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PROPRIETARY REAL ESTATE RESEARCH

The North Effect: Climate Resilience of the Canadian Real Estate Market

In partnership:

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Executive Summary

Our previous analysis of Canada's rental real estate market, released in 2024, found that high immigration levels are a key driver of the growing gap between housing demand and available supply. A deeper dive leveraging artificial intelligence and neural networks reinforced that this imbalance is expected to fuel rapid rental growth over the next decade, offering critical insights to help address long-term affordability challenges and guide both private and public investment in markets like Toronto, Vancouver, and Montreal.

As Canadian housing markets grapple with the dynamic of excess demand and insufficient supply, climate change introduces yet another layer of complexity, helping to inform international migration patterns.

Rising carbon emissions are increasing global temperatures at sea and on land, amplifying the frequency and severity of climate disasters such as wildfires, heatwaves, flooding, and hurricanes. These threats can diminish a region’s suitability as a migration destination, leading to negative demand shocks in localized real estate markets, while their reduced likelihood can boost demand elsewhere.

Beyond the immediate impact on physical risk, climate disasters can also drive financial uncertainty. Regions less directly affected by such events are not immune to the economic aftershocks, while shifting risk perceptions weigh on investment decisions.

For institutional real estate investors, this underscores the inherently geographic nature of climate risk. Managing investment risk requires a careful assessment of regional climate exposure, its financial implications, and any additional impacts it may have on regional real estate drivers, including migration patterns.

This report bridges climate risk and population growth by analyzing how climate change shapes migration to Canada, a key driver of real estate demand, while also examining similar

trends in the U.S. First, we document the impact of climate change on both countries by examining variables such as temperature, abnormal temperature, hot degree days (i.e. days with extreme heat), and wildfire frequency. Next, we analyze changes in immigration, measured as a percentage of the local population, at the Canadian census division and U.S. county level. Finally, we investigate how the climate exposure of immigrants' countries of origin influences immigration to Canada.

Our findings reveal new insights into the Canadian real estate market's climate resilience, an area rarely supported by data-backed analysis. Our study incorporates decades of climate data alongside economic, geographic, and demographic factors to build a comprehensive understanding of the dynamics at play — and, ultimately, Canada's climate resilience.

Research Highlights

- Higher climate risk exposure (wildfires, hot degree days, rising temperatures) is associated with decreased migration to affected regions.
- The "North Effect" — where climate change leads to milder temperatures in traditionally colder northern regions — tempers the negative effects of climate factors on immigration to Canada.
- Canada's comparatively moderate climate tends to attract a higher percentage of immigrants from origin countries with heavy climate exposure.
- Our analysis shows that while Canada is not immune to the effects of climate change, these climate factors play an ongoing role in driving migration to Canada, helping to support ongoing demand for Canadian real estate over the long term.
- Canada's lower climate risk profile offers an opportunity for institutional investors to diversify climate risk on a global scale.

Climate as an Indicator of Real Estate Risk and Reward

Data from the U.S. Environmental Protection Agency show that greenhouse gas concentrations have a direct correlation with the unprecedented warming observed in recent years. As global temperatures rise, the climate system becomes increasingly unstable, resulting in more frequent and severe extreme weather events, such as heatwaves, floods, wildfires, and hurricanes. This view is echoed by global leaders who warn that unchecked emissions could push our planet into dangerous new territory.

Although academic research has extensively explored the financial impacts of climate risk, practical market evidence is equally compelling. For instance, Bernstein et al. (2019) find that residential properties exposed to sea-level rise sell for approximately 7% less than comparable homes in locations with no exposure. In the context of flood risk from hurricanes, Ortega and Taspinar (2018) report that, after Hurricane Sandy, New York homes in flood-prone areas experienced persistent price declines of around 9%. Moreover, properties not projected to be flooded for nearly a century tend to show a smaller discount of approximately 4%, suggesting that buyers exercise greater caution when they perceive more immediate or frequent flooding hazards, as documented by Barr et al. (2021) and Gibson et al. (2017). Similarly, Addoum, Eichholtz, Steiner, and Yönder (2024) observe comparable price declines for coastal office properties following Hurricane Sandy, primarily driven by increased cap rates. Lenders respond to wildfire events by raising interest rates on new mortgages and lowering loan-to-value ratios, further reflecting these risk adjustments. Ouazad and Yönder (2024) find that wildfires increase the probability of residential mortgage foreclosure by almost 1% and raise prepayment probabilities by roughly 4%. As awareness of climate risks grows, buyers increasingly factor long-term hazards into their purchase valuation decisions.

The Canadian real estate market is not exempt from the impacts of climate change. In Canada, the Insurance Bureau of Canada has linked climate change to a 379% surge in

annual insurable losses over the past decade.[1] In addition, the Insurance Bureau of Canada recently recorded a record 228,000 insurance claims, a figure that is 406% higher than the 20-year average.

More recently in 2024, Desjardins announced that it would no longer originate mortgages in high-risk flood zones in Quebec,[2] and a report by the Intact Centre on Climate Adaptation found an 8.2% decline in average house prices in areas affected by flooding.[3]

As climate risk becomes an increasingly critical factor for investors, understanding its geographic distribution and managing it through geographic diversification is essential. Our analysis examines the relationship between climate factors and immigration, a powerful demand driver for Canada and other developed economies.

