0.000)	(0.000)	(0.083)
Education, Law, Social, & Government Occupations	0.218	-0.00527	-0.344**
	(0.535)	(0.984)	(0.008)
Art, Culture, & Recreation Occupations	-1.328	-0.795	-1.385**
	(0.071)	(0.208)	(0.002)
Sales and Service Occupations	0.517**	0.670***	0.326*
	(0.006)	(0.000)	(0.036)
Trades Occupations	-0.182	-0.147	0.161
	(0.307)	(0.337)	(0.174)
Primary Industry Occupations	0.0367	-0.185	-0.0617
	(0.815)	(0.159)	(0.751)
Manufacturing Industry Occupations	0.0938	0.304**	0.561***
	(0.415)	(0.004)	(0.000)

Notes: All models with single independent variables. Heteroscedasticity-robust p-values are reported in parenthesis, *, ** and *** indicate that coefficients are statistically significant at the .05, .01, and .001 levels, respectively.

It appears the main explanation for the negative relationship between tertiary industry and the percentage of middle class households in 2016 is influenced by knowledge-intensive business services (KIBS). There are three occupational categories that consist of occupations that are considered KIBS, which are management occupations, business, financial, and administrative occupations, and natural and applied science occupations. Apart from management occupations in census year 1996, all three occupational categories have an inverse relationship with the percentage of middle class households in each census year. These knowledge-intensive industries employ those that produce high order services and are highly skilled, and increased demand for these occupations leads to skill-biased technological change (Beach, 2016). Skill-biased technological change explains some of the polarization in the job market in Canada, is linked to a downward shift in the demand for middle-skill jobs, and is a key aspect of the routinization hypothesis (Beach, 2016).[6] When the results are examined in conjunction with the finding that middle skill jobs had negative growth and middle class wages have stagnated, it follows that this shift towards high skilled professions and away from middle skilled professions has a negative impact on the middle class (Beach, 2016; Employment and Social Development Canada, 2013).

Up to this point, the results and analysis has been focused on labor market forces and economic characteristics as drivers of the middle class. However, there are also important socio-demographic variables to take into account. Results for models containing socio-demographic variables are presented in Table 4.6. In terms of the age distribution of the population, the variables percentage of young and percentage of senior had opposing results. The percentage of young had an inverse relationship with the percentage of middle class households, while the percentage of seniors had a positive relationship with the percentage of middle class households. There have been concerns regarding a growing generational divide in Canada, as older age

[6] See Acemoglu and Autor (2011) for more information on the routinization hypothesis.

groups have substantial wealth while younger age groups have net negative wealth (Beach, 2016). Furthermore, this generational divide is replicated in the United States, where the oldest have been the biggest "winners" since the 1970s, while the youngest have been among the "losers" (Pew Research Center, 2016).

Table 4.6 Cross-sectional bivariate OLS results (Socio-Demographic variables) for percentage of middle class households 1996 – 2016 (N = 124)

	1996	2006	2016
Socio-Demographic Variables			
Percentage with Bachelors	-0.428*** (0.000)	-0.577*** (0.000)	-0.318*** (0.000)
Percentage of Young	-0.942*** (0.000)	-1.335*** (0.000)	-0.590** (0.005)
Percentage of Senior	0.688*** (0.000)	0.830*** (0.000)	0.400*** (0.000)
Percentage of Visible Minority	-0.434*** (0.000)	-0.314*** (0.000)	-0.196*** (0.000)

Notes: All models with single independent variables. Heteroscedasticity-robust p-values are reported in parenthesis, *, ** and *** indicate that coefficients are statistically significant at the .05, .01, and .001 levels, respectively.

The findings of this study also show an inverse relationship between the percentage of visible minority population and the percentage of middle class households, which is largely corroborated by a previous study on inequality and the middle class (Bolton and Breau, 2012). In the United States, findings have shown that low-income areas have a high proportion of Hispanics, which is a group that is incorporated into the visible minority variable in this study (Pew Research Center, 2016). Although the results indicate this variable is a driver of the middle class, a significant caveat should be noted because over half of Canada's immigrant population

resides in the cities of Toronto, Vancouver, and Montreal, which are the three largest cities in Canada. As previous bivariate OLS model results showed higher city size to have a negative relationship with the middle class, it is possible that the driver of the middle class is city size, not percentage of visible minority population.

The final socio-demographic variable in this study is the percent of the population with a Bachelors degree. Results showed an inverse relationship between this variable and the percentage of middle class households across all three census years. This is an interesting result, as on the surface it is quite surprising. However, when examined in conjunction with trends seen in the results of other variables, the inverse relationship can be deciphered. As shown previously, the KIBS occupations have an inverse relationship with the percentage of middle class households. Those employed in these occupational categories are likely to be more educated, Canada has seen an upskilling in jobs, and metropolitan areas that are financial and commercial centers are more likely to have higher populations with a Bachelors degree, leading to a decrease in the middle class (Beach, 2016; Pew Research Center, 2016). Furthermore, while there is an increasing trend in the education levels of middle-income families in Canada, only 20% of these middle-income families had a head of household with a university diploma. Compared to the 57.6% of families in very high income and 40% of high-income families whose head of household had a Bachelors degree, this percentage is quite low (Employment and Social Development Canada, 2013).

The inverse relationship between the Bachelors variable and the middle class may also be linked to the relationship between education and manufacturing. Although there has not been a quantitative analysis that I could find in terms of the relationship between education and manufacturing in Canada, there is empirical evidence from the United States and I speculate that

the trend is similar in Canada. Although education levels have risen in manufacturing jobs since 2000, according to the US Bureau of Labor Statistics the percentage of those with a Bachelors degree in the manufacturing workforce was 20% in 2012 (The Manufacturing Institute, 2018). Therefore, the vast majority of workers in manufacturing industry occupations do not have a Bachelors degree, and manufacturing has been shown to have a mitigating effect on income inequality (see Bolton and Breau, 2012) and a positive relationship to the middle class.

The cross-sectional bivariate OLS regression analysis also provided a few results that were not focused on in the above analysis. Results showed an inverse relationship between the occupational category consisting of social sciences, education, law and government positions and the percentage of middle class households for the census year 2016. I have not found a plausible explanation for this relationship. Another result is the negative relationship between health occupations and the percentage of middle class households in 1996 and 2006, and its loss of significance in 2016. Health occupations are considered professional, high-skilled occupations, so the results from 1996 and 2006 are not surprising. The final result is the inverse relationship between the occupational category encompassing art, culture, and recreation occupations and the percentage of middle class households for census years 1996 and 2016. This finding could be due to the "superstar effect" outlined by Rosen (1981) who found that a small number of individuals earning enormous amounts of money skew income at the top of the distribution. Therefore, lower middle class levels are logical if these "superstars" are skewing the income distribution at the top. A word of caution is necessary regarding this analysis of the "superstar effect", as I have not investigated this effect on the middle class in depth.

