The Residential Crowding of Immigrants in Canada, 1971-2001

Abstract

Although rates of residential crowding in Canada declined between 1971 and 2001, the drop for immigrants was not nearly as pronounced as it was for the Canadian-born. The purpose of this paper is to determine the extent to which the differential trends in residential crowding can be attributed to changes in educational attainment, household composition, economic characteristics (including housing values), Census Metropolitan Area (CMA) of residence, and skin colour (visible minority status[1]). Additionally, the prospect of changing effects over time for several factors is also assessed. The main findings of the paper are that basic household characteristics explain a significant portion of the 30-year immigrant/Canadian-born divergence, and that including time interactions reveals that differences in propensities across CMAs emerged post-1971. Interestingly, time interactions also reveal that there have been nearly no significant changes in the propensity to crowd among visible minority groups since 1971.

Keywords: Canada, Immigrants, Housing, Residential Crowding, Ethno-racial groups.

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[1] 'Visible minority status' is a distinctly Canadian term to denote differences in skin colour, and is measured in accordance with the Employment Equity Act. It is not intended to denote actual differences beyond that of skin colour. As with any other racial marker, these are socially constructed signifiers of difference.

1. Introduction

In 1971, roughly 1 in 12 Canadian homes were crowded, or contained more than one person per room.[2] By 2001, this figure had dropped sharply, to roughly 1 in 40. Most researchers who study crowding believe that this decline was accompanied by improvements in both present (Gove & Hughes, 1983; Myers, 1999) and future (Baldassare, 1995; W.A.V. Clark & Dieleman, 1996; Myers, Baer, & Choi, 1996) social, economic and psychological wellbeing. If true, then the 1971-2001 Canadian residential crowding decline should largely be read as a good news story; in just 30 years, the rate of crowding among Canadian households[3] has dropped to roughly a third of what it once was.

As is often the case with rapid social change, however, not all groups experienced these declines in equal measures. Several individuals remained at risk of crowding in 2001, and identifying who these people are, and why crowding continues to be a problem for them, provides policymakers with much-needed information on the dynamics of one aspect of blocked residential mobility.

Although there are numerous groups worthy of study (lone parents, Aboriginal Canadians, etc.), in this paper I choose to focus on immigrants for several reasons. First, immigrants today account for roughly 2/3 of Canada's population growth (Statistics Canada, 2008), so the persistence of crowding here will eventually translate into an overall increase. Second, trends in crowding among immigrants have diverged noticeably from the Canadian-born in recent years (Table 1), suggesting that there are different storylines for each group.

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[2] A room is defined as it was by Statistics Canada for the 2001 census. Partially divided L-shaped rooms are considered to be separate rooms if they are considered as such by the respondent (e.g. L-shaped dining-room and living-room arrangements). Not counted as rooms are bathrooms, halls, vestibules and rooms used solely for business purposes.

[3] Where a household contains one adult and one or more children, or more than one adult with or without children. The period 1971-2001 was chosen because it captures the widest possible time span with existing data. Also, 1971 marks the first year that recent immigrants were more likely to be visible minorities than non-visible minorities (Troper 2003), and therefore marks an important milestone in Canada's immigration history.

*********Table 1 about here*************

Looking first at immigrants, crowding rates went from 8.4% in 1971 to 4.7% in 1986, only to once again climb to 6.7% in 2001. For the Canadian-born, they more or less fell monotonically across the 30-year time period, dropping from 9.4% in 1971 to 3.5% in 1986 to almost non-existence in 2001.

A final reason for focusing on immigrants stems from their fairly pronounced declines in economic wellbeing (for a review, see Picot & Sweetman, 2005). Given the many negative outcomes associated with residential crowding (Myers, Baer, & Choi, 1996; Myers & Lee, 1996)[4], it is important to know if the relative lack of change among immigrants can simply be added to the list of consequences of recent economic adversity, or if there are instead other reasons behind the occurrence.

This paper uses binomial probit regressions and the 1971 and 2001 censuses of Canada to investigate the factors behind residential crowding in Canada's census metropolitan areas. By doing so, it builds on existing research in a number of ways: first, it represents one of the few attempts to identify the correlates of household density in Canada; second, it tries to explain the changes in these rates for both immigrants and the Canadian-born over time using standard demographic and economic information; third, it uses the census master files, which contain information not available on public-use files, thereby allowing for an assessment of the impact of several unique characteristics, such as changes in housing values over time. Finally,

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[4] The list of negative outcomes is lengthy, but a short list could include poor mental health (Gove and Hughes, 1983), lower life satisfaction (Gove and Hughes, 1983), labour productivity (Hacker, 1999), child academic performance (Evans, Lepore, Shejwal, and Palsane, 1998), plus increasing the risk of tuberculosis, shigellosis, and pneumococcal infections (www.phac-aspc.gc.ca/publicat/ccdr-rmtc/03vol29/dr2905ea.html).

since most research focuses on the *effects* of crowding,[5] this study is novel in that it uses crowding as an outcome rather than a predictor.

2.   Housing and the Basic Consumer Choice Model

In most studies, a household's dwelling characteristics (tenure, quality, value, number of residents, propensity to be crowded, etc.) are situated at the intersection of its needs, preferences, and (often fiscal) constraints. These characteristics shift over time, reflecting changes in residents' age, educational attainment profile, marital status, family size, labour market characteristics, etc (W.A.V Clark, Dieleman, & Deurloo, 1984). It should therefore be possible to link a household's dwelling characteristics to basic demographic, socioeconomic and household composition characteristics. Furthermore, it should also be possible to explain changes over time - and differences between groups in changes over time – with this basic 'consumer choice' residential model. Regarding immigrants, duration is also an important factor to consider, since there is often initial mismatch between residential and household characteristics (Alba & Logan, 1992; Michael Haan, 2005; Pitkin & Myers, 1994).

Although it has its strengths, embedded in this model is the assumption that there exists an 'ideal-type' housing consumer. This person wants to own a home, he/she desires a family, holds a job, and has in his or her mind the approximate amount of space required for every person in their dwelling. Consequently, when these ideal-type spatial allocations are exceeded, a common conclusion is that it is the result of factors that are out of the consumer's control.