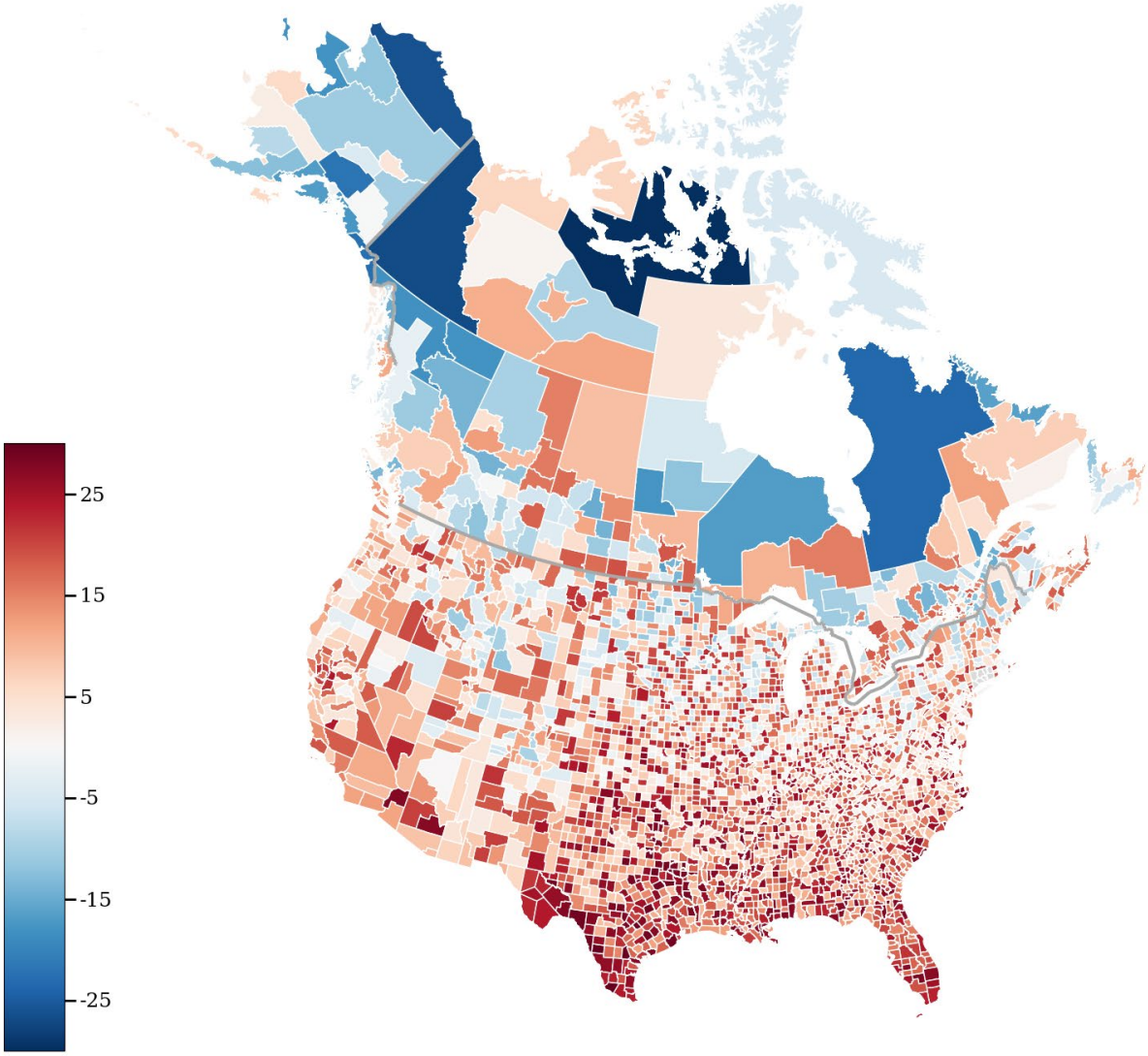
Mapping Climate Factors as an Indicator of Risk

We begin by documenting trends in key climate factors. We collect daily temperature data (including daily averages, minimums, and maximums) from 1980 onward for both Canadian census divisions and U.S. counties using NASA satellite maps. Additionally, we obtain wildfire data from the Canadian Wildland Fire Information System (CWFIS) and U.S. National Interagency Fire Center's database. Our analysis focuses on four primary climate factors: mean temperature, abnormal temperature, abnormal hot degree days, and wildfire activity.