To summarize the findings, Table 4.7 of Appendix B provides the sign of the coefficient and whether it is significant at the $p = 0.05$ level for each variable in each census year. Shown in

the table, the macro-regional variables of population and median income have an inverse relationship with the middle class, while unemployment has a puzzling positive relationship in 1996 and 2006. As discussed above the KIBS occupations display negative relationships with the middle class. Conversely, manufacturing industry occupations and secondary industry show positive relationships with the middle class. A possible generational divide is shown in the socio-demographic variables of percentage of young and senior. The percentage of visible minorities is also shown to have a negative relationship with the middle class. Finally, the table displays the negative and significant relationship between education and the middle class, which may be explained by increased demand for KIBS occupations.

4.2.2: Regression Models with Dummy Variables and Spatial Analysis

As displayed in the maps, there appears to be a distinctive spatial element to the percentage of middle class households across Canadian CMAs and CAs. This spatial element is also found in studies on inequality (see Bolton and Breau, 2012; Fortin and Lemieux, 2015) and those more focused on the middle of the income distribution (see Beach, 2016). In order to represent this spatial element, this study used dummy variables to represent the different regions of Canada. The benchmark variable that all regions were compared to in order to avoid the dummy variable trap was Central Canada (Ontario and Quebec), as that region had the highest number of observations. The results of these dummy variable regression models can be viewed in Table 4.8.

Table 4.8 Dummy variable regression results for percentage of middle class households 1996 – 2016 (N = 124)

	1996	*2006*	*2016*
Dummy 1 (Atlantic Canada)	4.348** (0.005)	1.646 (0.127)	-0.567 (0.542)
Dummy 2 (Prairies)	0.924 (0.398)	-3.007** (0.005)	-2.923** (0.002)
Dummy 3 (Western Canada)	-1.803 (0.086)	-2.340* (0.020)	-2.604** (0.002)

Notes: The benchmark dummy is Central Canada, which is defined as Quebec and Ontario. Atlantic Canada is defined as Newfoundland and Labrador, Nova Scotia, Prince Edward Island, and New Brunswick; the Prairies are defined as Manitoba, Saskatchewan, and Alberta; Western Canada is defined as British Columbia and Yukon Territory. Heteroscedasticity-robust p-values are reported in parenthesis, *, ** and *** indicate that coefficients are statistically significant at the .05, .01, and .001 levels, respectively.

It is immediately apparent upon examination of the results that for census year 1996, the spatial location of CMAs and CAs in Atlantic Canada has a positive and significant effect on their percentage of middle class households in relation to those in Quebec and Ontario. It appears that lower inequality and wage polarization have an effect on these results, as wage polarization did not occur in Atlantic Canada until 2005 (Fortin and Lemieux, 2015). In 2006, Atlantic Canada is no longer significant, while the spatial location of the Prairies and Western Canada become significant in relation to Quebec and Ontario and has a negative effect on the percentage of middle class households. It is possible that this shift is related to the resource boom that began in the early 21st century that increased inequality and wage polarization in Alberta (Bolton and Breau, 2012; Green and Sand, 2015). Results for census year 2016 show this negative relationship continued, and the middle class is likely still affected by the resource boom. Relating to findings from the United States, growth in the upper income tier was highest in cities with an

oil economy, such as Midland, Texas, which saw a 37% increase in median income alongside a decrease in the middle class (Pew Research Center, 2016). The findings provide further evidence that the resource boom may be responsible for these negative relationships

A series of multivariate OLS fixed effects models were run with the independent variables defined previously in the study and controlling for regional variation using the same dummy variables identified above. The results for census year 1996 can be found in Table 4.9 of Appendix B, and further confirm the spatial differentiation between Atlantic Canada and the rest of Canada. In 21 out of 23 models run, there was a positive and significant effect on the percentage of middle class for the dummy variable representing Atlantic Canada. Interestingly, the inverse relationship between business, finance and administrative occupations, sales and services occupations, and the proportion of the population with a Bachelors degree with the percentage of middle class households is exacerbated in Western Canada in relation to Ontario and Quebec. It is possible this result could be driven by the faster tertiarization of the economy and increase in knowledge-intensive industries in the 1990s, as well as Vancouver as a large CMA (Fong, 2017; Shearmur and Doloreux, 2008). Furthermore, it can be seen that primary industry occupations have a negative effect on the middle class in Western Canada, which foreshadows the negative western shift in the following two census years.

The dummy variable OLS models run for census year 2006 told a different story from those run in 1996. Of the models run, 7 showed a significant dummy variable coefficient in Atlantic Canada, 16 showed significance for the Prairies, and 12 showed significance for Western Canada. Results from these models are represented in Table 4.10 of Appendix B, and showed the impact of the resource boom in the West on the middle class. The variables primary industry and primary industry occupations both had a negative and significant relationship with

the percentage of middle class households in the Prairies, which is the heart of the resource boom. As has been stated before, the increased wage polarization and inequality in Alberta post 2000 does not make this result surprising, but it provides quantitative evidence of the effect of the natural resource industry on the middle class (Green and Sand, 2015). In addition, Calgary and Vancouver experienced significant increases in inequality over this time, which could reflect their rise as commercial and financial centers that attract KIBS occupations (see Fong, 2017), and contribute to the negative relationship with the middle class in the Prairies and Western Canada. There also appears to be a distinct East/West divide emerging that has been stated in the literature (see Breau, 2015), with all of the variables holding positive and significant coefficients located in Ontario, Quebec, and Atlantic Canada. Finally, results show that the positive relationship between manufacturing and the middle class is driven by Atlantic Canada, not Quebec and Ontario. Perhaps these results are surprising, as Ontario especially is known for its auto manufacturing industry.

