Passing Peak Millennial:
Planning for Demographic Change in Mid-sized and Large Metropolitan Areas in Canada and the United States

by
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A thesis
presented to the University of Waterloo
in fulfillment of the
thesis requirement for the degree of
Master of Arts
in
Planning

Waterloo, Ontario, Canada, 2017

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Author's Declaration

This thesis consists of material all of which I authored or co-authored: see Statement of Contributions included in the thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Statement of Contributions

I conceived the concept of an index of generational congestion and collaborated with Dr. Markus Moos on the specific choices made in its ultimate construction. I was lead author of both a paper co-authored with Dr. Moos presented at the 2016 Association of Collegiate Schools of Planning conference and a chapter co-authored with Dr. Moos within the forthcoming book, "The Millennial City: Trends, Implications, and Prospects for Urban Planning and Policy."

This thesis includes those works with additional exposition, review, analysis, and/or discussion in each chapter. Specifically: the reproduction and replication of Myers's (2016) household formation analysis in the United States and Canada has been added in Chapter 3; regional and local trend analysis of generational entry congestion in the United States, as well as distribution of generational entry congestion, generational exit congestion, and combined generational congestion in Canada, has been added in Chapter 4; and, additional discussion about the findings, implications for local planners and policymakers, and further research has been added in Chapter 5.

Abstract

The Millennial generation has been reshaping cities in the United States and Canada as their Boomer parents did before them. Prior research explored the relationship among the changing size of the young adult cohort, household formation, and progression into home ownership at a national level in the United States (Myers, 2016). Finding that the size of the Millennial cohort reached its apex, or "peak Millennial," in 2015, Myers' research suggests that the generational pressure on the housing market from young adults will now begin to decline.

In reproducing Myers' research from original data in the United States and replicating it in Canada, I find similar timing but different patterns in the rise and fall of those peaks. I also find the "peak Millennial" concept misses net immigration and local variation, so I develop a novel "index of generational congestion" that quantifies the flows of cohorts in and out of the housing market in mid-sized and larger metropolitan areas in Canada and the United States. While I find some evidence of increasing congestion from young adults, this varies widely. I further find an increasing rate of seniors leaving some Canadian housing markets that far outpaces new young adults. I conclude with recommendations for how local planners and policymakers can use this new index to understand the generational changes happening in their housing market.

Acknowledgements

I would like to thank my thesis supervisor, Dr. Markus Moos, for his guidance and support throughout this project including, in particular, on how we would construct a measure of changes in generational congestion. This work emerged from my interest in generational change and his suggestion of testing the "peak Millennial" approach in a Canadian context. This final version was improved thanks to the comments of my committee member, Dr. Pierre Filion, who encouraged me to further explore changing Canadian immigration trends, and my reader, Dr. Tara Vinodrai, who urged me to be more explicit about the pitfalls I found if planners followed "peak Millennial"-driven conclusions about the future of cities.

I would be remiss if I did not also offer my profound gratitude to my wife, Kate Daley. Her encouragement allowed me to defeat the blank page syndrome and her critical feedback permitted me to write a thesis (and other academic works throughout this degree) as coherent as the concise summary briefs to which I had become accustom. I only hope I have sufficiently returned the favour to her as she simultaneously completed her doctoral work.

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Introduction

The Millennial generation has been reshaping cities in the United States and Canada as their Boomer parents did before them. The geography of young adults has become increasingly centralized in urban cores and in high density housing since the 1980s (Moos, 2014a). Those urban cores have become increasingly gentrified and expensive places to live as they attract investment in new high-density housing (Florida, 2016).

Now as Millennials enter and progress through young adulthood, their challenges in securing housing in an increasingly expensive housing market have drawn the attention of researchers and the concern of planners and policymakers. If previous generations are a guide, how these challenges manifest themselves and are resolved into housing decisions at the end of Millennial's young adulthood will shape of our cities for generations to come (Cortright, 2014).

The extent that this current trend in the geographic location of young adult's housing represents a change in lifestyle preference or is specific to current economic conditions in the labour and housing market is an active question for researchers (Moos, 2015). It must also be a critical question for local planners as they make long-term plans for where and how to house people in their cities and regions.

Prior research has explored the relationship among the changing size of the young adult cohort, household formation, and progression into home ownership at a national level in the United States (Myers, 2015, 2016). Finding from an analysis of domestic births that the size of the Millennial cohort reached its apex, or "peak Millennial," in 2015, the prior research suggests that the pressure on the housing market from young adults will now begin to decline. The

pressure, which grew from the growing number of young adults arriving at the doorstep of the housing market and may decline as the numbers decrease, is described as a form of "congestion" (Myers, 2015, p. 15) that is fundamentally generational in nature.

Unfortunately, national-level data can obscure significant local variations. While broad economic factors and national government policy has important effects on housing markets, local variations can have significant differential effects (see for example Moore & Skaburskis, 2004; Quigley & Rosenthal, 2005). Canada also did not experience the same housing market collapse in 2008 as the United States, and the rise and fall of its Millennials may also be different.

These local variations in young adult populations also emerge from migration patterns, whether domestic or international, which are in addition to local births. Paraphrasing Foot and Stoffman (1998, pp. 18–19) on the importance of immigration, the primary demographic fact about 25 year olds is how many of them there are now, not how many were born 25 years ago. As the ability to find work is also critical factor in immigration decisions (Foot & Stoffman, 1998) and as economic conditions vary from city to city, any local demographic forecasts must also account for migration rather than assume the national pattern is present locally.

Research Questions

This thesis builds on the valuable work conducted by Dowell Myers by answering the following research questions:

(a) What are the similarities and differences between "peak Millennial" in Canada and the United States at the national level?

(b) Can these changes in cohort size of young adults – a form of generational congestion – be quantified at the level of the local housing market?

(c) By what practical methods can planners and policymakers use this quantification of generational congestion to improve outcomes for households, such as improved affordability, in their local housing markets?

Answering the first question will clarify the extent to which Myers's United States domestic demographic projections and analysis are relevant to Canadian researchers. It will also clarify what his national approach can and cannot capture at the local level in Canada and the United States for the use of local planners and policy makers. In doing so, this thesis replicates Myers's work in the United States, adapts his analysis for a Canadian context, and critically examines his methods and conclusions so we can understand how to engage with the concept of "peak Millennial" in our research and in our local planning.

The second and third questions point to an eminently practical objective of this thesis, which is to provide a new tool for local planners and policymakers to understand the demographic changes that drive demand in their local housing markets. While the housing literature focuses on the aggregate experience of young adults with some disaggregation by demographic characteristics to critically examine equity concerns, researchers rarely consider the role of the changing number of young adults. Quantifying Myers's new idea of "congestion" in housing markets can add a new tool to local planner's tool boxes as they develop and implement community plans to handle their changing populations.

Thesis Overview

In Chapter 1, I review the literature on the drivers of housing market demand and outcomes. These include the role of demographic change, economics, government policy, migration, and changes in personal preferences on housing transitions.

In Chapter 2, I describe the methodology, which takes a quantitative approach that uses and builds on Myers's (2015, 2016) method. Since the objective of this thesis includes supporting local planners and policymakers in assessing their housing markets and identify housing policy responses, my methodological choices keep these end users in mind.

In Chapter 3, I compare the shape of the Millennial cohorts in Canada and the United States as well as the changes in the number of young adults at the door of the housing market. This including assessing the role of immigration.

In Chapter 4, I construct a new quantitative tool to express as an indicator the 'generational congestion' of young adults described first by Myers (2015, 2016). It adds to Myers's work by including the role of older adults exiting the housing market. I apply this index to mid-sized and large metropolitan areas in Canada and the United States, identifying the different trajectories of generational congestion.

Finally, I offer some conclusions and recommendations for policymakers, planners, and researchers in Chapter 5.

Chapter 1: Literature Review

The demand for and supply of housing in our market economy is complex and changes over time, which makes developing long-term community plans particularly challenging for local planners. The particular challenge of understanding and forecasting housing demand is a central component to this planning exercise, which joins current data about the demographic structure of populations with forecasts of future housing choices.

As Millennials are reaching young adulthood, their early housing choices provide new demand and drive decades of housing need. To replicate, adapt, and critically examine Myers's concept of "peak Millennial" and what that will quantitatively mean for local housing markets, we need to understand demography and how well we can rely on demographic-based predictions. We also need to understand how changing how and why housing choices, or housing transitions, have happened in the past and are likely to happen in the future. The transitions of young adults requires specific attention as they drive new demand, but how and when older adults leave, reducing demand, may be just as important both to the housing market as a whole and to the prospects of young adults looking for housing.

In this chapter, I review the literature on the drivers of housing market demand and outcomes. Given the research questions of this thesis are on the housing experiences of the current Millennial generation, I begin with a review of the demographic change literature, particularly the role of generations as a driver of housing markets, economies, and government policy. This includes the new concept of "peak Millennial."

Next, I review the literature challenging demographics-as-destiny, focusing on the role of coincident changes in economies, government policy, migration, and personal preferences.

Then, I explore research on the effect of these changes on housing transitions and the aggregate impacts of these demand changes on housing markets. I find that researchers, policymakers, and planners have become concerned about the diversity of outcomes for households, particularly in terms of housing affordability stress and the challenges of young adults.

Finally, I review literature on the specific challenges of young adult housing transitions, including affordability concerns, economic challenges, and the role of demographics. I conclude with a brief review of demographic forecasts for the growing older adult population, as the research suggests potential shocks to the housing market that impact future outcomes for young adults.

Demographic Change

Arguing that demography can explain "two-thirds of everything" both to understand the past and the near future, Foot and Stoffman (1998, p. 8) discussed the cohort size effect on housing demand, family relationships, employment, and government services. The ability to forecast using demographic information is based on the premise that once each person is born, they will be a year older next year than they are this year. Subject to births, deaths, and migration in and out of whatever geography being studied, the size of the cohort and its movement through a series of ages from birth to death is eminently predictable and has had substantial impacts on cities. Cohorts are those groups of individuals born between particular years, the boundaries of which have usually been demarcated by a significant change in births, by economic shocks, or by other significant global events. These cohorts are often termed

generations and given a name, such as the Baby Boom generation. Demographic forecasting leverages these two principles to track the progress of cohorts, rather than individuals, through time and space.

The Baby Boom generation, more commonly referred to as the “Boomers”, was born after World War II, specifically between 1947 and 1966. The size of this generation was somewhat larger in Canada than in the United States, but both Canadian and American cohorts were larger than in Europe (Foot & Stoffman, 1998; Rose & Villeneuve, 2006). The rate of immigration, which included many young families, further increased the number of Boomers and sustained the population. Foot and Stoffman (1998) argue the boom was ended by an increasing number of women in the workforce or pursuing education along with the introduction of the birth control pill, which delayed childbirth and reduced fertility.

The Boomers were followed by the much smaller Baby Bust generation (or Generation X), born between 1967 and 1979 in the period after the birth control pill where women’s participation in the workforce continued to increase. They were followed in turn by the children of the Boomers, known first as the Baby Boom Echo and now known as the Millennial generation, born between 1980 and 1995 (Foot & Stoffman, 1998).

When observing the progress of these generations through different age groups, the effect is a rising and falling and rising again in those age groups over time as the Baby Boom gives way first to the Baby Bust and then the Millennials. When observing is progress through a population pyramid, the Boomers appear as a large bulge working its way upwards over time, with a second bulge for the Millennials recently starting its upward move.

Demographic changes, particularly in terms of the size of cohorts, have had a significant effect on cities. The demand first for schools in new suburbs in the 1950s and then apartments in downtowns in the 1970s for Boomers leaving home were driven by the size of the cohort, just as the collapse of apartment construction in the 1990s was driven by decreasing demand from the smaller next cohort (Myers & Pitkin, 2009). This rise in housing demand had sustained a substantial increase in real housing prices during the 1970s and 1980s (Foot & Stoffman, 1998; Mankiw & Weil, 1989). In the same period, demographic effects were also felt in the labour force and commercial real estate market. The arrival of the Baby Bust into the labour force saw far less of an expansion than under the Boomers before them, which contributed to the collapse of the commercial real estate market, as substantial new construction was not required (Foot & Stoffman, 1998).

Peak Millennial and Generational Congestion

As the Millennial generation first reached the housing market a decade ago, researchers have now had some time to consider Millennial's early demographic impacts. Myers (2016) explored the rise and fall of registered births over time in the United States and identified 1990 as the year with the largest number of births since the Baby Boom. He labeled this "peak Millennial" (Myers, 2016, p. 1). Further, he mapped household formation straddling the 2008 Great Recession (between 2000 and 2013), which demonstrated a growing rate of rental tenure and declining rate of ownership tenure among those aged 35-44. In his view, the combination of these effects was a surge of Millennials blocked from entering the housing market. He calls this effect demographic, or generational, congestion (Myers, 2016).

These demographic trends were coincident with the 2008 economic recession and housing market collapse, which Myers (2016) argued made it difficult for policymakers to disentangle those underlying trends from each other.

This challenge of coinciding economic and demographic changes, however, was not unique to the late 2000s. There is a healthy debate among researchers about Foot and Stoffman's assertion about the overwhelming predictive power of demographics, which I will explore next.

Challenging Demography as Destiny

The extent to which the preferences and choices of one generation is repeated by a subsequent generation has been a subject of both research and critique. When forecasts assume a subsequent generation will make the same choices at the same ages, they can miss their targets. After reviewing the upward pressure on housing price from the Baby Boom generation in the 1970s, Mankiw and Weil (1989) forecasted the smaller Baby Bust generation arriving at their house buying years in the 1990s would generate substantially lower housing demand depressing real housing prices through to 2007. This did not happen. Missing from the straight adult population-based forecast were changes in real income, in the relative prices to rent and to own, and in real interest rates that instead sustained and grew housing prices (Swan, 1995). Government mortgage policy can also be a factor in affordability impacting the ability of various households to access housing at different prices (Haan, 2011). Analysis and forecasts, then, should not be limited to cohort size effects without accounting for the

differential experiences of generations in terms of income, the price of renting and owning, and interest rates.

The lessons of forecasting housing demand and prices due to the Baby Bust have been a cautionary tale for those researching and forecasting the current and future experiences of the Millennials. This is particularly true in the United States after the Great Recession of 2008 and subsequent housing market crash in 2009. These major events added to the current challenges of Millennials in securing employment and affording housing.

Researchers have attempted to disentangle long-term trends from these temporal economic shocks. Myers and Lee (2016) identified an aging population, delayed retirement, decreasing housing affordability, and falling home ownership rates between ages 20 and 34 as the most likely trends through to 2030. They were far less certain whether recent changes in attitude around walkability and immigration levels will hold, particularly for younger and older adults.

Researchers and policymakers have long been discussing the looming arrival of a "grey tsunami"[1] with the retirement of the Boomers (Frey, 2007, 2010; Gabay, 2013; Myers & Ryu, 2008), but other demographic trends will also arrive at the same time. Between 1990 and 2010, the United States saw a significant increase in the population aged between 45 and 64, which represent the Boomers in their prime earning years. At the same time there was a slightly smaller increase in the population aged 10 – 24, mostly representing the Millennials. In the period between 2010 and 2030 when the grey tsunami arrives, Millennials will enter the

[1] The term "grey tsunami"(Canadian Institute of Health Information, 2015) describes the wave of the Baby Boomers reaching their senior years, and is used in connection with health care funding challenges for governments from this demographic-driven growth in costs. There are many variants of this term used in popular media with the same meaning. As one example, Frey (2007, pp. 1, 2) uses both "senior tsunami" and "age tsunami" to describe the same phenomenon.

workforce in their lean earning years and there will be a drop in the number of people in their prime earning years (Myers & Lee, 2016). These trends coincide with forecaster's projections of Boomers exiting home ownership, suppressing aggregate demand in the housing market and potentially creating a generational housing bubble (Myers & Ryu, 2008).

There are some variations in Canada, however, for how forecasters see the various trends and the impact of generations through their aging. Eight scenarios for household growth have been produced by Canada Mortgage and Housing Corporation (CMHC). These scenarios include high, medium, and low growth in fertility, life expectancy, and immigration with various interprovincial migration trends. Net household formation is assumed to be driven primarily by young adults (aged 20 to 29) less those aged 75 and above dissolving households, which arise from either mortality or moving into care facilities. Net new households will increase somewhere between 3.6-million and 7-million over the 2006-2036 period. While the Boomers and their children were approximately equal drivers of home ownership growth between 1991 and 1996, Boomer home ownership is anticipated to begin declining between 2011 and 2016. The annual increases in home ownership peaked between 2006 and 2011 with the rate of annual increases anticipated to decline through 2021. The rate of new family households, particularly households with children, is also forecast to decline considerably due to lower fertility rates and young adults leaving parental homes. Combined with the growing older adult population, the most prevalent household type will be one-person households by the 2020s (Gabay, 2013). These anticipated shifts in housing size, type, and tenure become less certain in their specific levels further out in time, and are not projected for individual local jurisdictions.

The challenges facing policymakers and planners from demographic changes, then, cannot just be viewed as a matter of changing cohort size. Each generation and the individuals within them may make different choices, especially housing choices, at different ages, and are influenced by changing economic situations. It is to these housing choices that we now turn.

Housing Transitions over Time

Housing transitions, or the specific changes individuals make in their choice of housing, happen across both space and time for a diverse range of reasons. This mobility of individuals, and in particular the specific type, tenure, location, price, quality, and size of housing sought at each transition, provides the demand side of the housing market. How we understand the sequence of choices Millennial's are and will make affects how I assess the impact of "peak Millennial" on local housing markets and the choices I must make when determining how to quantify these effects in a new tool for local planners.

This section explores how researchers have understood and studied these individual choices, the relationship of those choices to other life events, and how both of these have changed over time. It considers the drivers of housing demand, which is the aggregation of these transitions, and the variability in outcomes obtained. This section concludes by exploring the affordability challenges some are facing and the long-term impacts of those challenges.

Lifecycles, Ladders, Pathways

How an individual's housing, family, and employment status change over time have been formulated into specific theoretical conceptualizations, each of which interacts with how policymakers understand individual housing choices and plans to meet their housing needs.

Planners' and demographers' conceptions of residential mobility, intermingled with sociological conclusions around how human desires influence choices, have given rise to a number of different but related concepts around these housing transitions. These concepts are embedded in our interpretation of what past, present, and future demographic changes mean for communities, including how we understand Millennial's housing choices and those of older adults. Based on this review of the literature, I can make an informed choice of how to talk about these transitions when assessing "peak Millennial" and developing a method for quantifying congestion in local housing markets.

Lewis Mumford (1949) articulated the need to plan for a housing life cycle, accounting for the housing size and community amenity needs of families from birth to death, including new couples, young families, empty nesters, and retirees. This pattern sees the life cycle as one of family formation, expansion, contraction, and ultimately dissolution, with each step identifying different needs communities must plan to meet. Life cycles comingle transitions in housing with transitions in family status in an ordered and predictable way.

The housing ladder gives further but similar expression to this idealized nuclear family path of housing, climbing from renting to owning, and from smaller to larger dwellings (Morrow-Jones & Wenning, 2005; Perin, 1977). Some researchers continue to view this climb in housing across the life cycle as immutable, except for small, time-limited perturbations arising from external forces (see for example Krishnan & Krotki, 1993; Myers, Pitkin, & Park, 2002; Ostrovsky, 2003). This view shapes their forecasts of future patterns of demand.

The normative concepts of housing lifecycles and a housing ladder have been criticized as incompatible with the divergent needs and values in a postmodern society. Clapham (2002)

suggests housing is not always a means to an end but an end in itself, proposing instead concept of a housing pathway to describe the changing social practices of households in relation to their housing over time and space.

Emerging in the behavioural sciences, the concept of a life course also embodies the postmodern fracturing of normative conceptions of a singular course of family life, but is broader than just housing pathways. Methodologically, studying the life course longitudinally traces a group of diverse individuals over time, recording experiences as they happen (Elder, Johnson, & Crosnoe, 2003). Life histories also follows the life course, but chronologically identifies particular events such as a first home purchase, marriage or a first child, or a new job in a new community (for a more complete review, see Morrow-Jones & Wenning, 2005).

Housing careers arise from specific housing choices and are the specific sequence of decisions around housing tenure, quality, and price. These careers happen in parallel with changes in work and family status and composition through the life course (Clark, Deurloo, & Dieleman, 2003). Identifying the factors influencing housing careers can also be helpful in managing challenges of equity in cities.

Housing career trajectories, though having a greater variety of pathways than housing ladders, still generally trend upwards through most of the life course in terms of tenure, quality, and price in housing. Some research has noted this upward trend is closely related to household income and income growth, but there is significant regional-level variation that is strongly influenced by local tenure composition and housing price (Clark et al., 2003). Others conceptualize factors behind housing relocation decisions at the household, regional, national, and international levels. These factors are: mobility choice at the household level; tenure

composition, turnover rate, and price level at the regional level; inflation and mortgage rates, demographic change, and economic fluctuations at the national level; and, housing policies, variation in wealth, and tenure structures at the international level (Dieleman, 2001, 2002).

Among all of the transitions made by households, the transition from renting to owning is seen by researchers as a key step up on the housing ladder, a critical stage of the housing lifecycle, or an important move in a housing career. In assessing renters' transition into home ownership, some have identified a strong association with the stability of their rental tenure and their income, suggesting further that low income individuals or those with unstable rental tenures find ownership nearly unattainable (Withers, 1998). In an analysis of 27 metropolitan regions in the United States, more than 75% of housing mobility, or turnover, was generated by renters, particularly those renters under 35 (Dieleman, Clark, & Deurloo, 2000). For these rental households, then, the necessary stability for a transition into ownership typically comes with age. With age, however, come other family-related events.

The movement from renting to home ownership has been increasingly correlated with childbearing (Mulder, 2006; Öst, 2012). While home ownership costs can be easier to bear for couples with children, delays in childbirth have been observed where homeownership is seen as a prerequisite to having children, such as in England (Mulder, 2006). The relationship between age, rising incomes, and rising housing prices to delays in childbirth have also been observed for some time (see, for example, discussion in Kendig, 1990).

All of these careers and the decisions and experiences embedded in them have been understood as cumulative, meaning that the historical sequence affects future possibilities (Morrow-Jones & Wenning, 2005; Myers, 1999). These challenges suggest for researchers,

planners, and policymakers that early challenges in one's housing, work, and family careers can have lasting effects through the life course, including on housing demand both individually and in aggregate.

Housing demand

Housing demand is an aggregation of the individual movements of households across housing careers. The housing demanded varies based on the size, preferences, and financial capacities of these households. Supply to meet this demand arises through housing vacancies from mobility or new construction and varies in tenure, size, quality, and price (Haan, 2011; Harris, 2006; Knox & Pinch, 2010; Myers et al., 2002). Aside from these transitions within the housing market, which largely exchange existing housing stock, the largest driver of demand requiring a supply response is the creation of net new households.

