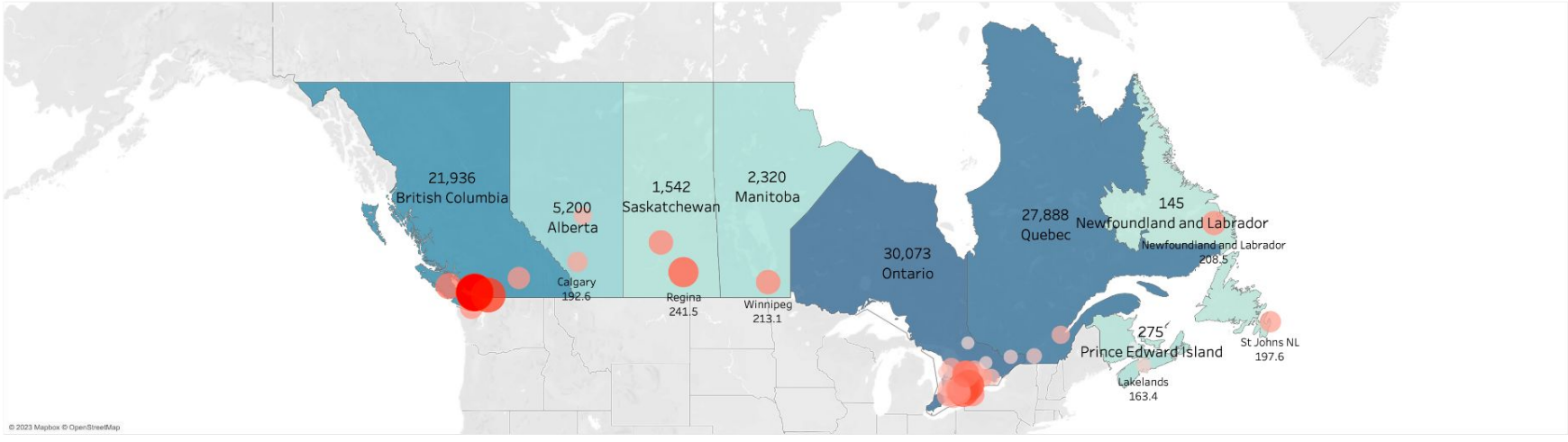
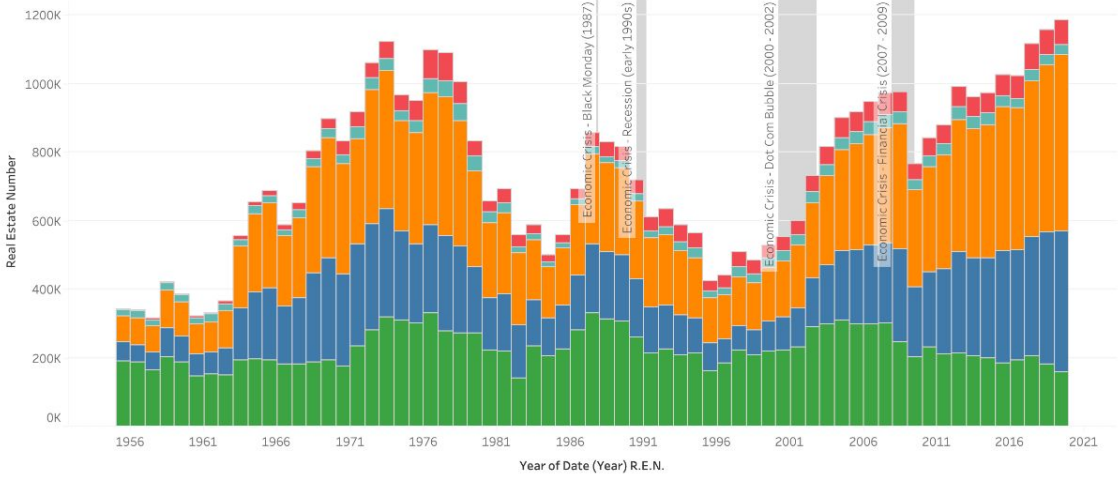
Analyzing House Price Trends in Canada

Peter Xu

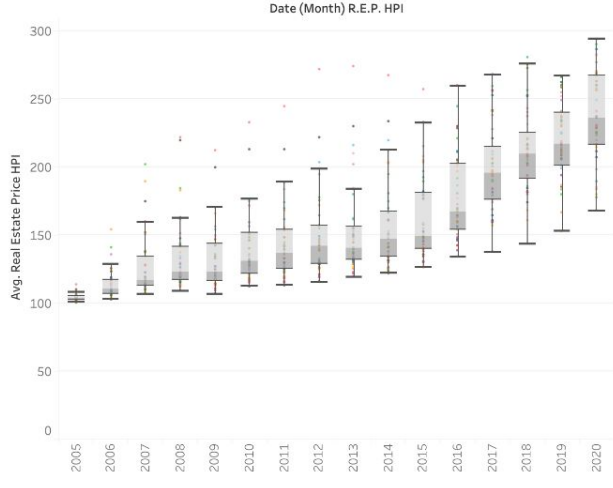
Canadian Provinces Map by Current House Numbers & Prices



Economic Crises and House Constructions



Price Variation Across Districts in Canada Over Time



Price: Housing Type
(All)
Apartment
Cancel Apply

YEAR
2018

Number: Housing Estimat..
(All)
Housing completions
Cancel Apply

Number: Unit Type
(All)
Apartment and oth...
Cancel Apply

Avg. Real Estate Price HPI
139.4 280.5

Real Estate Number
145 30,073

Type Of Unit Set
(All)
Apartment and oth...
Cancel Apply

Province (R.E.N.) (inc. Ca..
(All)
Alberta
Cancel Apply

Type Of Unit
Row
Semi-detached
Multiples

Price: Housing Type
(All)
Apartment
Composite

Price: Housing Type
(All)
Apartment
Cancel Apply

Region (R.E.P)(inc. Aggre..
Bancroft and Area
Barrie and District
Brantford Region

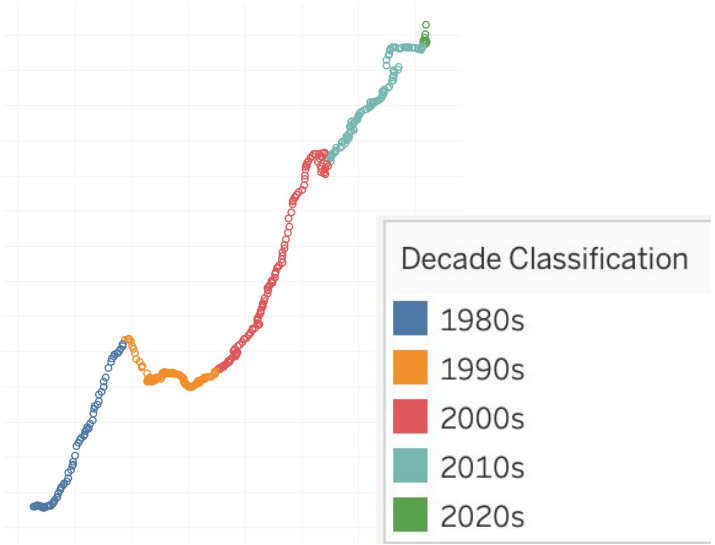
Project Flow Structure

* Data Extraction and Transformation using Python:
  - Convert JSON and XLXS files to CSV files.
  - Generate pivot tables using the .melt() method.
  - Convert weekly earnings data to monthly earnings data using the dt.daysinmonth() method