Results from the models run with 2016 census data are represented in Table 4.11 of Appendix B and showed a furthering of western locational significance in relation to the percentage of middle class households. Of the models run, none had significant dummy variable coefficients for Atlantic Canada, 15 were significant for the Prairies, and 16 were significant for Western Canada. Perhaps not surprisingly given the previous results, every model that showed significance for the Prairies and Western Canada had a negative relationship with the percentage of middle class households. These results align with the descriptive spatial results examined above showing the greatest decreases in the middle class in the Prairies. Following the natural resources story seen in the 2006 results, this is again likely the result of resources extraction, as shown by the negative and significant coefficients for primary industry and primary industry

occupations in the Prairies and Western Canada. A variable that was not mentioned previously but is both negative and significant in the Prairies and Western Canada in 2006 and 2016 is sales and service occupations. One possible explanation for this result is a supply shift in lower-end occupations in services driven by the resource boom (Green and Sand, 2015). It has also been argued that this supply-shift contributes to job polarization in the Prairies and Western Canada, thus hollowing out the middle class (Green and Sand, 2015).

To summarize briefly, it appears that there is distinct spatial variation to the middle class across Canadian cities, as seen in the descriptive results and corroborated by the dummy variable OLS regression. Results from these regression models appear to show a negative trend westward in the middle class in the 21st century that is largely driven by regional effects of the resource boom.

CHAPTER 5: DISCUSSION

This chapter consists of a further discussion of the results and provides recommendations for further research. The chapter begins with a discussion of the results in relation to the deindustrialization and off-shoring hypotheses. Then, I discuss skill-biased technological change and the routinization hypothesis. Finally, the results relating to socio-demographic variables are discussed and a few words are said about possible avenues for future research.

5.1: Situating the Results

The results described in the previous chapter can be situated within a greater discussion of the drivers of inequality and the decline of the middle class. Multiple theories and hypotheses have been postulated to explain increases in income inequality and decreases in the middle class over the past thirty years. Prominent theories include the deindustrialization hypothesis, the off-shoring hypothesis, the routinization hypothesis, and skill-biased technological change. In addition to these theories, there has been debate over whether demand side or supply side drivers of inequality have more relative significance.

I begin with a discussion of the deindustrialization hypothesis and the off-shoring hypothesis, which revolve around similar ideas and can be discussed in tandem with each other. The deindustrialization hypothesis originates from the work of Bluestone and Harrison published in 1982, and explores some of the reasons that well-paying jobs in manufacturing industries are being replaced by service sector jobs with higher wage polarization, thus increasing inequality (Breau, 2015). The off-shoring hypothesis states that lower labor costs abroad reduce the domestic demand to produce goods in the manufacturing industry, which are often jobs in the

middle of the income distribution. The demand for service sector jobs is then increased, resulting in further polarization (Beach, 2016).

Using the theoretical framework of these hypotheses, it is to be expected that higher levels of manufacturing and secondary industry jobs result in decreased income inequality. Indeed, multiple studies have found this to be the case (Bolton and Breau, 2012; Breau, Kogler, & Bolton, 2014; Pew Research Center, 2015a; Walks, 2013;). Through this same logic, higher levels of manufacturing jobs can be expected to result in increased levels of middle class households. As the results of this study reflect the logic postulated by these hypotheses, it appears that deindustrialization and off-shoring resulting in decreased levels of manufacturing jobs can be considered possible drivers of the middle class across Canadian cities.

The second part of the deindustrialization and off-shoring hypotheses is job and wage polarization as a result of an increased demand for service sector jobs whereas demand for highly skilled workers increases, thus increasing wages at the top of the distribution, those in middle-skill jobs that are lost move into lower-skill, lower paying service sector jobs, resulting in greater polarization (Beach, 2016). Highly skilled jobs at the top of the income distribution can be considered knowledge-intensive, while lower skilled jobs can be considered knowledge-poor (Shearmur and Doloreux, 2008). On this basis, occupations in categories such as management, business and financial services, and applied sciences can be considered knowledge-intensive business services (KIBS). It can be expected that cities with higher levels of KIBS occupations have increased wages at the top of the distribution, leading to greater inequality (see Walks, 2013) and thus a lower middle class share. These findings are borne out in the results of this study, as cities with higher levels of KIBS occupations have lower levels of the middle class.

The idea that increased demand for high skilled occupations leads to greater polarization, and thus a decrease in the middle class, is also present in the routinization hypothesis, of which a key element is skill-biased technological change. The routinization hypothesis postulates that technological advances have increased productivity and reduced costs of doing routine tasks in the workplace, thus replacing middle-skill manual workers (Beach, 2016). Therefore, since routine tasks can be replaced by technology and "computer capital", employment and wages for skilled workers rise while employment and wages for unskilled workers that previously conducted manual tasks fall (Green and Sand, 2015). Previous findings surrounding job polarization and the income distribution in Canada have found that skill-biased technological change fits at least part of the Canadian experience, and upskilling and downskilling of jobs, which decreases the number of middle-skill jobs, has been observed (Beach, 2016; Green and Sand, 2015).

Similar results surrounding secondary industry, and the KIBS occupations can also be used as evidence that the findings of this study fit the model postulated by the routinization hypothesis and skill-biased technological change. The question then, is what the relative strength of these hypotheses and effects are in relation to the middle class. Although a concrete answer to this question is beyond the scope of this project, I speculate it is likely multiple of these hypotheses are working simultaneously. Technological change can principally be seen as operating through occupations, while off-shoring can be seen as operating through industries (Beach, 2016). As evidenced in the bivariate OLS results, both manufacturing industry occupations and secondary industry have significant effects on the percentage of middle class households across CMAs and CAs in Canada. Furthermore, in 2016, tertiary industry had a significant effect on the percentage of middle class households in addition to the KIBS

occupations. These results lead me to speculate that hypotheses pertaining to both occupational structure and industrial mix can be used to help explain changes to the middle class in Canadian cities.

Arguments have been made that explanations for job and wage polarization in Canada must go either beyond these hypotheses or can be explained by other factors. For instance, Fortin and Lemieux (2015) argue that increases in minimum wages rather than the routinization of jobs are the main reason why wages at the very bottom grew faster than those in the middle leading to wage polarization. After the year 2000, findings indicate that the resource boom in the west had an impact on job and wage polarization (Fortin and Lemieux, 2015; Green and Sand, 2015). Arguments have been made that the polarization of the wage distribution that occurred in Alberta was not caused by technological change, but rather by difficulties getting a sufficient supply of low-skilled workers to resource boom areas (Green and Sand, 2015). Results from this study corroborate previous findings of the impact of the resource boom in Western Canada, as all models run with dummy variables for census years 2006 and 2016 showed an inverse relationship with the middle class. Significantly, in relation to the previous studies, models run with the variables primary industry occupations and sales and service occupations, which are occupational categories in which low-skilled workers in resources and services are employed, have an inverse relationship with the middle class in the Prairies and Western Canada. These findings further show that studies on inequality and the middle class post-2000 have to take into account a strong regional element influenced by the resource boom in the West.