The rate of household formation, which creates new households, is strongly associated with age but tempered by economic circumstances (Harris, 2006; Myers & Pitkin, 2009). Consistent with the literature around housing lifecycles and housing careers, the formation of new households by young adults and immigrants are the drivers of growth in the housing market (Clapham, Mackie, Orford, Thomas, & Buckley, 2014; Masnick, 2014; Myers & Lee, 2016). Net new households are calculated from the total new households less household dissolutions, which are most prevalent for older adults aged 75 and above due to deaths or moves into collective dwellings (Gabay, 2013). Once formed, the specific form of housing demand that is accommodated within the market is described as household consumption.

Housing consumption, specifically in terms of rooms per person, have specific minimum standards embedded into building codes (see for example Government of Ontario, 2014). The consumption rates per person have increased on average in Canada both over the housing lifecycle and over time, suggesting the demand per household has increased at the same time fertility and household size have fallen (Ostrovsky, 2003; Rose & Villeneuve, 2006). This data also suggests an absence of significant downsizing from empty nesters and retirees to date (Eichholtz & Lindenthal, 2014; Masnick, 2014). Despite numerical increases in older adults moving into apartments, recent research found these are primarily cohort size effects from an increased total population of older adults rather than from preference changes among them that would signal a new trend of households downsizing to apartments (Simmons, 2016). At some point, however, seniors are expected to exit the ownership market in numbers that have an impact on aggregate housing consumption, which will require the attention of planners (Myers & Ryu, 2008). Notwithstanding rising aggregate consumption per person amongst households, these averages hide inequalities, which manifests in differential levels of crowding and housing affordability challenges.

The concept of crowding in households generally relates the occupants of a dwelling to the number of rooms, particularly bedrooms (Shewchuk, Ojha, & Prentice, 2016). This concept has socio-economic variations from local and national averages as well as from normative expectations. While crowding has declined to very low levels for Canadian-born households between 1971 and 2001, the net decline was much smaller for immigrants and actually increased for immigrants over the 1990s (Haan, 2011). In the United States, growth in crowding occurred among immigrants over the 1980s and 1990s. It has been attributed by some to

cohort size effects, as the level held steady over time for each particular arrival group of immigrants by year of immigration but has been higher among the most recent arrivals (Myers, 1999). Notwithstanding different cultural norms around what constitutes crowding in households, this suggests growing affordability challenges amongst more recent immigrants (Haan, 2011; Myers, 1999).

Canadian housing policy has also assumed housing affordability is provided through filtering. This is a process where lower income households move into older, lower quality, cheaper homes when they are vacated by higher income households moving up the housing ladder (Hodge & Gordon, 2014). This assumption missed that the submarkets of lower income and higher income housing do not interact (Harris, 2006); moreover, while housing demand from middle and higher income households have generated a supply response from the market, there has not been new supply for lower income households (Moore & Skaburskis, 2004). The effects of gentrification, particularly in the refurbishing of older inner city homes by higher income households, have also reduced the supply of homes that had traditionally been part of the filtering cycle (Harris, 2006) with rents and prices of these homes increasing faster than newer construction (Skaburskis, 2006).

Forecasting the need for new housing builds upon these immutable and formulaic assumptions of household formation, housing consumption, the level of crowding, and filtering. Reviewing local planning needs in the United States, Myers et. al. (2005) observed housing demand estimates either assess the gap between current housing conditions and a normative standard or the amount by type of new construction required to accommodate projected population consuming housing by a normative standard. He observed these forecasting

methodologies incorrectly assumed the housing type and size obtained at each age by the last generation will be the same as needed by the last generation, when housing consumption has actually increased at similar ages over time (Myers, 1999; Myers et al., 2005). In their view, a generational momentum model, which would recognize the unique but growing housing consumption demanded by each successive generation, would provide a stronger basis for projections (Myers & Lee, 2016). This model, of course, embeds an assumption that this trend will continue, the validity of which would affect the accuracy of the model's forecasts.

In addition to age, cohort size, and generational effects, housing markets also vary across geographic space. While the limited transportation mobility of earlier generations had maintained a compact city form, the arrival of the automobile and its accommodation in cities after World War II has supported a dispersed suburban ring around older urban cores while initially keeping home to work travel times relatively constant (Bunting, Filion, & Priston, 2002; Bunting, Walks, & Filion, 2004; Hodge & Gordon, 2014). Despite the arrival of policies in some Canadian cities around compact, mixed-use, higher density urban forms in the 1970s, construction of new housing supply has mostly produced the aspirational single-detached home perched atop the housing ladder (Grant & Scott, 2012).

Though some have characterized Canadian communities as more compact than their counterparts in the United States, this was only true in the immediate post-World War II years through to the 1970s (Filion, Bunting, McSpurren, & Tse, 2004). This expanding suburban form, coincident with Boomers home buying years, has harmonized with household preferences, but has been disproportionately shaped by households of higher income or couples with children (Filion, Bunting, Pavlic, & Langlois, 2010; Filion, Bunting, & Warriner, 1999). Despite some

condominium development in urban cores of large metropolitan areas, tenure, specifically home ownership, continues to be the most important factor in describing the geography of household income (Moos & Mendez, 2015). These geographic characteristics of housing demand across household size, type, and especially income present challenges to equity and housing affordability in cities.

Housing affordability

Housing markets are not equally accessible to all individuals, and challenges of affordability can affect the choices available to households along their housing careers. Before exploring concerns about affordability for young adults gaining a foothold in the housing market, it is first necessary to understand what we mean by housing affordability and how its challenges manifest in cities.

The standard measures of housing affordability problems for households is spending more than 30% of gross household income on housing, while spending more than 50% is considered a severe affordability stress (Moore & Skaburskis, 2004; Quigley & Raphael, 2004; Shewchuk et al., 2016). Some researchers argue for other measures such as residual income after accounting for housing costs (Stone, 2006), while others have highlighted the percent-of-income approach conflates housing market problems with income inequality (Glaeser & Gyourko, 2008 as cited in; Bieri & Dawkins, 2016). However, as housing policymakers in both the United States and Canada continue to use the 30% of gross income threshold (Shewchuk et al., 2016) and as this thesis primarily aims to assist those policymakers and local planners, it is reasonable to use this standard threshold when reviewing the housing affordability literature.

In the United States, while homeownership and renting had remained about as affordable for the median income household over the period from the 1960s to 2000, the percentage of rental households with housing affordability stress, or rent burden households, in the lowest two quintiles of income jumped by 20%. Researchers found these changes, which mostly happened during the 1980s and 1990s, occurred almost entirely due to rent increases rather than real income declines (Quigley & Raphael, 2004).

The number of Canadian households with affordability challenges is higher based on housing tenure (higher for renters than owners), household size (higher for singles), and the presence of children (higher particularly for single parents). In relation to changing urban geographies across Canada, the overall growth rates of cities were not correlated with increasing affordability issues but there were correlations of increasing affordability issues with the size of cities and the price of rent (Moore & Skaburskis, 2004). These observations provide a framework for considering factors affecting local housing affordability, and can be augmented by understanding the geographic concentration or dispersion of these challenges in cities.

Examining how poverty concentration has changed Canadian metropolitan areas, Ades et. al. (2012) noted a shift from concentration in and near downtown cores in 1986 to increasing dispersion across suburban areas in 2006. Lower income households have found the remaining stock of inner core low quality housing increasingly expensive as higher income individuals move in and refurbish those homes (Moore & Skaburskis, 2004). This shift to the suburbs has not been accompanied by a transition into home ownership, which had been the characteristic tenure of suburbs. Low income and single parent families in particular have been

struggling to enter home ownership since the 1980s (Deurloo, Clark, & Dieleman, 1994), suggesting persistence in poverty.

Understanding how and for whom housing affordability stress persists for individual households over time can provide policymakers with insights into how well their housing markets are supporting households to find affordable housing. Recent Australian longitudinal research has identified those households likely to remain in housing affordability stress are renters and are older, female, single, less educated, and more urban (Baker, Mason, & Bentley, 2015). Moving, while helping some renter households find affordable housing (Wood & Ong, 2011), is often triggered by life events such as family breakdown and can cause or entrench housing affordability stress (Baker et al., 2015).

The lack of government attention to these challenges has broadly been characterized in the literature as characteristic of a neo-liberal state (see for example Filion & Kramer, 2011; Moos, 2014a). Others have argued it is less about retrenchment from Keynesian policies and more about the marginalization of housing agencies from the economic development agenda, which would steer more dollars in its direction (Dalton, 2009).

These growing affordability challenges, particularly as they affect the early housing careers of young adults, may have long lasting impacts. Given that these same young adults are supposed to drive housing market demand, I now turn to their housing transitions.

Young Adults' Transitions

The preceding discussion of the housing transitions literature suggested the growth in the housing market is largely driven by young adults, meaning that the housing market is

significantly affected by demography. Concerns around current economic challenges are raising questions about the lasting impacts on their housing careers. In considering the current and future housing transitions and needs of young adults for researchers, policymakers, and planners, it is important to clearly define this group and disentangle what experiences, expectations, and challenges are consistent with age, which are consistent with generation, and which are consistent with both. These steps will support both the analysis of the demographic impact of "peak Millennial" and to inform quantitative decisions in creating a new tool for local planners to assess these impacts in their local housing markets.

In defining and focusing on young adults, researchers typically assess those aged between 25 and 34 as a point where significant transitions occur in housing, employment, and family careers. Over the last thirty years in the United States, home ownership rates have risen sharply until age 34, at which point increases begin to level off (Myers & Lee, 2016). Age 25 is a convenient point to measure educational attainment as a standard path through bachelor's program would be complete. This age cohort is also highly mobile, and as migration levels decrease sharply with age, the location decisions of young adults can have lasting impacts on cities (Cortright, 2014).

The location of young adults has traditionally been associated with the inner city, transitioning into suburban single detached housing after coupling and starting families (Foot & Stoffman, 1998; Mankiw & Weil, 1989; Morrow-Jones & Wenning, 2005). However, this housing lifecycle is infused with cross-generational assumptions around meaning and aspirations of housing that are also subject to varying economic constraints and changing family choices. Increasingly young adults are living with parents, sharing accommodation, or living as couples

without children for extended periods of time (Clapham et al., 2014; Hochstenbach, 2015; Lee & Painter, 2013; Martin, Astone, & Peters, 2014; Moos, 2014a). The impact of recessions on household formation can also be significant, with the Great Recession of 2008 reducing the rate of household formation in the United States by up to 9% (Lee & Painter, 2013).

In some Canadian metropolitan areas, the geography of young adults has been increasingly centralized in urban cores and defined by proximity to transit, high density housing, and walkability to urban amenities since the 1980s (Moos, 2014a). In a process described as "youthification" by Moos (2015), these areas retain a young age profile as individuals growing older and leaving are replaced by new young adults. Young adult's housing careers in increasingly gentrifying cities are often widely varied rather than progressively linear, as they select for location and amenities despite insecurity and frequent moves (Hochstenbach, 2015). The extent that this trend represents a change in lifestyle preference or arises from macroeconomic or housing constraints specific to the Millennial generation requires more investigation (Moos, 2015).

Young adult transition into home ownership, while related to increased income, is less sensitive to income after accounting for life-stage decisions around marriage and starting a family (Mok, 2005). Declining marriage rates among young adults in the United States suggest that the percentage of Millennials that marry by age 40 will be the lowest level of any prior generation; however, this pattern diverges by educational attainment, ethnicity, and income, signifying married "haves" and unmarried "have nots" (Martin et al., 2014).

While high density living in urban cores is characteristic of the location of Millennials in metropolitan regions, the most important explanatory factors are still immigration status,

measures of social class, and household size (Moos, 2015). Parental contributions towards down-payments have also contributed to certain young adult's transition into home ownership, which reinforces the existing middle class while simultaneously pushing housing prices further out of reach of those without parental support (Hochstenbach & Boterman, 2015). These factors suggest that choice in housing is constrained by economic opportunities, and requiring assessments of the geographies of age to be considered in relationship to perpetuating geographies of income. Given the auto-centric nature of suburban living associated with those geographies of income, understanding the extent to which transportation mode choices of Millennials are shifting could change the old patterns.

Choices of public and active transportation over automobile orientations are often portrayed as a proxy for a downtown, urban lifestyle. The transportation mode choices of Millennials, in particular their lower levels of car ownership, shorter distances driven, and lower rate of having driver's licenses, have suggested that the observed changes in location are generational changes in attitudes (Kuhnimhof et al., 2012). However, others have concluded most of this decrease can be attributed to reductions in employment and the ability to shop and socialize virtually, suggesting that improved economic fortunes would again increase automobile use (McDonald, 2015). Lower education and higher unemployment is also correlated to young adults without driver's licenses (Schoettle & Sivak, 2014), which raises equity concerns when present in concert with housing affordability challenges and the increasing suburbanization of lower income households.

These geographies of age and the associated concentrations and dispersions of housing affordability concerns for young adults may be aided by the impending housing transitions for older adults, to which I now turn.

Older Adults' Transitions

While the growth in the housing market is led by young adults, its stability may increasingly depend on how and where older adults age, and when they inevitably leave the housing market. Whether those leaving are providing or will provide sufficient housing for the housing consumption demands of young adults is important to local planners and policymakers.

Describing this geography of aging begins with understanding the accumulated individual housing choices that generations bring with them as they turn 65 (Pitkin, 1990). These choices include increased housing consumption predominantly in home ownership that initially remain unaffected by reduced household size (Krainer, 2005). This is perhaps unsurprising as researchers have found home ownership, controlling for income, to be the strongest protection against housing affordability stress among older adults (Temple, 2008).

At the local level, aging in place is substantially more important than mobility in explaining the growth of seniors in local housing markets as Boomers turn 65 (Frey, 2010). Among those that do move, the net shift is from central cities to suburbs and to sunbelt US states. This has led forecasters to identify substantial new amenity and infrastructure needs for greying suburbs in slow-growing metropolitan areas of the northeast and midwest and for booming retirement communities in the south and southwest (Frey, 2007).

Aggregating these individual housing market transactions from movers has also provided some insight for forecasters on what might be coming as older adults continue to age. While young adults, who are generally entering home ownership, are net purchasers of homes and middle-aged adults generally buy and sell homes in equal numbers as they retain home ownership, older adults are net sellers of homes (Myers & Ryu, 2008). Demographic researchers estimated these buy and sell rates by age group across each US state, finding generally that sellers begin to outnumber buyers among those aged 65-69, sellers are double buyers among those aged 70-74, triple buyers among those aged 75-79, and vastly outnumber buyers among those aged 80+ (Myers & Ryu, 2008). Subject to those demographic-driven trends continuing, their forecast of a generational housing bubble when sellers begin to outnumber buyers in each state would undermine the stability of local housing markets.

Researchers have hypothesized a variety of possible housing market conditions depending on the location choices within a metropolitan area of both Boomers and Millennials (Moos et al., 2015). Figure 1 shows four such possible housing futures, though the relative impact in each quadrant depends on the number of Millennials and Boomers in it, which is also affected by overall cohort size and would vary by region and metropolitan area.

Despite desires for aging in place, there is also an inevitability of mortality or changes in health that will drive selling and household dissolutions that increase in likelihood as individuals age (Krainer, 2005). Prescriptions for policymakers to avert problems from older adults' housing transitions focus on retaining them as long as possible, attracting young adults, and attracting immigrants (Myers & Ryu, 2008). However, as those who move tend to be wealthier or healthier, the older adults which are retained may also be a strain on communities (Frey, 2007).

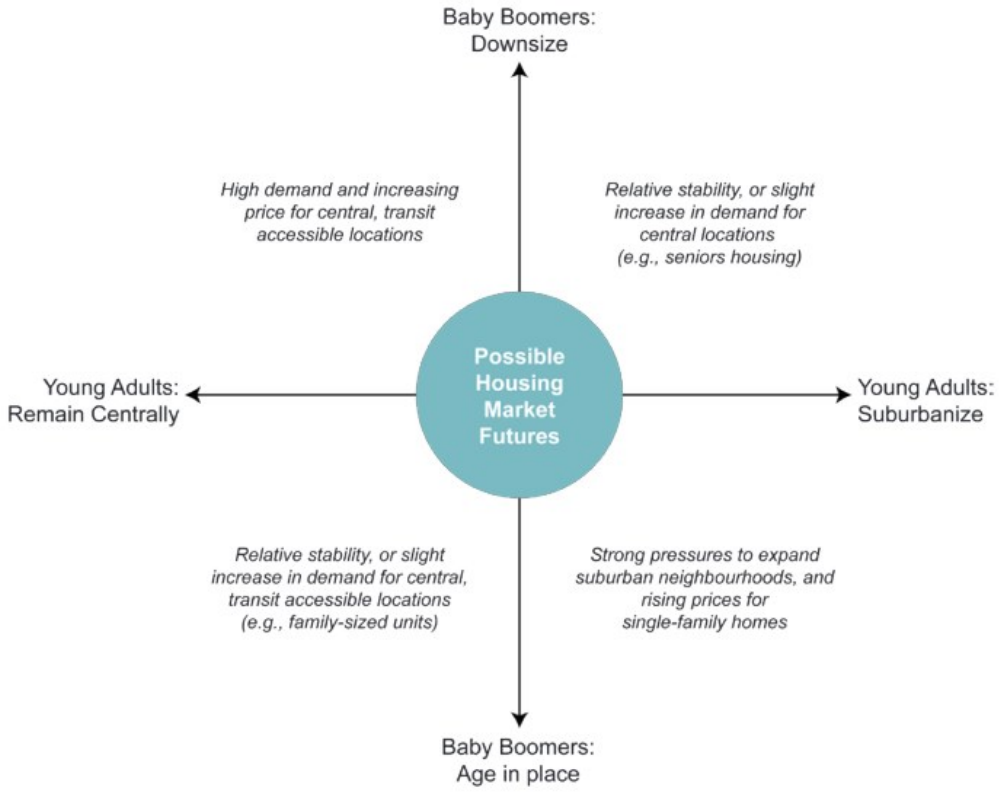

Figure 1 - Hypothetical future housing market outcomes (Reproduction of Figure 12 from Moos et al., 2015, p. 31 with corresponding author's permission)

The upside for planners of older adults ultimately leaving the housing market would be a releasing of housing supply for younger adults (Myers & Ryu, 2008). How this supply would match demand would again depend in each community on the location demands and choices of Millennials and Boomers as shown in Figure 1. The extent to which these specific housing preferences or needs are affected by availability or constrained by price shape whether those choices are realized (Pitkin, 1990).

Chapter 2: Methodology

The methodological approach of this thesis will be quantitative using publicly available statistical data collected by the United States and Canadian governments. This focus on publicly available data serves one of the important objectives of this thesis, which is to develop a method that can be replicated by local planning departments. The approach will progress in two phases, with results from the first phase informing design choices in the second phase.

The first phase explores the first research question: what are the similarities and differences between "peak Millennial" in Canada and the United States at the national level? In this phase, I reproduce and then replicate in a Canadian context most of Myers's (2016) study of coinciding demographic, housing, and economic cycles in the United States. I specifically compare "peak Millennial" (Myers, 2016, p. 1) in Canada and the United States as well as how the rise and fall of young adult cohort size at the entry point to the housing market has changed and how the rate of household formation by age and tenure has changed. In replicating Myers's (2016) study, I neither reproduce nor replicate national employment changes as they do not assist in answering the specific research questions of this thesis. However, I add an exploration of the net effects of immigration on the size of the young adult cohort nationally and locally in Canada. I do this to test whether it is reasonable to replicate in Canada Myers's exclusion of those effects in his United States-focused analysis. The findings from this first phase inform the methodological choices of the second phase.

In the second phase, I will construct a novel index of generational congestion to quantify the rate of change in the size of housing market demand attributable to demographic effects at the entry and exit stages of housing careers both nationally and locally. This effort answers the

second research question of this thesis: can changes in the cohort size of young adults be quantified at the level of the local housing market?

Throughout both of these phases, I need to define what I mean by Millennial. In the United States, Myers (2016) defines Millennials as those born between 1980 and 1999, which is statistically convenient given the timing of the decennial census and is what I will use when presenting United States data[2]. I define Canadian Millennials as those born between 1981 and 2000 as that is similarly statistically convenient given the timing of the Canadian census and as close as possible to the definition used by Myers for the United States.[3]

In this chapter, I discuss these two phases described briefly above in detail and in order. I focus in particular on detailing the methodological choices and the rational for those choices. I conclude by identifying the limitations of the analysis to come in subsequent chapters that arise from those methodological choices.

Reproducing and Replicating Myers

In the first phase, I reproduce Myers's (2016) study in the United States and then replicate it in a Canadian context.[4] I will begin by discussing the approach of assessing and declaring "peak Millennial" (Myers, 2016, p. 1) in Canada and the United States, which includes the choices of a specific age cohort for further review. I then discuss why adding a review of net immigration, including its local variation, in a Canadian context is an important addition to

[2] The U.S. Census Bureau's defines Millennials as those born between 1982 and 2000 (U.S. Census Bureau, 2015b), which varies slightly from Myers' more statistically convenient definition of 1980 to 1999.
[3] Personally, this definition means I am not a Canadian Millennial, but would be one if I moved to the United States.
[4] Reproducing means retrieving data from the original source and undertaking the analysis Myers (2016) described. Replicating means identifying similar Canadian sources to those used by Myers (2016) and undertaking that same analysis.

Myers's (2016) approach. I also highlight the results of this net immigration and local variation analysis from the next chapter as they inform the methodological choices of the second phase of this thesis described later in this chapter. Finally, I discuss the modification to reproducing Myers (2016) household formation approach and how I will reproduce his original approach in Canada. I again highlight the results of this household formation analysis from the next chapter as they inform the methodological choices of the second phase of this thesis described later in this chapter.

Peak Millennial

Myers (2016) first explored of the rise and fall of registered births over time in the United States using national vital statistics data from 1960 to 2013. 1990 had the largest number of registered births since the Baby Boom – a peak. As the 25-34 age bracket is of particular interest to housing researchers (Myers & Lee, 2016), Myers projected registered births forward 25 years, labeling 2015 "peak Millennial" as it occurred 25 years after the 1990 peak in births (Myers, 2016, p. 1). This projection excluded mortality, since it was nominal, and net immigration, since it has been relatively constant in the United States since 2000. The exclusion of net immigration would not, in Myers view, alter the underlying trend.

I will first reproduce Myers's work and then replicate this approach in Canada using Statistics Canada's estimates of births (specifically, Table 53-0001) from 1960-61 to 2013-14.[5] I then assess if and when "peak Millennial" occurred in Canada, replicating Myers's exclusion of

[5] Statistics Canada annualizes estimates of births from July 1 to June 30th instead of from January 1st to December 31st as is done by the National Centre for Health Statistics in the United States.

mortality and net immigration. I will compare these two graphs to identify if there is a Canadian "peak Millennial" and when that occurred in relation to the United States.