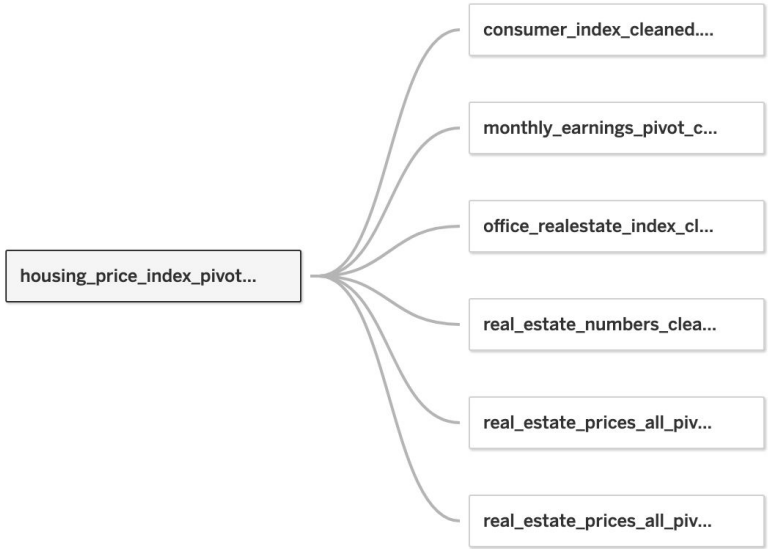
	Date	Region	Housing Type	Benchmark/HPI	Value
0	2005-01-01	Aggregate	Apartment	Benchmark	190600
1	2005-02-01	Aggregate	Apartment	Benchmark	192300
2	2005-03-01	Aggregate	Apartment	Benchmark	193200
3	2005-04-01	Aggregate	Apartment	Benchmark	194600
4	2005-05-01	Aggregate	Apartment	Benchmark	196100

Why Pivot Tables in Tableau?

- Convert column names to new dimensions.
- Use new dimensions for filtering, coloring, and labeling.
- Conforms to Tableau's workflow.



* Load data into Tableau:
  - Use "Data Source" option to link tables.
  - Use Date fields to link the tables and set the data type to "Date."
  - Set Region/Province fields to data type "Geo."



Extras:

- Adding latitude and longitude to unrecognized locations
- Finding out the start/end date of the four Economic Crisis

Economic Crisis	Starting Date	End Date
Black Monday (1987)	1987-10-19	1987-12-04
Recession (early 1990s)	1990-07-01	1991-03-01
Dot Com Bubble (2000 - 2002)	2000-03-10	2002-10-09
Financial Crisis (2007 - 2009)	2007-12-01	2009-06-30

Location	Latitude	Longitude
Barrie and District	44.3894	-79.6903
Brantford Region	43.1394	-80.2644
Fraser Valley	49.2838	-122.7010
Greater Moncton	46.0878	-64.7782
Greater Toronto	43.6532	-79.3832
Greater Vancouver	49.2827	-123.1207
Grey Bruce Owen Sound	44.4268	-81.3644
Guelph and District	43.5448	-80.2482
Hamilton Burlington	43.2500	-79.8662
Huron Perth	43.5500	-81.3833
Kitchener Waterloo	43.4643	-80.5204
London St Thomas	42.9849	-81.2453
Lower Mainland	49.2827	-123.1207
Montreal CMA	45.5017	-73.5673
Newfoundland and Labrador	53.1355	-57.6604
Niagara Region	43.0896	-79.0849

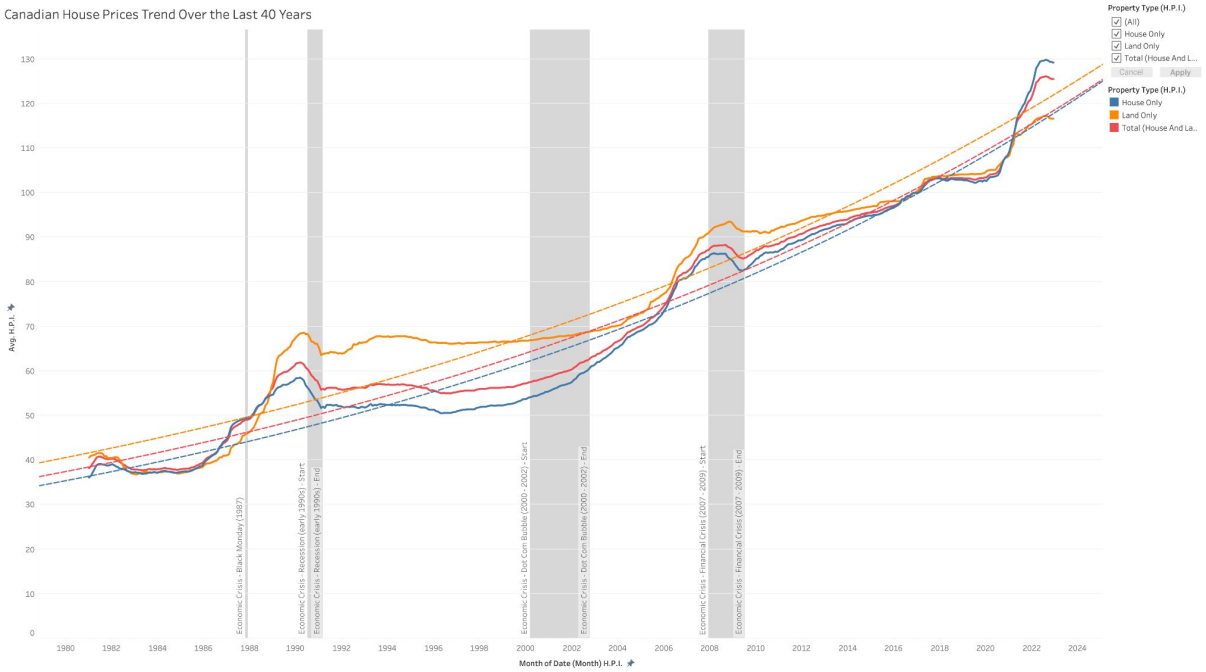
* Create sheets and dashboards:
  - Use parameters for the start and end dates of four economic crises.
  - Create calculation fields for "Decade Classification"