Neglected in the discussion to this point has been the results involving socio-demographic characteristics. Human capital theory links inequality to changes in a population's educational profile and age structure, and studies have shown that Canadian labor markets have

been influenced by a recent influx of migrants, and migrants represent an increasing share of Canada's visible minority population (Bolton and Breau, 2012). Therefore, it can be expected that socio-demographic variables have an impact on the middle class. However, based on results from this study and previous studies, I speculate that demand-side factors have more of an influence on the middle class than supply-side factors represented by socio-demographic variables.

In terms of educational attainment, I speculate that the inverse relationship with the middle class is driven by demand for highly skilled individuals in the KIBS occupations. As demand increases, these occupations attract individuals with higher education levels. Furthermore, findings from the United States indicate that adults with a Bachelors degree were no more likely to move up the income ladder than down the income ladder (Pew Research Center, 2015). In terms of the other socio-demographic variables, previous results regarding the effect of the age distribution on inequality have proven inconclusive (see Bolton and Breau, 2012). Finally, over 50% of the minority population in Canada lives in Toronto, Vancouver, and Montreal, and as city population also has an effect on the middle class, further investigation is needed to differentiate the influence of the two variables.

To summarize briefly, the results of this study seem to corroborate previous findings in the inequality literature. In addition, findings surrounding the drivers of inequality seem to be similar to potential drivers of the middle class. Spatially, this study finds that the resource boom in the west has an effect on the middle class, which is similar to previous studies on job polarization and inequality. Finally, the results of this study seem to fit the frameworks postulated by some of theories surrounding the drivers of inequality and polarization.

5.2: Further Research

As this study is exploratory in nature, it is intended to provide a launching point for further studies of the middle class at the metropolitan scale in Canada. Therefore, further research is needed to identify and explain changes and variation in the middle class, and postulate new theories surrounding middle class dynamics.

Public use household income data is only available in brackets of $10,000 instead of exact incomes. This means that specific income percentiles could not be calculated, and the middle class had to be defined using these brackets. Future studies could refine the definition of the middle class set out in this study with more precise income data. Furthermore, a previous study in the United States indicates that income inequality within metropolitan areas affects the middle class and used the 80/20-income ratio to provide this finding (Pew Research Center, 2016). Studies with access to more precise income data could investigate this claim for Canadian cities and provide empirical evidence on the link between the middle class and inequality in Canadian cities.

A similar study of the middle class in the United States incorporated differences in cost of living and the price of goods and services over time in their calculations of the middle class across metropolitan areas (Pew Research Center, 2016). Although this study utilized dummy variables to control for regional effects in the regression analysis, the original calculations of the percentage of middle class households did not include differences in costs of living and goods across the country. Future studies could attempt to incorporate cost of living and the price of goods and services to see whether the results from this study hold when those factors are incorporated.

A significant area that was not included in this study is the impact of institutional factors such as policies and free trade agreements on the middle class. Previous studies have shown that institutional factors have an impact on income inequality (Beach, 2016; Bolton and Breau, 2012). Ideally, future studies could either include variables as proxies for institutional and policy factors or focus specifically on these factors to determine what effect, if any, they have on the middle class. For instance, the percentage of the composition of income for persons living in a CMA or CA that are government transfer payments could be used as a proxy for general welfare and social infrastructure spending (see Breau, 2015 for a similar proxy at the provincial scale). As institutional factors have already been proven to have an effect on income inequality, it is likely they will also have an effect on the middle class.

Spatially, descriptive analysis showed a stark difference in the percentage of middle class households between Ontario and Quebec. As the dummy variable regression in this study placed Ontario and Quebec in the same region, it did not investigate spatial differences between the two provinces. An avenue for further research would be to investigate differences in the middle class between these two provinces specifically.

Finally, further research should also focus on creating a multi-dimensional model that explains the variation in the middle class across Canadian cities. This study and previous inequality studies provide a starting point for future studies of the middle class and variables that could be included in future models.

CHAPTER 6: CONCLUSION

The goal of this project was to perform an exploratory analysis of the possible drivers and spatial variation of the middle class across Canadian cities. Descriptive statistics indicate the middle class declined across all cities from 1996 to 2016, however there is variation in this decline from city to city. Using a series of bivariate OLS regression and dummy variable regression models, a number of possible drivers of the middle class, such as knowledge-intensive business services and secondary industry, were also identified. Key findings surround these relationships between KIBS occupations, secondary industry, and the middle class. Results of the study indicate a positive relationship between secondary industry and manufacturing jobs and the middle class. Conversely, knowledge-intensive business services appear to have a negative effect on the middle class and provide the main explanation for the negative relationship between tertiary industry and the middle class in 2016. Across all cities in Canada as a whole, these two categories of variables seem to have the most influence on the middle class at the metropolitan level.

The results from this study also fit theoretical frameworks postulated by previous studies on inequality, job polarization, and wage polarization. Canada has seen an upskilling and downskilling of jobs since the 1970s, which contributes to the hollowing out of middle-skill and middle-income jobs (Beach, 2016). This skill-biased technological change is reflected in the results of the study, as occupational categories with higher skills have a negative effect on the middle class. Deindustrialization and off shoring are also two prominent theories in the inequality literature, postulating that rising inequality is driven by the loss of middle-income jobs in manufacturing. Results from this study again reflect these theories, as manufacturing industry occupations and secondary industry have a positive effect on the middle class.

Although the results from this study largely fit past theoretical frameworks, an important spatial factor has to also be taken into account in any study of the middle class and inequality at the sub-national level in Canada. The post-2000 resource boom in western Canada has been shown to have a significant impact on job polarization, to the point where a previous study found that the resource boom, not skill-biased technological change, was the explanation for increased job polarization in western Canada (Green and Sand, 2015). This study largely corroborated findings that the resource boom in western Canada has an effect on inequality and the middle class. Results from dummy variable regression showed an overall negative trend westward since 1996, and found that primary industry and primary industry occupations had a further negative impact on the middle class. Therefore, it is clear that future studies of the middle class must take into account the resource boom in Canada.

Findings from this exploratory analysis provide a starting point for future research on the middle class at the metropolitan scale in Canada. Broadly, it appears that demand side factors such as industrial mix and occupational structure have relatively more influence on the middle class than supply side factors. Many of the possible drivers of the middle class identified in this study are also drivers of inequality. As greater numbers of Canadians are living in cities than ever before and a strong middle class is important for economic growth and political stability (see Thurow, 1984) it is vital that we understand the drivers of the middle class at the metropolitan level moving forward.