Based on the registered birth projection described above, Myers next calculated the annual percentage change in the size of the 25-29 age cohort between 1990 and 2034. This projection delineates the rise and fall in the number of young adults expected to be seeking entry into the housing market. The restriction of this analysis to those aged 25-29 rather than 25-34 is apparently due to Myers's (2016) assessment that the former better represent renters competing for the same apartments. I will repeat these calculations for those aged 25-29 in the United States and make them in Canada, comparing and contrasting how the young adult cohort size rises and falls in Canada and the United States.

Net Immigration and Local Variation

While Myers (2016) states that immigration has been flat to declining in the United States since 2000, this needs to be assessed in Canada before drawing conclusions from the replication of Myers's study. I will review the change in cohort size for those aged 25 to 29 by immigration status between each census period from 1991 to 2006 using long-form census data and 2011 NHS data retrieved from CHASS. Since this thesis also aims to provide useful tools and analysis for local planners, the percentage of those aged 25 to 29 who are immigrants will also be reviewed for mid-sized and large metropolitan areas. The rationale for this particular selection of metropolitan is discussed later in this chapter. The results from this analysis further confirm the importance of understanding demographic change effects at a local level, as these can vary substantially from national level changes.

Household Formation

Myers identified what he termed "congestion" (Myers, 2016, p. 12) in the rental housing market based on a review of household formation rates by age group and tenure. Using data from the 2000 census and the 2006 and 2013 American Community Survey (ACS),[6] he calculated the ratio of household heads to total population, or the headship rate, for each five year age group between age 20 and 44. He then plotted the ratio of the headship rate in 2006 and 2011 to the base year of 2000 to identify how they had changed for all households as well as for both rental and owner households. This analysis showed the rate of owner households declined for all households in 2013 relative to 2006 or 2000 but particularly so for those under 30. At the same time, the rate of renter households increased for those 30 and older while the headship rate for those under 30 declined.

I will first reproduce Myers's work and then replicate his approach in Canada to assess whether similar congestion may have been present in Canada, which did not experience the same housing collapse during the 2008 Great Recession as did the United States. The reproduction will use 10-year age ranges rather than Myers's 5-year age ranges given only 10-year age ranges are available in publicly produced tables.[7] The replication will use short-form census data for population and long-form census data retrieved from CHASS for household headship by age data in 2001, 2006, and 2011.[8] These dates are as close to Myers's choices as

[6] Myers (2016) argued these were the appropriate time periods as the most recent rise in the number of young adults in the United States began in 2000 while 2006 and 2013 provided data points on either side of the Great Recession of 2008.

[7] Age ranges used in Census Summary File and ACS 1-Year Table B25 are 15-24, 25-34, 35-44 rather than 20-24, 25-29, 30-34, 35-39, and 40-44 constructed by Myers.

[8] Data from the 2011 NHS, as a voluntary survey, may be biased against lower income and minority respondents (see for example Green & Milligan, 2010). Thankfully, the 2016 census was again compulsory.

possible given the timing differences of data collection between Canada and the United States, and they also match Myers' original five-year age ranges.

The results of this analysis indicate household formation patterns were different in Canada than in the United States as only those aged 20 to 24 experiencing a decline in household formation overall while, at the same time, those aged 20 to 29 experienced an increase in the rate of owner households. Congestion, then, could be different in Canada than in the United States and requires further exposition.

Index of Generational Congestion

The results of the first phase of this thesis, described methodologically in the preceding section, inform the methodological choices of this second phase. In that first phase, I focused on the rise and fall in the number of young adults entering the housing market at the national level. Exploring net immigration in Canada confirmed a different experience than in the United States, but also showed significant local variation that must be added to any analysis of generational congestion. The literature review also explored the housing transitions of older adults, which Myers's study did not consider in assessing congestion. Any added pressure from net new young adults in a market may be eased by older adults exiting the market.

In this second phase, I develop a novel index of generational congestion to quantify changes in cohort sizes at ages of particular interest to housing researchers as well as local policymakers and planners. I will begin by describing what I mean by local housing markets and provide an overview of the model used for assessing housing market demand from the perspective of generational congestion. I will then review the rationale for selecting specific age

groups, followed by the data required to construct the index. Next, I will describe how to calculate and interpret the index of generational congestion. Finally, I will select specific time periods and metropolitan areas to calculate this new index, concluding with some specific limitations.

Local Housing Markets and the Generational Congestion Model

Statistically, the regional level for housing markets best fit the delineations of metropolitan areas: metropolitan statistical areas (MSAs) in the United States, and census metropolitan areas (CMAs) in Canada.[9] Using MSAs and CMAs also ensures socio-economic data is available over the same time period and geography, allowing researchers, and local planners, to conduct multivariate analysis to test the relative impact of generational congestion against other socio-economic factors impacting housing markets.

This thesis' generational congestion index models these demographic change and migration factors through both an "entry" and "exit" component at the local housing market level (Figure 2). It is normalized to changes in people and households in the whole market to ensure the model isolates these generational entry and exit effects for local planners and policymakers.[10]

Conceptually, and focused solely on generationally-driven changes in demand, it is better for young adults when the number of young adults entering the housing market declines and/or when the number of older adults exiting the housing market increases.

[9] Both CMAs and MSAs are geographical areas defined around an urban core area with a population of at least 50,000 and where there is a high degree of social and economic integration of municipalities and counties respectively as measured by commuting patterns (Statistics Canada, 2015a; U.S. Census Bureau, n.d.).
[10] For example, if a metropolitan area experiences a 10% rise in the young adult population but its adult population also climbs by 10%, the housing market can be congested but not generationally congested.

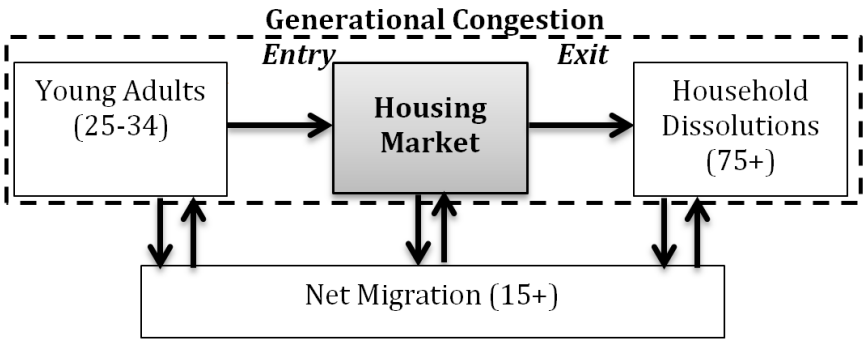

Figure 2 - Generational Congestion Housing Demand Model

Age Group Selection

In his study, Myers (2016) primarily identified young adults as those aged 25 to 34, except when assessing rental apartment competition, where he focused on those aged 25 to 29. This thesis will use age 25 to 34 for consistency with the housing literature and because the index constructed is for the overall housing market rather than by tenure. While individuals may choose to enter the housing market earlier or later than age 25 to 34, the literature supports focusing in aggregate on this specific age group as the primary generators of new housing demand, both for rental and ownership tenure.

For the purpose of the index, I define the older adult population as those aged 75 or older as this is the age range used by the Canada Mortgage and Housing Corporation when assessing household dissolutions (Gabay, 2013). Myers and Ryu's (2008) estimates of home buying and selling by age in the United States are reasonably consistent with CMHC's cutoff. While not all older adults leave the housing market due to entering care facilities or due to mortality, the literature supports focusing in aggregate on this specific age group as the primary contributors to a reduction in total housing demand. As discussed later in the subsection on

calculating generational congestion, only the actual aggregate reduction in housing demanded within a particular geographic area is counted in the index.

Data Requirements

As local planners and policymakers are among the intended end users of this index, it is primarily constructed from publicly available, easily accessible, familiar data sources. Table 1 outlines these data sources and their availability for both Canada and the United States.

Publicly available data sources for the United States include the decennial Census for population (15+ and 25-34) and household heads (15+, 65+, and 75+) by MSA, as well as the ACS (1-Yr) since 2005. Publicly available data sources for Canada include the Census for population (15+ and 25-34) and household heads (15+. 65+, and 75+) by CMA every five years, except 2011 where this data is available instead from the National Household Survey[11]. Household heads (70+) by CMA is also publicly available from the 2011 National Household Survey, while they are available for 1991, 1996, 2001, and 2006 to researchers at post-secondary institutions participating in Statistics Canada's Data Liberation Initiative (see Statistics Canada, 2017 for a list of participating institutions).

In this thesis, I gathered the required Canadian household heads data across all required age ranges and selected CMAs through CHASS, the University of Toronto's microdata analysis tool. Planners could purchase this data as part of their existing census data purchases, or they could cooperate with their local institutions to access this information, but as the required age ranges became publicly available for the first time in 2011, it is reasonable to anticipated that

[11] Unfortunately the 2011 NHS, as a voluntary survey, may be biased against lower income and minority respondents (see for example Green & Milligan, 2010). Thankfully, the long form 2016 Census of Canada was again mandatory.

these will regularly be available in future censuses and so will become accessible without cost for local planners moving forward.

Table 1 - Generational Congestion Data Requirements and Availability in Canada and the United States

Country	Data Required	Data Source	Year Available (since 1990)
Canada	Population by CMA:		
	15+, 25-34	Census	1991, 1996, 2001, 2006, 2011
	Household heads by CMA:		
	15+, 65+, 75+	Census	1991, 1996, 2001, 2006
		NHS	2011
	70+	NHS	2011
		Census (CHASS)	1991, 1996, 2001, 2006
United States	Population by MSA:		
	15+, 25-34	Census	1990, 2000, 2010
		ACS (1-Yr)	2005 – 2015
		ACS (5-Yr)	2010 – 2015
	Household heads by MSA:		
	15+, 65+, 75+	Census	1990, 2000, 2010
		ACS (1-Yr)	2005 – 2015
		ACS (5-Yr)	2010 – 2015
	70+	**N/A**	**N/A**

Reviewing the available data in Canada and the United States, there are two key data differences: collection frequency and five year household head age groups.

On the collection frequency, the census in Canada occurs every five years, while the United States census occurs every ten years. The United States Census Bureau also releases annual data from the ACS beginning in 2005 for areas larger than 65,000 people and for all areas since 2010.[12]

Myers's (2016) research on generational congestion used a five year rolling average of change in the size of the young adult population. The index therefore uses census data in Canada and ACS data in the United States for local metropolitan area calculations to be

[12] This data is continuously collected, rather than at one particular time in the year, and provides a statistically valid sample for regions larger than 65,000 annually and for all areas every five years. As the sample is rolling, updated 1-year estimates for regions larger than 65,000 and 5-year estimates for all regions are released every year (U.S. Census Bureau, 2008).

consistent with measuring changes over five year periods. This interval should provide enough time to recognize changes over a short enough period to be useful for local policymakers and planners.

On the five year household head age groups, ACS data for the United States are released in publicly available tables with ten year age groups while publicly available tables for Canadian census data have recently provided five year age groups with prior census data being publicly available for municipal planners through purchase or cooperation with post-secondary institutions.

Calculating Generational Congestion

Based on the model in Figure 2 and the preceding discussion of data availability, calculations for both the entry and exit components of this thesis' generational congestion index are provided in Table 2. If all other factors held constant in the geographic area, the anticipated effect from different generational congestion results on young adult's ability to enter the housing market is summarized in Table 3.

On the entry side (generational entry congestion), the change in young adults (aged 25-34), which includes natural aging and net migration, is normalized against the change in the total population potentially seeking housing. This normalization allows planners and policymakers to understand generational entry congestion in the broader context of all population changes in their metropolitan area. Data collected would include the effects of net migration and so do not need to be separately obtained or calculated. Population rather than

the number of households is used to avoid undercounting young adults living at home or with roommates due to affordability concerns (Lee & Painter, 2013).

Table 2 - Generational Congestion Calculations

	Population Description	**Generational Congestion Index Calculation**
Generational Entry Congestion	Relative Change of Young Adults (25-34) to all Adults (15+)	$\left(\frac{P_t^{25-34}}{P_t^{15+}}\right) \Big/ \left(\frac{P_{t-5}^{25-34}}{P_{t-5}^{15+}}\right)$
Generational Exit Decongestion	Relative Change in Older Adult-led Household Dissolutions (75+) to all Households (15+)	$\left(\frac{HH_{t-5}^{70+} - HH_t^{75+}}{HH_t^{15+}}\right) \Big/ \left(\frac{HH_{t-10}^{70+} - HH_{t-5}^{75+}}{HH_{t-5}^{15+}}\right)$
Combined Generational Congestion	Change in Young Adults (25-34) to Change in Older Adult-led Household Dissolutions (75+), Relative to Change in all Adults and all Households (15+)	$\frac{Generational\ Entry\ Congestion}{Generational\ Exit\ Decongestion}$
Where P_t^c *is the population of age group* c *at time* t; HH_t^c *is the number households headed by age group* c *at time* t		

Table 3 – Anticipated effect from generational congestion on young adult's ability to enter the housing market

When <below> index is…	**…greater than 1**	**…less than 1**
Generational Entry Congestion	Harder to enter	Easier to enter
Generational Exit Decongestion	Easier to enter	Harder to enter
Combined Generational Congestion	Harder to enter	Easier to enter

As I briefly discussed when describing the generational congestion model above, the index is normalized to the total adult population or households so that planners and policymakers focus on the specific generational changes in their local housing markets. In determining the age for an adult population, the index must be consistent for population and households. Statistical agencies in Canada and the United States begin counting household

heads at age 15. While there are few household heads aged 15, the 15-19 age group includes high school graduates that may leave the parental household for work or school. For consistency, age 15 is thus used as the lower bound for both household heads and the adult population potentially seeking to form households in an area.

The construction of the index as a ratio quickly shows a rate of change, allowing comparisons of different sized regions as well as changes in rates of change in other factors affecting housing affordability as part of a multivariate analysis. When generational entry congestion in a metropolitan area is greater than one, the size of the young adult population has increased compared with five years prior relative to the size of the adult population as a whole. This indicates an increase in generational entry congestion, which would make it harder for young adults to enter the housing market. When the result is less than one, the size has decreased, indicating a decrease in generational entry congestion. This would make it easier for young adults to enter the housing market.

On the exit side (generational exit decongestion), the model focuses on household dissolutions, or households leaving the private housing market, which occurs primarily due to mortality or moving into care facilities. Any added pressure from net new young adults in a market – its generational entry congestion – may be eased by older adults exiting the market.

Calculating household dissolutions is similar to using the cohort-component projection method,[13] except the data points are in the present and the past rather than the future.

[13] The cohort-component project method uses the existing population by age group and projects that group forward in time, less age-specific mortality rates , and adjusted by past age-specific net migration rates. This approach is usually visualized in population pyramids, with an age group moving up the pyramid over time. The lowest level on the pyramid represents those born since the last period, adjusted by net migration, and is calculated based on age-specific fertility rates (for a full review, see Klosterman, 1990, pp. 49–109).

Dissolutions are measured for those households headed by individuals aged 75 and older (Gabay, 2013).

The number of household dissolutions among older adults over a five-year period is calculated as the difference between the number of households aged 70 and older five years ago and the number of households aged 75 and older today. These moves out of the housing market are the only moves captured in the calculation, which means both those aging in place and those downsizing to another unit in the same housing market remain counted in the overall number of households. This is not precisely a household dissolution measurement, however, as it includes net migration, likely from retirement moves (Myers & Ryu, 2008), and the net effects of couples forming and dissolving, which fully captures the effect on housing demand. This dissolution rate is normalized against the change in all households. This normalization again allows planners and policymakers to understand generational exit congestion in the broader context of all household changes in their metropolitan area.

Interpreting the exit component is the inverse of the entry component in terms of its effect on congestion. A rate greater than one represents an increased rate of household dissolutions, which creates decongestion in the metropolitan area. Provided young adults could access this supply of housing,[14] this decongestion would make it easier for young adults to enter the housing market. A rate less than one indicates a slowing rate of household dissolutions, which increases generational congestion and would make it harder for young adults to enter the housing market.

[14] This access to supply would either be through direct purchase or through a filtering process in the market, where others already in the market move into this new supply and free up housing for young adults to access.

The lack of five-year age groupings of household heads in the ACS prevents the construction of the exit component in the United States on the basis of a five year rate of change. While it would be possible to construct this component from 10-year census data, that approach is not presented in this thesis as it would not be consistent with the other components of the index or with Myers's (2016) approach to measuring changes in the young adult cohort size on which this thesis builds.

Relating the two components to create a combined index of generational congestion can be obtained by dividing the entry component by the exit component, at least in Canada. Similar to the entry component, a result greater than one means an increase in generational congestion making housing market entry harder for young adults while a result less than one means a decrease in generational congestion making housing market entry easier for young adults.

Selecting Time Periods

Myers's (2016) reviewed congestion in housing markets in 2000, 2006, and 2011. He argued these were the appropriate time periods as the most recent rise in the number of young adults in the United States began in 2000 while 2006 and 2011 provided data points on either side of the Great Recession of 2008.

In the United States, as discussed previously and in Table 1, data to calculate the change from five years prior is available nationally for 2005 and then annually from 2010 onwards. Unfortunately, the hierarchy and coding system for MSAs changed in 2005, so local level five-year data is only readily available annually from 2010 onwards. This means that the index can

be calculated for generational entry congestion from 2010 to 2015 inclusive and measures congestion changes relative to five years prior (2005 to 2009).

In Canada, data to calculate the change from five years prior is available nationally and is available in CMAs for researchers at Data Liberation Initiative partners in 1991, 1996, 2001, 2006, and 2011. I will focus on 2001, 2006, and 2011 as these dates align with the time periods covered by Myers (2016). The indices (generational entry congestion, generational exit decongestion, and combined generational congestion) measures congestion changes relative to five years prior, or 1996, 2001, and 2006.

Selecting Metropolitan Areas

The index of generational congestion is applied in this thesis to metropolitan areas (CMAs in Canada, MSAs in the United States) that were larger than 500,000 people in 2015. Smaller communities are excluded since housing market and demographic trends play out quite differently in small as opposed to medium and large metropolitan areas (Chow, 1981; Erickcek & McKinney, 2006). Selecting metropolitan areas of at least 500,000 people also provides broader insights into mid-sized areas that are not as well covered in urban and planning research (Filion, Bunting, Frenette, Curry, & Mattice, 2000). This allows those local planners and policymakers to study and observe how generational congestion applies in their context rather than debate whether research from the largest, more frequently studied, metropolitan areas apply to them.

The 11 Canadian CMAs (Table 4) have experienced modest geographic changes over time, usually through small expansions into adjacent areas. These additions are not accounted

for when calculating generational congestion. Geographic names have also changed, so the name used in this thesis is from the 2011 census.

Table 4 - List of Canadian Census Metropolitan Areas with over 500,000 population in 2015

Quebec, QC	Hamilton, ON	Calgary, AB
Montreal, QC	Kitchener-Cambridge-Waterloo, ON	Edmonton, AB
Ottawa-Gatineau, ON-QC	London, ON	Vancouver, BC
Toronto, ON	Winnipeg, MB	

The 107 MSAs in the United States (Table 5) have also experienced name boundary changes several times over the period presented above, including absorbing and discarding counties and micropolitan statistical areas[15]. The names used reflect those used in the 2015 ACS. Adjustments have been made when calculating generational congestion to reflect 2015 boundaries to the extent possible, as ACS 1-Yr data is valid only where a county is larger than 65,000 persons. These adjustments are catalogued in Appendix A.

Table 5 - List of United States Metropolitan Statistical Areas with over 500,000 population in 2015

Akron, OH	Greensboro-High Point, NC	Phoenix-Mesa-Scottsdale, AZ
Albany-Schenectady-Troy, NY	Greenville-Anderson-Mauldin, SC	Pittsburgh, PA
Albuquerque, NM	Harrisburg-Carlisle, PA	Portland-South Portland, ME
Allentown-Bethlehem-Easton, PA-NJ	Hartford-West Hartford-East Hartford, CT	Portland-Vancouver-Hillsboro, OR-WA
Atlanta-Sandy Springs-Roswell, GA	Houston-The Woodlands-Sugar Land, TX	Providence-Warwick, RI-MA
Augusta-Richmond County, GA-SC	Indianapolis-Carmel-Anderson, IN	Provo-Orem, UT
Austin-Round Rock, TX	Jackson, MS	Raleigh, NC
Bakersfield, CA	Jacksonville, FL	Richmond, VA
Baltimore-Columbia-Towson, MD	Kansas City, MO-KS	Riverside-San Bernardino-Ontario, CA
Baton Rouge, LA	Knoxville, TN	Rochester, NY
Birmingham-Hoover, AL	Lakeland-Winter Haven, FL	Sacramento--Roseville--Arden-Arcade, CA
Boise City, ID	Lancaster, PA	St. Louis, MO-IL

[15] Micropolitan statistical areas are defined in the same way as metropolitan statistical areas, except that they contain at least one urbanized area of between 10,000 and 50,000 people instead of at least one urbanized area of at least 50,000 people (U.S. Census Bureau, n.d.).

Boston-Cambridge-Newton, MA-NH	Las Vegas-Henderson-Paradise, NV	Salt Lake City, UT
Bridgeport-Stamford-Norwalk, CT	Lexington-Fayette, KY	San Antonio-New Braunfels, TX
Buffalo-Cheektowaga-Niagara Falls, NY	Little Rock-North Little Rock-Conway, AR	San Diego-Carlsbad, CA
Cape Coral-Fort Myers, FL	Los Angeles-Long Beach-Anaheim, CA	San Francisco-Oakland-Hayward, CA
Charleston-North Charleston, SC	Louisville/Jefferson County, KY-IN	San Jose-Sunnyvale-Santa Clara, CA
Charlotte-Concord-Gastonia, NC-SC	Madison, WI	Santa Rosa, CA
Chattanooga, TN-GA	McAllen-Edinburg-Mission, TX	Scranton--Wilkes-Barre--Hazleton, PA
Chicago-Naperville-Elgin, IL-IN-WI	Memphis, TN-MS-AR	Seattle-Tacoma-Bellevue, WA
Cincinnati, OH-KY-IN	Miami-Fort Lauderdale-West Palm Beach, FL	Spokane-Spokane Valley, WA
Cleveland-Elyria, OH	Milwaukee-Waukesha-West Allis, WI	Springfield, MA
Colorado Springs, CO	Minneapolis-St. Paul-Bloomington, MN-WI	Stockton-Lodi, CA
Columbia, SC	Modesto, CA	Syracuse, NY
Columbus, OH	Nashville-Davidson--Murfreesboro--Franklin, TN	Tampa-St. Petersburg-Clearwater, FL
Dallas-Fort Worth-Arlington, TX	New Haven-Milford, CT	Toledo, OH
Dayton, OH	New Orleans-Metairie, LA	Tucson, AZ
Deltona-Daytona Beach-Ormond Beach, FL	New York-Newark-Jersey City, NY-NJ-PA	Tulsa, OK
Denver-Aurora-Lakewood, CO	North Port-Sarasota-Bradenton, FL	Urban Honolulu, HI
Des Moines-West Des Moines, IA	Ogden-Clearfield, UT	Virginia Beach-Norfolk-Newport News, VA-NC
Detroit-Warren-Dearborn, MI	Oklahoma City, OK	Washington-Arlington-Alexandria, DC-VA-MD-WV
Durham-Chapel Hill, NC	Omaha-Council Bluffs, NE-IA	Wichita, KS
El Paso, TX	Orlando-Kissimmee-Sanford, FL	Winston-Salem, NC
Fayetteville-Springdale-Rogers, AR-MO	Oxnard-Thousand Oaks-Ventura, CA	Worcester, MA-CT
Fresno, CA	Palm Bay-Melbourne-Titusville, FL	Youngstown-Warren-Boardman, OH-PA
Grand Rapids-Wyoming, MI	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	

Analysis

In the United States, the results from the 107 MSAs will be displayed in box plots to identify the interquartile range, the 5th to 95th percentile range, the median, and the average. The national average will also be plotted over this time period. This aggregation will also be performed by census region to identify regional variations in distribution and as regional averages. Finally, the MSAs will be reviewed to identify those with consistently increasing or decreasing generational entry congestion to further facilitate explaining those locally specific trends.