- Economic Crisis - Black Monday (1987) - End
- Economic Crisis - Black Monday (1987) - Start
- Economic Crisis - Dot Com Bubble (2000 - 2002) - End
- Economic Crisis - Dot Com Bubble (2000 - 2002) - Start
- Economic Crisis - Financial Crisis (2007 - 2009) - End
- Economic Crisis - Financial Crisis (2007 - 2009) - Start
- Economic Crisis - Recession (early 1990s) - End
- Economic Crisis - Recession (early 1990s) - Start

```
IF YEAR(DATETRUNC('year',[Date])) < 1990 THEN '1980s'
  ELSEIF YEAR(DATETRUNC('year',[Date])) < 2000 THEN '1990s'
  ELSEIF YEAR(DATETRUNC('year',[Date])) < 2010 THEN '2000s'
  ELSEIF YEAR(DATETRUNC('year',[Date])) < 2020 THEN '2010s'
ELSE '2020s'
END
```

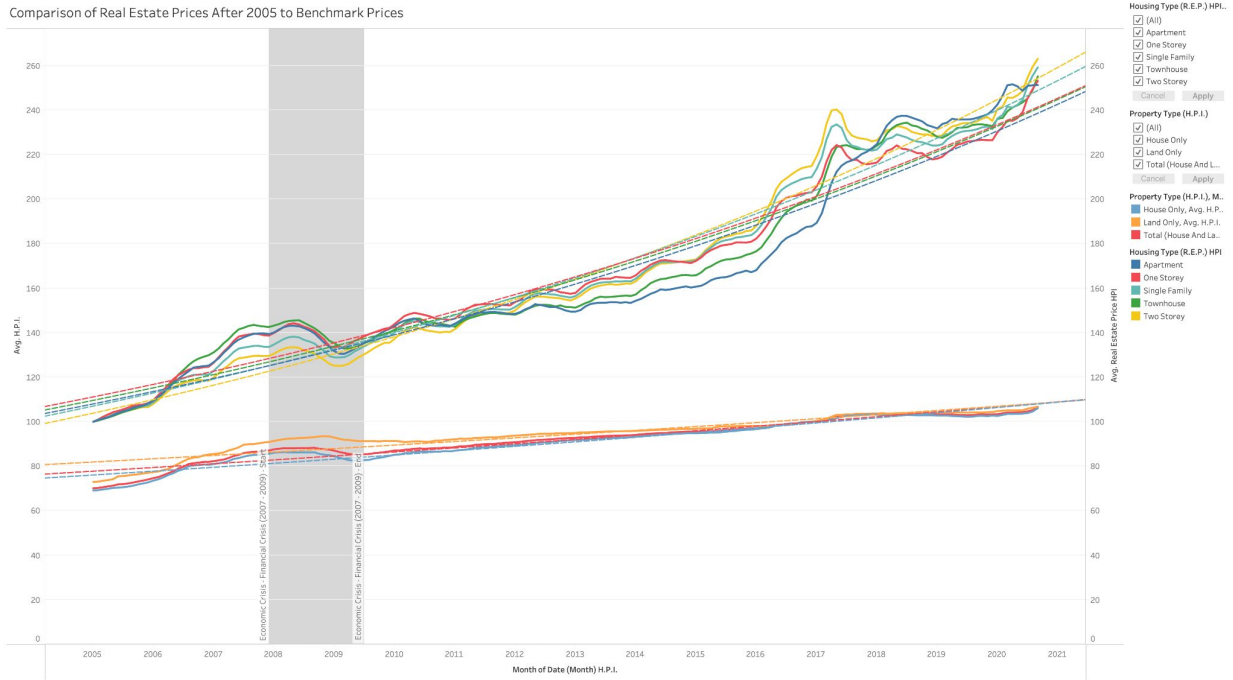
Answers

Q1: Show the trend of house prices across Canada in the last 40 years



The trend of house prices across Canada over the past 40 years indicates a consistent overall increase. Three of the crises have apparently had an influence on the HPI.

Q2: Compare the trend after 2005 with actual benchmark prices.



- The benchmark prices are more responsive to changes in the market, exhibiting a greater overall increase rate and amount in comparison to the HPI trend observed after 2005.
- The **apartment** type has become the real estate type with the highest appreciation rate since **August 2017**. This trend implies that **apartments are becoming increasingly expensive and in high demand**, potentially due to various factors such as population growth, urbanization, and changes in market conditions.

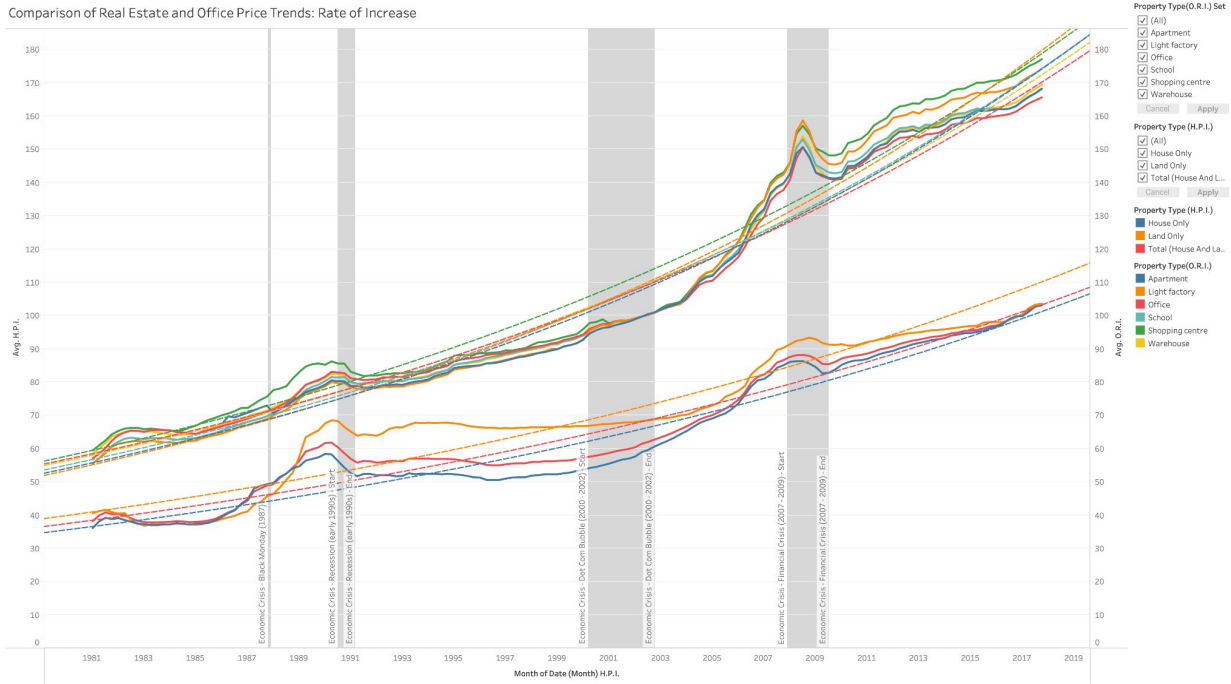
Benchmark Price vs HPI

If the benchmark price increased faster than the house price index between 2005 and 2020, it means that the prices of higher-end or luxury homes increased more rapidly than the overall housing market. The benchmark price is typically a measurement of the price of a typical or average high-end property in a given area, while the house price index measures the changes in the overall housing market, including lower-end and mid-range homes.