Most would admit that this is a rather crude approximation of individuals, but if deviations from the norm were purely random, it wouldn't affect the utility of the model. The problem is that this may not be the case; differences in density vary widely worldwide, so it

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[5] Exceptions include Gove and Hughes (1983), Gillis, Richard and Hagan (1986), and Myers, Baer and Choi, (1996).

shouldn't be surprising if immigrants bring their attitudes about density with them. In addition to this, immigrants have an additional incentive to demonstrate success in their host society, and may systematically make different decisions than the median consumer to achieve it. If, for example, a family wanted to buy a house so that they could in part illustrate that they've 'made it' to the host society, we might see that family decide to accept boarders to help cover purchase costs if they lacked sufficient funds. In this situation, crowding could be considered beneficial because it made the purchase possible.

Another limitation of the framework above is the lack of attention paid to some of the constraints that are externally imposed upon a household's residential options. Aside from basic economic (households may not be able to afford their ideal house) and supply constraints (some houses are simply not available for purchase), households are otherwise believed to face few residential barriers. As consumers in a market free from constraint, they are essentially at liberty to choose any dwelling they wish and can afford. Presumably, then, they will choose one that is big enough to accommodate everyone.

This runs contrary to research (Myles & Hou, 2004; Ornstein, 2000) that shows profound differences in the way households experience Canada's residential space. For reasons beyond those discussed in the basic framework, ethno-racial groups often find themselves pushed into different 'channels' of the housing market. Group members may encounter issues like discrimination, residential steering, and redlining, resulting in a racialized housing market. This suggests that the consumer choice model is poorly applied when it comes to residential issues, because it does not acknowledge the reality of Canada's racialized urban environment (Henry, 1989; Henry, Tator, Mattis, & Rees, 2000; Hulchanski, 1997; Murdie, 2002).

As only one example of stratification in the Canadian housing market, consider there is currently an unexplained homeownership gap of nearly 30 percentage points between ethno-racial groups in Canada (M. Haan, 2007). This gap is what remains *after* removing differences in labour market success, time spent in Canada, and many of the other factors that are known to affect access to owner-occupied housing. This illustrates the difficulties that some groups experience in the Canadian housing market, and how these problems result in high levels of residential stratification. These gaps are not well-explained by the consumer choice framework, and one of the goals of this paper is to see how well the framework explains crowding. If it doesn't, what does? Since the primary purpose is to assess the ability of the basic consumer choice model, we'll return to alternatives at the end of the paper.

In the sections below, descriptive statistics for some of the factors that fall within the basic model are first displayed, followed by a lengthier discussion of factors that have been found to impact crowding but do not fall within the traditional framework.

2.1   *Demographic Correlates*

One of the central components of the basic consumer choice model described above is family size and structure. Budget constraints aside, the number of children and adults should heavily determine the characteristics of the dwelling a household occupies, and, for the most part, (primarily US) research supports this expectation. Younger households, often with newborn children, have higher densities than do older ones (Myers, Baer, & Choi, 1996; Van Hook & Glick, 2007), with lone parent dwellings being more likely to experience space constraints than married (or, presumably, common-law) couples (Angel & Tienda, 1982; Kamo, 2000). What this suggests is that there is a connection between the number of adults and children in a dwelling, and the propensity to be crowded.

Descriptive evidence for Canada seems to support this conclusion (Table 2). From 1971 to 2001, there was virtually no change in the number of adults, and a 1/3 reduction in the number of children, in an immigrant dwelling. For the Canadian-born, there were reductions on both counts; the number of children was cut in half, and there was a reduction of 0.3 adults per dwelling. Consequently, we might expect that household structure will explain some of the 30-year differential changes, and that both of these household characteristics will positively predict crowding.[6]

2.2   Economic Factors

The consumer choice model is also heavily predicated on finances, so that crowded dwellings exist because inhabitants are unable to afford a bigger dwelling. Given this, we might expect that differential changes in economic status will results in changes in the propensity to crowd. As this relates to the immigrant/native-born bifurcation, it is possible that part of the reason for the divergence in recent years is the well-known hardships that have been endured by immigrants in the labour market in recent history (Frenette & Morissette, 2003; Picot & Sweetman, 2005).

Looking first at unemployment levels, there appears to be a link to crowding, with 15.8% (1971) and 5.2% (2001) of households where the highest earner is unemployed being crowded. The trend for owner-occupied dwellings is less readily discernible, as the crowding rate is only slightly below the national average for owned dwellings in both years. Much easier to detect is

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[6] Other standard household characteristics are age, education, years since migration, and knowledge of English or French, but descriptive results for these factors are not shown here because the changes over time suggest that there would be even larger differential gaps (age, education, YSM, knowledge of English or French) between groups. Furthermore, in the regression models presented later, there is a count of children and adults rather than the combinations presented above for illustration purposes.

the trend between income and crowding, with houses in the lowest quartile being roughly twice (1971) or three times (2001) as likely to be crowded as those in the highest quartile.

Turning now to the extent to which these factors can be expected to explain the immigrant/Canadian-born patterns, there is a slight divergence in unemployment rates between immigrants and the Canadian-born over time, with immigrant unemployment rates increasing alongside no change for the Canadian-born.[7] Owner-occupied households have slightly lower levels of crowding, and the substantial growth in ownership among the Canadian-born alongside relative small increases for immigrants suggests that there might also be some explanatory potential here.

The trends for household income are somewhat more complex. First of all, there is a clear connection between income and crowding, but the low quartile cutoff for immigrants has barely moved in real terms between 1971 and 2001, whereas for the native-born it's increased by over $10,000. At the same time, the top cutoff for both groups increased by nearly $30,000. What this suggests is that while immigrant household income at the top quartile has increased in step with the Canadian-born (likely alongside decreases in crowding), low-income immigrants were unable to make real gains across the 30-year period. It is these people that are likely to remain at risk of crowding, and likely to be the group that explains the relative lack of change in immigrant crowding levels.

To summarize, there is good reason to expect that economic characteristics will explain some of the immigrant/Canadian-born divergence. Although there is only a weak relationship between crowding and ownership status, income and employment status do seem to be linked

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[7] Readers are reminded that these rates pertain only to the highest household earner, which are more likely to be employed than the labour force population overall.

more closely to crowding. Given this, it is likely that 1971-2001 crowding patterns will be partially explained in the multivariate analysis to follow later by these characteristics.

2.2.1 Deteriorating Affordability in Several Housing Markets across Canada

Although a good deal of the economic change over time is tied to the labour market, there have also been shifts in metropolitan housing markets between 1971 and 2001 that may affect crowding. Prices have risen in virtually all cities, which tend to affect new housing market entrants most directly. Consequently, all else equal, the growth in prices hurts new entrants more than established ones, since it is the new entrants that are most likely to contend with the larger mortgages that result from price increases.