In Canada, the results from the 11 CMAs are not numerous enough to create a 5th to 95th percentile range in a traditional box plot. Modifying the traditional box plot to include all data points is reasonable to demonstrate the variation across all studied CMAs for entry, exit, and combined generational congestion.

Limitations

Form of Housing Demand

The indices measure changes at the metropolitan level, both in terms of potential housing units demanded by new young adult entrants based on population and of the actual reduction in housing units demanded by aging older adults exiting the metropolitan housing market. It does not capture the form of housing demanded, and so cannot describe the extent to which the available mix of housing supply matches the type, tenure, size, quality, or price of housing demanded. The differences in tenure among young adults in the United States and Canada from Chapter 3 suggest the match of supply to demand would differ by country.

On the new entrant side, it cannot capture the specific housing demanded, which may change for each individual based on a variety of factors other than congestion-induced supply shortages and price increases.

On the exit side, the index does not measure the desire of an older adult to leave the housing market, whether that is an unmet desire due to the unaffordability of care facilities or their desire was to remain but a move to a care facility was required due to health reasons or family pressure. Those exits from the local housing market may also be a migration to another jurisdiction, likely retirement into the Sunbelt, and so can only be described as exits from that specific local housing market and not necessarily the housing market as a whole.

Location of Housing Congestion

Metropolitan areas are necessarily large, and so it is reasonable to infer there could be metropolitan areas where generational entry congestion or exit decongestion is not present overall but is happening in what Moos (2014b, 2015) describes as "youthified" neighbourhoods or in "generationed space." So, while those youthified areas and generationed spaces may contribute to a combined generational congestion at the metropolitan level, I cannot draw neighbourhood-level conclusions from the indices.

Precision

The index as constructed can be skewed by teenagers aging into the 15 to 19 age group while remaining in their parental home, potentially understating generational entry congestion. The alternative of excluding this group from the total population would undercount those who do form households and would deviate from government statistical agencies' practices of beginning to count household heads from age 15.

Some metropolitan areas may have a significant number of post-secondary students who are recorded in the census or ACS as living at a parental home in another community. This undercount of local housing demand in their educational community could potentially overstate generational congestion back in their originating community. As local planners and policymakers would certainly be aware of this census and ACS data limitation and make adjustments for it, they would need to do the same for the data used in the index.

Generational Exit Decongestion in the United States

Publicly available tables from the ACS and census only provide ten year age ranges for household heads rather than the five year age groups that were Myers's focus. This limitation in the United States prevents the calculation of a generational exit decongestion index over five-year intervals. If ten year intervals were used instead and given the requirement of two consecutive intervals to calculate generational exit decongestion, the decennial census would provide that data instead of the American Community Survey. As this would reduce the frequency of available data for local planners and policymakers, and as five-year age ranges are available in Canada, a ten-year interval was not chosen. This limits the ability to draw conclusions about both combined generational congestion and generational exit decongestion in the United States or to make comparisons in this area between the United States and Canada.

Selection of Metropolitan Areas

While the statistical definition of metropolitan areas (CMAs in Canada and MSAs in the United States) are based on economic and commuting relationships that are reasonable to

equate to local housing markets, this may not be the case in all metropolitan areas reviewed with an unknown quantum of error in the results.

The restriction of analysis to those mid-sized and metropolitan areas with a population of at least 500,000 in 2015 means that no conclusions can be drawn about what, if any, generational congestion is happening in smaller communities.

Metropolitan Boundaries

Changing metropolitan boundaries over time may cause an error in the calculations of generational congestion as populations and households may not be calculated over the same geography. While adjustments have been made where possible in the United States, where counties added or removed from MSAs were smaller than 65,000 people, ACS 1-year data is not available to permit adjustments. In a Canadian context, no adjustments were made to account for CMA boundary changes, which for the most part were small additions from expanding urban boundaries rather than new inclusions of whole counties. In both cases, the effect on calculated indices should be minor, but may have an effect on the weight of conclusions in these local jurisdictions, particularly those identified in Appendix A.

Local planners and policymakers in Canada and the United States ought to be in a better position to understand how to manage these errors as they understand their specific geographies and how to adjust for national statistical collection changes.

Housing Affordability

Finally, generational congestion as calculated by these indices may affect housing affordability in local markets, but that relationship is not assessed in this thesis. That research is an important next step, but is beyond the scope of this thesis.

Chapter 3: Reproducing and Replicating Myers

In this chapter, I explore the similarities and differences between "peak Millennial" in Canada and the United States at the national level. I do this by reproducing and then replicating in a Canadian context most of Myers's (2016) study of coinciding demographic, housing, and economic cycles in the United States. First, I will reproduce Myers's "peak Millennial" (Myers, 2016, p. 1) work in the United States and then replicate it in Canada. Second, I will reproduce Myers's work to map the rise and fall of the young adult cohort size at the entry point to the housing market and then replicate that approach in Canada. Third, I add an exploration of the net effects of immigration on the size of the young adult cohort nationally and locally in Canada to test whether it is reasonable to replicate in Canada Myers's exclusion of those effects in his United States-focused analysis. Fourth, I will reproduce Myers's analysis of changes in the rate of household formation by age and tenure in the United States and then replicate it in Canada. In all of these stages, I will assess the similarities and differences between the two countries. Finally, I will identify conclusions from this analysis that affect the second phase of this thesis: creating an index of generational congestion. These conclusions also assess the utility of the concept of "peak Millennial" for local planners and policymakers.

Peak Millennial in the United States and Canada

Myers's (2016) exploration of the rise and fall of registered births in the United States between 1960 and 2013 is reproduced here in Figure 3[16]. As Myers found, registered births in the United States had sharply declined from a Baby Boomer high of 4,268,326 in 1961 to a low

[16] As described earlier in the Methodology chapter, reproducing means retrieving data from the original source and undertaking the analysis Myers (2016) described.

of 3,136,965 in 1973. Births then rose steadily, hitting a peak of 4,158,212 in 1990. It was this group born in 1990 that Myers called "peak Millennial" when they reached the 25-29 age group in 2015 (Myers, 2016, p. 1). After 1990, births edged off slightly over the next decade to 3,880,894 in 1997 before bouncing back to even higher than "peak Millennial" at 4,316,233 in 2007. This suggests a more prominent "peak Generation Z" born in 2007.[17]

When I construct the Canadian picture, I find that there are similarities in the timing of a peak but also important differences surrounding that peak (Figure 4). Over the same period,[18] births were highest in 1960-61 at 479,419 then declined much more sharply than in the United States to 1967-68, finally hitting a low of 342,446 in 1973-74. This low point was at the same time as in the United States. However, births only rose modestly in Canada after that to a high of about 376,265 in 1984-85 before actually reducing until 1987-88. Births then quickly spiked to peaks of 403,280 in 1989-90, 402,929 in 1990-91, and 403,127 in 1991-92. These three years would be the Canadian "peak Millennial" when they reach the 25-29 age group in 2014-17 and surround similar points (1990/2015) in the United States. In contrast, births then fell sharply to 327,107 in 2000-01, much lower than the post-Boomer low point in the 1970s. Births then recover to 379,290 in 2008-09, which is still lower than the Canadian "peak Millennial" and in contrast with the more than full recovery in the United States.

[17] Generation Z generally describes those born after the Millennial generation, which is from as early as 1995 to the early 2000s, is a relatively new construct that has particularly become a focus of marketing agencies (see for example Kingston, 2014; Williams, 2015)

[18] This is not precisely the same period as Statistics Canada annualizes estimates of births from July 1 to June 30th instead of from January 1st to December 31st as is done by the National Centre for Health Statistics in the United States. The Canadian data, therefore, begins 6 months later than the data from the United States; hence the first year in Canada is identified as 1960-61 while the first year in the United States is 1960.

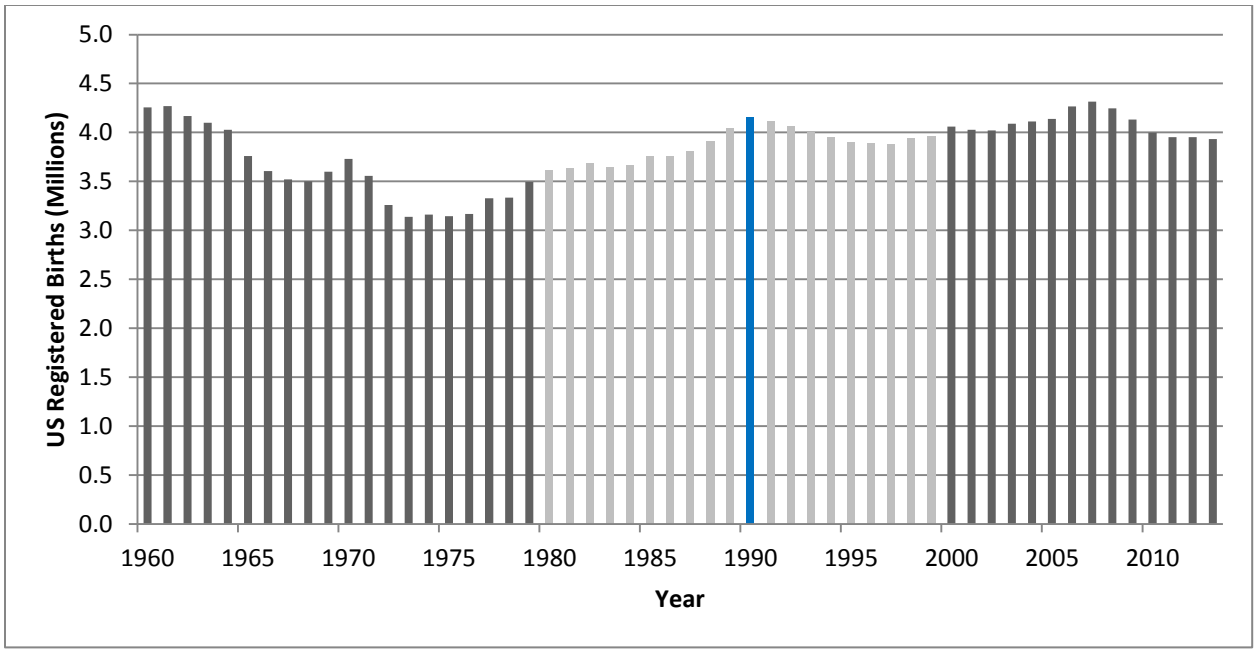

Figure 3 - Annual Registered Births in the US, 1960 to 2013 (Millennials in light gray, Peak Millennial in blue). Author's reconstruction (based on "National Vital Statistics Reports, Volume 64, Number 1," 2015, Table 1).

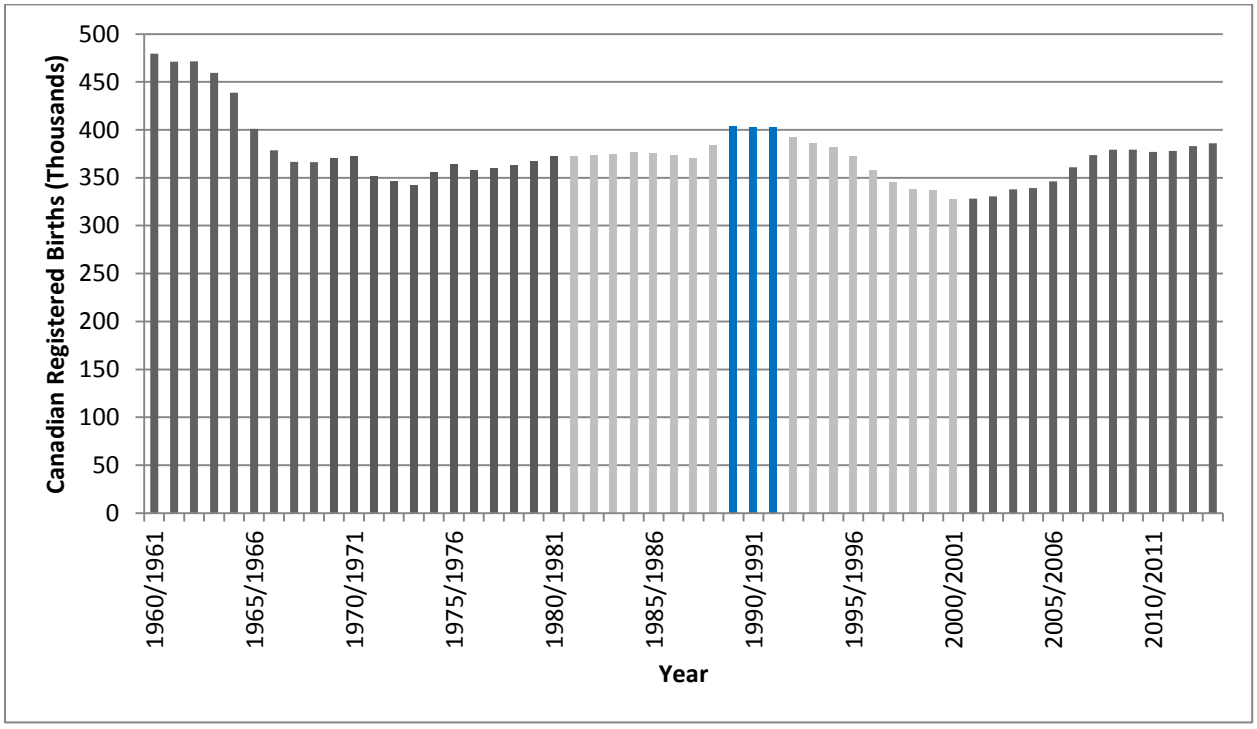

Figure 4 - Annual Registered Births in Canada, 1960/61 to 2013/14 (Millennials in light gray, Peak Millennial in blue). Author's construction (based on Statistics Canada, 2016, Table 053-0001).

The Rise and Fall of the Young Adult Cohort

Based on negligible mortality rates and relatively flat to declining immigration in the United States, Myers (2016) projected the annual change of the 25-29 age cohort over time. His work is reproduced here in Figure 5. The 1990s were a time of decline in the size of this critical age group at around 2% per year, while the arrival of the Millennial generation has seen increases peaking at just under 3% in 2015, 25 years after registered births also peaked in 1990. The 25-29 age cohort will continue to grow at a lower rate through 2018, making it the actual year of "peak Millennial" instead of 2015. For 2019 to 2023, this age cohort shrinks by an average of 0.81% per year prior to growing again at an average of 0.75% per year. Notwithstanding this small decline followed by sustained growth, Myers suggested that passing "peak Millennial" in 2015 could end (or at least slow) the urban renaissance in downtown cores given the slowing pace of new arrivals at the entry point to the housing market (Delgadillo, 2016).

The Canadian data, shown in Figure 6, shows some drastic differences to the United States. Excluding mortality and net immigration effects as Myers did, the period from the late 1990s through the mid-2000s saw modest growth, rather than decline, in the 25-29 age cohort at around 0.7%. While this growth approximately doubles with the arrival of the Millennials, it then falls sharply as the generation ages. The turning point coincides with Canadian "peak Millennial" in 2015 when the annual change becomes negative and ultimately declines at a rate of 2.5% per year between 2017-18 and 2021-22. Growth then returns in 2025-26 at much higher growth rate than during the "peak Millennial" period, reaching 2.5% in 2028-29.

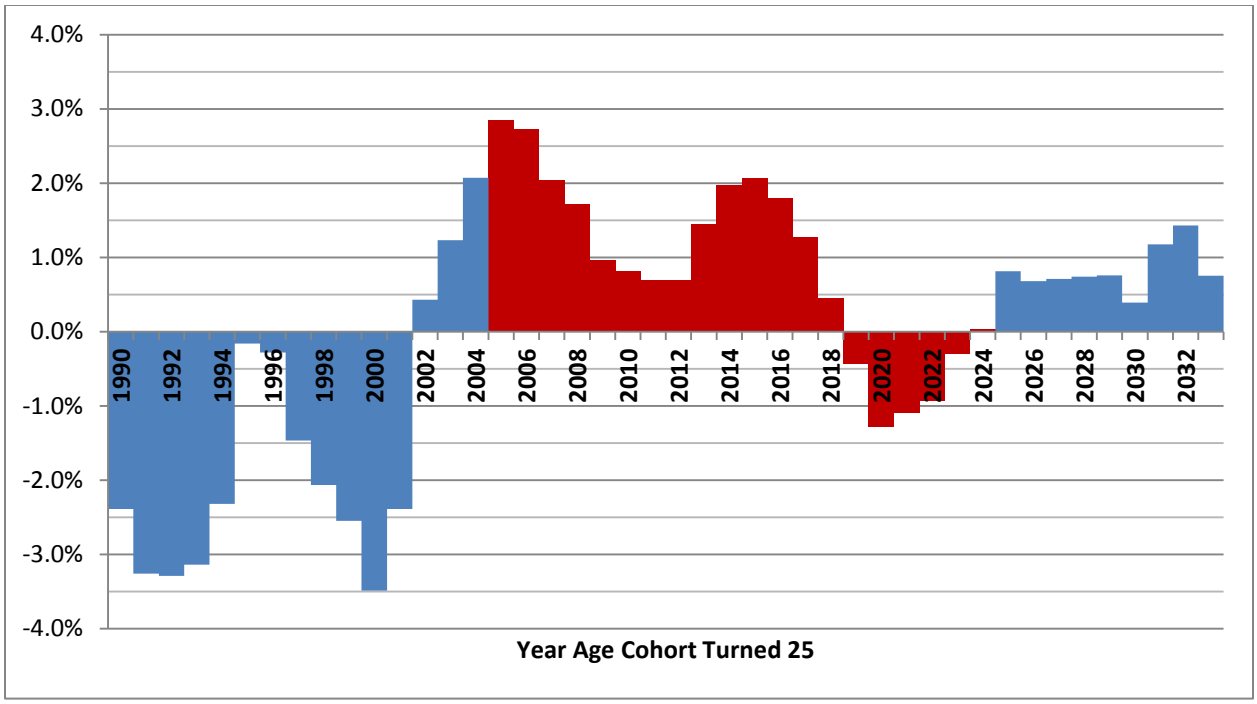

Figure 5 - Annual % Change in Size of 25-29 Age Group in the US (Millennials in Red). Author's reconstruction (based on "National Vital Statistics Reports, Volume 64, Number 1," 2015, Table 1). Presentation assumes full survival and ignores net immigration.

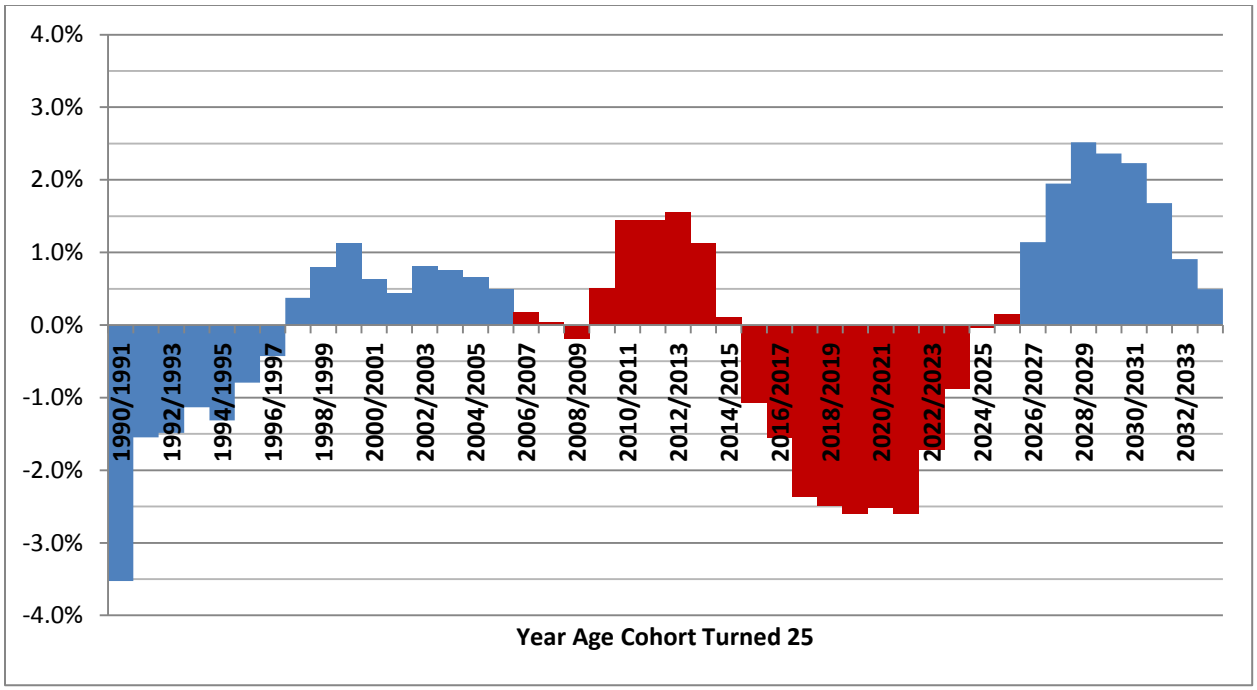

Figure 6 - Annual % Change in Size of 25-29 Age Group in Canada (Millennials in red). Author's construction (based on Statistics Canada, 2015b, Table 051-0013). Presentation assumes full survival and ignores net immigration.

