

Immigration and Housing Crisis in Canada

Sukarn Pahuja
Department of Applied Modelling and
Quantitative Methods
Trent University
Peterborough, Ontario, Canada
sukarnpahuja@trentu.ca

Aviral Walia
Department of Applied Modelling and
Quantitative Methods
Trent University
Peterborough, Ontario, Canada
aviralwalia@trentu.ca

Sudhanshu Kharbanda
Department of Applied Modelling and
Quantitative Methods
Trent University
Peterborough, Ontario, Canada
sudhanshukharbanda@trentu.ca

Abstract— This project aims to address the growing concern of the immigration and housing crisis in Canada through data visualization and storytelling. The project will leverage data from Statistics Canada (StatCan) to conduct an Exploratory Data Analysis (EDA) and use data visualization techniques to create compelling narratives that highlight the relationship between immigration patterns and the housing crisis. The methodology involves using Python, Jupyter Notebook, and relevant libraries and BI tools such as Tableau for data analysis and visualization. The project aims to provide a comprehensive understanding of the immigration and housing crisis in Canada and to offer insights into the relationship between the two. The research will be a valuable resource for policymakers, researchers, and other stakeholders who are interested in addressing the issue of the immigration and housing crisis in Canada.

Keywords—Exploratory Data Visualization, Immigration, Housing, Python, Tableau

I. INTRODUCTION

Canada's housing crisis is a complex issue that is closely linked to immigration patterns. The rapid influx of immigrants, particularly in major cities such as Toronto and Vancouver, has put immense pressure on housing availability, affordability, and quality. According to the Canadian Real Estate Association (CREA), the average price of a home in Canada was \$668,754 in July 2023, up 6.3% from July 2022 [1]. This is unattainable for many Canadians and newcomers alike. The average price of a home is higher still in Ontario and British Columbia, where the majority of newcomers choose to settle. Homes in these provinces cost \$856,269 and \$966,181, respectively [2].

The increased scrutiny of Canada's immigration policies and population growth comes as the country faces a housing affordability crisis caused in large part by a shortage of homes. A report by the Canada Mortgage and Housing Corporation (CMHC) shows that over 22 million housing units will be required by 2030 to help achieve housing affordability for everyone living in Canada [3]. The primary cause for the housing affordability challenge in Canada is the inability to build more housing that is in line with the increase in population [3]. A TD report released in late July also warned that continuing with a high-growth immigration strategy could widen the housing shortfall by about a half-million units within just two years [3].

To address this issue, the Canadian government has set a target to welcome 500,000 immigrants annually by 2025 [3]. However, according to a report by CBC News, the pace of population growth, facilitated by immigration, is making the housing crisis worse. Academics, commercial banks, and policy thinkers have all been warning the federal government that the primary cause for the housing affordability challenge in Canada is our inability to build more housing that is in line with the increase in population [4].

In addition to the above, the housing crisis is also affecting newcomers and residents in Toronto. The city is in the midst of a serious housing crisis — one that is having an impact on both new and longtime residents. And experts say the city could risk seeing an exodus of diversity and talent if all levels of government don't work together to fix the issue — and fast. We "don't have decades" to fix the problem, Matti Siemiatycki, professor of geography and planning and director of the infrastructure institute at the University of Toronto, told Global News. "People are being priced out of housing markets, they're having trouble finding places to rent, they're leaving the cities where they grew up, or where their opportunities for employment are." While the city has been facing high costs and a lack of supply for years, the problem has only intensified since COVID-19 pandemic restrictions were lifted and immigration targets were ramped up [2].

Data visualization can be a powerful tool to analyze and understand the complex issue of Canada's housing crisis. It can help identify patterns, trends, and relationships in the data that may not be immediately apparent. For example, interactive data visualization tools provided by Statistics Canada like Housing Construction Data, Immigration Data, Population Growth data, etc [5,6,7] can help explore the results of population projections on immigration and diversity for Canada and its regions. These tools can provide a dynamic way to visualize the data and help understand the impact of immigration on housing affordability.