The increase in benchmark price could be due to several factors, such as strong demand for luxury homes, limited supply of high-end properties, or an increase in the cost of building and materials used in the construction of luxury homes. Meanwhile, the house price index could be influenced by other factors, such as changes in the economy, employment rates, interest rates, and demographics.

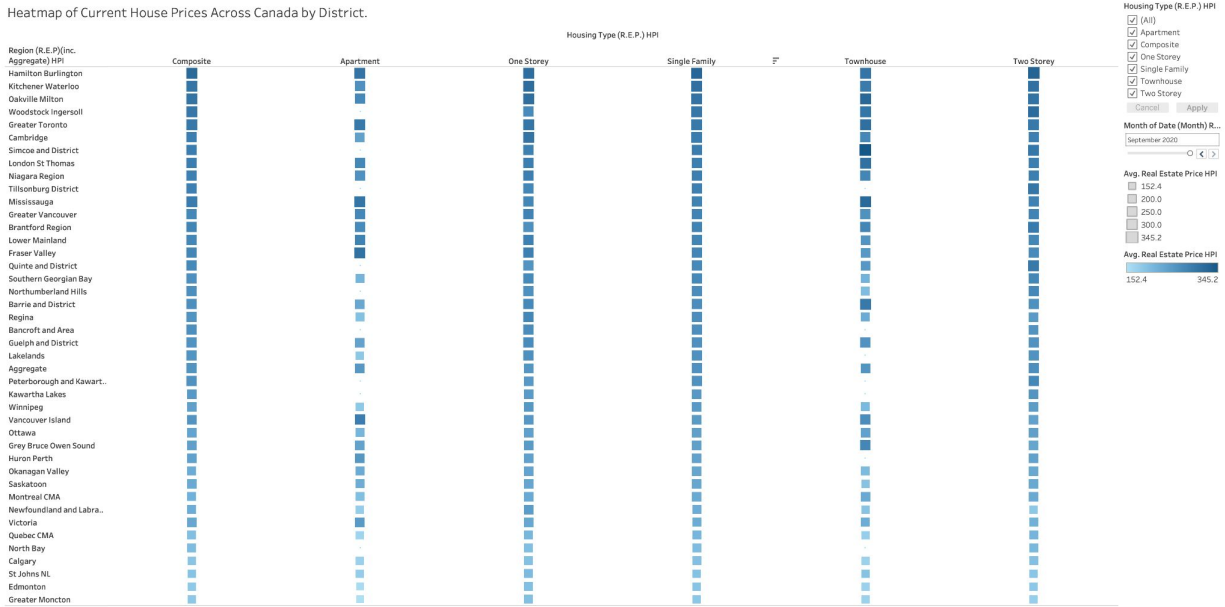
Overall, the trend indicates that **the higher end of the housing market outperformed the broader housing market during this time period.** However, it's important to note that this trend may vary depending on the specific geographic region and the time period analyzed.

Q3: Compare this trend with the trend of office prices. Which one is getting more expensive, faster?



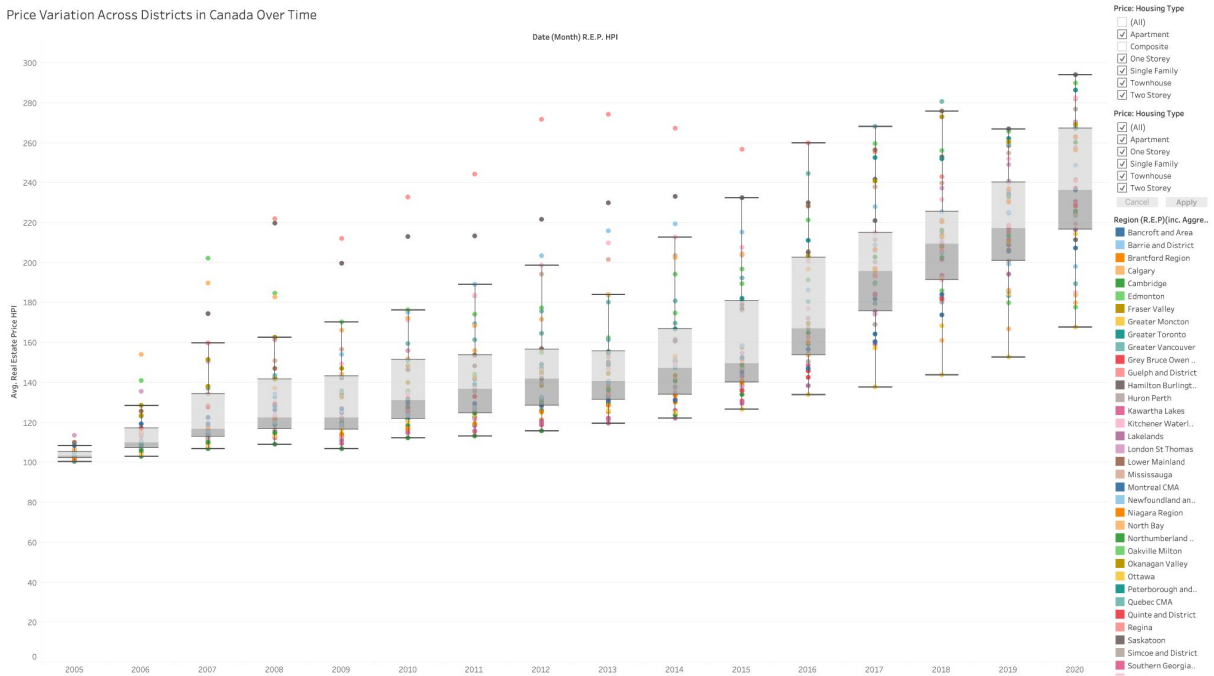
Shopping centers, classified as office real estate, generally experience the highest appreciation rates compared to other types of office real estate. This trend is particularly pronounced after the Financial Crisis of 2007-2009.

Q4: Create a heatmap of Canada with current house prices for each available district.