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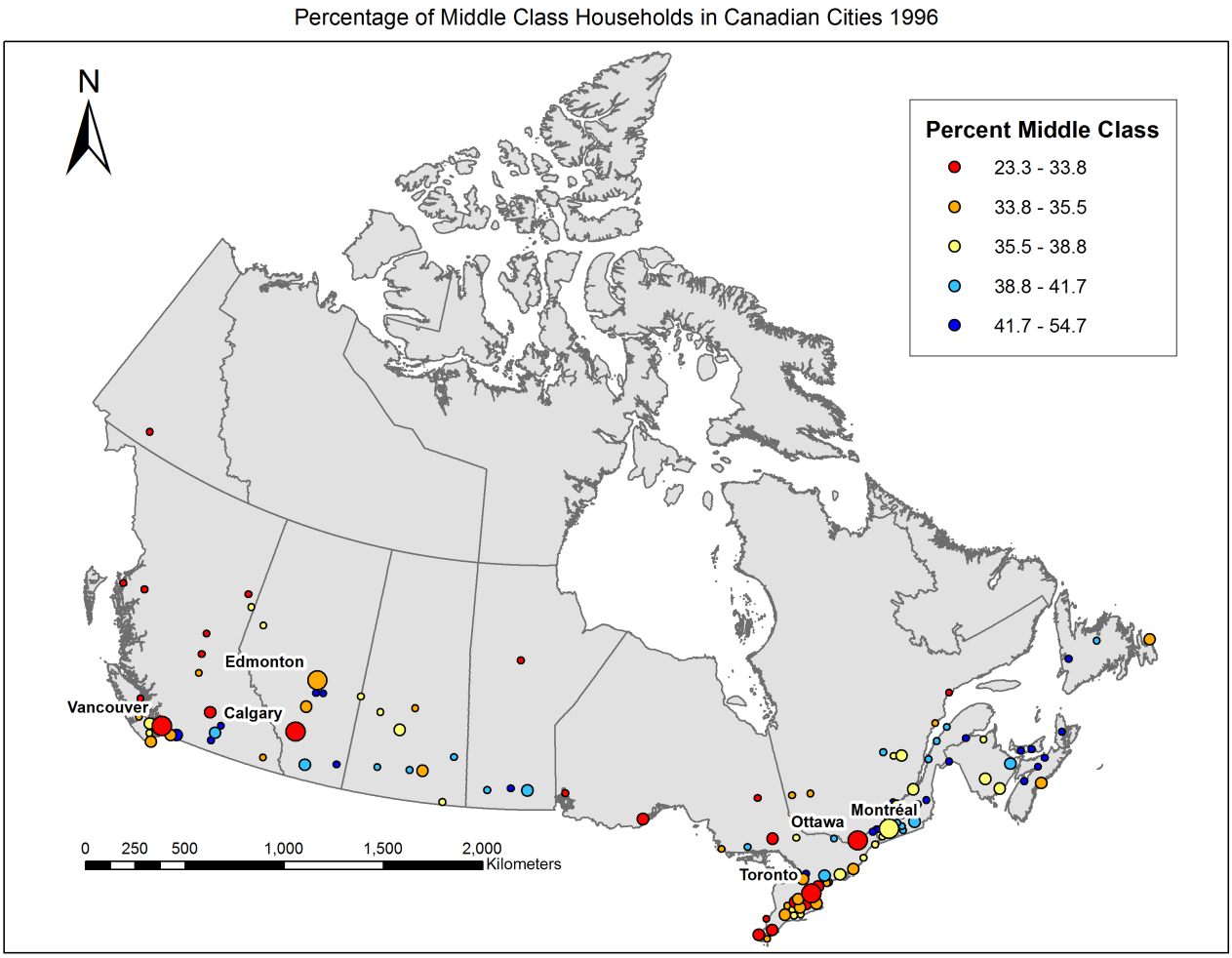
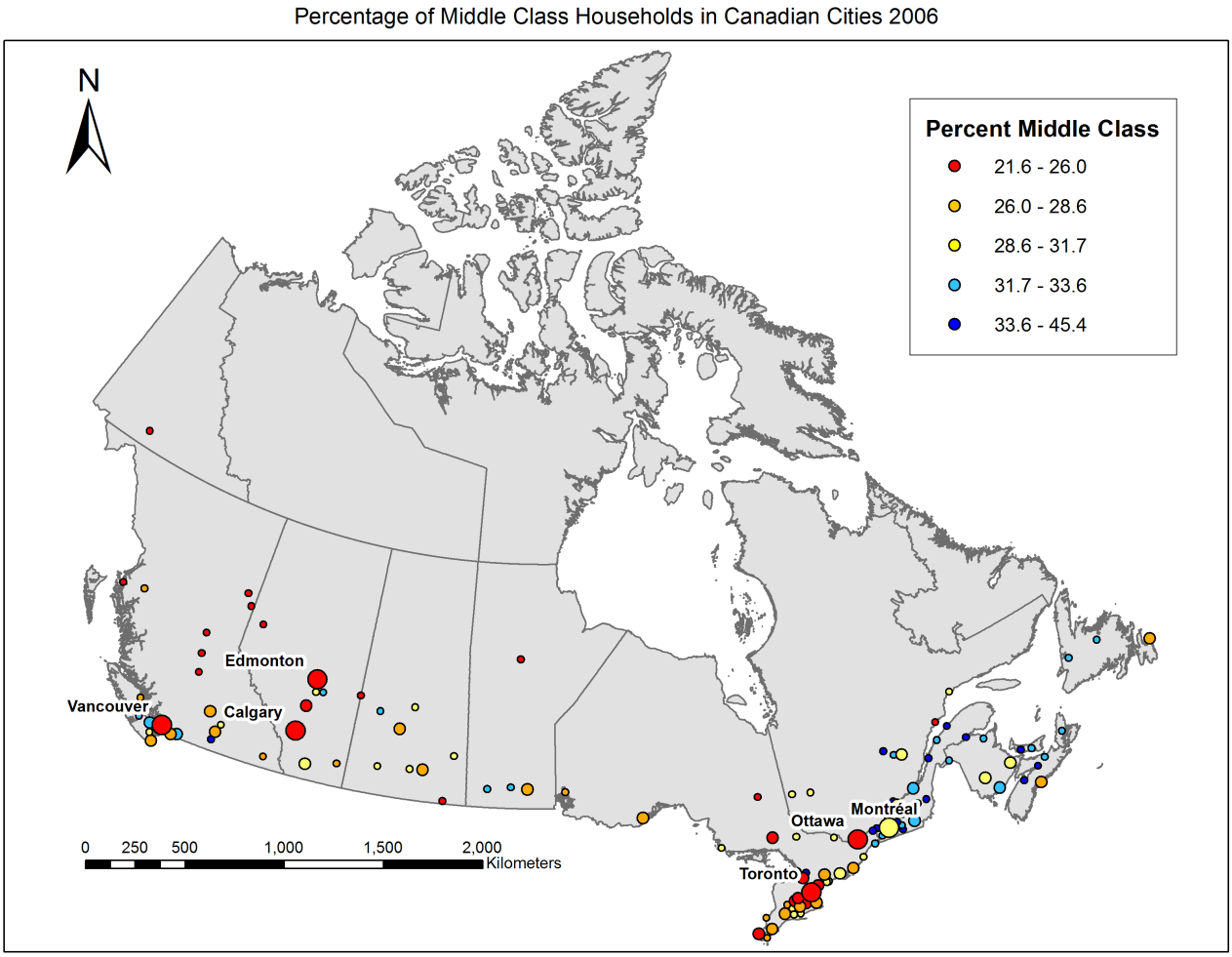
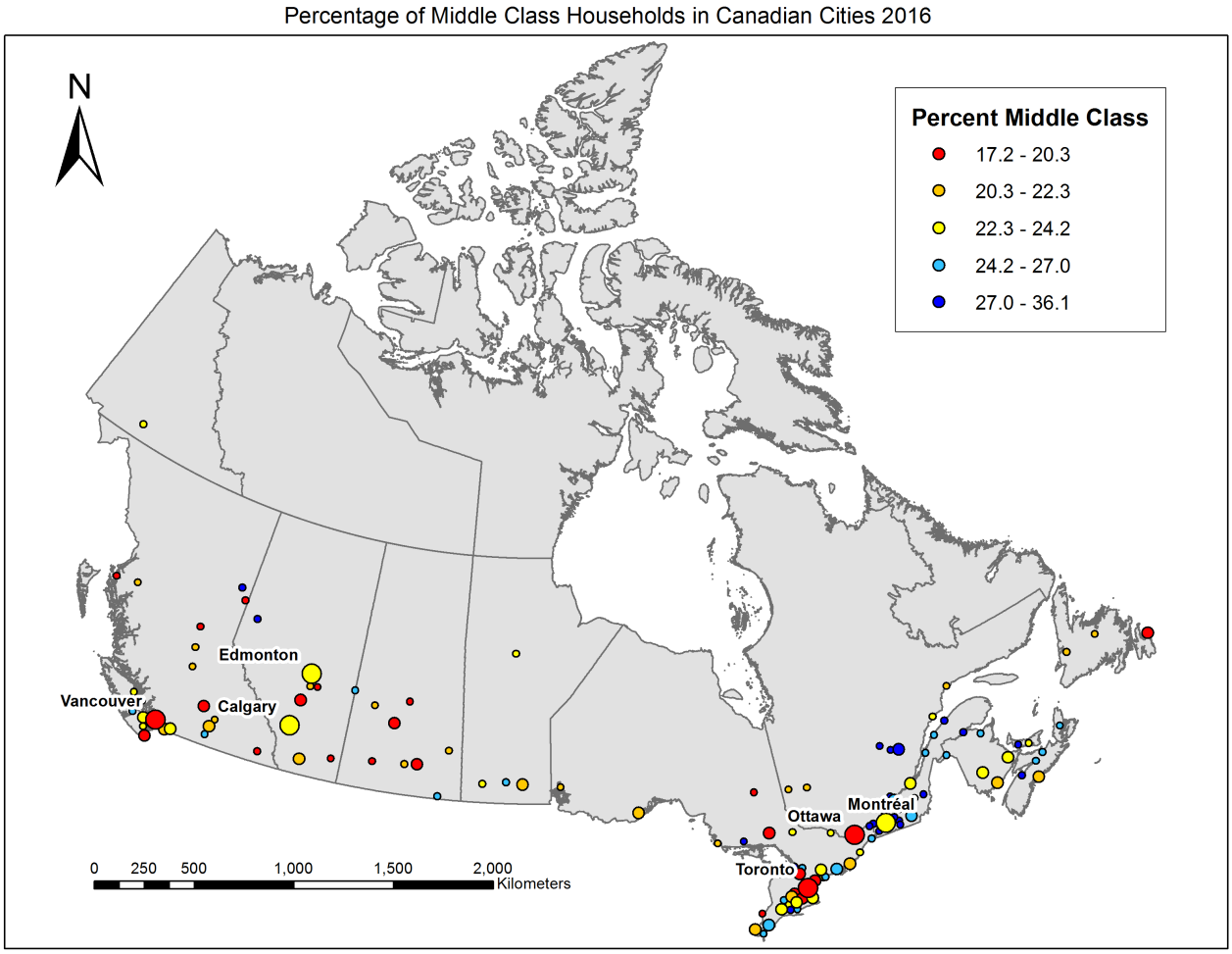
APPENDIX A: MAPS