Moreover, data visualization can help identify the areas where the housing crisis is most severe. For instance, a report by the Canadian Real Estate Association (CREA) shows that the average price of a home in Canada was \$668,754 in July 2023, up 6.3% from July 2022 [1]. The average price of a home is higher still in Ontario and British Columbia, where the majority of newcomers choose to settle. Data visualization tools can help identify

the areas where the housing prices are the highest and where the housing crisis is most severe.

In addition, data visualization can help identify the relationship between immigration and the housing crisis. A report by TD warns that continuing with a high-growth immigration strategy could widen the housing shortfall by about a half-million units within just two years[4]. However, the Canadian government has set a target to welcome 500,000 immigrants annually by 2025[4]. Data visualization can help identify the relationship between immigration and the housing crisis and help policymakers make informed decisions.

II. PREVIOUS WORK

A recent article from CBC News Politics [8] that discusses the federal government's immigration plan and its impact on the housing crisis in Canada. The article cites a TD report that warns that continuing with a high-growth immigration strategy could widen the housing shortfall by half a million units in two years. The article also quotes Murtaza Haider, a professor of data science and real estate management at Toronto Metropolitan University, who states that the primary cause for the housing affordability challenge in Canada is our inability to build more housing that is in line with the increase in population.

In addition, Statistics Canada has published a data table [9] that presents projected population figures broken down by age group, sex, racialized group, generation status, place of residence (province, territory and census metropolitan area) and projection scenario for the years 2016 to 2041. This data visualization tool [9] can be used to explore the population projections on immigration and diversity for Canada and its regions.

The housing crisis in Canada has been a topic of concern for many years. The crisis has been attributed to various factors, including the lack of affordable housing, rising home prices, and the increasing demand for housing. One of the main factors contributing to the housing crisis in Canada is immigration. The federal government's immigration plan has been criticized for its impact on the housing market. According to a recent article from CBC News Politics [8], a TD report warns that continuing with a high-growth immigration strategy could widen the housing shortfall by half a million units in two years. The report suggests that the government should consider reducing immigration levels to address the housing crisis.

However, some experts argue that immigration is not the primary cause of the housing crisis in Canada. Murtaza Haider, a professor of data science and real estate management at Toronto Metropolitan University, states that the primary cause for the housing affordability challenge in Canada is our inability to build more housing that is in line with the increase in population [8]. Haider argues that the government should focus on building more affordable housing to address the housing crisis.

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data visualization tool [9] can be used to explore the population projections on immigration and diversity for Canada and its regions. The data table provides valuable insights into the projected population growth in Canada and its impact on the housing market. The data shows that the population of Canada is projected to increase from 36.5 million in 2021 to 44.4 million in 2041 [9]. The data also shows that the number of immigrants is projected to increase from 1.2 million in 2021 to 1.5 million in 2041 [9]. The data suggests that the government needs to take proactive measures to address the housing crisis in Canada.

The federal government has taken some steps to address the housing crisis in Canada. The Fall Economic Statement for 2023 released by Canada's Finance Minister Chrystia Freeland highlights a strategy to increase the supply of affordable housing in Canada [10,11]. The statement acts as an update to the progress of Canada's economic plan since the release of Budget 2023. The statement outlines the government's commitment to increasing the supply of affordable housing in Canada. The government plans to invest \$4 billion over the next five years to support the construction of new affordable housing units [10]. The government also plans to introduce a new tax incentive to encourage the construction of new rental housing units [11].

The housing crisis in Canada is a complex issue that requires a multifaceted approach. Immigration is one of the factors contributing to the housing crisis in Canada. However, experts argue that the primary cause of the housing affordability challenge in Canada is our inability to build more housing that is in line with the increase in population. The federal government has taken some steps to address the housing crisis in Canada, including investing in affordable housing and introducing a new tax incentive to encourage the construction of new rental housing units. The data table published by Statistics Canada provides valuable insights into the projected population growth in Canada and its impact on the housing market. The data suggests that the government needs to take proactive measures to address the housing crisis in Canada.