While both countries reached “peak Millennial” in or near 2015, the overall shape is almost a mirror image – a valley followed by a peak and a relative plateau in the U.S., and a relative plateau followed by a peak and a deep valley in Canada. Though Myers’s predicted the end of an urban renaissance from a very small decline in the size of the young adult cohort starting three years later than his date of “peak Millennial”, the Canadian story may be a far better match. But is it reasonable to ignore the effects of net immigration on the overall trend in Canada as Myers did in the United States?

Net Immigration and Local Variation

Myers (2016) stated that immigration has been flat to declining in the United States since 2000 and so projecting trends from registered births forward was reasonable. However, whether and how immigration has changed in Canada needs to be assessed before drawing conclusions from the Canadian replication of Myers’s “peak Millennial” analysis in this chapter.

Understanding the role of immigration includes a review of emigration, as it is net immigration that affects total population levels. Canadian immigration, emigration, and net immigration data is provided in Figure 7. Net immigration rose substantially from the mid-1980s, and has varied between approximately 125,000 and 220,000 but has generally been higher since 2000-01. The variation in net immigration has been mostly due to changes in immigration, as emigration has been relatively steady at around 50,000 since the late 1970s.

So immigration in Canada has been somewhat higher over the period where Myers’s observed flat to declining immigration in the United States. This picture of net immigration,

however, is a total from all age groups rather than just those affecting the change in the young adult population that was reviewed in the previous section.

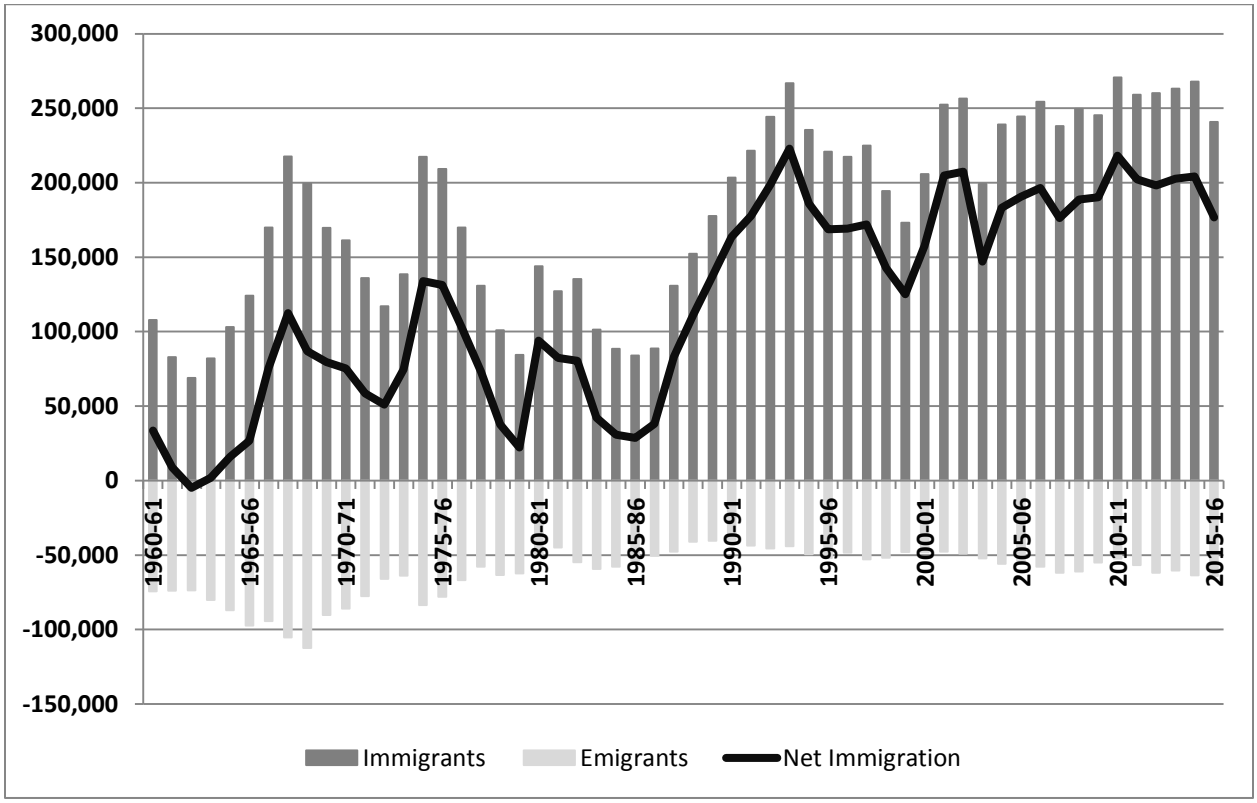

Figure 7 - Canadian immigration and emigration. Author's construction (based on Statistics Canada, 2016, Table 51-0037)

Figure 8 shows that immigration has had a varied and substantial effect on the change in the size of the 25-29 age group in Canada. Based on census data of actual population, rather than projections of registered births, the size of the non-immigrant population aged 25-29 drops (-334,812) between 2001 and 2006. This is in sharp contrast with the 2.9% growth shown in Figure 6 that was solely based on a straight projection of registered births, suggesting significant emigration took place. In this same period, there was an increase in the size of the immigrant population aged 25-29 (+199,115), which substantially but not completely moderated the decline. In the other periods, the change in immigrants and non-immigrants was

in the same direction. This confirms that net immigration, which includes accounting for emigration, is a better assessment than just immigration when reviewing changes in the size of the young adult cohort in Canada, or in determining "peak Millennial."

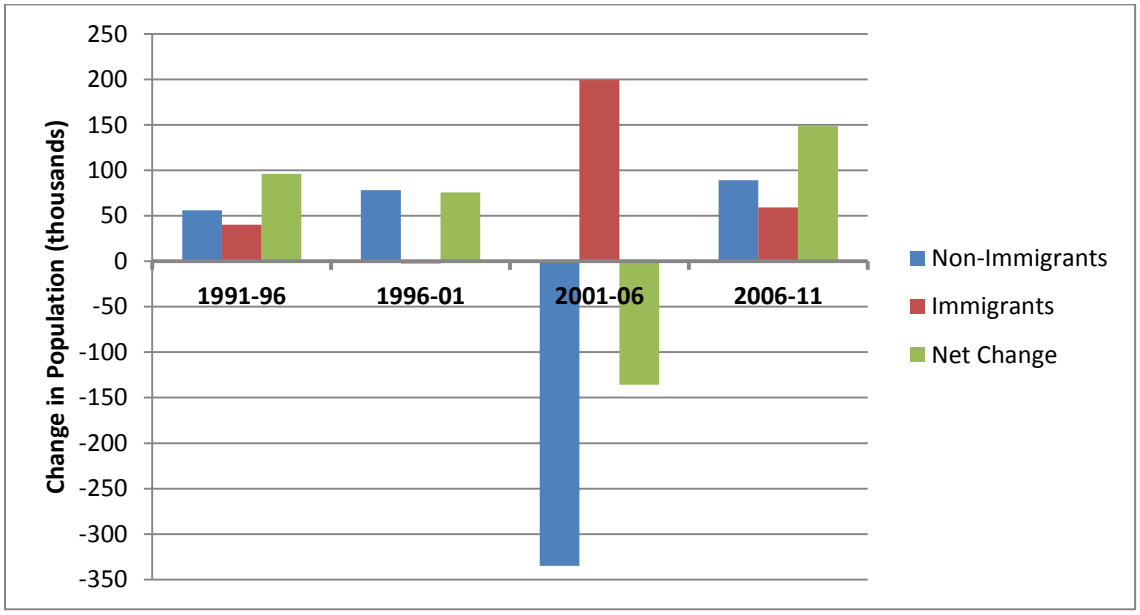

Figure 8 - Change in 25-29 population by immigration status in Canada between consecutive censuses. Author's construction (based on Statistics Canada, 1991, 1996, 2001, 2006, 2011).

The general trend line of immigrants as a percentage of those aged 25-29 has also been increasing in Canada, from 13.9% in 1991 to 18.5% in 2011 (based on Statistics Canada, 1991, 1996, 2001, 2006, 2011). However, the prominence of this trend varies across the country. Figure 9 shows how the share of immigrants aged 25-29 changed nationally in Canada, in Canada's four largest metropolitan areas, and also in Quebec City (the seventh largest).[19] There is geographic variation in where immigrants are settling in Canada. By 2011, the immigrant share of those aged 25-29 reached 42% in Toronto and 34% in Vancouver while Quebec City was only approaching 6%.

[19] The share of immigrants across the 11 mid- and large-sized metropolitan areas in Canada range between Toronto (highest) and Quebec (lowest). Those five excluded from this presentation to reduce the clutter of the graph all cluster around the national average, slightly below Calgary and Montreal.

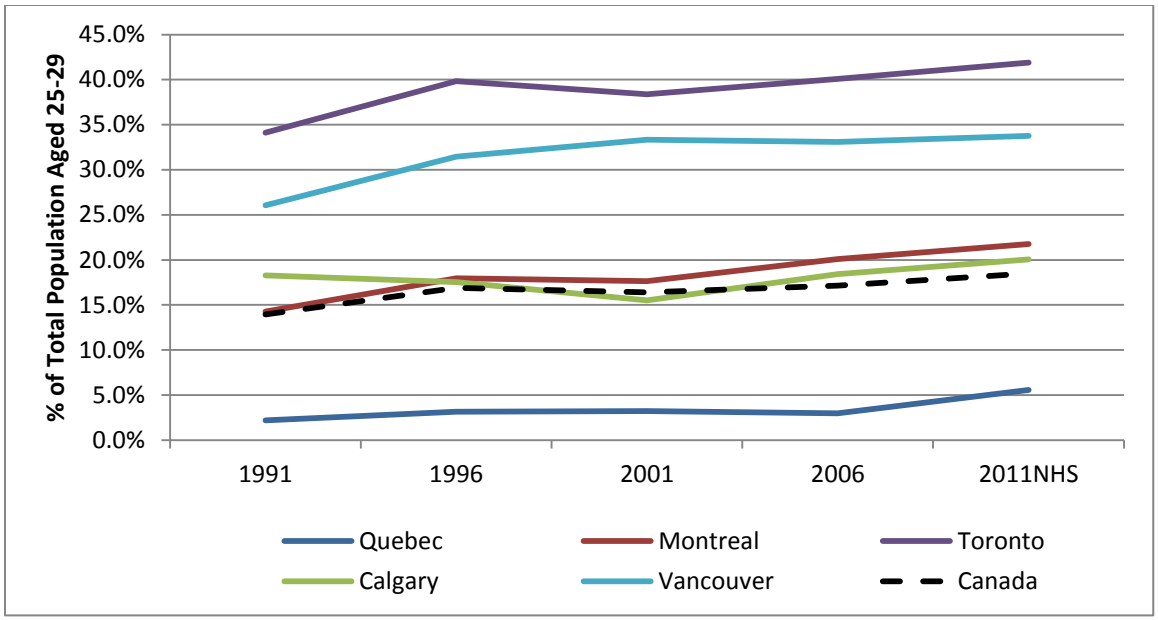

Figure 9 - Immigrants as % of Total Population Aged 25-29 in Canada and Select CMAs. Author's construction (based on Statistics Canada, 1991, 1996, 2001, 2006, 2011).

This immigration-related data and the variation in non-immigrant populations from registered birth projections suggest the limitation of such projections in assessing trends at the national and local level in Canada. It is reasonable to speculate that this deviation from the national average is also true for metropolitan areas in the United States since growth patterns vary dramatically by community across the nation there too. This is important because if there are indeed generational congestion effects to be experienced, they would play out at the local level where housing market dynamics are affected by in and out migration. It is critical, then, to quantify the specific changes happening in the size of the young adult cohort in a way that accounts for net migration in local contexts. As Myers's approach is based on registered births, it simply cannot account for migration, either domestic or international, at the local level.

Household Formation

To assess the impact of Millennials' arrival in young adulthood on housing demand, Myers (2016) compared household formation rates by five-year age group in 2000 (as the first Millennials turned 20), 2006 (prior to the recession), and 2013 (after the recession).[20] He plotted the headship rate by age group for 2006 and 2013 as a relative to the incidence of headship in the baseline year of 2000. This approach is reproduced in Figure 10, except that the age ranges used differ from Myers's as they reflect age ranges used in publicly produced tables.[21]

While the rate of household formation among those aged 15-24 in the United States declined moderately in 2006, it plummeted in 2013. This was particularly true for the rate of ownership households, which fell to 52% of the 2000 value for those aged 15-24 and 75% for those aged 25-34. At the same time, the rate of rental households among those aged 35-44 in 2013 was 120% of 2000 levels. Myers called this "congestion" in the rental housing market due to the impact of the recession, blocking many Millennials from entering the housing market through the formation of rental households (Myers, 2016, p. 12).

The experience of Canadian Millennials appears to be markedly different, likely because the 2008 recession did not include a housing market collapse here. In Figure 11, I replicate Myers (2016) approach in Canada including his five-year age ranges in the closest census years to his data points: 2001, 2006, and 2011.

[20] As this analysis used data from the census and ACS, it included net immigration.
[21] Age ranges used in Census Summary File and ACS 1-Year Table B25 are 15-24, 25-34, 35-44 rather than 20-24, 25-29, 30-34, 35-39, and 40-44 constructed by Myers.

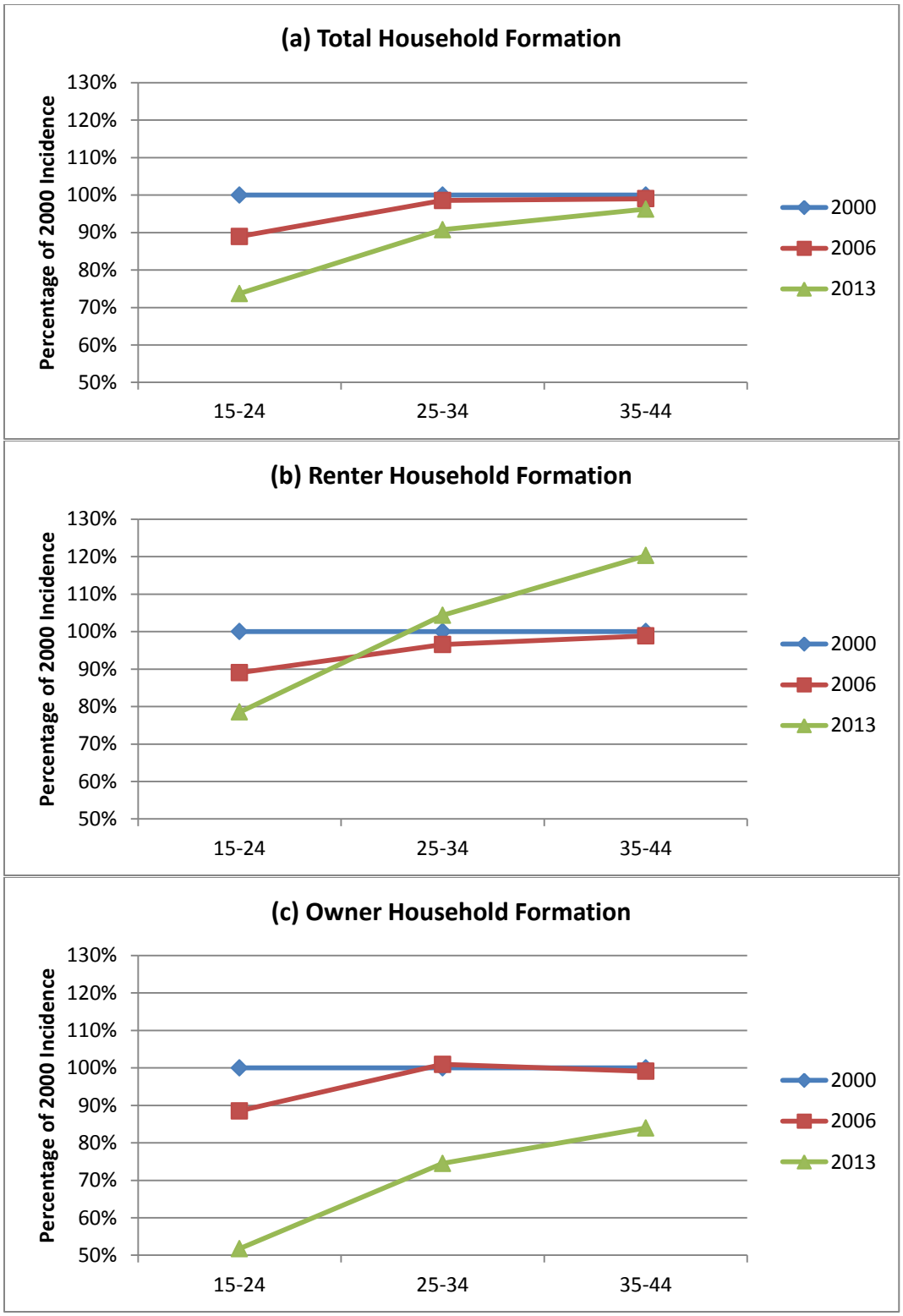

Figure 10 - Proportional changes in household formation in the United States by age relative to incidence among population in 2000 (2000 = 100%): (a) total household formation, (b) renter household formation, and (c) owner household formation. Author's reconstruction based on Census and ACS data (U.S. Census Bureau, 2000b, 2006b, 2013b)

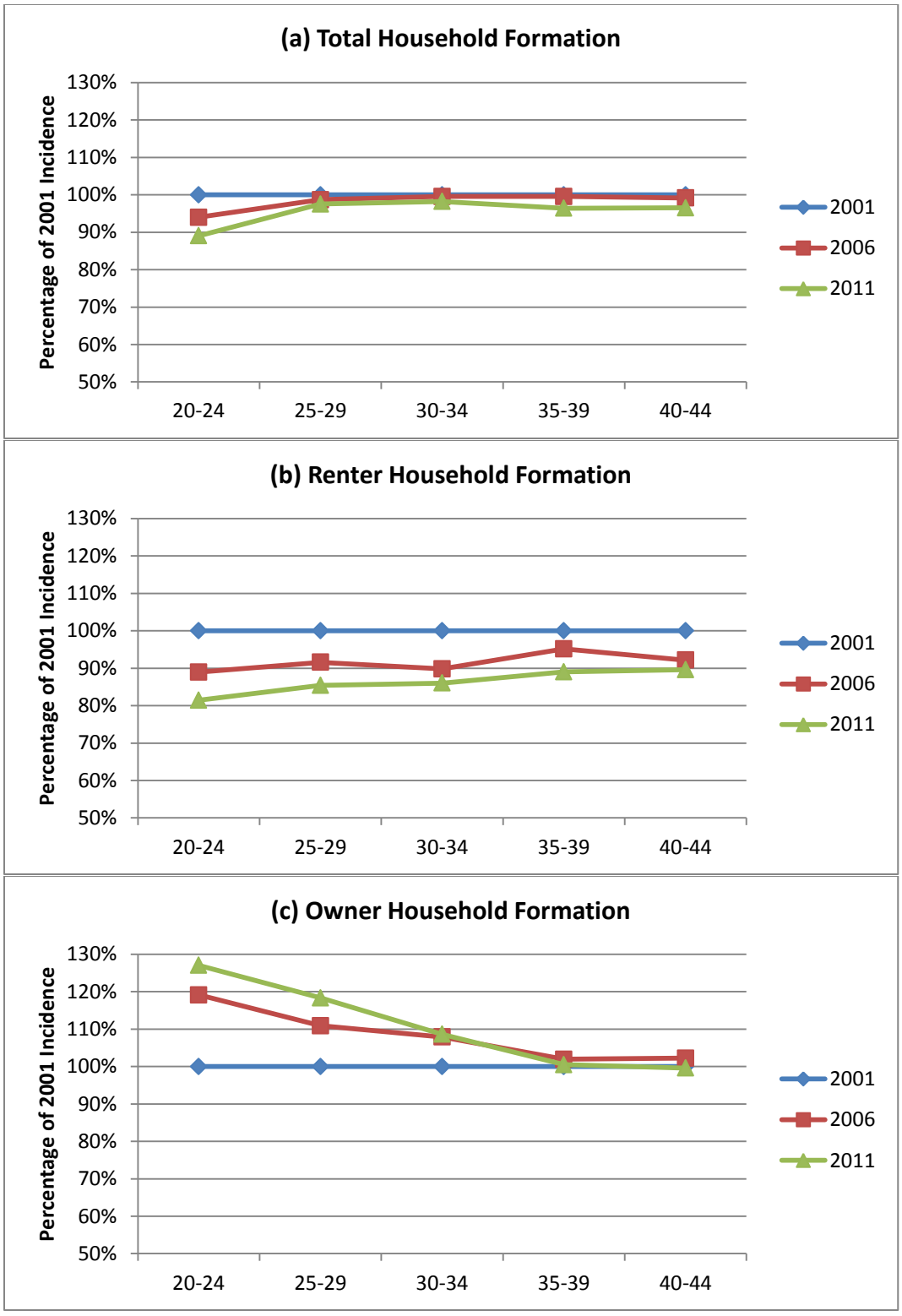

Figure 11 – Proportional changes in household formation in Canada by age relative to incidence among population in 2001 (2001 = 100%): (a) total household formation, (b) renter household formation, and (c) owner household formation. Author's construction based on long form Census and NHS data (Statistics Canada, 2001, 2006, 2011 as retrieved from CHASS)

I find there was also a drop in total household formation for those aged 20-24 in Canada, which was modest in 2006 and more pronounced in 2011. However, that reduction is quite modest for those aged 25-44. Much more remarkable is the difference in the rate of rental and ownership households in Canada over this period. In stark contrast to the United States, the rate of ownership households moved much higher in 2006 to 108% of 2001 levels for those aged 30-34 and 119% for those aged 20-24. After the recession, ownership moved even higher for those aged 20-29 by another 8%. This increasing rate of ownership came at the expense of rental households, which went lower in 2006 and lower still in 2011 across all age groups reviewed here.

I conclude from this brief review on translating population change to housing demand by age and tenure that there are important differences between Canada and the United States. From the start of the new millennium, rates of ownership households among those aged 20-34 are higher in 2011 and 2006 than 2001 in Canada. This suggests a greater percentage of Canadian Millennials entered home ownership earlier than their immediate predecessors. Over a similar period, United States Millennials seem stalled in their progress in forming rental households or moving into forming ownership households. This suggests that any construction of an index of generational congestion based on households at the entry point to the housing market would underrepresent the United States Millennial population. At the same time, constructing an index based on population would overstate housing demand from existing levels of consumption, while perhaps more accurately reflecting the unattained aspirations of the stalled United States Millennials.