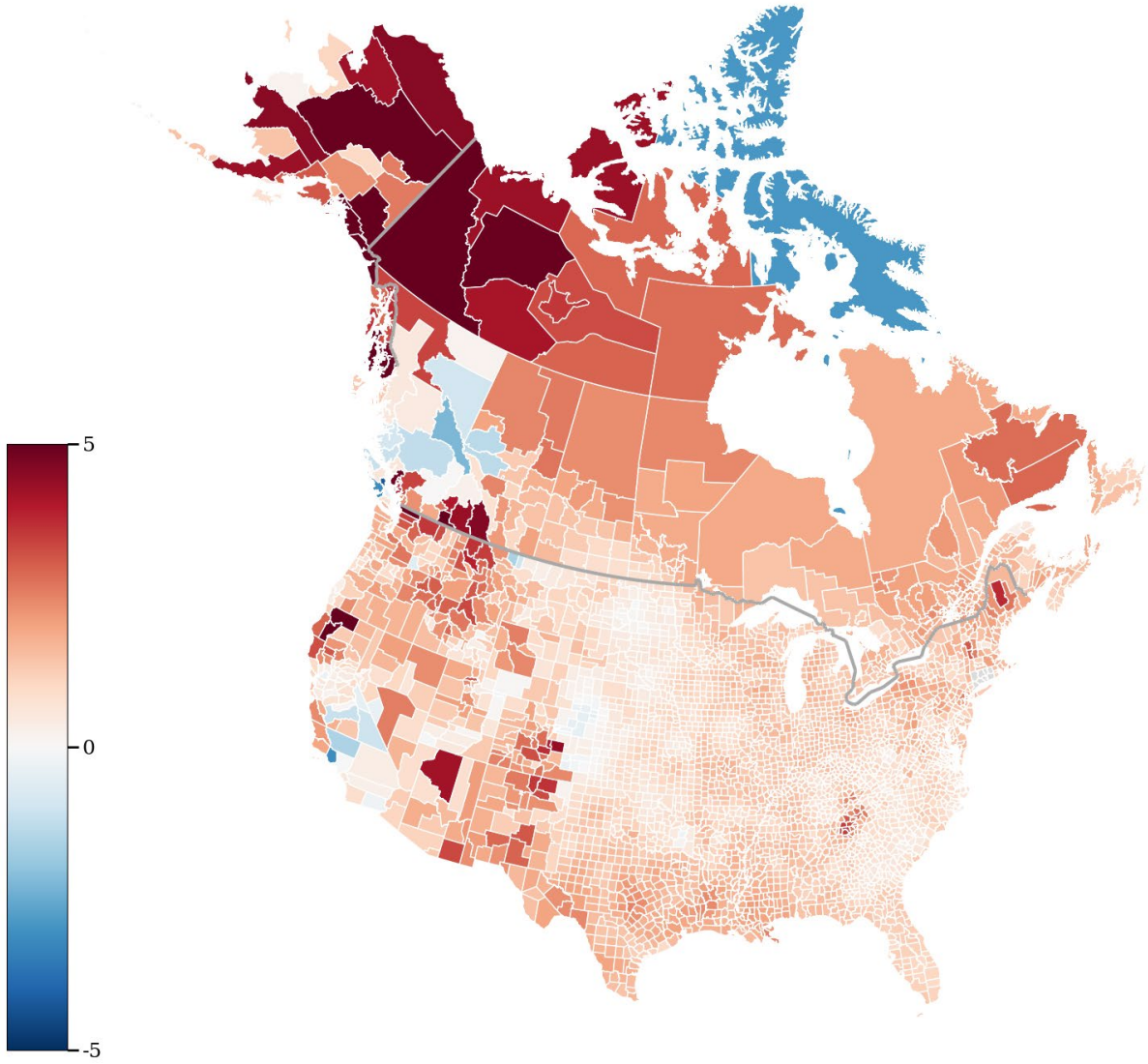
The maps in **Figure 1** illustrate the temperature dispersion across Canada and the U.S. Panel A displays average temperatures from 1980 to 2000 for Canadian census divisions and U.S. counties, revealing significant variation within and between the two countries. Lower mean temperatures can be observed in northern regions, as expected. Panel B shows abnormal

[1] Climate Change is Responsible for a 379% Increase in Average Annual Insurable Damages in the Last Decade in Canada, Oct. 16, 2024
[2] A Quebec lender opted out of mortgages in flood zones. Experts warn it could happen elsewhere, Mar. 4, 2024
[3] Treading Water: Impact of Catastrophic Flooding on Canada's Housing Market, February 2022

temperatures relative to 1980-2000 averages. In most locations, we observe temperature increases, although with considerable geographic variation. These maps clearly indicate that temperatures are rising across both Canada and the U.S., and that the magnitude of this change varies by region.



Panel A. Mean Temperature by Canada Census Divisions and U.S. Counties from 1980 to 2000



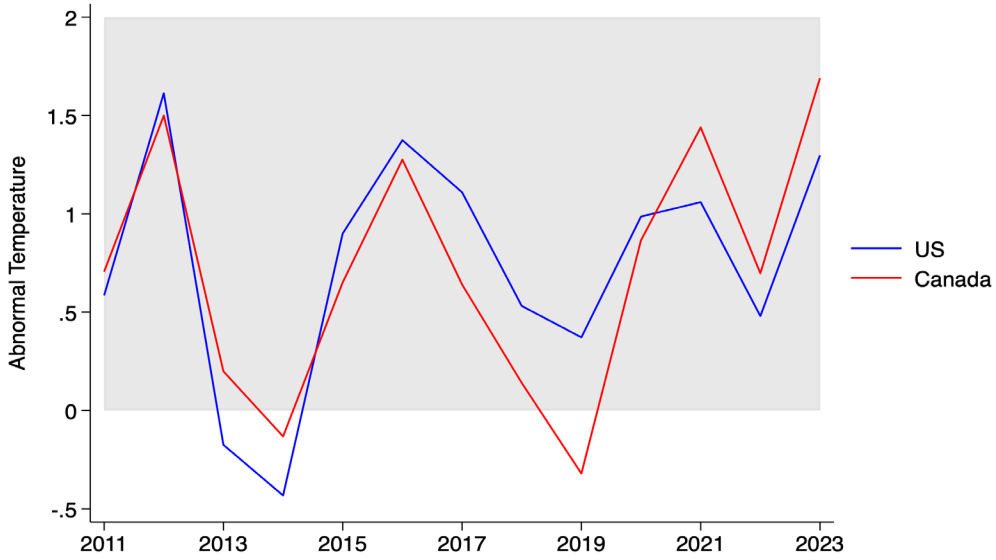
Panel B. Abnormal Temperature by Canada Census Divisions and U.S. Counties in 2023

Figure 1. Temperature Map of Canada and the U.S.