III. METHODOLOGY

A. Data Extraction

Data extraction is the process of collecting or retrieving disparate types of data from a variety of sources, many of which may be poorly organized or completely unstructured. The data for this project has been extracted from various sections of the National Statistics Organization of Canada, Statistics Canada [12]. The data collected provides statistics about the Housing Prices, Dwellings, Permits Issued to construct houses and Immigration over the last decade. The data information is given below:

1) New Housing Price Index (NHPI)

The New Housing Price Index (NHPI) is a monthly report that tracks variations in the selling prices of new houses by contractors over time. The comparison is made between two consecutive periods, with the specific details of each house remaining consistent. The survey

includes various dwelling types such as single homes, semi-detached homes, and townhouses [13]

It's important to note that this application provides only a subset of the information found in Statistics Canada's complete New Housing Price Index data tables [13]

2) *Building Permits (BPER)*

The Building Permits Survey, conducted monthly, gathers information on the monetary value of permits granted by Canadian municipalities for both residential and non-residential structures, along with the count of authorized residential dwellings. Additionally, the survey assesses the number of demolished dwelling units [14]. Building permit data serve as a crucial leading indicator for the construction industry, as obtaining a building permit marks one of the initial steps in the construction process [14]. These statistics play a vital role in calculating expenditures for residential building construction, as well as in formulating quarterly and annual estimates for net capital stock and depreciation by component [14]. Moreover, they are a significant factor in determining investment in non-residential building construction on a sub-annual basis [14]

This survey is a component of the Integrated Business Statistics Program (IBSP), which consolidates around 200 distinct business surveys into a unified master survey program [14]. The IBSP is designed to collect industry and product details at the provincial level while minimizing redundancy across various survey questionnaires. The revamped business survey questionnaires share a uniform appearance, structure, and content [14].

3) *Canada Mortgage and Housing Corporation*

The Canada Mortgage and Housing Corporation (CMHC) generates an extensive database encompassing over 14,000 housing series [15]. Through CANSIM, you have the option to access residential housing statistics, including data on housing starts, completions, structures under construction, newly completed but unoccupied units, vacancy rates, and mortgage information [15]. The CMHC database offers a comprehensive overview of various aspects within the realm of residential housing [15].

4) *Quarterly Demographic Estimates (QDE)*

This estimation program furnishes quarterly assessments of the overall population in Canada, including provinces and territories [16].

These estimates play a crucial role in computing various demographic, social, and economic indicators [16]. The calculated population figures are integral to the Federal-Provincial Fiscal Arrangements, the Federal Post-Secondary Education and Health Contributions Act, and the Canada Student Loans Act, influencing the amounts allocated for federal-provincial-territorial transfers [16]. Furthermore, this data contributes to the determination of

the annual immigration levels set by the Government of Canada [16].

The postcensal estimates are derived from the 2021 Census counts, adjusted for census net undercoverage, as well as incompletely enumerated reserves and settlements [16].

B. Data Preparation

Data preparation is the process of cleaning and transforming raw data prior to processing and analysis. It is an important step prior to processing and often involves reformatting data, making corrections to data, and combining datasets to enrich data [17]. The different data preparation methods used in this project are:

1) *Data Merging and Data Concatenation*

Data merging and data concatenation are two techniques used to combine data from multiple sources. Data merging is the process of combining two or more datasets into a single dataset based on common columns or indices [18]. This technique is used to merge different datasets gathered together to form a single dataframe altered for ease of visualization.

2) *Data Pivoting*

Data pivoting is a technique used to transform data from a long format to a wide format or vice versa. It is a process of rotating data from one axis to another to create a summary table [19]. This technique is used to convert the row data into column heading format for a particular dataset.