Several studies have shown that there is a negative relationship between household density and affordability in a city (Kritz, Gurak, & Chin, 2000; Myers & Wolch, 1995; Spain, 1990), suggesting that housing values will impact the propensity for crowding.

Table 4 here

Table 4 above illustrates the increase in housing values across the 1971-2001 period (note: prices are in constant 2000 dollars).[8] Although affordability also requires an assessment of interest rates (discussed more fully below), Table 4 above does begin to provide a measure of declining affordability over time. Other research that discusses this decline includes Holt and Goldbloom (2007) and Skaburskis (2004).

As mentioned in the previous paragraph, housing values are only one aspect of affordability. Other aspects worthy of consideration are mortgage interest rates and amortization periods. Maximum amortization periods have remained stable over most of the

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[8] Comparing Census Metropolitan Areas in Canada over time is complicated by changes in boundaries over time. I chose to use current boundaries, and readers are reminded that most metropolitan areas have grown sizably across the study period.

observation period[9], but there has been considerable variation in interest rates, as Figure 1 below shows:

Figure 1 here

Temporarily putting price increases aside, Figure 1 suggests that housing was at its least affordable point in the early 1980s, when rates peaked at over 18%. Both before and after then rates were lower, and there are actually rather small differences in rates in the years leading up to the 1971 and 2001 observation points used here, with rates declining slightly at the close of the 1960s and increasing for most of the 1990s. Consequently, we might conclude that a new homebuyer would be in a similar position regarding interest rates at the two observation points, and that, all else equal, the housing affordability constraints faced by potential homebuyers in the 1990s should more or less be similar to those of the 1960s, and that there is therefore in some ways a similar economic context for crowding.

2.3   Cultural Explanations for Crowding

A factor that potentially complicates the application of the consumer choice model, and is not often mentioned by those who look to its tenets for guidance, is the assumption that there is a general agreement about what constitutes an appropriate amount of space per person (Gillis, Richard, & Hagan, 1986; Greenfield & Lewis, 1969). In North America, a dwelling is typically considered to be 'appropriate' when there is less than one person per room (Myers & Lee, 1996), and dwellings that exceed this threshold are crowded.[10]

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[9] Interestingly, however, the Canada Mortgage and Housing Corporation recently reversed its recent trend of extending amortization periods in July 2008, by reducing the maximum period from 40 years to 35.

[10] A more common definition used in Canada is that of the National Occupancy Standard, which also looks at the age and distribution of individuals across rooms. Since many datasets do not contain this information, comparability is compromised to some extent, so this study instead uses total number of persons/number of rooms to identify crowding.

As mentioned earlier, this definition is arguably not universally accepted. People from certain parts of the world may be more accustomed to living in closer proximity with one another, and they might bring these customs with them to Canada. A reduced need for personal space, regardless of economic constraints, could therefore be misinterpreted as crowding, and might therefore partly explain differences between immigrants and the Canadian-born. Furthermore, given the profound changes in Canada's immigrant flows in recent history (Statistics Canada, 2000), the entry of new groups, with new conventions about personal space, could explain some of the changes in crowding rates over time, pointing to the salience of skin colour, an admittedly crude proxy for measuring difference, as an explanatory factor behind 1971-2001 crowding trends.

It is also possible that observed differences by skin colour stem from discrimination, either in the labour or housing market. In the event that it is manifested in the labour market, however, it would be captured by economic characteristics, but if it is in the housing market, it may be more difficult to detect, and would result in persistent differences across groups.

The third possibility for differences between groups represents a combination of the above two. First, in situations where families face constraints (either from discrimination or other sources), it could be the *reaction* that is group-specific. This too will produce significant differences across groups, and although it will not be possible to decipher between these explanations in this paper, they present interesting possibilities for future research.

These possibilities are consistent with the patterns that have been observed between density and years in host country. Some of the highest rates of overcrowding in the United States (and Canada (http://www.cic.gc.ca/english/research/papers/menu-recent.html)) are found among recent immigrants, with gradual declines over time spent in the host country

(Myers, Baer, & Choi, 1996; Myers & Lee, 1996). Even after controlling for duration and economic factors, however, some groups (notably Hispanic and Asian households) have much higher housing densities than do other groups (Ellen & O'Flaherty, 2007; Glick, Bean, & Van Hook, 1997; Kamo, 2000), lending support to the notion that there are cultural differences in what would be considered to be an adequate amount of space per person.

Similar patterns can be witnessed in the descriptive results for Canada, where there are wide variations in the propensity to crowd across groups (Table 5).

Table 5 here

Whites have one of the lowest propensities to crowd, so the growth in non-white immigration is likely exerting upward pressure on crowding levels for immigrants. This can not be said for the Canadian-born population, since the visible minority composition was largely unchanged. Naturally, it is difficult to tell whether the differences in the table above can be linked to cultural variations, or if they instead flow from other factors that differ systematically by group. In any event, the growth in the non-white immigrant population between 1971 and 2001 suggests that the lack of change in crowding rates for immigrants, alongside sharp declines for the Canadian-born, might stem from growth in Canada's visible minority immigrant population.[11]

3.   The Changing Effects of Characteristics over Time

Many diverse changes have swept across the western world in recent history – urbanization, credential creep, individualization of the life course, a shift away from Europe as the dominant source region for immigrants, changing housing markets, to name only a few – so the factors behind residential crowding across a 30-year period are likely to be more than simply

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[11] My use of visible minority indicators is not intended to denote within-group homogeneity. Since race is socially constructed and imbued with meaning, it is my intention to capture the social process of collapsing heterogeneity and labeling groups "Black", "White", and using these markers to establish treatment.

compositional in nature. Does holding a university degree bear the same relationship to crowding in 2001 as it did in 1971? What about being non-white? Having a child? If not, then a person's social, economic and demographic 'repertoire' will position them differently for crowding over time. The 'potency' of various factors could therefore be changing over time, pointing to interactions between time and the explanatory variables mentioned above.

One of this paper's goals is to explain changes over time (and to assess the ability of the consumer choice model to do this), and controlling for compositional characteristics alone might be insufficient to achieve this goal. That is to say, the trends might not only stem from compositional characteristics, but also from changes in how these characteristics relate to crowding over time. To assess this, many of the variables in the regression models will be interacted with the year of observation to determine whether there are time interaction effects.[12]

4. Research Questions

Guided by the discussion and descriptive results above, the following four questions emerge about residential crowding in Canada and about the differences between immigrants and the Canadian-born:

1)   To what extent do basic household characteristics (age, family size and structure, etc.) explain the differences in residential crowding rates between immigrants and the Canadian-born from 1971-2001?