Key Findings for Creating an Index of Generational Congestion

In reproducing and replicating Myers's (2016) approach, I found that "peak Millennial," by Myers's definition, did happen in Canada and at roughly the same time as in the United States. However, the way births rose and fell here in Canada is substantively different than in the United States. Here, they rose modestly to a peak before falling precipitously. There, they rose sharply to a peak before falling modestly and then recovering to levels higher than "peak Millennial." In addition to overstating "peak Millennial," then, Myers's (2016) data better shows "peak Generation Z", which reaches the 25-29 age group in 2032.

Myers's definition of "peak Millennial," however, is misaligned with the peak in the size of his selected young adult cohort, age 25-29, seeking rental housing. This peak occurs when the annual rate of change switches from positive to negative that he projects will happen in the United States in 2019. Here in Canada, this change happens in 2015-16 and happens to be aligned with the peak in registered births.

This rise and fall of the young adult cohort size, however, shows other differences between the two countries. The rate of change is much more modest in Canada than in the United States, rising more slowly and falling more deeply. After the Millennial generation ages out of the 25-29 cohort, Canada is projected to see a faster growing young adult population while the United States rate of change is projected to be more modest.

All of the above findings are predicated on the assumptions of full survival and do not include net immigration. I found net immigration in Canada to have fluctuations, but to have been relatively steady in the new millennium. However, I found the effect of immigration on the 25-29 age cohort to be increasing since 1991. The variation in immigration among mid-sized

and large metropolitan areas is also remarkable, and suggests any analysis of young adults requires an understanding of immigration and of local variations.

Finally, when reviewing the rate of household formation across young adults, I found substantive differences between the United States and Canada. The post-recession experience in the United States has seen those aged 35-44 stalled in rental housing, perhaps blocking younger adults from forming rental households, while the rate of ownership households and overall household formation has fallen. The 2008 housing market collapse changed owners to renters through foreclosures across the United States and kept them as renters longer through higher rents. These negative effects disproportionately affected Millennials, Hispanics, and those on either United States coast (Kochhar, Gonzalez-Barrera, & Dockterman, 2009; Uh, 2016). Here in Canada, where the 2008 recession did not include a housing market collapse, the rate of household formation has remained relatively steady. The rate of rental households has actually fallen, as a greater percentage of young adults form ownership households at a younger age. This suggests that using household numbers for young adults would undercount housing demand in the United States. It also suggests that in both Canada and the United States any population-based or household-based analysis would not tell us about the specific tenure demanded or obtained.

These findings suggest that “peak Millennial” is a poor indicator of change in cities as it suggests a significant turning point where no substantial change exists. This is particularly true at the local level, where omitting immigration from the construction of a “peak Millennial” misses an increasingly sizeable component of population change. As I consider how to construct an index of generational congestion in the next chapter, these findings also tell me that the

index must consider migration and local variation while avoiding undercounting young adult housing demand by focusing on population changes rather than households.

Chapter 4: An Index of Generational Congestion

It's an old adage in real estate is that the three things that matter most are: location, location, location. In assessing generational congestion in housing markets, the national picture obscures important variations across the country. Migration matters both in terms of the settlement patterns of immigrants and in terms of domestic movers, whose numbers include a substantial share of young adults (Cortright, 2014). The proportion of different age cohorts in a local population itself also varies, particularly in areas of declining populations or retirement communities.

These observations from the previous chapter shaped the methodological approach to constructing indices of generational congestion, which can be used by local planners and policymakers to assess the impacts of generational change at the level of their local housing markets. In this chapter, I will briefly review the methodology used to construct indices of generational congestion. Next, I will share the resulting indices for mid-sized and large metropolitan areas in Canada, which are their generational entry congestion, generational exit decongestion, and combined generational congestion indices. I will then share the resulting generational entry congestion indices for mid-sized and large metropolitan areas in the United States. Generational exit decongestion is unavailable at the five-year change level and so neither exit decongestion nor combined indices are calculated for the United States. As there are far more mid-sized and large metropolitan areas in the United States than in Canada, I will also provide a regional review of generational entry congestion by census region and categorize local trends into consistently increasing and consistently decreasing congestion. Finally, I will compare results in Canada and the United States.

A Brief Methodological Review

The model used by this chapter for assessing demographically driven demand-side changes in local housing markets, as described in the methodology chapter, is shown again here in Figure 12. The specific calculations used for both generational entry congestion and generational exit decongestion indices, as well as the combined generational congestion index, are also shown again here in Table 6.

As local housing markets best fit the statistical definition of metropolitan areas – metropolitan statistical areas (MSAs) in the United States and census metropolitan areas (CMAs) in Canada – this is the level of analysis used in this chapter. The analysis focuses only on those metropolitan areas larger than 500,000 people as of 2015.

Table 7 summarizes the anticipated effect of these various indices results on young adults ability to enter the housing market in a given geographic area, provided all other factors held constant. For the generational entry congestion or combined generational congestion indices, a number great than one represents an increase and less than one represents a decrease relative to the level five years prior. Generational exit decongestion is the inverse of the other indices in terms of its effect on congestion, so here a number greater than one indicates a slowing rate of household dissolutions that increases generational congestion. In both cases, the change measured is relative to overall changes in the adult population or households, and so is a measurement of changes in the demographic structure of the population or households at the entry and exit points of the housing market. Where young adult populations rise or fall in lockstep with total adult population, the generational entry congestion index would be 1.0.

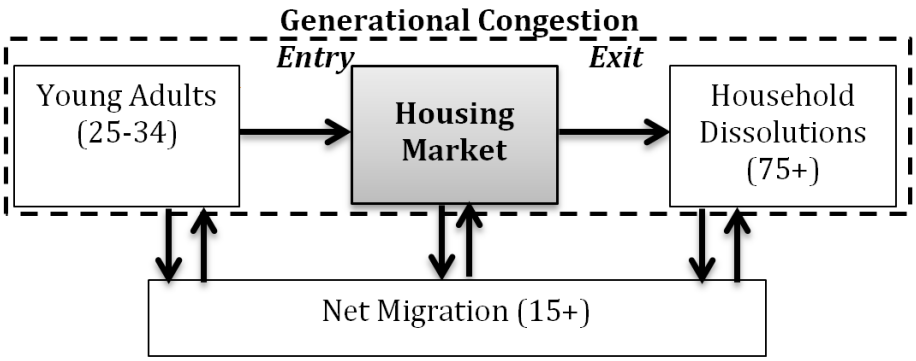

Figure 12 - Generational Congestion Housing Demand Model

Table 6 - Generational Congestion Calculations

	Population Description	**Generational Congestion Index Calculation**
Generational Entry Congestion	Relative Change of Young Adults (25-34) to all Adults (15+)	$\left(\frac{P_t^{25-34}}{P_t^{15+}}\right) \Big/ \left(\frac{P_{t-5}^{25-34}}{P_{t-5}^{15+}}\right)$
Generational Exit Decongestion	Relative Change in Older Adult-led Household Dissolutions (75+) to all Households (15+)	$\left(\frac{HH_{t-5}^{70+} - HH_t^{75+}}{HH_t^{15+}}\right) \Big/ \left(\frac{HH_{t-10}^{70+} - HH_{t-5}^{75+}}{HH_{t-5}^{15+}}\right)$
Combined Generational Congestion	Change in Young Adults (25-34) to Change in Older Adult-led Household Dissolutions (75+), Relative to Change in all Adults and all Households (15+)	$\frac{Generational\ Entry\ Congestion}{Generational\ Exit\ Decongestion}$
Where P_t^c *is the population of age group* c *at time* t; HH_t^c *is the number households headed by age group* c *at time* t		

Table 7 – Anticipated effect from generational congestion on young adult's ability to enter the housing market

When <below> index is…	**…greater than 1**	**…less than 1**
Generational Entry Congestion	Harder to enter	Easier to enter
Generational Exit Decongestion	Easier to enter	Harder to enter
Combined Generational Congestion	Harder to enter	Easier to enter

The selection of five-year ranges, rather than ten-year ranges that would make calculating generational exit decongestion and combined generational congestion indices possible in the United States, was done for two reasons: (1) Myers's (2016) used a rolling five-year change for comparing demographic changes with other factors, and (2) five year changes provide more frequent data for local planners and policymakers.

A step-by-step description of this approach written specifically for local planners to use in their own CMA or MSA is provided at the end of this thesis in Appendix B.

Canadian Results

The calculated indices of generational congestion for Canada and for the 11 mid-sized and large CMAs between 2001 and 2011 are provided in Table 8. Figure 13 aggregates these local indices, presenting the box plot distribution of generational entry congestion indices across these CMAs. The whiskers of the box plot represent the full range of data rather than the 5^{th} to 95^{th} percentile, given those percentile ranges do not exist with only 11 CMAs.

The median generational entry congestion for the 11 CMAs and the national average are similar, rising substantially between 2001 and 2011, suggesting entering the housing market is getting more difficult for young adults. However, generational exit decongestion varies widely among these CMAs in 2001 and 2011 with the national average moving up sharply and the median of the 11 CMAs finishing even higher, which would make it easier for young adults. The range of combined generational congestion indices among these CMAs is modestly tighter than their generational exit decongestion indices, with their median continuing to vary from the national average in a mirror of decongestion.

Overall, the combined generational congestion index shows that the increasing rate of dissolutions is outpacing the increasing relative rate of young adults nationally and in most metropolitan areas. Generational exit decongestion dominates generational entry congestion. In other words, more people are leaving the housing market than entering and so it should be getting easier for young adults to enter it if all other factors are constant and they can access this new supply of housing from dissolving households.

Looking at results for the individual CMAs, generational entry congestion was highest in 2011 in Edmonton (1.095), followed by Quebec City (1.031), Vancouver (1.030), Calgary (1.028), and Winnipeg (1.025), with other areas experiencing a decrease in generational entry congestion (between 0.973-0.996).

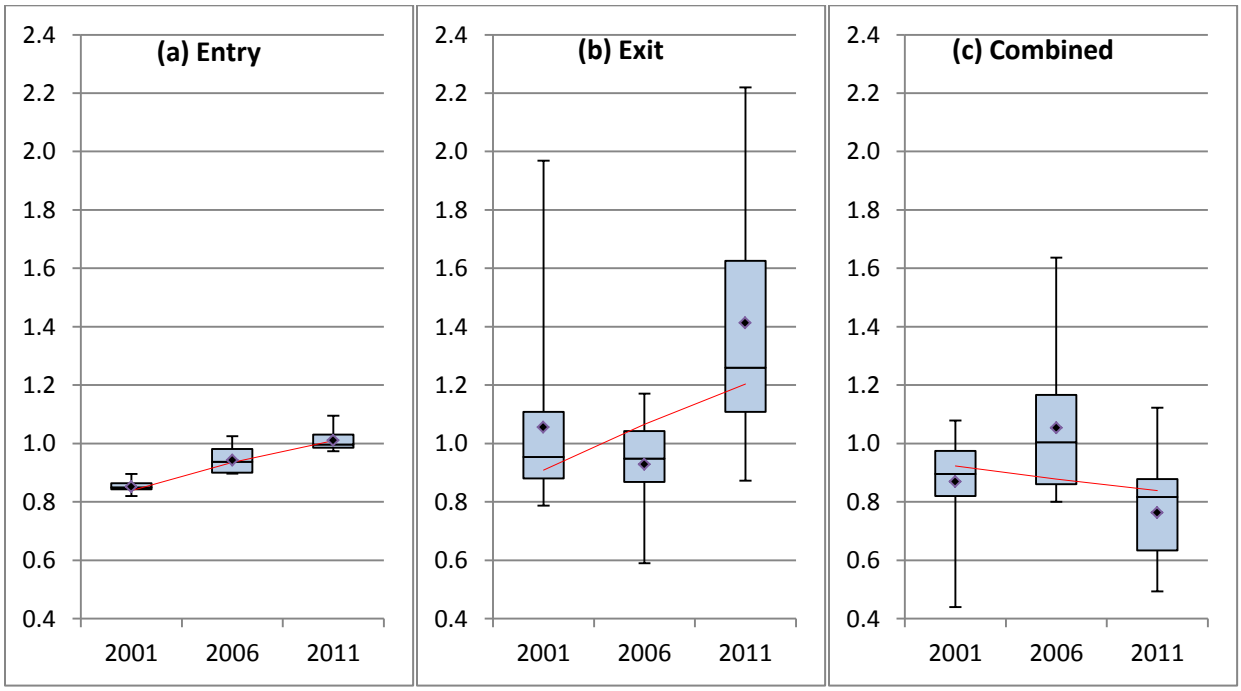

Figure 13 - Distribution of Generational Congestion in Mid-Sized and Large CMAs in Canada, with national average (red line) and average of mid-sized and large CMAs (black diamond): (a) Generational Entry Congestion, (b) Generational Exit Decongestion, and (c) Combined Generational Congestion. Box plot whiskers represent the full range of 11 MSAs rather than the 5th to 95th percentile range, as that percentile range does not exist with only 11 data points.

Table 8 - Generational Congestion in Mid-sized and Large Canadian CMAs

	Entry Congestion			Exit Decongestion			Combined Index		
	2001	**2006**	**2011**	**2001**	**2006**	**2011**	**2001**	**2006**	**2011**
Canada	0.839	0.935	1.010	0.909	1.065	1.204	0.923	0.878	0.839
Median of Below CMAs	0.850	0.937	0.996	0.954	0.948	1.260	0.896	1.004	0.817
Quebec	0.825	1.025	1.031	0.949	0.880	1.626	0.869	1.166	0.634
Montreal	0.849	0.981	0.993	0.954	0.948	1.490	0.890	1.035	0.667
Ottawa-Gatineau	0.843	0.897	0.996	0.842	1.042	1.056	1.002	0.860	0.943
Toronto	0.864	0.907	0.973	1.108	0.994	1.108	0.975	0.912	0.878
Hamilton	0.850	0.897	0.985	1.161	0.894	1.198	0.732	1.004	0.822
Kitchener-Cambridge-Waterloo	0.864	0.932	0.979	1.969	0.868	0.873	0.439	1.074	1.122
London	0.820	0.937	0.991	0.916	1.171	1.559	0.896	0.800	0.635
Winnipeg	0.850	0.948	1.025	0.787	1.127	1.177	1.079	0.841	0.871
Calgary	0.896	0.966	1.028	1.092	0.590	1.987	0.820	1.637	0.518
Edmonton	0.860	0.986	1.095	0.956	0.743	2.220	0.900	1.327	0.493
Vancouver	0.851	0.900	1.030	0.880	0.965	1.260	0.968	0.933	0.817

Nationally, decongestion from household dissolutions increased sharply from 0.909 in 2001 to 1.204 in 2011. At the metropolitan level, it jumped between 2006 and 2011 in most CMAs, with the sharpest acceleration in Edmonton (0.743 to 2.220) and Calgary (0.590 to 1.987). Kitchener-Cambridge-Waterloo, however, saw declining dissolutions (0.868 and 0.873).

Variations from the trend in the combined generational congestion index occurred in Edmonton and Calgary in 2006, which returned to the general trend of accelerating rates of dissolutions in 2011. Kitchener-Cambridge-Waterloo stands alone, with generational entry congestion outpacing generational exit decongestion in 2006 and 2011.

Explaining these variations, young workers were likely attracted to Edmonton and Calgary's booming oil-and-gas economy, while Vancouver's rising concentration of young adults

has been connected with rising costs, changing economies, and preferences for urban living (Moos, 2015). Winnipeg's young adult population was still 16% below 1991 levels, so its recovery has only been partial and recent.

The combination of older adult migration into jurisdictions and an aging demographic can quickly grow the number of individuals who reach a point in their lives where they dissolve their households. These dissolutions are actual exits from a housing market and do not include aging in place or downsizing to other units within that same housing market. CMHC forecast a decline in Boomer home ownership between 2011 and 2016 after peaking at some point between 2006 to 2011 (Gabay, 2013). Edmonton and Calgary, both in Alberta, are lower tax jurisdictions, which may have attracted retirees. One theory to explain the variation in Kitchener-Cambridge-Waterloo could be the approximately 90,000 students in its three post-secondary institutions, a much higher relative population than other mid- and large-sized Canadian metropolitan areas. Many of these young adults are counted elsewhere at their parental home by the census (Parkin & Martin, 2012) but may subsequently settle and be counted in the area after graduation, increasing the relative number of young adults.

United States Results

Due to data limitations discussed in the Methodology chapter, results for the United States are limited to generational entry congestion. This was the original focus of Myers's (2016) congestion work. Generational entry congestion indices for each of the 107 MSAs between 2010 and 2015 as well as the national index over the same period and 2005 are provided in Table 10 at the end of this section. Figure 14 aggregates these local indices,

presenting the box plot distribution of generational entry congestion indices across these United States MSAs.

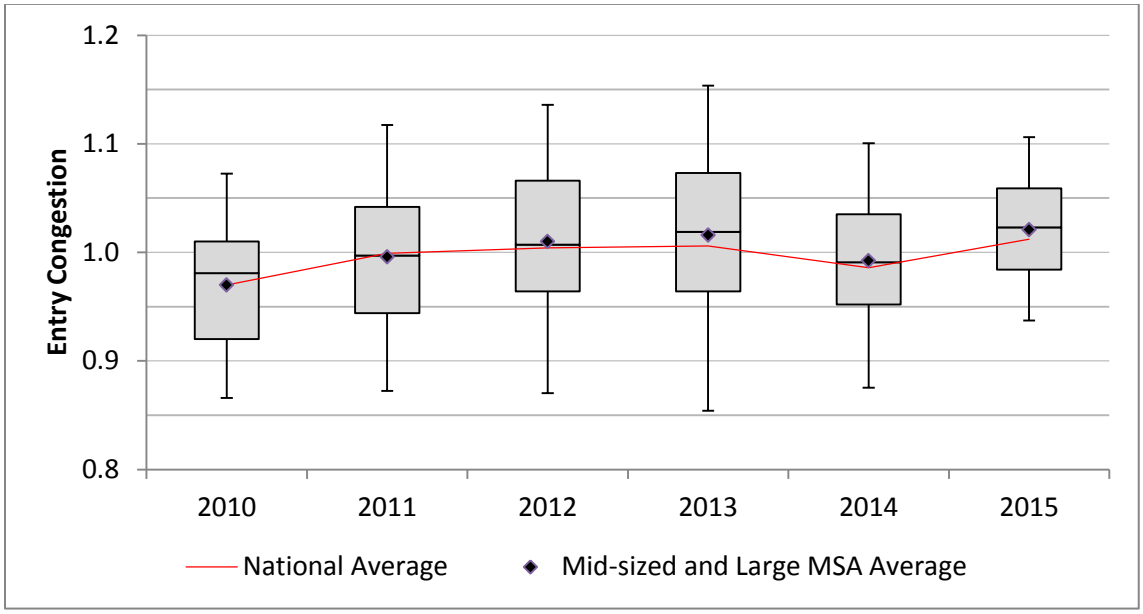

Figure 14 – Distribution of Generational Entry Congestion in Mid-Sized and Large MSAs in the United States

The average and median generational entry congestion indices for the 107 MSAs and the national average are similar, rising almost continuously between 2010 and 2015. This suggests entering the housing market is getting more difficult for young adults. Generational entry congestion was present (greater than 1.0) nationally and in the majority of MSAs in 2012, 2013, and 2015. The variation between most MSAs has been consistently small, as the size of the interquartile range has remained stable, between 0.08 and 0.10. There is still a wide variation among a small number of MSAs, though this has tightened, as the 5th to 95th percentile range grew to 0.30 by 2013 before falling again to 0.17 in 2015.

The deviation from the national and MSA trend in 2014 happens five years after 2009, the first full year of ACS data after the 2008 Great Recession. Since the index measures changes

over five years prior, this deviation is coincident with that recession but is actually reflective of underlying demographic changes.[22]

Generational entry congestion was most pronounced in New Orleans (peaking at 1.306 in 2012) followed by Milwaukee (peaking at 1.185 in 2013), San Francisco (peaking at 1.184 in 2013), and Pittsburgh (peaking at 1.166 in 2013). New Orleans, in recovering most of its 2005 pre-Hurricane Katrina population by 2014, attracted young adults faster than the whole adult-aged population. A growing technology industry in San Francisco relies on young adult workers, but understanding Milwaukee and Pittsburgh's relative gains require further analysis beyond the scope of this thesis to offer a reasonable hypothesis.

The largest decrease of generational entry congestion was in North Port-Sarasota-Brandenton, Florida (dropping to 0.794 in 2011 and 0.796 in 2013) followed by Cape Coral-Fort Myers, Florida (dropping to 0.806 in 2013), Deltona-Daytona Beach-Ormond Beach, Florida (dropping to 0.830 in 2011), and Riverside-San Bernardino-Ontario, California (dropping to 0.830 in 2011). Most of the communities with the greatest decreases in generational entry congestion are in Florida and have seen both a growing older adult population and a stagnant young adult population, signaling that they are growing retirement communities. However, all four had seen reversals by 2015 and are now experiencing generational entry congestion. These are caused by a recent spike in young adults, suggesting these communities are attracting more than just retirees as has been assumed by some.

[22] Nationally, there were 10 million more 25-34 year olds in 2009 than 2008 while the adult population only climbed by 2 million. 2010 then saw 3 million more adults while there were 3 million fewer 25-34 year olds. This relative growing and shrinking in the young adult to total adult population ratio would account for the deviation.

Regional Variation

There is significant variation in generational entry congestion across the four census regions in the United States (Figure 15). This suggests there are regional patterns in terms of the relative ease of entry into the housing market for young adults.