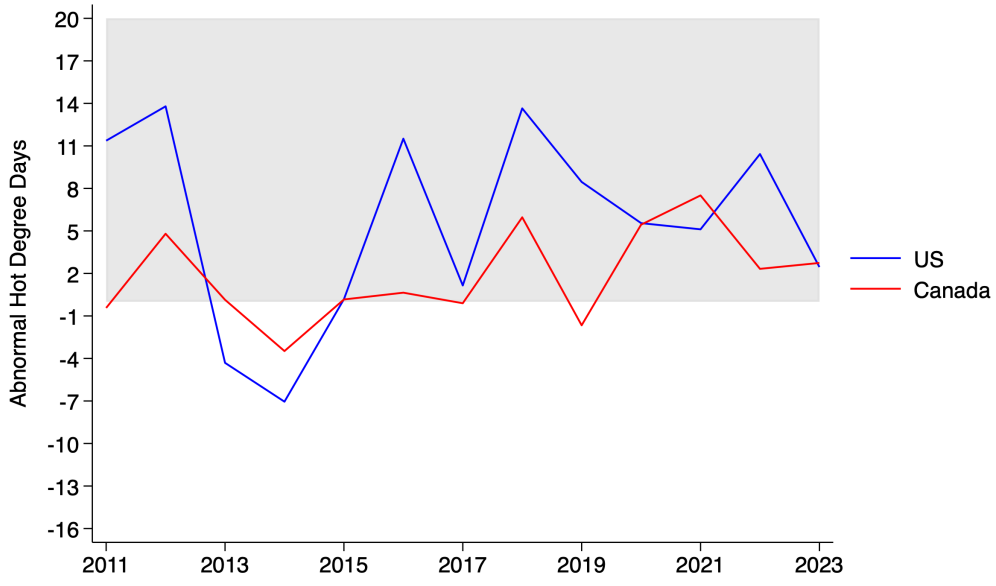
Methodology: Monthly abnormal temperature is calculated by first determining the deviation of each month's temperature from the corresponding monthly average during the 1980-2000 period. These monthly deviations are then averaged to obtain the annual abnormal temperature.

In **Figure 2**, we compare the averages of abnormal temperatures and abnormal hot degree days in Canada and the U.S. by year. Panel A shows that temperatures in both countries have

increased in parallel by approximately one degree relative to their 1980-2000 averages. Panel B shows abnormal hot degree days. In the typical year, we see that the U.S. records between five and 10 extreme temperature days exceeding 30°C, while Canada has fewer. This difference is potentially related to the lower temperatures in Canada compared to the U.S., so while temperatures increase in Canada, days that exceed 30°C are less common.