2)   Does the 30-year immigrant/Canadian-born disparity simply reflect the growing economic hardships experienced by immigrants relative to the Canadian-born (Heisz, Jackson, & Picot, 2002; Li, 2000)?

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[12] Ideally, all of the characteristics would be tested as a time interaction but, as discussed later in the paper, several could not be due to problems with multicollinearity.

3)   Can these changes be related to a shift in visible minority status composition for

        Canadian newcomers?

4)   Have the effects of certain characteristics changed over time?

5.   Data and Methods

5.1   Data

The primary data source for this paper is a concatenated 1971-2001 Census of Canada

household-level dataset. Only permanent residents, where the highest earner is between age 25

and 65 and not currently in an institution, collective dwelling or military quarters, are included.

The demographic and socioeconomic characteristics (age, education, duration, etc) of the

highest earner are chosen to represent the entire household, and a household must have more

than one resident to be included. A 20% random sample of the master file was taken after these

restrictions were imposed to ease computing, yielding a final sample size of roughly 340,000

observations.

Choosing the 1971-2001 period stems from a combination of historical and empirical

factors. First, the 1971 census has not visible minority indicators, so very little is known about

these populations at all. Using techniques established by methodologists at Statistics Canada,

however, it is possible to impute visible minority characteristics. Second, 1971 was the year in

which Europe ceased to be the primary donor region for Canadian immigrants (Troper, 2003).

It is therefore historically significant, because it marks the beginning of a radically new era in

Canadian immigration. 1971 is an ideal start-point for this study because it marks the onset of

Canada's new immigration era.

In all models, a room is defined as an enclosed area within a dwelling that is suitable

for year-round living: a living room, bedroom, kitchen, or a finished room in attic or basement.

Bathrooms, halls, vestibules and spaces used solely for business purposes are not counted as rooms. The dependent variable is a crowding indicator, where a dwelling is defined as crowded if the number of persons per room in the dwelling is one or higher (1). Otherwise, the value for that household is coded as zero.

5.2 Independent Variables

In table 6 below, a list of variables and their means appears. Essentially, there are clusters of explanatory variables that are sequentially entered in the regression models to answer the research questions posed earlier. The first cluster contains standard household information, followed by a vector of economic indicators. Together, these factors characterize the characteristics inherent in the consumer choice model, and allow for an assessment of the ability of this model to explain the trends noted in Table 1. Next appears a model that adds CMA variables, followed by a series of visible minority indicators, which will be used as an admittedly crude attempt to measure group differences in the cultural propensity to crowd.

Table 6 here

5.3 Methods

As mentioned above, for all of the regressions in this paper, the focal outcome is a dichotomous variable, set to 0 if a dwelling is not crowded (less than one person per room), and 1 if it is crowded (greater than or equal to one person per room). The equations designed to assess changes in compositional characteristics take the following form:

$$Crowding = Period + Immigrant + Immigrant*Period \qquad (1)$$

$$Crowding = Model\ 1 + Demographic\ and\ Immigrant\ Characteristics \qquad (2)$$

$$Crowding = Model\ 2 + Economic\ Characteristics \qquad (3)$$

$$Crowding = Model\ 3 + CMA\ Characteristics \qquad (4)$$

Crowding= Model 4 + Visible Minority Characteristics   *(5)*

Where:

> *Crowding* = whether a dwelling is not crowded (0) or crowded (1).
> *Period* = Census year (1971=0, 2001=1)
> *Immigrant Indicator* = Immigrant status (0=Canadian-born, 1=immigrant).
> *Immigrant*Period= Period* interacted with *Immigrant*
> *Demographic Characteristics* = marital status, number of children in
>   household, household type, etc.
> *Immigrant Characteristics*=Years since migration, years since migration
>   squared, and knowledge of English or French.
> *CMA and Housing Characteristics=A vector CMA indicators and a median
>   housing value figure for each CMA for each year.*
> *Economic Characteristics =*
> *Visible Minority Status* = Self-reported visible minority status.

In all of the above models, *Period* captures the change between 1971 and 2001 in the propensity for Canadian-born households to crowd (stated as a marginal effect), *Immigrant* equals the gap between immigrants and the Canadian-born in 1971, and *Immigrant*Period* stands for the change in the immigrant crowding rate relative to the Canadian-born rate over the 30-year period. These coefficients reflect the propensity for crowding that is unexplained by other variables in the model. Since there are no other variables in model 1, they could be considered the baseline trends.

The interpretation of these coefficients does not change with the inclusion of other covariates[13], only now it is the size of the gap after adjusting for other characteristics. It could therefore be said that *Period*, *Immigrant*, and *Immigrant*Period* represent the differences in propensity to crowd that are not explained by other variables in the model. The primary goal of

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[13] There is actually some discussion around this issue. Some would say that the interpretation actually does change, since the reference group becomes more specific with the inclusion of controls.

the analysis is to reduce the magnitude of these three coefficients using other available information in the census. This is done in subsequent models.[14]

Since the outcome of interest is dichotomous, these models above are appropriate for either logit or probit techniques, but given the greater ease of interpretation of the marginal effects of a probit model, these models were chosen over their logit counterpart.

To compare models, there are many competing model fit statistics, but here the Bayesian Information Criterion, or BIC (Raftery, 1995), is used. Although its value has no straightforward or intuitive interpretation (like R^2 does), BIC is preferable to many other fit statistics because its values can be compared across models, while penalizing for model complexity. It is therefore more likely to ensure that the choice between models is both judicious and conservative. Lower values of BIC imply a closer alliance between the observed data and the experimental model, and are therefore preferable.

6.   Multivariate Results

Tables 1-5 are useful in that they provide information about the broad contours of residential crowding in Canada, and how propensities vary by household characteristics. Given the interrelatedness of these characteristics, however, it is difficult to identify whether the relationships reflect actual differences or if they are instead mediated by other characteristics.

In the sections below, multivariate results are shown in an attempt to identify whether the trends noted above persist when controls are introduced. In Models 1-5 (Table 7), variables are incrementally introduced without any consideration for changing effects over time (except for a period main effect term and a period*immigrant interaction). From these models it can be determined how compositional changes have differentially affected crowding propensities for

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[14] It is important to note that the order in which variables are entered is not intended to imply causal prioritization, but are instead intended to reflect the theoretical order of importance often implied or stated in the literature.

immigrants and the Canadian born. Then, in Table 8, interactions are introduced to test whether effects have changed over time.