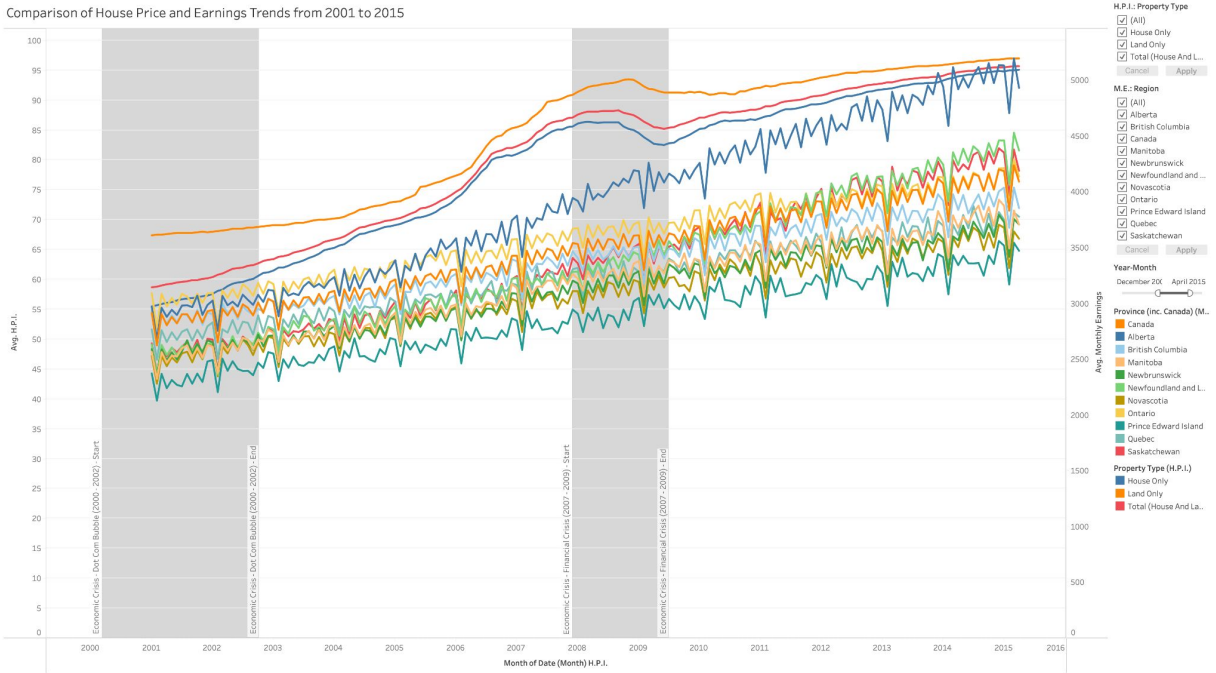
- A heatmap is a powerful tool for effectively comparing numerical values across different geographic regions and categorical dimensions.
- With the sorting button, users can quickly identify the ranking of regions for a specific property type. Moreover, the year-month slider enables easy navigation to a specific point in time, facilitating dynamic analysis of the data.

Q5: Are the price differences between different districts increasing?



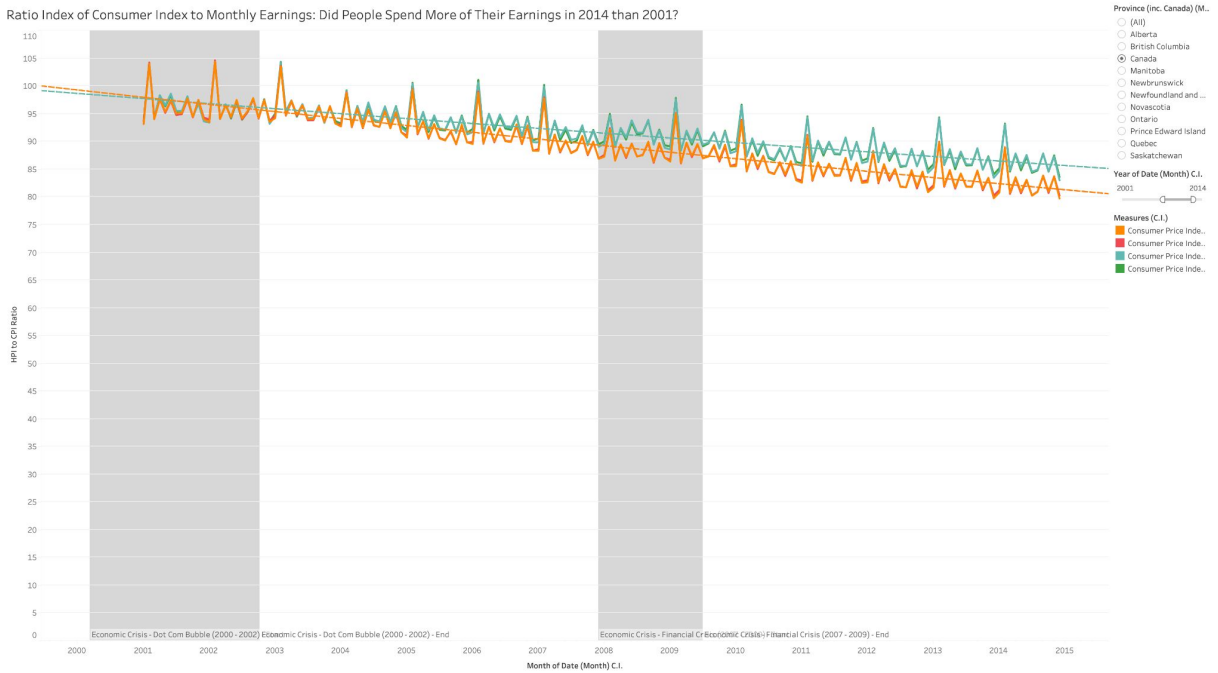
By plotting the boxplot of the price index from different regions over history, one can see statistical information such as **standard deviation** and **interquartile range**. Comparing the height of the box and the length of the interquartile range, it can be concluded that **the price differences between different districts have been increasing**.

Q6: Compare the trend of house prices with earnings.



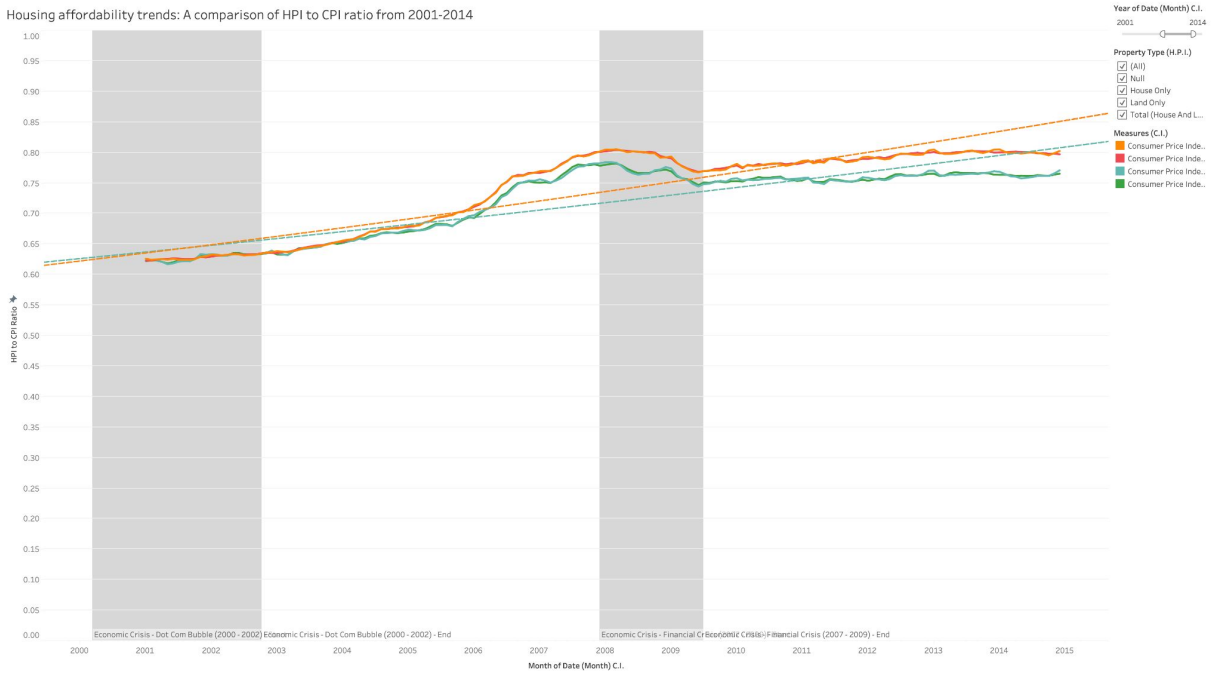
The income growth level in **Alberta** province is significantly higher than in other provinces, and this growth rate has surpassed the HPI growth rate. This means that residents of Alberta province are more likely to cope with the economic burden brought by the rising property prices.