Panel A. Abnormal Temperature Relative to the 1980-2000 Average

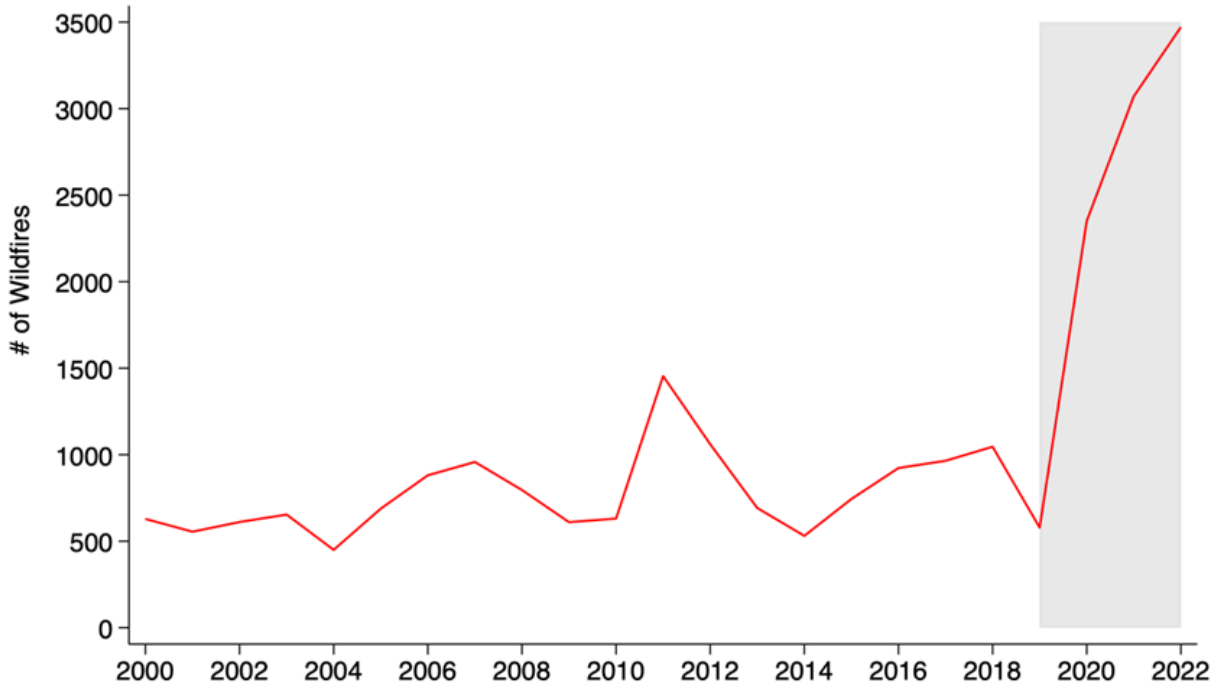


Panel B. Abnormal Hot Degree Days Relative to the 1980-2000 Average

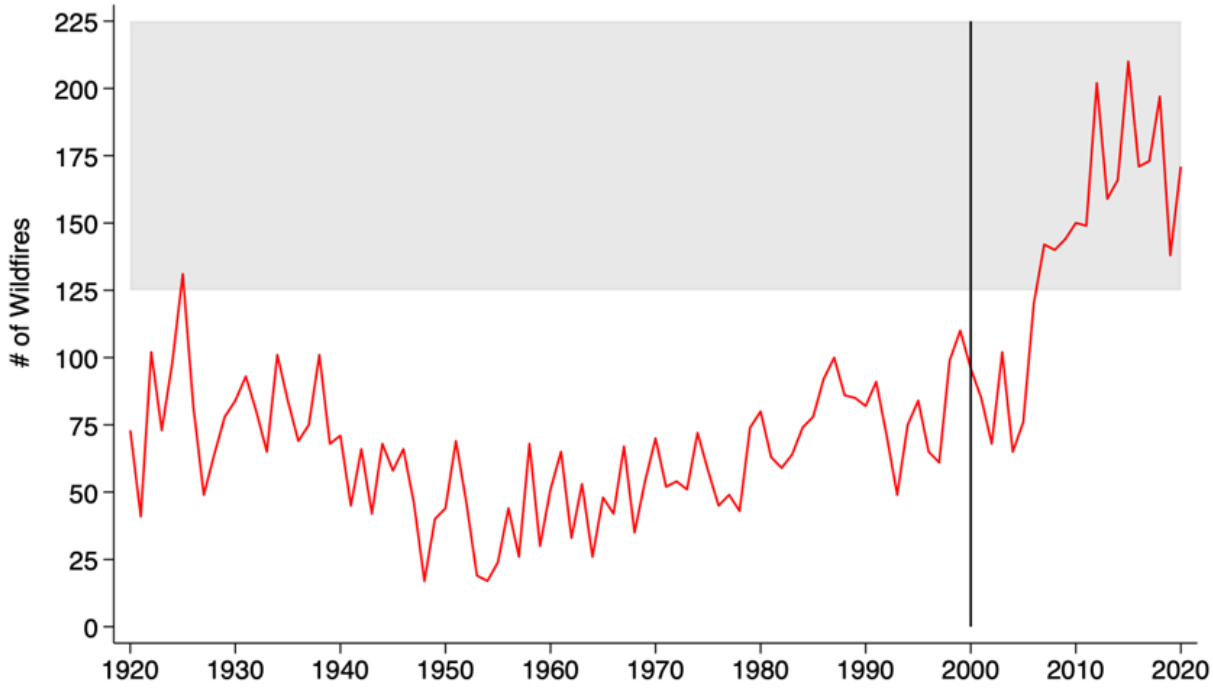
Figure 2. Abnormal Temperature and Hot Degree Days

Methodology: Hot degree days are quantified by determining the number of days per year that exceed 30°C. The baseline is established by computing the average number of such days over the period 1980-2000. Each subsequent year's count is then compared to this baseline by subtracting the reference value, providing a measure of the increase in hot days over time.

The charts in **Figure 3** show the number of U.S. zip codes and Canadian three-digit postal codes affected by wildfires by year. Panel A observes a significant jump in the number of locations affected by wildfires in the U.S. Since 2019, the number of U.S. zip codes affected by wildfires increases by more than five times. By the 2020s, the number of three-digit postal codes affected by wildfires triples across Canada.



Panel A. Number of U.S. Zip Codes Affected by Wildfires



Panel B. Number of Canadian 3-Digit Postal Codes Affected by Wildfires

Figure 3. Number of Locales Affected by Wildfires

Methodology: Wildfire impact is measured as the percentage of land area affected by wildfires within each Canadian census division or U.S. county.

Overall, our climate factor analyses demonstrate that, while we observe that abnormal temperature increases follow similar trends in both countries, the U.S. experiences greater exposure to extreme hot temperatures compared to Canada by the number of zip codes affected. The trends we identify suggest that temperature increases in Canada lead to more moderate, and potentially more comfortable, temperatures in some regions rather than extremes. Similarly, both countries experience more frequent and geographically dispersed wildfires, although the dispersion appears to be greater in the U.S.

Impact of Climate Factors on Immigration

Adverse climate exposure can create significant physical and financial risks, including declining property values and reduced economic opportunities, prompting migration to

regions with lower exposure. In this report, we examine how climate factors influence immigration patterns.

This analysis covers data from Canadian census divisions and U.S. counties for 2011, 2016, and 2021 via Statistics Canada and the U.S. Census Bureau. Census data is merged with the climate factors discussed earlier. A linear regression tests the impact of climate factors on Canadian and U.S. immigration. This technical regression factors in: climate risks, the natural logarithm of population and median income in a location, in addition to time-varying country economic indicators (such as interest rates and inflation).