3) *Data Aggregation and Grouping*

Data Grouping refers to the grouping of the data on the basis of a particular category (example: year) and aggregating refers to applying a numerical operation (eg: sum) on the numerical columns in accordance to the grouped data. In this project the data is grouped on the basis of type of construction and the related values are aggregated by summing them.

4) *Data Type Conversion*

The datatype of various columns is converted to different datatype required for the visualization. Example, the Date column is converted from string to datetime object.

5) *Dropping Columns*

The data extracted had a number of columns which were not required for the visualization. These columns are dropped from the actual data in the data preparation stage for the ease of handling data.

The data prepared for the visualization consists of 3 tables as mentioned below:

i) *Dwellings Table*

This contains the amount of revenue generated by issuing permits for different kinds of dwelling – Single, Multiple, Commercial, Industrial and Institutional according to the year for the last decade.

ii) *House and Land Price Index Table*

This data contains the average Monthly price for Land, House and combined total of Land and House. This data is used to compare the change in prices of land and house for the last decade.

iii) *Population Change Table*

This data consists of the population trends of Canada. It contains the breakdown of population for the last decade comprising of total Immigration, Births, and Deaths accounting to the total population change.

C. Data Visualization

The data prepared is used to visualize data using various different types of plots on a BI tool, **Tableau** to convey a story. The different types of plots used include Histograms, Line Plots, Bar Plots, Choropleths Maps and Kernel Distribution Plots.

IV. RESULTS

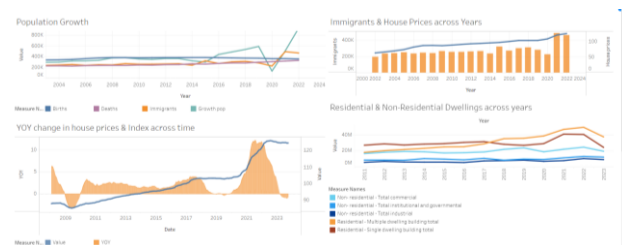


Figure-1. Tableau Dashboard

The Tableau Dashboard created can be accessed from this [link](#) [20]. Figure 1 shows the Dashboard that depicts a story about the Immigration and related housing crisis in Canada [20].

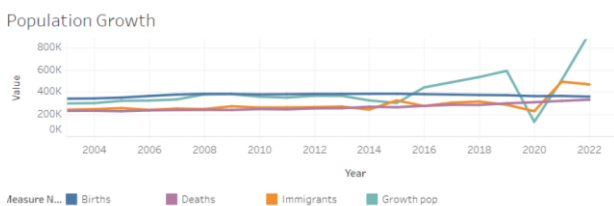


Figure-2. Population Growth Chart

Figure 2 shows the Population Growth trend for the last two decades. It can be seen that the Population of Canada was growing at a constant pace from 2004 to 2019. The

immigration was controlled, that is, the immigrants were being called in accordance to the births and deaths to continue the yearly population growth at a constant pace. However, in the year 2020, because of the outbreak of deadly COVID-19 pandemic, the number of deaths increased and the births have been on a constant decline from the year 2014.

In addition, the immigration also declined significantly hindering the population growth. The population saw significant decline in the year 2020. However, the urge to increase the population and cover the significant dip, led to an uncontrolled immigration in which the number of immigrants coming into the country was more than ever which led to a huge spike in population growth.

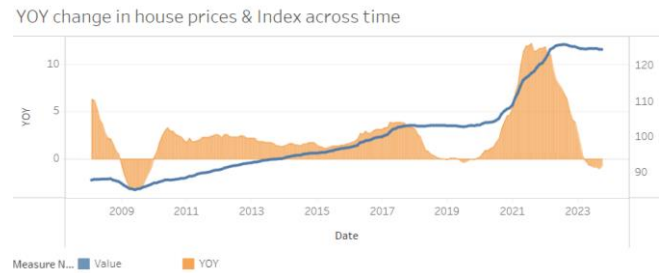


Figure-3. House Price Index

Figure 3 shows the change in house prices over the last two decades. As depicted in the Figure 1, the population grew at a constant pace until 2019 and rose significantly in 2020 due to uncontrolled immigration, it can be inferred by looking at Figure 1 and Figure 2 that the prices for houses increased drastically with a drastic increase in population mainly due to immigration.