Q7: Did people spend more of their earnings in 2014 than they did in 2001?



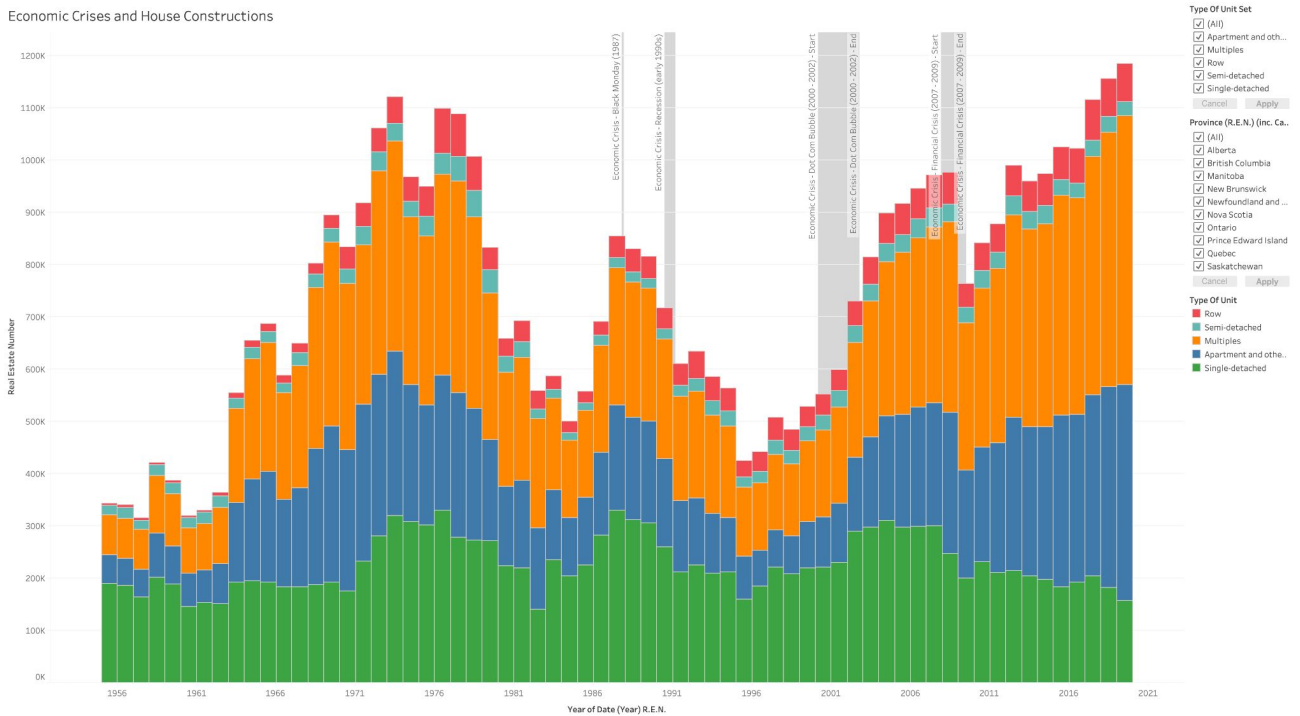
- This question is essentially asking what percentage of one's income from 2001 to 2014 would be required to purchase a specific item.
- To address this inquiry, we require the ratio of the Consumer Price Index (CPI) to the monthly earnings that have been normalized. Normalization is done by dividing the monthly earnings by the value of monthly earnings on July 1, 2002, when the CPI index was set to 100.
- **The purchasing power of people's monthly income has steadily increased. If the same goods need to be purchased, people spent less in 2014.**

Ratio of HPI to CPI



Compared to the prices of other consumer goods, the price of housing has risen more significantly, even after adjusting for inflation. As a result, the burden of housing consumption has increased.

Q8: the effect of these crises on house constructions



Not every economic crisis has a negative impact on real estate construction. For example, during the dot-com bubble economic crisis, a significant increase in housing construction can be observed. This may be a strategy used by governments to address economic crises, and a similar pattern has also occurred between 2020 and 2022.

Why not every economic crisis affects economic indicators in Canada?

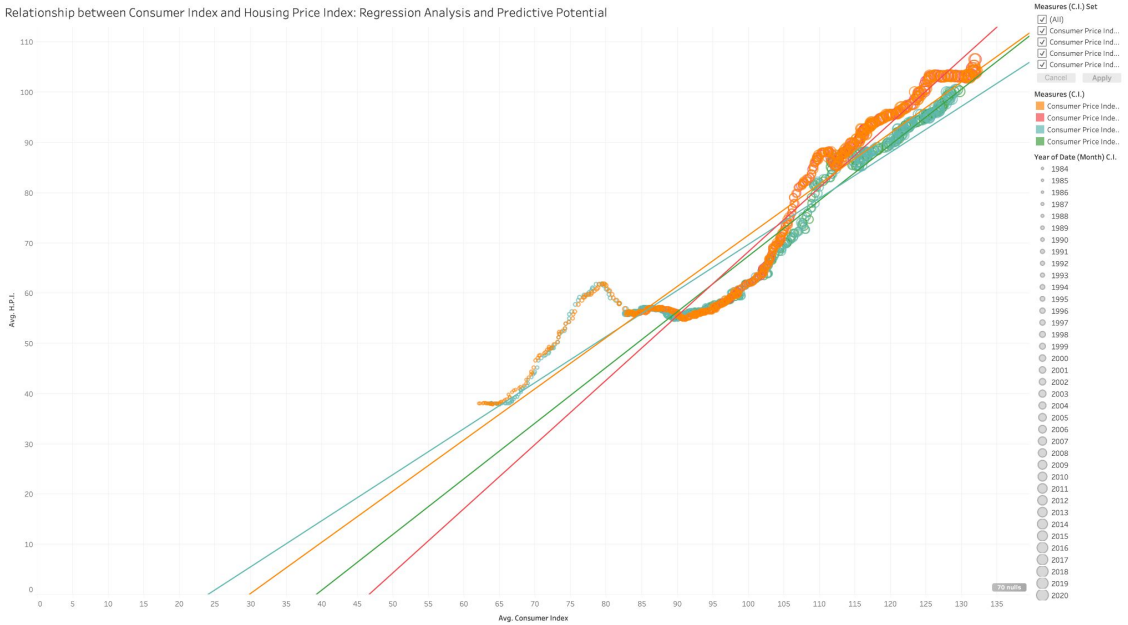
Black Monday (1987)

- The long-term effects of Black Monday (1987) on Canada were relatively limited. While the stock market crash had an immediate impact on the Canadian economy, it did not cause a prolonged recession or major structural changes.
- One reason for this is that the Canadian financial system was relatively well-regulated and stable at the time, which helped to mitigate the effects of the crash.
- Additionally, the Bank of Canada and other policymakers were able to respond quickly by implementing monetary and fiscal policies that helped to stabilize the economy.
- Overall, while Black Monday had a significant impact on Canada in the short term, its long-term effects were relatively limited.