Moreover, we ensure that our results isolate the true effects of climate factors, independent of background influences. Our findings account for key economic and demographic factors, including population size and median income in each location. We control for broader national trends indirectly, covering impacts from factors such as interest rates and inflation, as well as any fixed economic or demographic differences across states or provinces.

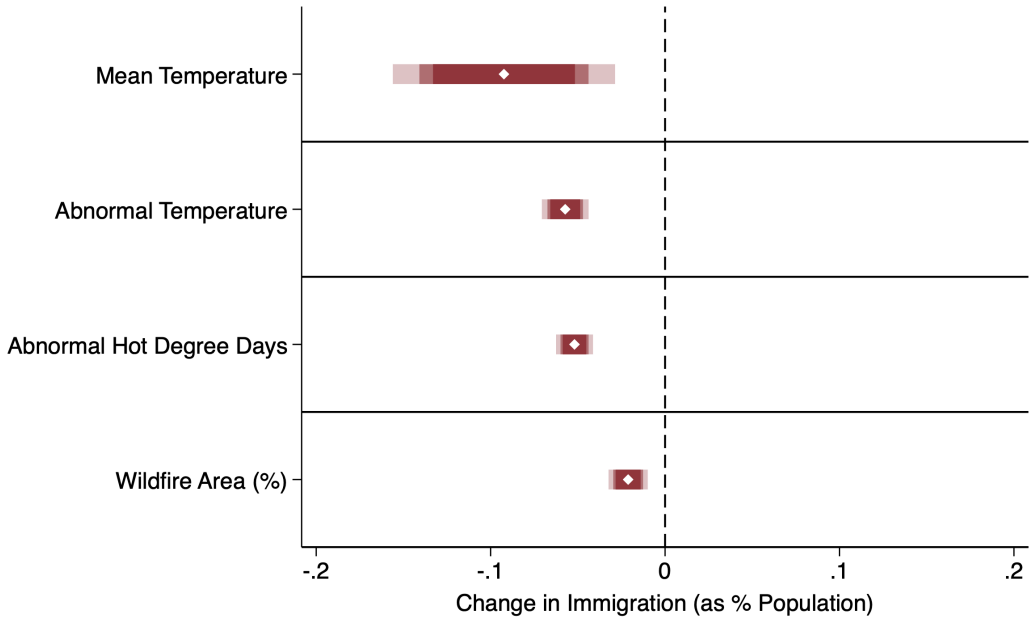
Figure 4 shows the estimation results for both the combined sample and separate samples for Canada and the U.S.[4] Panel A shows that increases in mean temperature, abnormal temperature, abnormal hot degree days, and area affected by wildfires decrease immigration to the affected locations. More specifically, a one-degree increase in average temperature lowers the share of immigrants by 0.1% relative to 2011, while a one-degree increase in abnormal temperature reduces it by roughly 5%. In addition, an increase of 10 extreme-temperature days in a year reduces the share of immigrants by 0.5%, and a 10% increase in wildfire area lowers the share by 2% relative to 2011.

The impact of climate factors is broken down by country in Panel B of Figure 4. Climate factors consistently negatively affect U.S. counties. By contrast, the examined climate factors are unlikely to have a statistically significant impact on Canadian census divisions.

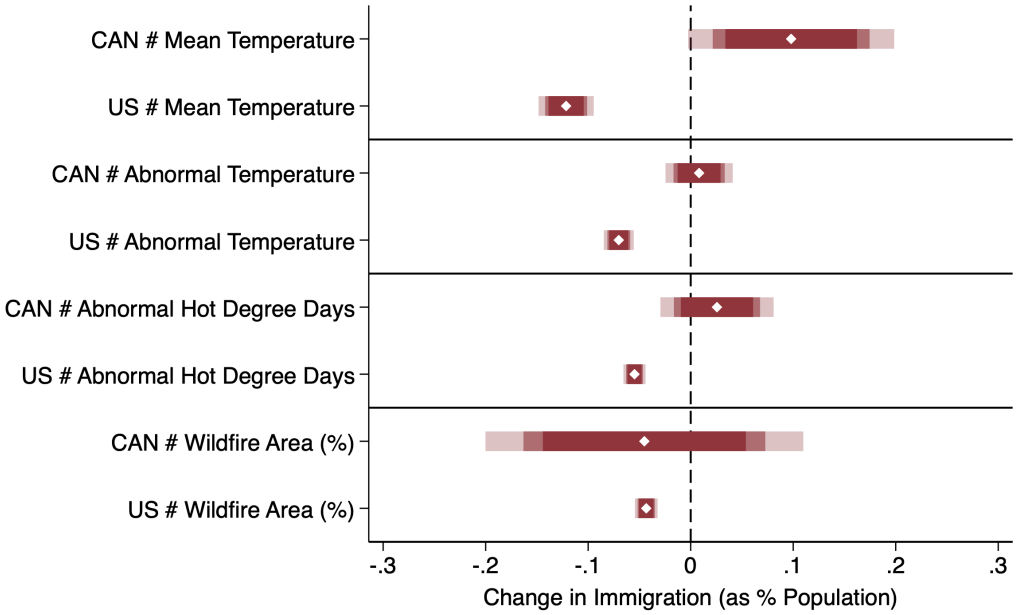
[4] Full regression results are available in the Online Appendix.