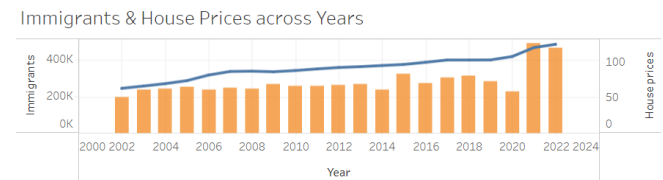


Figure-4: Immigration and House Prices

Figure 4 shows the Housing Price Index in accordance with the immigration growth. It can be seen that when the population growth was constant over the years (2000-2018), the house prices didn't peak but rose at a constant rate.

It can be inferred that as the immigration was increasing the demand for houses was increasing and thus was the supply for new houses. However, when the immigration spiked in the year 2020, the house prices shot up.

Residential & Non-Residential Dwellings across years

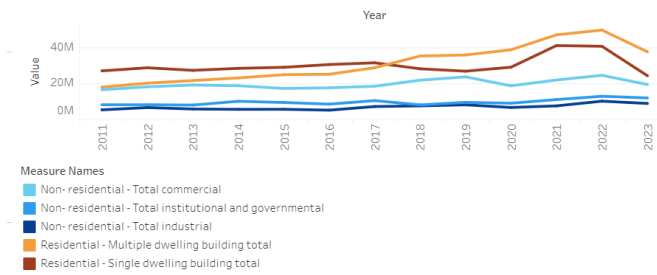


Figure-5: Residential and Non-Residential Dwellings

From Figure 5, it can be concluded that the supply of new houses was not enough to meet the demand which causes this much increase in house prices and thus led to the housing crisis. While the Non-residential building dwellings (Commercial, Institutional and Governmental, Industrial) increased with the increase in growth of the businesses at a constant pace, the Single and Multiple dwellings also increased and showed a little spike. However, the dwellings to increase the number of houses constructed (Single and Multiple) was not enough to keep up with the pace of increasing immigration. The Single and Multiple Dwellings increased in 2021, however, it again came down and decreased from 2022 till present. The dwellings are not enough to provide accommodation to the huge number of immigrants coming in the country.

Thus, this led to the extreme increase in the demand of houses, whereas, the supply (dwellings) were not enough to keep up with the pace of increasing population. This led to the immediate increase in House prices and shortage of houses and thus at the Present, there is an ongoing Immigration and Housing Crisis.

V. POLICY SOLUTIONS

Policy solutions can help address the housing crisis. The following bullet point list presents some policy solutions:

- Increase the supply of affordable housing.
- Increase funding for social housing.
- Increase the availability of rental housing.
- Increase the availability of land for housing development.
- Increase the use of public-private partnerships to fund housing development.

VI. CONCLUSION

The immigration and housing crisis in Canada is a complex issue that requires attention. The project has used data visualization and storytelling to create compelling narratives that highlight the relationship between immigration patterns and the housing crisis. The visualizations include line charts, bar charts, histograms, choropleth maps, and kernel distribution plots. The

sequence of visualizations aligns with the story and provides a clear and informative narrative.

The visualizations show that immigration has contributed to the increase in housing prices and the number of households. The housing shortage has developed over the years, and the number of dwellings has not kept pace with the number of households. Housing affordability has also changed over the years, and the proportion of income spent on housing has increased. Policy solutions can help address the housing crisis, such as increasing the supply of affordable housing, increasing funding for social housing, and increasing the availability of rental housing.

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