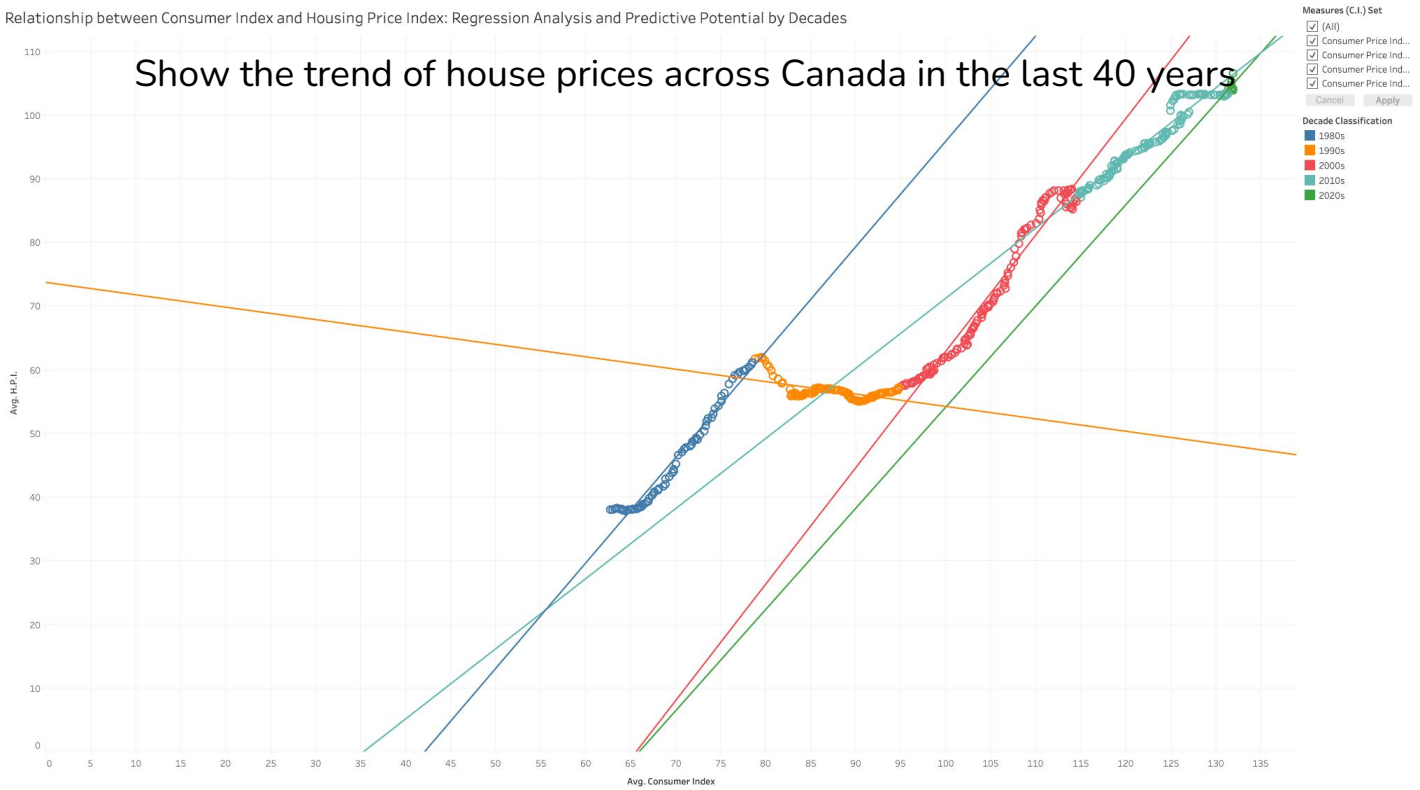
Dot Com Bubble (2000 - 2002)

- The dot com bubble was primarily a US phenomenon that affected mostly US-based tech companies and investors.
- The dot com bubble had a limited impact on the Canadian economy due to the country's lesser investment in the tech sector and the government's implementation of policies to stabilize the economy. Although there were still negative effects, such as reduced trade and demand for exports.

Q9: Plot consumer_index together with housing_price_index and fit the regression line between them. Can we predict consumer_index from the housing_price_index?



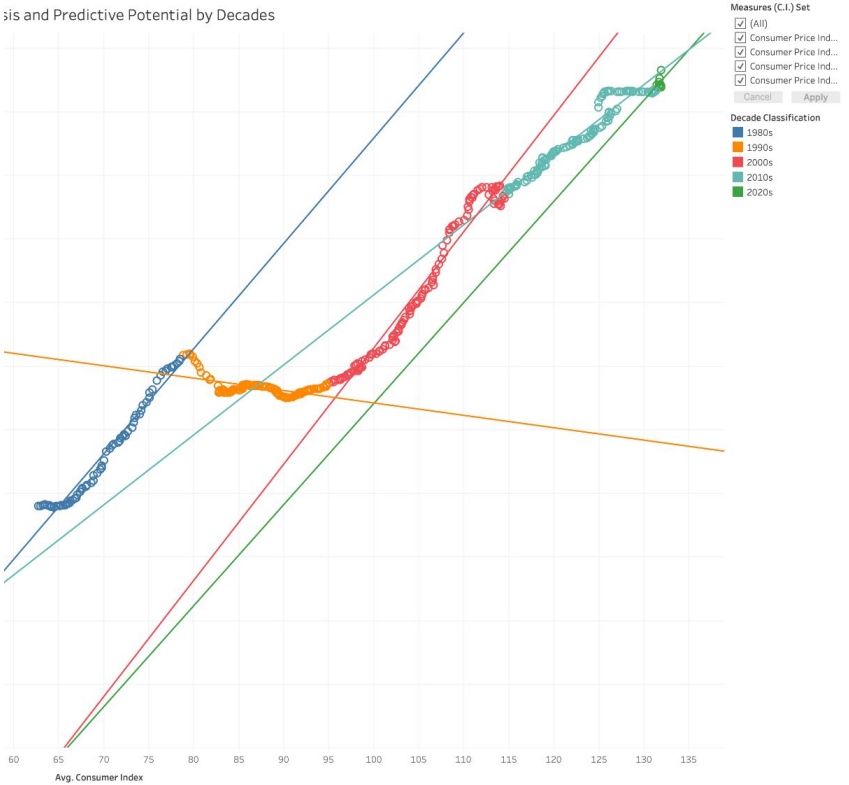
If we evaluate the data over the 40-year period as a whole, we can see four trend lines from different CPI indicators that roughly point in the same direction.