Wildfires may have some impact on Canadian census divisions, but the average effect is no different than zero, likely due to geographic variation in wildfire impacts across Canada. Interestingly, a one-degree increase in average temperature increases immigration to Canada statistically significantly, suggesting that more comfortable temperature levels in Canada attract more immigrants.

Overall, Canada potentially benefits from the "North Effect" and immigration to Canada remains less affected by the climate factors examined.



Panel A. Joint Impacts of Climate Factors on Canada and the U.S.



Panel B. Separate Impacts of Climate Factors on Canada and the U.S.

Figure 4. Impact of Climate Factors on the Change in Immigration (% of Population)

How Home Country Climate Affects Migration Patterns

An analysis of immigration to Canada by country of origin is necessary to better understand Canada's climate advantage at the global level. For this, data from Statistics Canada on work permit holders via the Temporary Foreign Worker Program (TFWP), study permit holders, and permanent residents helps reveal key trends by country of origin. These are combined with climate, economic, and social indicators from the Notre Dame Global Adaptation Initiative at the University of Notre Dame. Matching these databases helps shed light on how immigration to Canada can be impacted by the climate exposure of an immigrant's home country.

The Notre Dame Global Adaptation Initiative evaluates a country's vulnerability by examining six essential categories — food, water, health, ecosystem services, human habitat, and infrastructure. In our analysis, we focus on the "Climate Exposure" indicator that measures the exposure of these six categories to climate-related or climate-exacerbated hazards. **Figure 5** presents climate exposure by country for selected countries with bottom and top

climate exposure. Climate exposure of home countries of the immigrants to Canada varies from 24.71 to 72.24 as measured by the Notre Dame Global Adaptation Initiative.

Migration patterns to Canada from each country of origin are regressed based on climate exposure and GDP. Further, the analysis accounts for population, governance, and social indices by country. The bottom quartile of countries as measured by the Human Development Index remain excluded from the analysis to better control for lack of economic resources to migrate.[5]

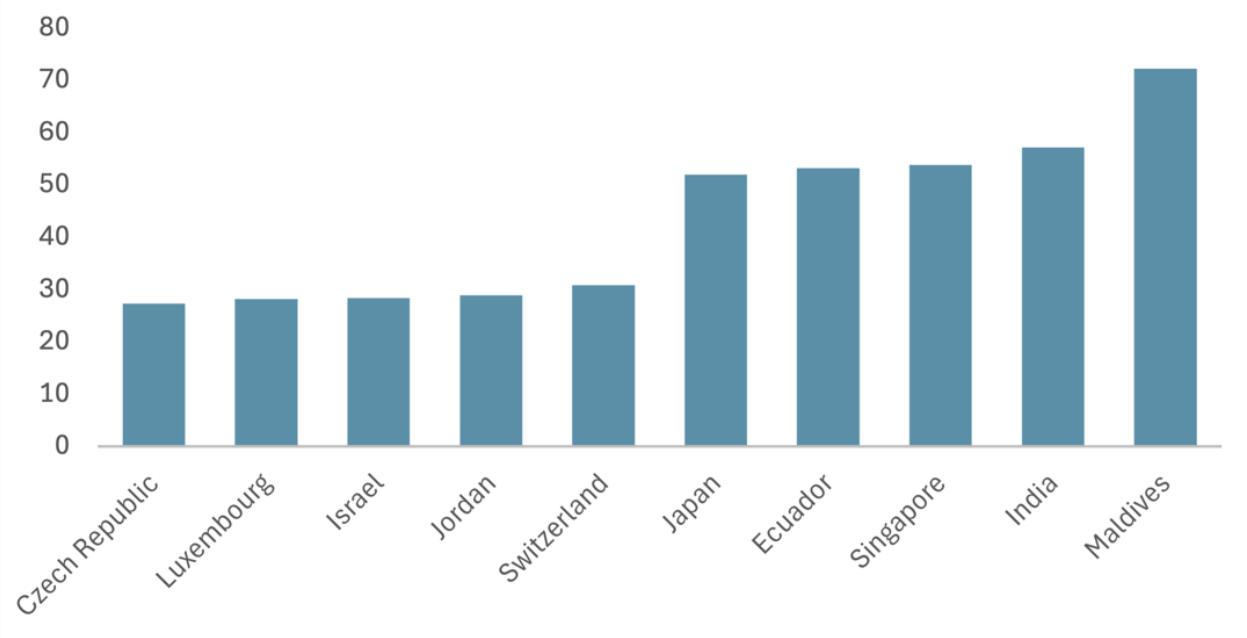
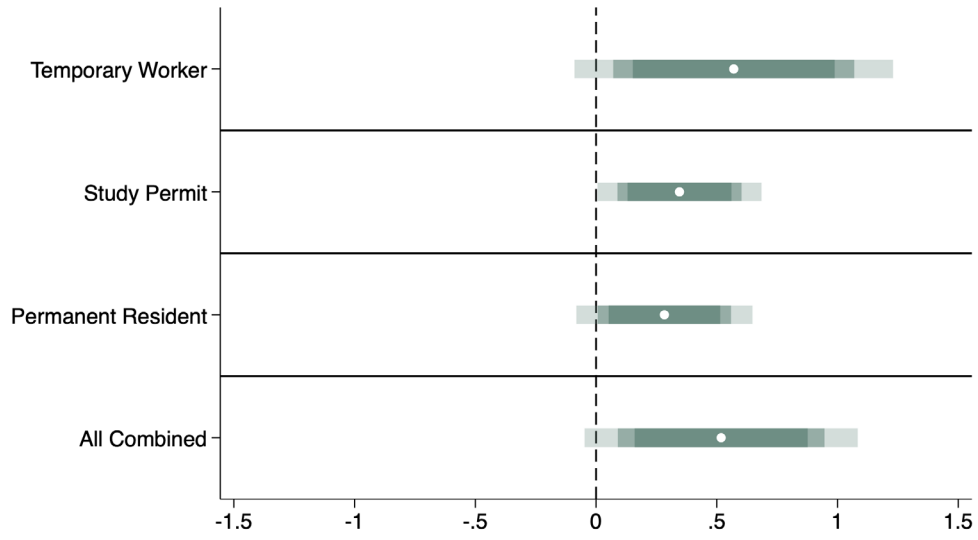
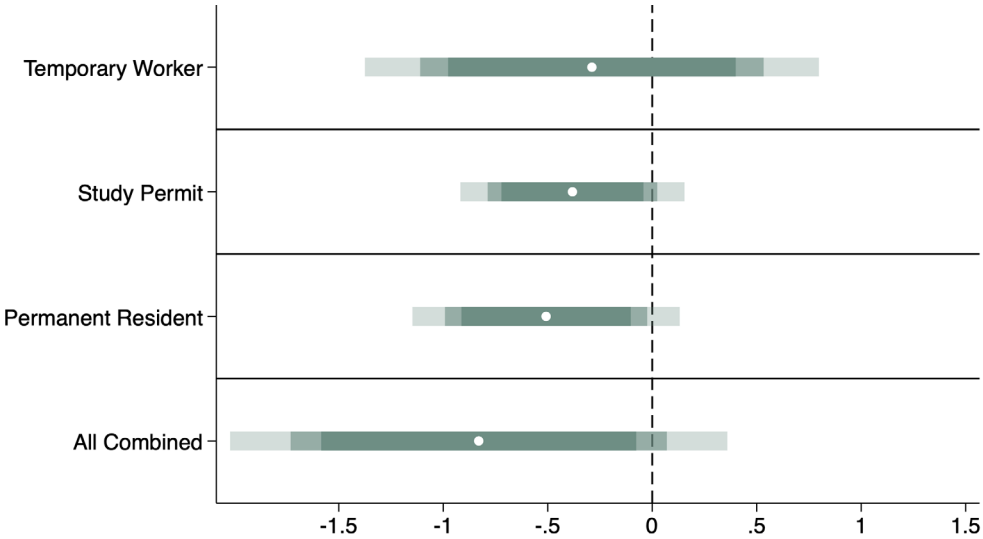