<div align="center">***Table 7 here***</div>

The value of -0.004 for the variable immigrant reflects the difference between immigrants and the Canadian-born in 1971, whereas the period marginal effect value of -0.118 refers to the drop for the Canadian-born over the study period. Finally, period*immigrant value of 0.132 describes the immigrant change relative to the native-born between 1971 and 2001. The task in subsequent models is to note how these values change when additional variables are added.

6.1   Does the Consumer Choice Model Explain Crowding Trends?

With our three focal coefficients in mind, we turn to Model 2, where basic household composition characteristics are entered as explanatory variables. The rationale for adding these factors first is threefold. First, they are central to the basic consumer choice model described earlier, and second, past research (Gove & Hughes, 1983; Myers, Baer, & Choi, 1996; Van Hook & Glick, 2007) has shown them to have considerable explanatory value. Finally, they are some of the factors that the consumer choice model leads us to value. Looking at the coefficients for these characteristics, it appears that the presence of people under 18 in the household elicits a stronger effect on crowding than does the presence of adults. This may be because young people require less personal space, so their presence provides a smaller incentive for households to move than the presence of another adult does. Age has a slight but significant impact on crowding, and the propensity to live in cramped quarters shrinks for the more highly educated. For immigrants, rates of crowding decline with years spent in Canada, and knowledge of English or French further reduces the risk.

That said, given that all three focal coefficients are still significant, it remains worthwhile to determine whether or not economic characteristics can further explain the dynamics of crowding among immigrants and the Canadian-born. In Model 3, a household's economic characteristics are introduced and, as expected, unemployed individuals and those with lower incomes are more likely to be crowded. The model also shows that more expensive, owner-occupied, dwellings are less likely to be crowded. Once again, model fit improvements favour this model over the previous version. These economic characteristics identified here further reduce the unexplained gap between immigrants and the Canadian-born. Each of the three coefficients is more or less cut in half, leaving unexplained differences of less than two percentage points in each instance. The dramatic improvements in model fit, plus the reduction in the magnitude of unexplained differences, speak to the utility of the consumer choice model, and of its appropriateness as a good *starting* point for explaining residential crowding. At the same time, significance differences remain between immigrants and the Canadian-born, suggesting that the consumer choice model is incomplete.

In Model 4, city effects are assessed. Although all cities but Vancouver differ significantly from reference group Toronto, the differences are rather slight and have little explanatory impact on any of the three focal coefficients, even though the model fit statistics prefer retaining these variables (BIC drops by 117 points[15]).

Finally, in Model 5 visible minority indicators are included. These coefficients reveal strong and significant differences between all groups and reference group Whites, with all groups being more likely to be crowded than Whites. Although the inclusion of these factors

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[15] Researchers typically assess the significance of reductions in BIC by using critical chi-square values with k degrees of freedom. These reductions are all well above the threshold value, so little attention is paid to chi-square assessments. Also, the values themselves do not have a straightforward interpretation, but BIC values can be used to compare the relative explanatory value of each set of variables.

have little impact on the 1971 immigrant/native-born difference or the native-born change over time (likely because there was little difference in the visible minority composition between them in 1971), the composition of the immigrant population did subsequently change considerably (Table 5), and this is reflected in reductions to the Period*Immigrant coefficient. Once again, visible minority indicators are a worthy addition, as judged by a reduction of a 230 point reduction in BIC.

Despite the many reductions that come from including compositional characteristics, small but significant differences persist between the Canadian-born and immigrants, both in 1971 (the variable "Immigrant") and over time ("Immigrant*Period"). Immigrants in 1971 continue to have crowding rates that are significantly higher than the Canadian-born, and since then the unexplained disparities have grown slightly. As mentioned earlier, one of the implications of sequentially entering compositional characteristics into a series of statistical models is that we must assume that the effect of each characteristic remains stable over time. This can be questioned, however, given the many cultural, economic, and structural changes that have swept across Canada from 1971-2001. If this is true, then a household's social, economic and demographic characteristics repertoire will have different implications for crowding propensities in 2001 than in 1971. By including a series of interaction terms, we can determine whether or not it is safe to assume 'ahistoricity', or whether it is necessary to account for changing effects. In Table 8 below, most of the variables in Model 5 (except for immigration characteristics and the vector of economic factors[16]) are interacted with time to assess ahistoricity.

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[16] The decision to exclude these variables was made by running tests for collinearity (using a linear probability model and variance inflation factors), and determining that these variables excessively inflate variance estimates. Furthermore, they had little impact on the coefficients of interest, further prompting their exclusion.

6.2 The Changing Relationship between Household Characteristics and Residential Crowding

By interacting key variables in the models with the year in which they were observed, it is possible to determine whether part of the reason for the loss of the immigrant housing advantage is a change in the impact of certain characteristics over time.

Table 8 here

Looking first at Model 6, the effect of family characteristics appear to have shifted significantly over time. Individuals under 18 are less likely to produce crowding in 2001 than in 1971, as are the number of adults. The effect of age hasn't changed, however, and each education category has distanced itself somewhat from the university-educated. As with earlier models, being in school seems has no independent effect, and a roughly 1100 point reduction in BIC points to a large improvement in model fit.

The three focal coefficients (Immigrant, Period, and Immigrant*Period) shift slightly, so that the unexplained change for the Canadian-born increases slightly, and is now actually positive. The coefficient for Immigrant increases slightly, and the change over time for the Canadian-born is now also slightly positive. What this means is that accounting for changing effects in basic characteristics over time completely explains the native-born decline, while at the same time unexplained change over time for immigrants declines very slightly.

In Model 7, CMA indicators are interacted with period, making it possible to determine how crowding propensities and living in a particular CMA have shifted. Now, all of the main effects but "Montreal" and "other CMA" are no longer significant. Interestingly, the interaction terms suggest that nearly all of city differences in the propensity to crowd have emerged post-1971. Not surprisingly, given the many new significant results, BIC is once again reduced, and

although the Immigrant and Period coefficients increase slightly, there is a sizeable reduction in the unexplained immigrant change over time (Immigrant*Period). This suggests is that it is not only the shift of immigrants across cities that matters in terms of geography, but also how these cities have *themselves* changed that requires a look.