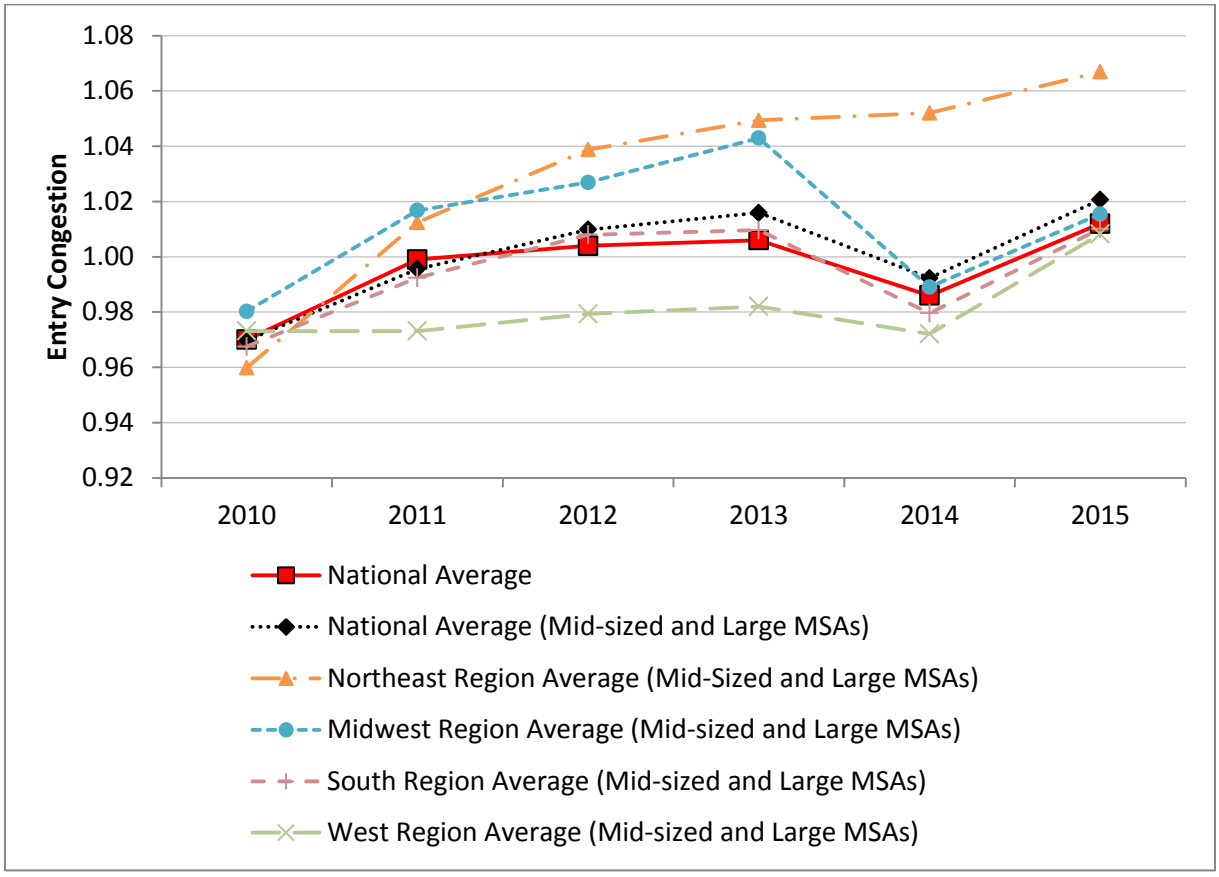

Figure 15 – Average Generational Entry Congestion in Mid-Sized and Large MSAs by Census Region

Between 2010 and 2015, the 43 mid-sized and large MSAs in the South region roughly tracked the overall national average and the national mid-sized and large MSAs average. Given this region represents 40% of the 107 mid-sized and large MSAs reviewed, this is not particularly surprising. The 26 MSAs in the West region lagged behind from 2011 through 2014 with congestion decreasing before returning to near the national average in 2015 and experiencing some modest generational congestion (1.008). The Midwest region (19 MSAs) led

the country in 2010 (0.980) and 2011 (1.017), reaching its peak generational entry congestion in 2012 (1.043) before falling back to the national average. Finally, the Northeast region (19 MSAs), which had on average seen the largest decrease in generational entry congestion in 2010 (0.960) rose quickly, leading the country since 2012 with increasing generational entry congestion that averaged 1.067 in 2015.

The distribution of generational entry congestion inside each census region is further explored in Figure 16 where the regional averages of the mid-sized and large MSAs now appear as black diamonds.

In all four census regions, the respective regional averages hide significant variation. In the Northeast, which has led the nation in generational entry congestion on average since 2012, shows both that a number of MSAs were still experiencing decreases in generational entry congestion through 2013 and that many more were experiencing even higher levels of congestion. In the South, where the regional average roughly tracked the national average, its sizeable number of MSAs had the second widest average of 5^{th}-95^{th} percentile ranges and the largest single year spread (0.34 in 2013). The Midwest had the narrowest average interquartile range (0.067), while the West had the widest average 5^{th}-95^{th} percentile range (0.27).

While overall balance of the United States population has been moving from the Northeast and Midwest to the South and West (Henderson, 2016), this either has not been a shift of young adults out of mid-sized and large metros or it has been a shift from other age groups given the increasing generational entry congestion left behind. Decreasing generational entry congestion in the West further suggests an overall attraction of an adult population other

than young adults. However, the substantial local variation these box plots show suggests further analysis of trends at the local level.

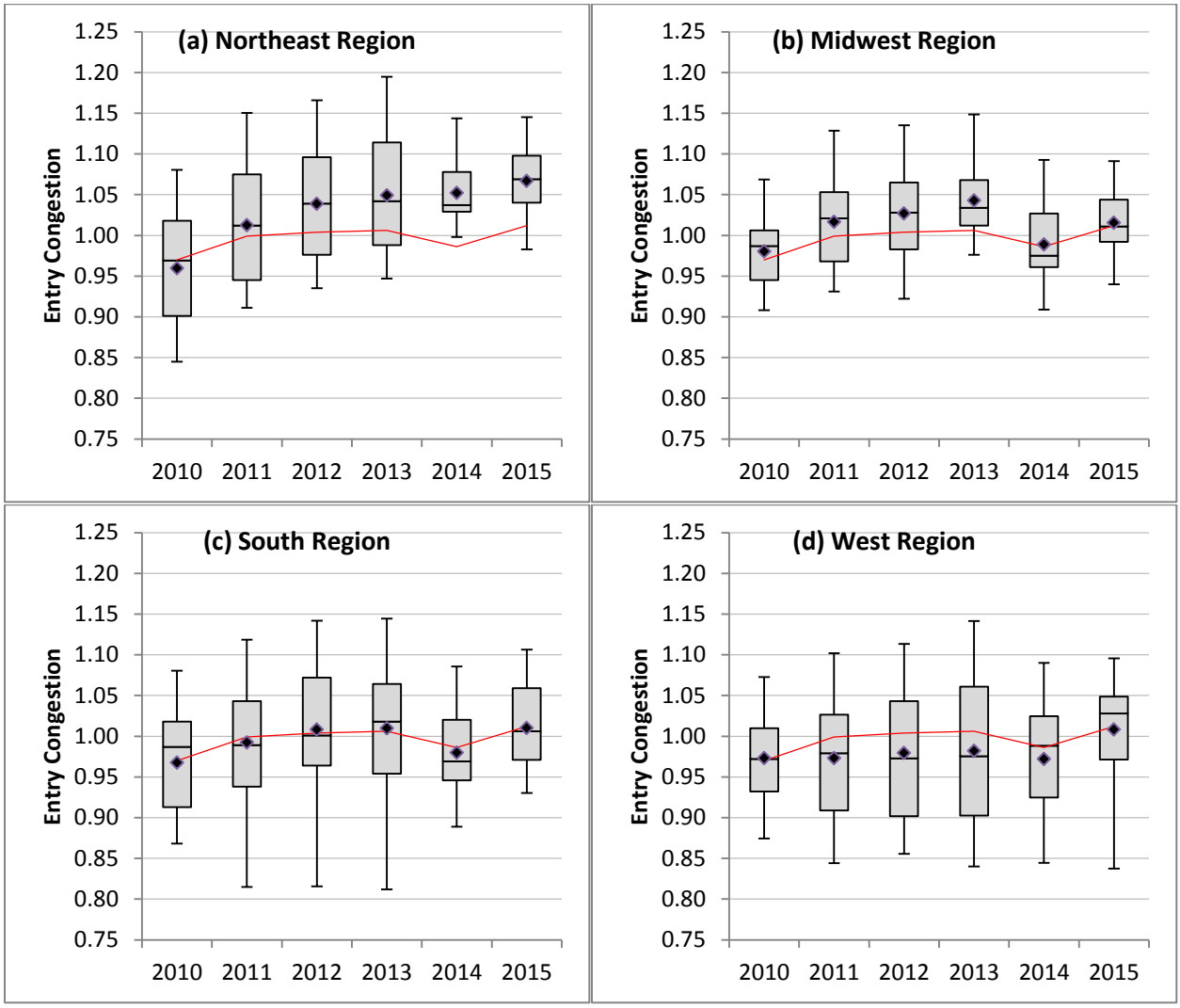

Figure 16 – Distribution of Generational Entry Congestion by Region, with national average (red line) and regional average of mid-sized and large MSAs (black diamond): (a) Northeast, (b) Midwest, (c) South, and (d) West.

Local Trends

While most mid-sized and large MSAs (83) experienced a mix of increasing and decreasing generational entry congestion between 2010 and 2015, some consistently experienced either increasing *or* decreasing congestion. Table 9 shows the 13 MSAs that

consistently had increasing congestion and the 11 MSAs that consistently had decreasing congestion.

Table 9 – Metropolitan Statistical Areas with Consistent Directionality of Generational Entry Congestion

Consistently Increasing			**Consistently Decreasing**		
MSA	Region	5 Yr Avg	MSA	Region	5 Yr Avg
New Orleans-Metairie, LA	South	1.180	Boise City, ID	West	0.895
Pittsburgh, PA	Northeast	1.113	Phoenix-Mesa-Scottsdale, AZ	West	0.904
San Francisco-Oakland-Hayward, CA	West	1.091	McAllen-Edinburg-Mission, TX	South	0.919
Urban Honolulu, HI	West	1.089	Tucson, AZ	West	0.929
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	Northeast	1.083	Las Vegas-Henderson-Paradise, NV	West	0.931
Baltimore-Columbia-Towson, MD	South	1.078	Winston-Salem, NC	South	0.931
Miami-Fort Lauderdale-West Palm Beach, FL	South	1.073	Dallas-Fort Worth-Arlington, TX	South	0.931
El Paso, TX	South	1.061	Raleigh, NC	South	0.933
New York-Newark-Jersey City, NY-NJ-PA	Northeast	1.060	Atlanta-Sandy Springs-Roswell, GA	South	0.937
Santa Rosa, CA	West	1.049	Fayetteville-Springdale-Rogers, AR-MO	South	0.949
Portland-South Portland, ME	Northeast	1.044	Charlotte-Concord-Gastonia, NC-SC	South	0.950
Baton Rouge, LA	South	1.041			
Hartford-West Hartford-East Hartford, CT	Northeast	1.032			

Of the MSAs with consistently increasing generational entry congestion, the Northeast is perhaps unsurprisingly well represented. Pittsburgh, Portland (Maine), and Hartford are perhaps more surprising entrants than New York and Philadelphia, given the attention on gentrification in the latter (see for example “Report Analyzes New York City’s Gentrifying Neighborhoods and Finds Dramatic Demographic Shifts,” 2016; Young, 2014). From the South, Hurricane Katrina provided New Orleans a low population base from which to recover, and displacement from New Orleans may have contributed to Baton Rouge’s increasing

generational entry congestion. El Paso, as a booming border town, would likely be host to an increasing and young population of immigrants from Mexico. In the West, Honolulu and Santa Rosa are also perhaps more surprising entrants than San Francisco, which is well-known for attracting young tech workers to Silicon Valley (see for example Miller, 2014; Quinn, 2014).

Of the MSAs with consistently decreasing generational entry congestion, the South is over represented. All of those 11 MSAs, which are in the South or West region, have seen their overall population boom outpacing growth rate of their young adult population, except for Winston- Salem where the young adult population declined. The index, then, is properly separating the general population boom from the growth of the young adult population, so that only structural demographic changes are captured.

While the generational entry congestion index suggests it should be easier for young adults to enter these housing markets, the pace of overall population gain has not been held constant. So, while there has certainly been a rise and a peaking in the size of the young adult cohorts seeking to enter the housing market, specific metropolitan areas' adult populations and households have also grown in general at a more rapid pace. This suggests growing overall populations rather than generation-specific population increases is the more important factor for young adults and so of greater concern for local planners and policymakers in these jurisdictions.

As a final observation from reviewing local trends in the United States, the Midwest is notable for not having any mid-sized or large MSAs either continually increasing or continually decreasing generational entry congestion. Given the regional analysis, where the Midwest

tracked the Northeast until 2014 where it returned to the national average, the absence of Midwest MSAs from Table 9 is less surprising.

Table 10 - Generational Entry Congestion in Mid-sized and Large MSAs in the United States[23]

	Entry Congestion						
	2005	2010	2011	2012	2013	2014	2015
United States	0.947	0.970	0.999	1.004	1.006	0.986	1.012
Akron, OH	-	0.919	0.952	0.966	0.976	1.027	1.063
Albany-Schenectady-Troy, NY	-	0.901	0.945	0.994	0.996	1.081	1.056
Albuquerque, NM	-	1.070	0.995	0.998	0.995	0.930	1.004
Allentown-Bethlehem-Easton, PA-NJ	-	0.928	0.932	0.976	0.985	1.025	1.030
Atlanta-Sandy Springs-Roswell, GA	-	0.895	0.935	0.960	0.964	0.929	0.936
Augusta-Richmond County, GA-SC	-	0.985	1.119	1.110	1.052	1.052	1.091
Austin-Round Rock, TX	-	0.935	0.971	0.983	1.018	0.905	0.994
Bakersfield, CA	-	0.985	0.905	0.902	0.892	1.026	1.043
Baltimore-Columbia-Towson, MD	-	1.072	1.069	1.098	1.109	1.051	1.066
Baton Rouge, LA	-	1.003	1.037	1.051	1.022	1.124	1.006
Birmingham-Hoover, AL	-	1.023	1.065	1.007	1.030	0.929	0.950
Boise City, ID	-	0.945	0.885	0.890	0.861	0.847	0.939
Boston-Cambridge-Newton, MA-NH	-	0.969	1.079	1.096	1.129	1.041	1.070
Bridgeport-Stamford-Norwalk, CT	-	1.078	1.115	1.133	1.133	1.040	0.983
Buffalo-Cheektowaga-Niagara Falls, NY	-	0.981	1.060	1.066	1.090	1.085	1.157
Cape Coral-Fort Myers, FL	-	0.873	0.811	0.809	0.806	0.911	1.008
Charleston-North Charleston, SC	-	1.028	1.132	1.138	1.156	0.980	1.078
Charlotte-Concord-Gastonia, NC-SC	-	0.902	0.957	0.964	0.968	0.947	0.961
Chattanooga, TN-GA	-	0.913	0.938	1.007	0.990	0.956	1.009
Chicago-Naperville-Elgin, IL-IN-WI	-	0.992	1.026	1.028	1.040	0.975	0.970
Cincinnati, OH-KY-IN	-	0.987	0.999	1.018	0.996	0.954	1.010
Cleveland-Elyria, OH	-	0.990	1.039	1.040	1.068	1.049	1.030
Colorado Springs, CO	-	0.892	0.960	0.968	0.994	1.125	1.072
Columbia, SC	-	1.019	1.041	1.102	1.111	0.953	0.943
Columbus, OH	-	0.959	0.979	0.989	1.020	0.909	1.047
Dallas-Fort Worth-Arlington, TX	-	0.921	0.924	0.940	0.930	0.908	0.965
Dayton, OH	-	0.977	1.026	1.034	1.034	1.028	1.070
Deltona-Daytona Beach-Ormond Beach, FL	-	0.867	0.830	0.842	0.835	0.932	1.068
Denver-Aurora-Lakewood, CO	-	0.953	1.011	1.042	1.054	0.991	1.030
Des Moines-West Des Moines, IA	-	0.997	1.067	1.060	1.092	0.941	0.992
Detroit-Warren-Dearborn, MI	-	0.908	0.957	0.983	1.012	0.972	1.044
Durham-Chapel Hill, NC	-	0.886	1.004	1.065	1.084	0.951	0.966

[23] Underlying data for indices calculations is from the American Community Survey and United States Census (U.S. Census Bureau, 2000a, 2005, 2006a, 2007, 2008, 2009, 2010, 2011, 2012, 2013a, 2014, 2015a). As discussed in the Methodology chapter, adjustments have been made to reflect 2015 boundaries to the extent possible. These are catalogued in Appendix A.

	Entry Congestion						
	2005	2010	2011	2012	2013	2014	2015
El Paso, TX	-	1.001	1.068	1.093	1.090	1.032	1.084
Fayetteville-Springdale-Rogers, AR-MO	-	0.914	0.996	0.978	0.924	0.885	0.998
Fresno, CA	-	0.987	0.960	0.957	0.957	0.970	1.048
Grand Rapids-Wyoming, MI	-	0.945	0.960	0.965	0.998	0.946	1.043
Greensboro-High Point, NC	-	0.893	0.957	0.977	1.007	0.974	1.023
Greenville-Anderson-Mauldin, SC	-	0.883	0.935	0.977	0.966	1.011	0.992
Harrisburg-Carlisle, PA	-	1.005	0.980	1.059	1.047	1.037	1.004
Hartford-West Hartford-East Hartford, CT	-	1.018	1.018	1.039	1.040	1.035	1.042
Houston-The Woodlands-Sugar Land, TX	-	0.996	0.982	1.003	0.988	0.969	0.983
Indianapolis-Carmel-Anderson, IN	-	0.966	0.978	1.018	1.024	0.961	1.003
Jackson, MS	-	1.032	1.062	1.077	1.064	0.982	0.970
Jacksonville, FL	-	1.018	0.994	1.015	1.040	1.020	1.067
Kansas City, MO-KS	-	1.010	1.042	1.048	1.062	0.963	0.984
Knoxville, TN	-	0.920	0.942	0.987	0.928	1.037	0.971
Lakeland-Winter Haven, FL	-	0.939	0.876	0.860	0.860	0.969	1.049
Lancaster, PA	-	0.872	0.923	0.953	0.947	1.029	1.107
Las Vegas-Henderson-Paradise, NV	-	0.938	0.911	0.925	0.936	0.909	0.964
Lexington-Fayette, KY	-	1.019	0.940	0.966	1.005	0.943	0.905
Little Rock-North Little Rock-Conway, AR	-	1.020	1.044	1.072	1.112	0.990	0.988
Los Angeles-Long Beach-Anaheim, CA	-	0.971	1.016	1.037	1.073	0.955	1.023
Louisville/Jefferson County, KY-IN	-	0.995	0.989	0.995	1.019	0.951	0.985
Madison, WI	-	0.987	1.020	1.065	1.016	1.077	0.940
McAllen-Edinburg-Mission, TX	-	0.935	0.921	0.908	0.914	0.909	0.929
Memphis, TN-MS-AR	-	0.975	1.001	1.046	1.043	0.969	1.006
Miami-Fort Lauderdale-West Palm Beach, FL	-	1.047	1.079	1.123	1.144	1.010	1.037
Milwaukee-Waukesha-West Allis, WI	-	1.078	1.159	1.143	1.185	0.993	1.021
Minneapolis-St. Paul-Bloomington, MN-WI	-	1.006	1.067	1.089	1.099	0.990	0.992
Modesto, CA	-	0.948	0.910	0.902	0.921	1.008	1.030
Nashville-Davidson--Murfreesboro--Franklin, TN	-	1.008	1.025	1.028	1.033	0.953	0.975
New Haven-Milford, CT	-	0.987	1.005	1.023	1.029	0.998	1.040
New Orleans-Metairie, LA	-	1.098	1.271	1.306	1.288	1.060	1.059
New York-Newark-Jersey City, NY-NJ-PA	-	1.020	1.075	1.096	1.114	1.026	1.030
North Port-Sarasota-Bradenton, FL	-	0.889	0.794	0.807	0.796	0.952	1.010
Ogden-Clearfield, UT	-	0.961	1.025	0.974	0.919	0.862	0.907
Oklahoma City, OK	-	0.998	1.043	1.039	1.049	1.003	1.005
Omaha-Council Bluffs, NE-IA	-	0.994	1.075	1.096	1.067	0.965	0.993
Orlando-Kissimmee-Sanford, FL	-	0.966	0.976	0.991	1.032	0.966	1.068
Oxnard-Thousand Oaks-Ventura, CA	-	0.997	1.009	1.014	0.996	1.029	1.008
Palm Bay-Melbourne-Titusville, FL	-	0.987	0.930	0.936	0.879	1.019	1.047
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	-	1.029	1.087	1.122	1.150	1.035	1.076
Phoenix-Mesa-Scottsdale, AZ	-	0.900	0.891	0.890	0.905	0.866	0.974
Pittsburgh, PA	-	1.029	1.132	1.141	1.166	1.078	1.130

	Entry Congestion						
	2005	2010	2011	2012	2013	2014	2015
Portland-South Portland, ME	-	1.016	1.012	1.078	1.087	1.032	1.041
Portland-Vancouver-Hillsboro, OR-WA	-	0.977	0.997	0.996	1.008	0.935	0.975
Providence-Warwick, RI-MA	-	0.854	0.946	0.971	0.988	1.037	1.098
Provo-Orem, UT	-	0.900	0.937	0.909	0.850	1.111	0.800
Raleigh, NC	-	0.890	0.978	0.953	0.954	0.882	0.941
Richmond, VA	-	0.996	0.985	0.969	1.038	1.060	1.073
Riverside-San Bernardino-Ontario, CA	-	0.865	0.830	0.839	0.835	0.986	1.043
Rochester, NY	-	0.965	1.026	1.101	1.084	1.164	1.088
Sacramento--Roseville--Arden-Arcade, CA	-	0.915	0.902	0.901	0.890	1.001	1.031
St. Louis, MO-IL	-	1.022	1.053	1.070	1.074	0.990	1.011
Salt Lake City, UT	-	0.973	1.031	1.016	1.022	0.871	0.954
San Antonio-New Braunfels, TX	-	0.978	0.991	1.001	1.003	1.023	1.053
San Diego-Carlsbad, CA	-	0.988	1.022	1.055	1.072	1.046	1.055
San Francisco-Oakland-Hayward, CA	-	1.057	1.096	1.145	1.184	1.014	1.050
San Jose-Sunnyvale-Santa Clara, CA	-	1.016	1.057	1.078	1.111	0.960	1.000
Santa Rosa, CA	-	1.073	1.059	1.047	1.057	1.024	1.033
Scranton--Wilkes-Barre--Hazleton, PA	-	0.969	1.036	1.015	1.042	1.028	1.069
Seattle-Tacoma-Bellevue, WA	-	1.056	1.083	1.091	1.116	0.999	1.052
Spokane-Spokane Valley, WA	-	1.008	0.945	0.928	0.947	0.945	1.061
Springfield, MA	-	0.854	0.944	0.935	0.970	1.132	1.105
Stockton-Lodi, CA	-	0.894	0.870	0.886	0.895	0.993	1.026
Syracuse, NY	-	0.917	1.010	0.996	0.992	1.041	1.093
Tampa-St. Petersburg-Clearwater, FL	-	0.990	0.984	0.997	1.015	0.974	1.069
Toledo, OH	-	0.925	0.968	0.964	1.018	1.064	1.061
Tucson, AZ	-	0.943	0.963	0.972	0.911	0.843	0.940
Tulsa, OK	-	0.996	1.018	1.020	1.002	0.946	1.017
Urban Honolulu, HI	-	1.089	1.032	1.100	1.132	1.028	1.151
Virginia Beach-Norfolk-Newport News, VA-NC	-	0.995	1.032	1.078	1.105	1.063	1.131
Washington-Arlington-Alexandria, DC-VA-MD-WV	-	1.047	1.110	1.127	1.133	1.056	0.982
Wichita, KS	-	1.020	1.021	1.013	1.052	0.971	1.003
Winston-Salem, NC	-	0.857	0.918	0.939	0.908	0.987	0.977
Worcester, MA-CT	-	0.845	0.911	0.943	0.949	1.044	1.052
Youngstown-Warren-Boardman, OH-PA	-	0.943	0.931	0.922	0.983	1.017	1.016

Comparing the United States and Canada

In 2011, where I have been able to calculate generational entry congestion indices for both Canada and the United States, the national averages and mid-sized and large metropolitan area averages are similar. However, in both cases Canada experienced modest increases in

generational entry congestion (1.010 and 1.011 respectively) while the United States experienced modest decreases in generational entry congestion (0.999 and 0.996 respectively). While the median metropolitan areas were also almost identical (0.996 in Canada and 0.997 in the United States), there was a much greater range of generational entry congestion in the United States than Canada, particularly below the median.