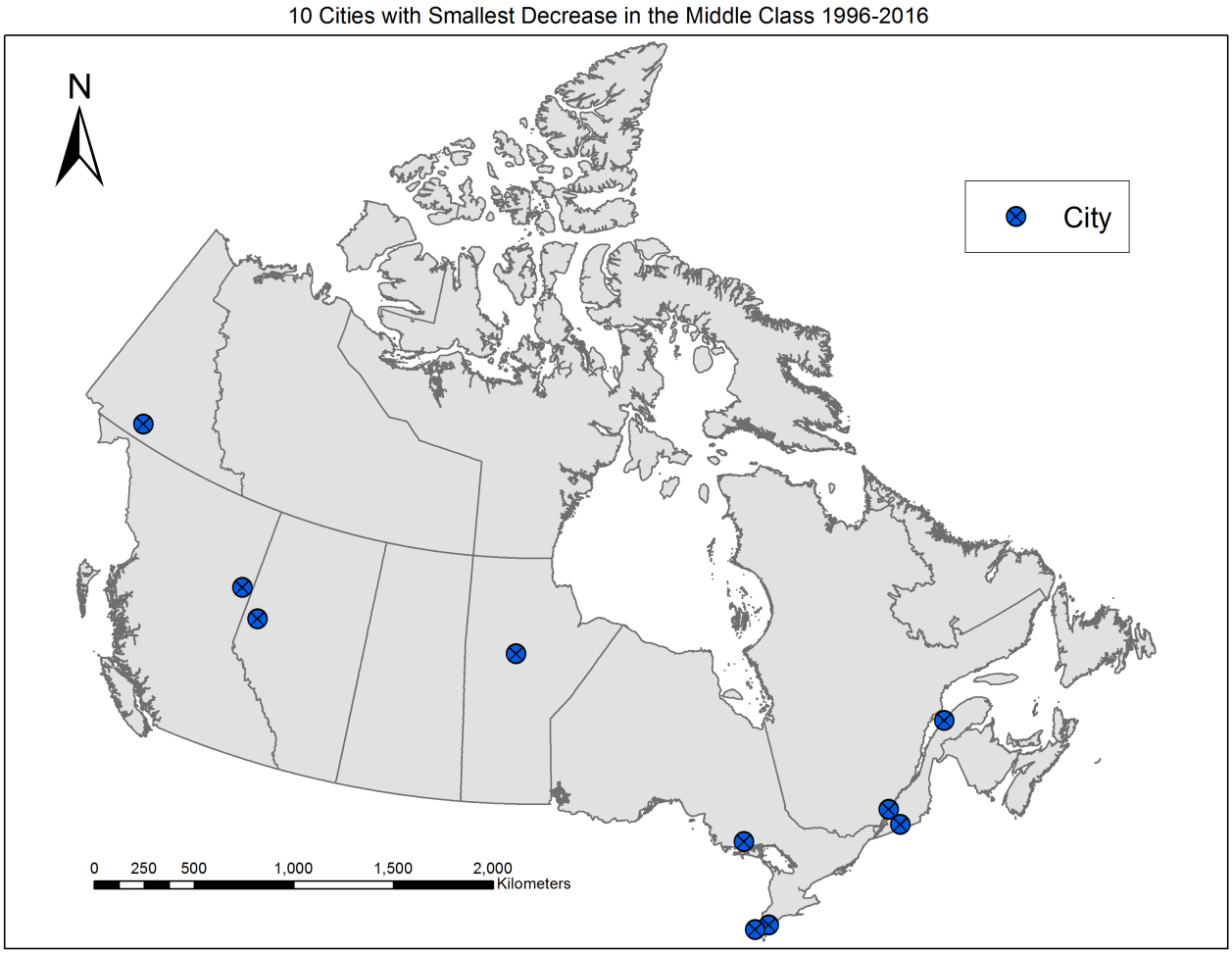
Map 4.1: The percentage of middle class households in Canadian cities in 1996.