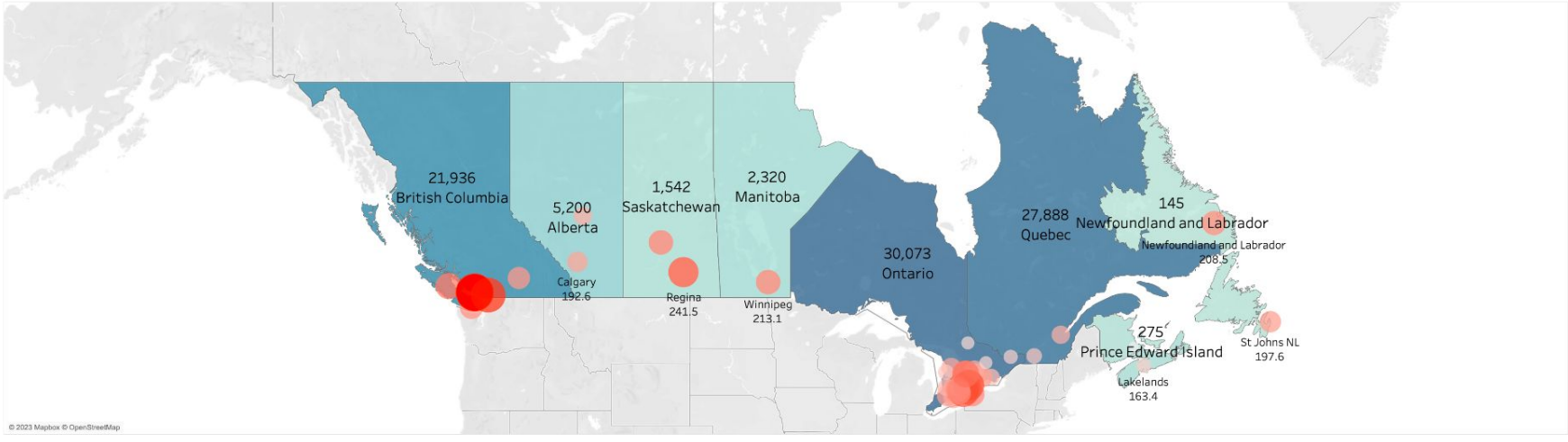
However, if the short-term (10-year) trend lines are used, the direction of each trend line on the scatter plot for each decade is different in direction, which illustrates the difficulty in making long-term predictions.

Q9: Conclusions

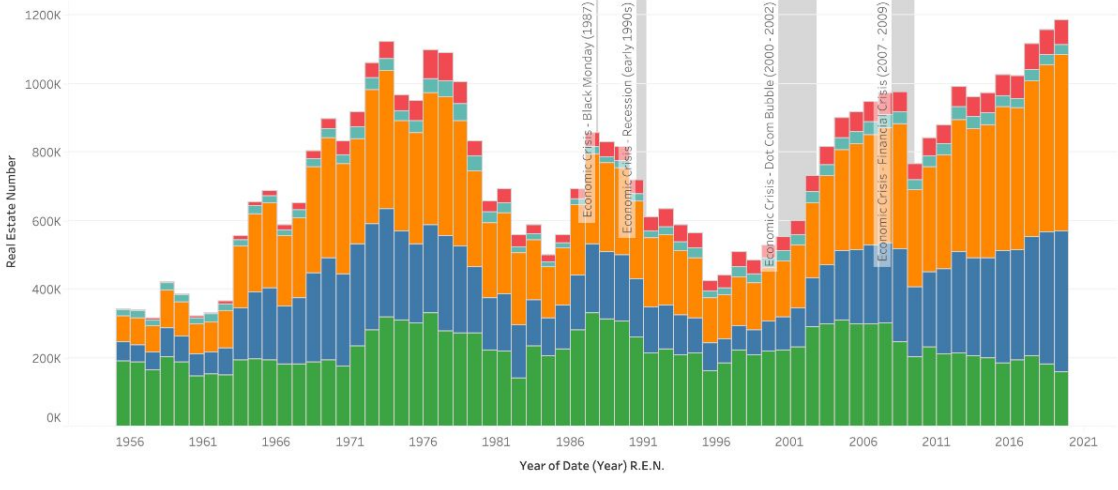
- The results indicate that on the scatter plot, each decade shows a relatively independent and continuous sequence of segments.
- Applying trend lines to the scatter plot reveals that the trends for each decade are not the same, particularly in the trend lines for the 1980s and 1990s. However, the trend lines for the most recent two decades are roughly similar.
- Based on this observation, we can conclude that **we may use this scatter plot for short-term trend forecasting, but predicting trends beyond a decade may be difficult** due to the multiple factors influenced by domestic and international political and economic conditions.



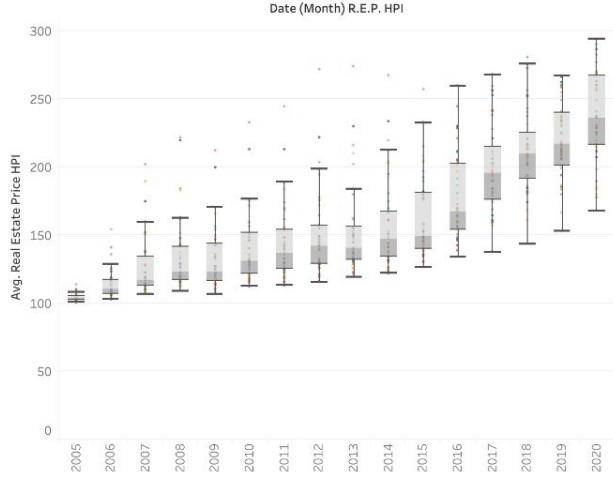
Canadian Provinces Map by Current House Numbers & Prices



Economic Crises and House Constructions



Price Variation Across Districts in Canada Over Time



Price: Housing Type
(All)
Apartment
Cancel Apply

YEAR
2018

Number: Housing Estimat..
(All)
Housing completions
Cancel Apply

Number: Unit Type
(All)
Apartment and oth...
Cancel Apply

Avg. Real Estate Price HPI
139.4 280.5

Real Estate Number
145 30,073

Type Of Unit Set
(All)
Apartment and oth...
Cancel Apply

Province (R.E.N.) (inc. Ca..
(All)
Alberta
Cancel Apply

Type Of Unit
Row
Semi-detached
Multiples

Price: Housing Type
(All)
Apartment
Composite

Price: Housing Type
(All)
Apartment
Cancel Apply

Region (R.E.P)(inc. Aggre..
Bancroft and Area
Barrie and District
Brantford Region

Thank you!