Finally, Model 8 looks at how the impact of visible minority status has changed over time in relation to crowding. Here, once again, lies an interesting story. First, most of the main effects are still statistically significant (all but the coefficient for Black), but none of the interaction terms is significant. This means that there have essentially been no changes in the gaps between groups since 1971. This finding is further asserted by looking at the model fit statistic, which holds that time interactions result in a *worse* fitting model. This means that it is more efficient and judicious to leave visible minority as a main effect than it is to model change over time, since the unexplained differences between groups that existed in 1971 have not changed significantly since then. In terms of model fit, the only worthy time interactions among those tested are for basic household and Census Metropolitan Area characteristics.

7.   Discussion and Conclusion

In this paper, the efficacy of the consumer choice model of human behaviour was assessed as an explanation for residential crowding. Notably, household demographic, immigration, and economic factors were used to explain why immigrants and the Canadian-born have diverged dramatically in their tendency to live in crowded quarters since 1971. In addition to the basic model, skin colour characteristics and city-level differences were identified. Finally, relevant time-interactions were included.

For the most part, these models explained a considerable amount of the differential change over time, suggesting that basic demographic and economic (as measured in this paper)

factors are the primary drivers behind the 1971-2001 trends. It also shows that it is possible to rely on a single cross-section of data to understand a household's propensity to crowd in Canada. Most effects were stable over time.

That said, there are a few interesting changes that could not be captured by looking at one time point alone. First, differences between census metropolitan areas have largely emerged post-1971, raising questions about what has happened in Canada's major urban centres in recent history. Naturally, price increases are part of the story; between 1971 and 2001, prices in real terms nearly doubled in the two largest Canadian cities (Toronto and Vancouver), and it is these regions where the smallest decrease in rates of crowding occurred in the 30-year period. Given that price appreciation occurred so rapidly in both cities (the 1980s for Toronto, and the 1990s for Vancouver), it's possible that the risk of crowding would be highest for those that entered the market when at the peak of price inflation. If this is true, the policy-relevant question to ask is what happens to new entrants that enter a market that recently experienced a price shock over time? Do they experience 'scarring' in terms of propensity to crowd, and will they then be at higher risk of crowding forevermore? If so, what options exist to rectify this?

Second, the thirty-year period was an era of massive urban sprawl in all Canadian cities, which not only affected supply, but also the type of housing stock that exists in most cities. In Toronto, for example, outlying cities within the Census Metropolitan Area like Brampton and Scarborough have essentially been built since 1971, and the larger housing stock that exists enables householders to afford fairly large dwellings. At the same time, however, price appreciation has encouraged families in these areas to form multiple family dwellings, potentially counteracting the effect that increased dwelling size has had on crowding.

It will be interesting to see how the 2005 introduction of the 'green belts' stretching around the city impacts residential crowding trends. The explicit intention of these policies is to curb urban sprawl, and it will be interesting to see (though probably too early to tell) how these policies affect household density.

One other interesting aspect in this paper revealed by looking at time interactions with skin colour is the surprising lack of change over time. This suggests that any explanation for crowding also needs to include conceptual space for racialization. This is perhaps the most interesting finding here, particularly since skin colour is such a highly inaccurate indicator of homogeneity. As only one example of this, consider that respondents that identified as Black in 2001 hailed from over 50 different countries. In 1971, most Blacks came from the Caribbean, whereas by 2001 there was a significant number coming from Africa. Despite these changes, there has been almost no shift in the propensity to crowd over time.

These results are both remarkable and troubling. The consistency over time in crowding rates, alongside massive changes in immigrant flows, points in the direction of a racialized housing market. Several researchers have already argued that this is true (Darden & Kamel, 2000; Hulchanski, 1993; Murdie, 1994; Ornstein, 2000), and these results lend some support to this for residential crowding. Excellent research on the mechanisms that stratify in the housing market already exist (Danso & Grant, 2000; Hiebert & Wyly, 2006; Leloup & Zhu, 2006; Mendez, Hiebert, & Wyly, 2006), but clearly there is room for more of this work.

Although there have no doubt been profound changes in other characteristics that might differentiate immigrants and the Canadian-born (access to credit, deteriorating labour market outcomes, declining access to homeownership, etc.), it seems as though the quest for new and interesting explanations has at times downplayed the impact of basic household demographic

characteristics, even though they are the core factors behind living arrangements. The basic consumer choice model continues to explain a good deal of this, and other, residential outcomes. For crowding, these basic factors explain more variation than all of the other factors combined, as just by model fit statistics. Since this is the case, we could say that a good deal of what distinguishes immigrant groups from the native-born in Canada, at least in terms of residential crowding, is not culture or economy at all, but instead differences in basic things like family size and composition.

That is not meant to imply that future research needs only to remain locked solely within the confines of this framework. Indeed, a central component of the consumer choice model is the choice allotted to individuals. Given this, a fruitful area for further study would be to look at the interaction of culture and other factors in terms of the choices that are made. How, for example, do immigrants from different source regions react to the same affordability or space constraints? Will some be more likely to crowd so that they can afford higher quality housing than others? How will newcomers from the same source region fare in different host countries? Given that each host country has its own incentive structure (such as mortgage interest deduction) for promoting choices of dwelling choice. This would permit an investigation of behaviour from same-group members under different incentive structures, paving the way for a more nuanced discussion of the reasons behind residential crowding in Canada or elsewhere.

10.   References

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Table 1: Propensity for crowding in Canada, Immigrants and the Canadian-born, 1971, 1986, and 2001

	1971	1986	2001
Immigrant	8.4%	4.7%	6.7%
Canadian-Born	9.4%	3.5%	0.7%

Source: 1971, 1986, and 2001 Censuses of Canada
Note: Crowding is defined as more than one person per room

Table 2: Household Composition Characteristics and the Propensity for Crowding

	# Children		# Adults		% Crowded	
	1971	2001	1971	2001	1971	2001
Immigrant	1.29	0.85	2.32	2.36	8.4%	6.7%
Canadian-Born	1.38	0.67	2.23	1.93	9.4%	0.7%

Source: 1971 and 2001 Censuses of Canada
Note: Crowding is defined as more than one person per room

Table 3: Economic Characteristics and the Propensity for Crowding

	% Unemployed		% Owner		Household Income			
	1971	2001	1971	2001	1971		2001	
					Lowest Qtile	Highest Qtile	Lowest Qile	Highest Qtile
Immigrant	3.1%	3.9%	66.5%	68.3%	$35,660	$67,929	$37,809	$95,065
Canadian-Born	3.0%	3.0%	58.6%	73.0%	$35,205	$68,206	$45,325	$98,932
Crowding Rates	15.8%	5.2%	7.2%	1.2%	12.3%	6.8%	4.2%	1.4%