Figure 5. Climate Exposure of Selected Countries

[5] The results mainly hold if we keep such countries. Additionally, we winsorize independent variables by 1%, dampening outliers. We report full regression results in the Online Appendix.



Panel A. Climate Immigration to Canada



Panel B. Economic Immigration to Canada

Figure 6. Impact of Climate and Economic Factors on Immigration to Canada

We present the results in **Figure 6**. Panel A shows how Canadian migration can be shaped by the climate exposure of an immigrant's home country. As the climate exposure of an immigrant's home country increases, immigration from that country to Canada increases significantly. This finding holds for temporary workers, study permit holders, and permanent residents alike. A 10-unit increase in the climate exposure score of an immigrant's home country increases the share of immigrants from that country by around 0.5% across all

immigration categories. These impacts account for the population, GDP, governance, and social quality of the immigrant's country of origin.

Panel B illustrates the impact of the GDP of an immigrant's home country on Canadian immigration. A one-unit decrease in the log of a home country's GDP per capita is associated with an increase in its share of immigrants to Canada by roughly 0.4 to 0.9 percentage points. In other words, if one country's GDP per capita is half that of another, its immigrant share is about 0.4 to 0.9 percentage points higher.

Zooming out, this analysis indicates that climate exposure and lower GDPs tend to drive migration to Canada. In turn, climate and economic immigrants are key contributors to Canada's resilient housing demand over the long term.

These findings have strong implications for institutional investors. The Canadian housing market demonstrates a high degree of resiliency to climate impacts in part due to its muted exposure to physical risk and as an attractive destination for climate migration. Overall, the Canadian housing market offers a diversification opportunity against climate risk for institutional investors.

Summary of Recommendations

- Exploring opportunities in sustainable real estate development, particularly green-certified buildings and climate-adaptive infrastructure projects, can be beneficial. With the Canadian government actively promoting sustainability initiatives, investments in energy-efficient housing and disaster-resistant infrastructure upgrades may benefit from policy incentives while ensuring long-term asset value preservation.
- Organizations like the United Nations have warned that climate change may render some parts of the world inhospitable due to high temperatures, disasters, and other climate-related risks. Based on our findings, Canadian policy and investment should

reflect a potential acceleration in climate migration to Canada. This is particularly important at a time when Canada faces an ongoing shortage of housing.

- To effectively manage climate risk, investors are advised to incorporate geographic diversification into their real estate portfolios. Investing in Canadian real estate offers an opportunity to offset exposure to high-risk markets, where properties may face climate-driven physical and financial threats.