The trend across all years reviewed in both countries is generational entry congestion moving from decreasing to increasing, with important variations across metropolitan areas. This suggests that, on the basis of relative changes in the young adult population, it is getting more difficult for young adults to enter the housing market. As 2016 age-based population data is released in both countries this year, another set of indices can be calculated, becoming available for comparison.

So, there is a wealth of data from generational entry congestion indices that provides new insight into changes in population structures driven by young adults. However, the increasing level of and wide variation in generational exit decongestion indices from older adult household dissolutions in the Canadian context suggest that the decongestion data in the United States, if it becomes readily available in future years through the ACS with five-year age groups, would add further local insights and potentially affect any policy recommendations that would otherwise be made from solely reviewing generational entry congestion results. These increasing rates of household dissolutions, as it can making housing market entry easier for young adults, may change increasing congestion in an MSA to decreasing congestion. Planners and policy makers would then be more interested in whether young adults can access this new supply.

Chapter 5: Discussion

I began this thesis seeking to answer the following questions, which build on the valuable work conducted by Myers (2016):

(a) What are the similarities and differences between "peak Millennial" in Canada and the United States at the national level?

(b) Can these changes in cohort size of young adults – a form of generational congestion – be quantified at the level of the local housing market?

(c) By what practical methods can planners and policymakers use this quantification of generational congestion to improve outcomes for households, such as improved affordability, in their local housing markets?

In this chapter, I will discuss the key findings under each of these questions in order. Data to answer the first two questions were provided in the two preceding chapters. The final question builds on that "peak Millennial" and generational congestion data and discussion and so is explored in detail later in this chapter.

Peak Millennial

Myers (2016) review of registered birth data in the United States since the Baby Boom highlighted an increasing number of births that peaked in 1990 before falling off again. In reproducing this "peak Millennial" result, I observed a few key challenges to his conclusions.

First, while this peak was certainly much higher than the prior level of registered births, the subsequent decline was relatively minor and short-lived. In fact, a much higher peak came in 2007. This was even more evident when reproducing the changing size of the 25-29 age

cohort. While Myers declared 2015 to be the year of "peak Millennial" as it was the point that 1990 peak in births arrived at the 25-29 age cohort on the doorstep of the housing market, the cohort size continues to rise until 2019[24]. Myers's conclusion that the urban renaissance from Millennials desire for downtown living may come to an end because "peak Millennial" has passed is not supported by the modest and belated declines his own data shows. It would be reckless for planners to adjust their urban plans for declining populations as Myers's suggested (Delgadillo, 2016) simply because this peak in births was reached back in 1990.

Second, Myers's analysis ignored the effects of immigration. He noted United States immigration levels had been relatively flat and so concluded immigration would not impact the general trends observed. However, this assumption is clearly flawed when considering specific metropolitan areas. Since his inauguration in early 2017, President Donald Trump has pushed bans on immigration from certain countries and changed regulations to restrict certain work visas (Solon, 2017; Thrush, 2017). The extent to which these changes directly and indirectly affect immigration flows may change the overall trends and so must be included in conversations around "peak Millennial."

Third, Myers's review was exclusively at the national level, which misses any local variation in the changing presence of Millennials. Given young adults are the most highly mobile segment of the population (Dieleman et al., 2000), this undermines the ability of any national level conclusions to provide insights to local planners and policymakers who may be experiencing stark variations from those national trends.

[24] Perhaps for Myers, this peak was about the change in direction from positive to negative of the second derivative (the rate of change of the rate of change of the 25-29 age cohort) rather than the change in direction from positive to negative of the first derivative (the rate of change of the 25-29 age cohort).

In replicating Myers (2016) approach in Canada, I observed some similarities but some key differences with the United States.

First, "peak Millennial" as defined by Myers arrived here in Canada around 2015, the same time as in the United States, and 25 years after births peaked here in 1989-90 through 1991-92. How it arrived and passed in Canada, however, is almost a mirror image from the United States with registered births plunging here after the peak. Reviewing the changing size of the 25-29 age group, the decline post-"peak Millennial" in Canada is much sharper than in the United States and, while the pace of recovery to the next peak is also sharper, here it neither surpasses nor recovers to the level of "peak Millennial." The Canadian experience, then, would be a much better fit than the United States for Myers's conclusions that passing "peak Millennial" could signal the end of the urban renaissance, if not for the absence of immigration and local variation in his approach.

Second, immigration in Canada provides a much different story than Myers's statements about the unimportance of immigration to assessing generational trends in the United States. Here, immigration has moved somewhat higher overall, but has been particularly evident in the changing population of the 25-29 age group, where it provides new young adults. As a result, understanding Canadian trends surrounding a registered births-driven "peak Millennial" requires understanding immigration, which Myers did not consider.

Third, local variation, which Myers also did not consider, is critically important, particularly due to the Canadian immigration story, and because immigration patterns are highly geographically uneven at the metropolitan scale both in Canada and the US. The share of immigrants in the total population in Canada and its largest metropolitan areas has been

increasing, but varies widely around a 2011 national average of 18%, ranging from 42% in Toronto to less than 6% in Quebec City. These variations are completely missing from Myers's national-level view.

Fourth, the rate of household formation among young adults looks markedly different in Canada. While Myers's showed congestion in the rental housing market after the 2008 Great Recession from 35-44 year olds unable to move into home ownership, rates of home ownership among young adults increased in Canada over the same period, beginning at earlier ages. The lack of a housing market crash in Canada during our 2008 recession is a reasonable explanation for the difference given the negative impact of the foreclosure crisis in the United States. This demonstrates that similar demographic factors can be dwarfed by different economic factors, meaning demography is not destiny.

Planners and policymakers, then, should not be fooled into making important decisions about their own cities based on Myers's concept of "peak Millennial". In the United States, changes in the young adult population are not only less drastic than Myers's foretells but they haven't yet dropped at all. In Canada, immigration has more than made up for significant declines in registered births 25 years ago, negating what would otherwise be a more apt example of Myers's post-"peak Millennial" urban decline. Instead, planners should consider an approach that is both local and considers migration, as it can provide an accurate picture of local generationally-driven changes in demand.

Generational Congestion

This thesis developed novel indices of generational congestion to quantify changes in the number of young adults at the entry point and older adult-led households at the exit point of the housing market relative to changes in the overall adult population and households. It specifically isolated the changes in generational structure nationally and in mid-sized and large metropolitan areas in Canada and the United States, providing an indication of whether young adult's ability to enter the housing market is getting easier or more difficult.

Generational entry congestion, or the changing number of young adults relative to the population seeking housing in metropolitan areas in Canada and the United States, grew in Canada and the United States leading up to Myers's birth-driven "peak Millennial." This overall trend, which is indicative of housing market entry becoming more difficult for young adults, hides significant regional variation, with slightly higher congestion in the Canadian west and substantially higher congestion in the United States Northeast. Where generational entry congestion declined, however, it was most often due to the overall population boom surpassing a growing young adult population, suggesting the primary challenge for young adults and planners in those metropolitan areas was not generational but general growth.

While the original impetus of this thesis was to quantify the local changes in young adults in local housing markets in the lead up to "peak Millennial," the addition of older adults exiting those same housing markets provided even more interesting findings. While generational entry congestion was growing in Canada leading up to our birth-driven "peak Millennial," changes in generational exit decongestion were of a much greater scale and had much wider diversity across the country. In their earlier analysis of the year by which sellers

would outnumber buyers in states due to the aging population, Myers and Ryu (2008) forecast these changes would have arrived across much of the Northeast by 2020 and half of US states by 2030. This exit would, in their view, end a "generational housing bubble" with precipitous drops in prices (Myers & Ryu, 2008, p. 27). The end of that bubble would also make housing market entry easier for young adults. Though that approach could not be replicated in Canada due to a lack of real estate transaction data by age (McCloskey, 2013), generational exit decongestion data showing an accelerating rate of household dissolutions between 2001 and 2011 suggest similar challenges could be coming to Canada. Already, the combined generational congestion index shows in most of the country that housing market entry is getting easier for young adults, provided all other factors remained constant.

Finally, the United States analysis is certainly incomplete. Choosing five-year age ranges that favour timely data for planners and policymakers and that aligns with Canadian data, encounters limitations in ACS data, which prevents the calculation of generational exit decongestion. This overall approach, however, can be flexible. Researchers as well as local planners and policymakers can make different choices in age ranges or leverage any existing analyses they do to overcome this limitation.

Implications for Local Planners and Policymakers

While Myers (2016) suggests local planners and policymakers should be concerned that the passing of "peak Millennial" will end their urban renaissance, his national level data does not support that conclusion. With a small decline in births, continued flow through of new young adults into the 25-29 age group, and a coming rise towards an even higher "peak

Generation Z" in 2032, the United States does not appear to have a domestic population problem ahead.

Instead of being concerned with "peak Millennial", local planners and policymakers should be concerned with migration, both domestic and international, with their own demographic structures, and with what is happening in their census regions. Generational entry congestion data suggests that these are much more important factors that are driving significant variation from the national trend and affecting the ease of young adult's entry into housing market. In many locations, this data shows it is overall population changes rather than the rise of young adults that present the most pressing housing market entry challenges and planning problems.

For Canadian planners, what could be an even bleaker picture here for the stability of housing markets after "peak Millennial" than the one Myers's painted for the United States appears to be buffeted by robust and growing immigration levels. Given changes in immigration policy from the new President of the United States, Canadian policymakers may make further immigration gains, which would support local communities to reverse a young adult population decline. As economists and housing researchers in both countries begin to wonder who will ultimately buy Boomers' single detached suburban homes (Adès, 2013; Kirk, 2017), immigrants have increasingly been the answer (Anderson & Campsie, 2008; Suro, Wilson, & Singer, 2011).

The generational congestion indices could also provide local planners and policymakers with a more nuanced understanding of current housing demand through a generational change lens. The Canada Mortgage and Housing Corporation provides CMA-specific tables of housing market indicators annually for the use of local planners, policymakers, developers, and the

public (see Canada Mortgage and Housing Corporation, 2017). Focused mainly on supply, the four demand-side indicators include population, net migration, and employment statistics, but do not include an assessment of the underlying population structure. The indices of generational congestion may be of value to add as a demand-side indicator, subject to future research on its relationship with other key factors in the housing market.

As the Baby Boomer generation ages, one of the key questions facing local planners and policymakers is what proportion will age in place and for how long, and what proportion will downsize or require accommodation in seniors' supportive living facilities across a continuum of care needs (see for example Canada Mortgage and Housing Corporation, 2015). Forecasts in this regard were, for example, highly contentious in the Ontario Municipal Board's review of the Region of Waterloo's Official Plan (Ontario Municipal Board, 2013). While my analysis here does not offer insights into moves within the housing market,[25] I do find that the rate of household dissolution is increasing in Canada. This means that the housing market exit, which is inevitable, has already begun, which should provide additional housing supply to the market. Given the different rates of household formation and tenure by age between the United States and Canada due to different housing market conditions, how well the size, location, tenure, type, condition, and price of that additional housing supply matches demand is then a key question for growth planning.

The approach developed in this thesis may assist local planners in the creation of land budgets as it offers insights into the overall demand for housing units. Moreover, regardless of

[25] The four hypothetical future housing scenarios shown Figure 1 in Chapter 1 provide a good framework for understanding the interaction of Boomer's choices to age-in-place or downsize with Millennial's preferences for remaining in core areas or moving to the suburbs.

whether a household chooses to age in place or downsize to a rental or ownership unit in the housing market in the near to medium term, at some point age will catch up and their household will dissolve. So whether the medium term forecasts of downsizing are correct or not is perhaps not nearly as important as the observation that a sizeable population will eventually be exiting the housing market. The latter is an inevitable fact arising from aging, and does not need to rely on forecasting. Indeed, based on the generational decongestion indices in Canada reviewed in Chapter 4, the housing market exit is already happening, and the pace is quickening. While those results suggest young adult's entry into the housing market should be getting easier, planners need to understand how readily this future supply will be suitable to match young adult's housing demands.

Subject to consistent policies and economic conditions, forecasting future changes in generational congestion indices would also be possible using standard cohort component projection methods, as discussed in Klosterman (1990, pp. 49–109). If local planners and policymakers limited projections to the near term, that would minimize the underlying volatility in forecasting net migration and allow the relatively uncomplicated linear extrapolation approach, which projects the past trend into the future on a straight line, to be reasonably accurate (see description in Klosterman, 1990, pp. 9–16).

While this means that land budgets, which look decades ahead, may be challenged to precisely forecast future demand using these generational congestion indices, they may be useful for monitoring plan implementation. Where municipalities can time infrastructure projects or use other tools to stage development, evaluating how well standard forecasts relate

to actual generational congestion or near-term generational congestion forecasts may assist local planners and policymakers in deciding when to permit additional development.

The generational congestion indices do not, however, provide local planners or policymakers with insight into the intra-metropolitan geography of generational change or how well housing demanded in terms of type, tenure, size, quality, or price matches metropolitan supply. Older adults exiting the housing market from large, high-priced single detached suburban homes may not be accessible for young adults with limited funds and a desire for an urban lifestyle. An expanding and economically booming metropolitan area may show a decrease in generational entry congestion because new middle-age families in new exurbs outnumber new young adults flocking downtown.

Conclusions and Recommendations

"Peak Millennial" arrived in both Canada and the United States around 2015. However, the shapes of the Millennial cohort age distributions in the two countries are mirror opposites of each other, as I presented in Figure 3 and Figure 4 back in Chapter 3. I showed that Myers's (2016) overstates the decline after the peak in the United States, which is modest and soon rises again towards a higher peak. Canada would be a better candidate for a meaningful "peak Millennial" given the drastic decline in births that followed; however, I also showed that the births-based approach would miss the substantial variations in immigration and emigration over time and space in Canada, which has meaningfully altered the shape of its Millennial cohort. Planners and policymakers should not base decisions on the passing of "peak Millennial" as it would lead to the wrong conclusions about the future of housing demand.

In both countries, location and local context also matter. Indices of generational congestion show wide variation across mid-sized and large metropolitan areas in the US and Canada. Increasing generational entry congestion suggests it is getting more difficult for young adults to enter the housing market. However, inclusive of net migration, the generational exit decongestion and combined generational entry congestion indices show that outflows may already be outpacing inflows in some Canadian housing markets. While ostensibly making housing market entry easier for young adults, the increasing pace of household dissolutions suggest young adults could be the wrong generational change on which to focus for planners and policymakers concerned with the stability of their local housing markets. The increasing outflow of older adults may finally bring the instability that has been prematurely forecast for years.

Planners and policymakers in metropolitan areas can use this new index alongside their own understanding of local dynamics in assessing whether their housing policies are generationally aligned with their present and future demands. As discussed earlier in this chapter, local planners and policymakers should consider:

1. Focusing on generational entry congestion rather than births-driven "peak Millennial" to understand their changing number of young adults;
2. Reviewing the dissolution rate of older adult households, as these may be more significant than changes in young adults seeking to form households;
3. Including generational entry congestion and exit decongestion indices when monitoring the implementation of land budgets for staging development; and

4. Attracting young adult migrants, both domestic and international, where generational entry congestion is decreasing.

Further Research

While I explored concerns around the increasing unaffordability of young adults in Chapter 1, the relationship of housing affordability and other economic factors to generational congestion is the work of further research. This includes exploring what, if any, relationship exists between housing affordability at the metropolitan level (e.g., the percentage of households experiencing housing costs greater than 30% of their household income) and the metropolitan area's indices of generational congestion. The relative importance of generational congestion on affordability to socio-economic factors, such as income, education, and employment, would allow local planners and policymakers to focus their housing policies on the most important components of the housing affordability challenge. That research could also support a future decision by CMHC to include generational congestion in their annual housing market indicators reports.

As discussed, variations in the tenure, type, size, and condition of housing demanded can result in a housing market where demand and supply are mismatched even if there is a decrease in generational congestion. Further research is thus also required into these local housing markets where the generational congestion index is decreasing but housing affordability remains a challenge.

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Appendix A: Boundary Changes, Data Adjustments, and Unresolved Issues

Municipal Statistical Area Name (2015)	CBSA (2015)	Years	Boundary Change; Data Changes Made
Los Angeles-Long Beach-Anaheim, CA	31080	2005-12	MSA's CBSA was 31100 prior to 2013; recoded prior years to 31080
Urban Honolulu, HI	46520	2005-12	MSA's CBSA was 26180 prior to 2013; recoded prior years to 46520
North Port-Bradenton-Sarasota, FL	35840	2005-12	MSA's CBSA was 42260 (2005-07), 14600 (2008-09); recoded all to 35840
New York-Newark-Jersey City, NY-NJ-PA	35620	2005-12	35620 absorbed 39100 in 2013; recalculated 35620 to include 39100 in 2005-12
Indianapolis-Carmel-Anderson, IN	26900	2005-12	26900 absorbed 11300 in 2013; recalculated 26900 to include 11300 in 2005-12
Greenville-Anderson-Mauldin, SC	24860	2005-12	24860 absorbed 11340 in 2013; recalculated 24860 to include 11340 in 2005-12
Grand Rapids-Wyoming, MI	24340	2005-12	24340 absorbed 26100 in 2013; recalculated 24340 to include 26100 in 2005-12
Deltona-Daytona Beach-Ormond Beach,FL	19660	2005-12	19660 absorbed 37380 in 2013; recalculated 19660 to include 37380 in 2005-12
Winston-Salem, NC	49180	2005-12	49180 absorbed 45640 in 2013; recalculated 49180 to include 45640 in 2005-12
Charlotte-Concord-Gastonia, NC-SC	16740	2005-12	16740 absorbed 30740, 41580, 44380, 29580 in 2013; recalculated 16740 in 2005-12
Worcester, MA-CT	49340	2005-12	49340 absorbed 48740 in 2013; recalculated 49340 to include 48740 in 2005-12
Municipal Statistical Area Name (2015)	**CBSA (2015)**	**Years**	**Boundary Change; Reason Unresolved**
Grand Rapids-Wyoming, MI	24340	2005-12	Lost one county to new micro-statistical area, gained two other counties each less than 65,000 in 2013; no ACS 1-Yr data
Charlotte-Concord-Gastonia, NC-SC	16740	2005-12	Absorbed one micro-statistical area less than 65,000 in 2013 and 29580, noted as absorbed in previous table, was less than 65,000 in 2005-06; no ACS 1-Yr data
Knoxville, TN	28940	2005-12	Absorbed two micro-statistical areas, one county each less than 65,000 in 2013; no ACS 1-Yr data
Springfield, MA	44140	2005-12	Absorbed two micro-statistical areas each less than 65,000 in 2013; no ACS 1-Yr data
Worcester, MA-CT	49340	2005-12	Gained two counties (one from Springfield MA-CT) each less than 65,000 in 2013; no ACS 1-Yr data
Dayton, OH	19380	2013-14	Lost one county less than 65,000 (about 5% population of 19380) in 2013; no ACS 1-Yr data
Columbus, OH	18140	2005-12	Gained two counties each less than 65,000 (about 5% population of 18140) in 2013; no ACS 1-Yr data
Ogden-Clearfield, UT	36260	2005-12	Absorbed one micro-statistical area less than 65,000 in 2013; no ACS 1-Yr data
Salt Lake City, UT	41620	2013-14	Lost one county to new micro-statistical area less than 65,000 in 2013; no ACS 1-Yr data
Spokane-Spokane Valley, WA	44060	2005-12	Gained two counties each less than 65,000 in 2013; no ACS 1-Yr data
Madison, WI	31540	2005-12	Absorbed one micro-statistical area less than 65,000 in 2013; no ACS 1-Yr data

Appendix B: Generational Congestion Guide For Local Planners

	Canada	United States
1. Data Required	• Population by Age ○ 15+ and 25-34 (2016 census) ○ 15+ and 25-34 (2011 NHS) • Private Households by Age ○ Total and 75+ (2016 census) ○ Total, 70+, and 75+ (2011 NHS) ○ 70+ (2006 census)	• Population by Age ○ 15+ and 25-34 (2016 ACS 1Yr) ○ 15+ and 25-34 (2011 ACS 1Yr)
2. Data Location	• Population by Age ○ http://www.statcan.gc.ca ○ Find Census Profile for your CMA ○ Locate Age Group data • Private Households by Age ○ http://www12.statcan.gc.ca/datasets ○ Change Survey: select census/NHS ○ Topic: Housing (exact title varies) ○ Geography: CMA/CA ○ Variable: Age groups of primary household maintainer (13)* ○ Select any table and then your CMA	• Population by Age ○ http://factfinder.census.gov ○ Search for S0101: Age and Sex ○ Select "Add Geography" ○ Select MSA (310) ○ Find your MSA ○ Select version (2016, 2011)
3. Calculate	• Generational Entry Congestion $\left(\frac{P_t^{25-34}}{P_t^{15+}}\right) / \left(\frac{P_{t-5}^{25-34}}{P_{t-5}^{15+}}\right)$ • Generational Exit Congestion $\left(\frac{HH_{t-5}^{70+} - HH_t^{75+}}{HH_t^{15+}}\right) / \left(\frac{HH_{t-10}^{70+} - HH_{t-5}^{75+}}{HH_{t-5}^{15+}}\right)$ • Combined Generational Congestion ○ From above result, $Entry \div Exit$	• Assemble population for required age groups from percentages of total • Generational Entry Congestion $\left(\frac{P_t^{25-34}}{P_t^{15+}}\right) / \left(\frac{P_{t-5}^{25-34}}{P_{t-5}^{15+}}\right)$
	In the preceding calculations, P_t^c *is the population of age group* c *at time* t HH_t^c *is the number households headed by age group* c *at time* t	

* Note that in census years prior to 2011, "Age groups of primary household maintainer (13)" is not freely available online. This data can be purchased from Statistics Canada along with other census data municipalities already purchase. Alternatively, municipal planners can contact a Statistics Canada Data Liberation Initiative partner, which include post-secondary institutions from across the country (list available at http://www.statcan.gc.ca/eng/dli/dli).