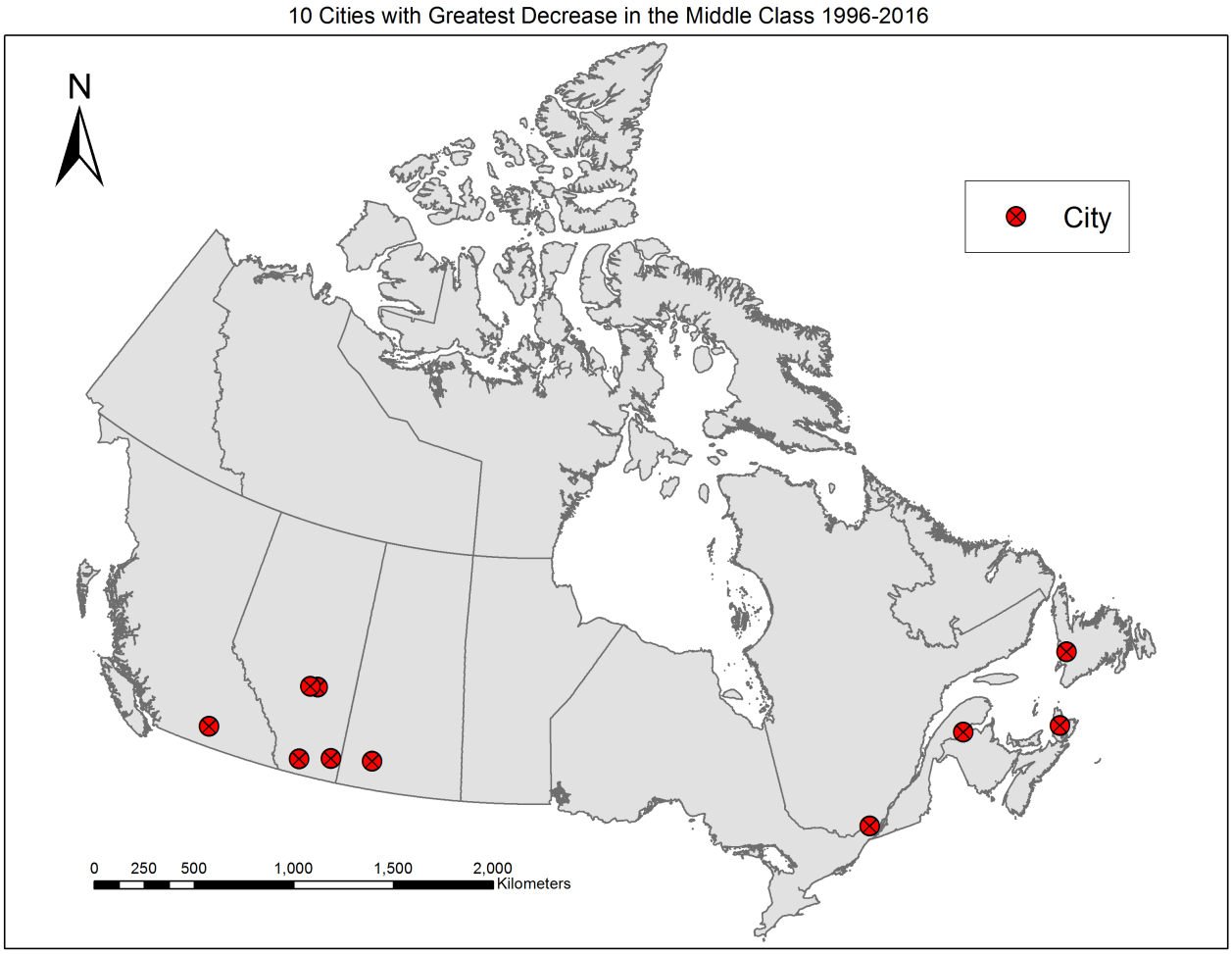
Map 4.2: The percentage of middle class households in Canadian cities in 2006.



Map 4.3: The percentage of middle class households in Canadian cities in 2016.



Map 4.4: The 10 cities with the smallest decrease in the middle class from 1996-2016



Map 4.5: The 10 cities with the largest decrease in the middle class from 1996-2016.