Source: 1971 and 2001 Censuses of Canada
Note: Crowding is defined as more than one person per room
Note: All figures refer to the characteristics of the highest household earner

Table 4: Self-Reported Housing Values Across Canada's Major Census Metropolitan Areas

	Calgary		Edmonton		Montreal		Ottawa-Hull	
	1971	2001	1971	2001	1971	2001	1971	2001
Median Price	$112,977	$186,000	$117,118	$140,000	$94,286	$120,000	$116,872	$160,000
% Immigrant	27.4%	25.1%	26.0%	20.9%	19.9%	21.8%	16.3%	20.2%
Crowding Rates	6.0%	1.5%	8.4%	1.6%	11.9%	1.6%	9.2%	1.7%
	Winnipeg		Toronto		Vancouver		Other CMA	
	1971	2001	1971	2001	1971	2001	1971	2001
Median Price	$94,286	$120,000	$140,394	$250,000	$141,872	$280,000	$140,394	$220,000
% Immigrant	23.1%	19.4%	43.5%	53.7%	32.0%	43.9%	20.6%	14.9%
Crowding Rates	7.7%	1.9%	7.0%	5.0%	5.8%	3.7%	10.3%	0.8%

Source: 1971 and 2001 Censuses of Canada
Notes: Crowding is defined as more than one person per room. All figures are calculated only for highest household earner that report that they own their dwelling. Values are self-reported and stated in $2000.
CMA boundaries have shifted over time, and these figures reflect boundaries at time of measurement.

Table 5: Percent Black, Chinese, South Asian and White by Immigrant Status, 1971 and 2001

	Black		Chinese		South Asian		White		Other	
	1971	2001	1971	2001	1971	2001	1971	2001	1971	2001
Immigrant	2.2%	8.2%	3.0%	14.8%	1.2%	12.6%	92.6%	45.2%	1.0%	19.3%
Canadian-Born	0.1%	0.7%	0.2%	0.6%	0.0%	0.2%	99.3%	96.1%	0.4%	2.4%
Crowding Rates	14.9%	8.0%	18.4%	6.8%	15.8%	14.4%	9.0%	0.7%	11.1%	9.5%

Source: 1971 and 2001 Censuses of Canada
Note: Crowding is defined as more than one person per room
Note: All figures refer to the characteristics of the highest household earner

Table 6: Regression Variables and Coding Key

Immigration Characteristics	Coding	Mean
Immigrant	Dichotomous, 1=yes	0.29
Period	Dichotomous, 1=yes	0.64
Immigrant*Period	Dichotomous, 1=yes	0.19
Demographic Information		
Number of People<18 in dwelling	Continuous	1.14
Number of People>=18 in dwelling	Continuous	2.36
Age of Highest Earner	Continuous	42.79
No Highschool	Reference Category	0.34
Highschool	Dichotomous, 1=yes	0.17
Post-Secondary Training	Dichotomous, 1=yes	0.30
University Degree	Dichotomous, 1=yes	0.19
In School	Dichotomous, 1=yes	0.08
Years since migration	Continuous	5.59
Years since migration squared	Continuous	154.79
Speaks English/French	Dichotomous, 1=yes	0.97
Economic Characteristics		
Unemployment Status of Highest Earner	Dichotomous, 1=yes	0.03
Household Income	Continuous, logged	10.91
Dwelling is Owned	Dichotomous, 1=yes	0.68
Value of Dwelling (set to 0 for renters)	Continuous, logged	11.86
Census Metropolitan Indicators		
Calgary	Dichotomous, 1=yes	0.05
Edmonton	Dichotomous, 1=yes	0.05
Montreal	Dichotomous, 1=yes	0.20
Ottawa/Gatineau	Dichotomous, 1=yes	0.06
Toronto	Reference Category	0.23
Vancouver	Dichotomous, 1=yes	0.10
Winnipeg	Dichotomous, 1=yes	0.04
Other Census Metropolitan Areas	Dichotomous, 1=yes	0.29
Visible Minority Indicators		
Black	Dichotomous, 1=yes	0.02
Chinese	Dichotomous, 1=yes	0.03
South Asian	Dichotomous, 1=yes	0.03
White	Reference Category	0.87
Other	Dichotomous, 1=yes	0.05

Note: there were some problems with comparability across the census years. First, years since migration in 1971 was coded into five year groupings, whereas 2001 used individual years. For 1971, bin centres were used to convert the ordinal variable to a continuous measure. Second, visible minority status had to be imputed for 1971, using the methods outlined in Haan (2007).

Table 7: Determinants of Crowding Differences between Immigrants and the Canadian-born

	1	2	3	4	5
Immigrant	-0.004 ***	0.031 ***	0.016 ***	0.014 ***	0.012 ***
Period	-0.118 ***	-0.014 ***	-0.007 ***	-0.006 ***	-0.007 ***
Period*Immigrant	**0.132 *** **	**0.038 *** **	**0.019 *** **	**0.018 *** **	**0.011 *** **
# People <18		0.011 ***	0.008 ***	0.008 ***	0.008 ***
# People 18+		0.009 ***	0.008 ***	0.007 ***	0.007 ***
Age of Respondent		0.000 ***	0.000 ***	0.000 ***	0.000 ***
Highschool		-0.006 ***	-0.003 ***	-0.003 ***	-0.003 ***
Post-Secondary		-0.007 ***	-0.003 ***	-0.003 ***	-0.003 ***
University Degree		-0.008 ***	-0.003 ***	-0.003 ***	-0.003 ***
Currently In School		0.001 *	0.000	0.000	0.000
Years since Migration		-0.002 ***	-0.001 ***	-0.001 ***	-0.001 ***
Ysm-Squared		0.000 ***	0.000 ***	0.000 ***	0.000 ***
English/French Knowledge		-0.005 ***	-0.002 ***	-0.002 ***	-0.002 ***
Highest Earner is Unemployed			0.002 ***	0.002 ***	0.002 ***
Owned Dwelling			-0.018 ***	-0.017 ***	-0.017 ***
Income (Logged)			-0.002 ***	-0.002 ***	-0.002 ***
Value of Dwelling (Logged)			-0.003 ***	-0.004 ***	-0.003 ***
Calgary				-0.003 ***	-0.003 ***
Edmonton				-0.002 ***	-0.002 ***
Montreal				-0.002 ***	-0.002 ***
Ottawa/Hull				-0.002 ***	-0.002 ***
Vancouver				0.000	-0.001
Winnipeg				-0.002 ***	-0.002 ***
Other Census Metropolitan Area				-0.002 ***	-0.002 ***
Black					0.002 ***
Chinese					0.005 ***
South Asian					0.009 ***
Other Visible Minority					0.006 ***
BIC	-4209240	-4249444	-4256305	-4256422	-4256652
Number of Observations	339797	339797	339797	339797	339797