APPENDIX B: TABLES

Table 4.7 Coefficient signs of cross-sectional bivariate OLS results for percentage of middle class households 1996 – 2016 (N = 124)

	1996	*2006*	*2016*
Macro-Regional Variables			
Population (ln)	-*	-*	-*
Median Income	-*	-*	-*
Unemployment Rate	+*	+*	+
Industry Variables			
Primary Industry	-	-*	-
Secondary Industry	+	+*	+*
Tertiary Industry	+	-	-*
Occupational Variables			
Management Occupations	-	-*	-*
Business, Financial, & Administration Occupations	-*	-*	-*
Natural and Applied Sciences Occupations	-*	-*	-*
Health Occupations	+*	+*	+
Education, Law, Social, & Government Occupations	+	-	-*
Art, Culture, & Recreation Occupations	-	-	-*
Sales and Service Occupations	+*	+*	+*
Trades Occupations	-	-	+
Primary Industry Occupations	+	-	-
Manufacturing Industry Occupations	+	+*	+*
Socio-Demographic Variables			
Percentage with Bachelors	-*	-*	-*
Percentage of Young	-*	-*	-*
Percentage of Senior	+*	+*	+*
Percentage of Visible Minority	-*	-*	-*

Notes: All models with single independent variables; * indicates that coefficients are statistically significant at the p = .05 level.

Table 4.9 Cross-sectional bivariate OLS results with regional dummy variables for middle class 1996 (N = 124)

	X_{it}	*Dummy 1*	*Dummy 2*	*Dummy 3*
Macro-Regional Variables				
Population (ln)	-*	+*	+	-*
Median Income	-*	+*	+	+
Unemployment Rate	+*	+	+*	-
Industry Variables				
Primary Industry	-	+*	+	-
Secondary Industry	+	+*	+	-
Tertiary Industry	-	+*	+	-
Occupational Variables				
Management Occupations	-	+*	+	-
Business, Financial, & Administration Occupations	-*	+*	+	-*
Natural and Applied Sciences Occupations	-*	+*	-	-*
Health Occupations	+*	+*	+	+
Education, Law, Social, & Government Occupations	-	+*	+	-
Art, Culture, & Recreation Occupations	-*	+*	+	-
Sales and Service Occupations	+*	+*	-	-*
Trades Occupations	-	+*	+	-
Primary Industry Occupations	+	+*	+	-*
Manufacturing Industry Occupations	+	+*	+	-
Socio-Demographic Variables				
Percentage with Bachelors	-*	+*	+	-*
Percentage of Young	-*	+*	+*	+
Percentage of Senior	+*	+*	+	-
Percentage of Visible Minority	-*	+*	+	-

Notes: All models with single independent variables and dummy variables controlling for regional fixed effects. The benchmark dummy is Central Canada (Quebec and Ontario); Atlantic Canada (Newfoundland and Labrador, Nova Scotia, Prince Edward Island, and New Brunswick); the Prairies (Manitoba, Saskatchewan, and Alberta); Western Canada (British Columbia and Yukon Territory). * indicates that coefficients are statistically significant at the p = .05 level.

Table 4.10 Cross-sectional bivariate OLS results with regional dummy variables for middle class 2006 (N = 124)

	X_{it}	*Dummy 1*	*Dummy 2*	*Dummy 3*
Macro-Regional Variables				
Population (ln)	-*	-	-*	-*
Median Income	-*	-	-	-*
Unemployment Rate	+	+	-*	-*
Industry Variables				
Primary Industry	-	-	-*	-
Secondary Industry	+	+*	-	-
Tertiary Industry	-	+	-*	-*
Occupational Variables				
Management Occupations	-*	+	-*	-
Business, Financial, & Administration Occupations	-*	+*	-*	-*
Natural and Applied Sciences Occupations	-*	+*	-*	-*
Health Occupations	+*	-	-*	-
Education, Law, Social, & Government Occupations	-	+	-*	-*
Art, Culture, & Recreation Occupations	-	+	-*	-*
Sales and Service Occupations	+*	+	-*	-*
Trades Occupations	+	+	-*	-*
Primary Industry Occupations	+	+	-*	-*
Manufacturing Industry Occupations	+	+*	-	-
Socio-Demographic Variables				
Percentage with Bachelors	-*	+*	-*	-*
Percentage of Young	-*	+	+	-
Percentage of Senior	+*	+*	-	-
Percentage of Visible Minority	-*	+	-*	-

Notes: All models with single independent variables and dummy variables controlling for regional fixed effects. The benchmark dummy is Central Canada (Quebec and Ontario); Atlantic Canada (Newfoundland and Labrador, Nova Scotia, Prince Edward Island, and New Brunswick); the Prairies (Manitoba, Saskatchewan, and Alberta); Western Canada (British Columbia and Yukon Territory). * indicates that coefficients are statistically significant at the p = .05 level.

Table 4.11 Cross-sectional bivariate OLS results with regional dummy variables for middle class 2016 (N = 124)

	X_{it}	*Dummy 1*	*Dummy 2*	*Dummy 3*
Macro-Regional Variables				
Population (ln)	-*	-	-*	-*
Median Income	-*	-	+	-
Unemployment Rate	+	-	-*	-*
Industry Variables				
Primary Industry	+	-	-*	-*
Secondary Industry	+*	+	-	-
Tertiary Industry	-*	+	-*	-*
Occupational Variables				
Management Occupations	-*	-	-*	-
Business, Financial, & Administration Occupations	-*	+	-*	-*
Natural and Applied Sciences Occupations	-*	-	-*	-*
Health Occupations	+	-	-*	-*
Education, Law, Social, & Government Occupations	-*	-	-*	-*
Art, Culture, & Recreation Occupations	-*	-	-*	-*
Sales and Service Occupations	+	-	-*	-*
Trades Occupations	+*	-	-*	-*
Primary Industry Occupations	+	-	-*	-*
Manufacturing Industry Occupations	+*	+	-	-
Socio-Demographic Variables				
Percentage with Bachelors	-*	+	-*	-*
Percentage of Young	-*	-	-	-*
Percentage of Senior	+*	-	-	-*
Percentage of Visible Minority	-*	-	-	-*

Notes: All models with single independent variables and dummy variables controlling for regional fixed effects. The benchmark dummy is Central Canada (Quebec and Ontario); Atlantic Canada (Newfoundland and Labrador, Nova Scotia, Prince Edward Island, and New Brunswick); the Prairies (Manitoba, Saskatchewan, and Alberta); Western Canada (British Columbia and Yukon Territory). * indicates that coefficients are statistically significant at the p = .05 level.