Source: 1971 and 2001 Census of Canada Household File created by author

Table 8: Determinants of Crowding Differences between Immigrants and the Canadian-born

	5	6	7	8
Immigrant	0.012 ***	0.015 ***	0.016 ***	0.017 ***
Period	-0.007 ***	0.002 **	0.007 ***	0.007 ***
Period*Immigrant	**0.011 *****	**0.009 *****	**0.006 *****	**0.005 *****
# People <18	0.008 ***	0.011 ***	0.010 ***	0.010 ***
# People 18+	0.007 ***	0.009 ***	0.009 ***	0.009 ***
Age of Respondent	0.000 ***	0.000 ***	0.000 ***	0.000 ***
Highschool	-0.003 ***	-0.004 ***	-0.004 ***	-0.004 ***
Post-Secondary	-0.003 ***	-0.008 ***	-0.008 ***	-0.007 ***
University Degree	-0.003 ***	-0.007 ***	-0.007 ***	-0.007 ***
Currently In School	0.000	-0.001 *	-0.001 *	-0.001
Years since Migration	-0.001 ***	-0.001 ***	-0.001 ***	-0.001 ***
Ysm-Squared	0.000 ***	0.000 ***	0.000 ***	0.000 ***
English/French Knowledge	-0.002 ***	-0.003 ***	-0.002 ***	-0.002 ***
Highest Earner is Unemployed	0.002 ***	0.002 ***	0.002 ***	0.002 ***
Owned Dwelling	-0.017 ***	-0.020 ***	-0.019 ***	-0.019 ***
Income (Logged)	-0.002 ***	-0.002 ***	-0.002 ***	-0.002 ***
Value of Dwelling (Logged)	-0.003 ***	-0.004 ***	-0.004 ***	-0.004 ***
Calgary	-0.003 ***	-0.003 ***	-0.002 ***	-0.002 ***
Edmonton	-0.002 ***	-0.002 ***	0.000	0.000
Montreal	-0.002 ***	-0.002 ***	0.002 ***	0.002 ***
Ottawa/Hull	-0.002 ***	-0.002 ***	0.001	0.001
Vancouver	-0.001	-0.001	0.001	0.001
Winnipeg	-0.002 ***	-0.002 ***	0.000	0.000
Other Census Metropolitan Area	-0.002 ***	-0.003 ***	0.001 *	0.001 *
Black	0.002 ***	0.004 ***	0.003 ***	0.002
Chinese	0.005 ***	0.007 ***	0.006 ***	0.004 **
South Asian	0.009 ***	0.013 ***	0.011 ***	0.006 *
Other Visible Minority	0.006 ***	0.008 ***	0.007 ***	0.006 **
Interactions with Time				
# People <18		-0.003 ***	-0.003 ***	-0.003 ***
# People 18+		-0.002 ***	-0.002 ***	-0.002 ***
Age of Respondent		0.000	0.000	0.000
Highschool		0.007 ***	0.005 ***	0.005 ***
Post-Secondary		0.014 ***	0.012 ***	0.012 ***
University Degree		0.020 ***	0.018 ***	0.017 ***
Currently In School		0.001	0.001	0.001
Calgary			-0.002 *	-0.002 *
Edmonton			-0.003 ***	-0.003 ***
Montreal			-0.005 ***	-0.005 ***
Ottawa/Hull			-0.003 ***	-0.003 ***
Vancouver			-0.002 ***	-0.002 ***
Winnipeg			-0.003 ***	-0.003 ***
Other Census Metropolitan Area			-0.005 ***	-0.005 ***
Black				0.002
Chinese				0.002
South Asian				0.003
Other Visible Minority				0.001
BIC	-4256652	-4257760	-4258120	-4258076
Number of Observations	339797	339797	339797	339797

Source: 1971 and 2001 Census of Canada Household File created by author

Figure 1: Average Canadian Yearly Mortgage Rate, 1960-2002
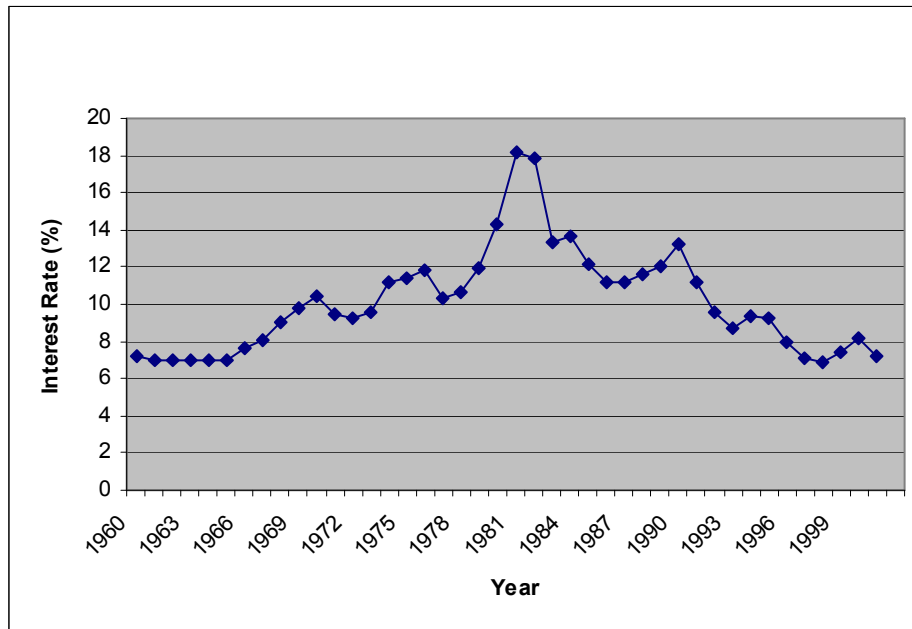
Source: Bank of Canada www.bankofcanada.com