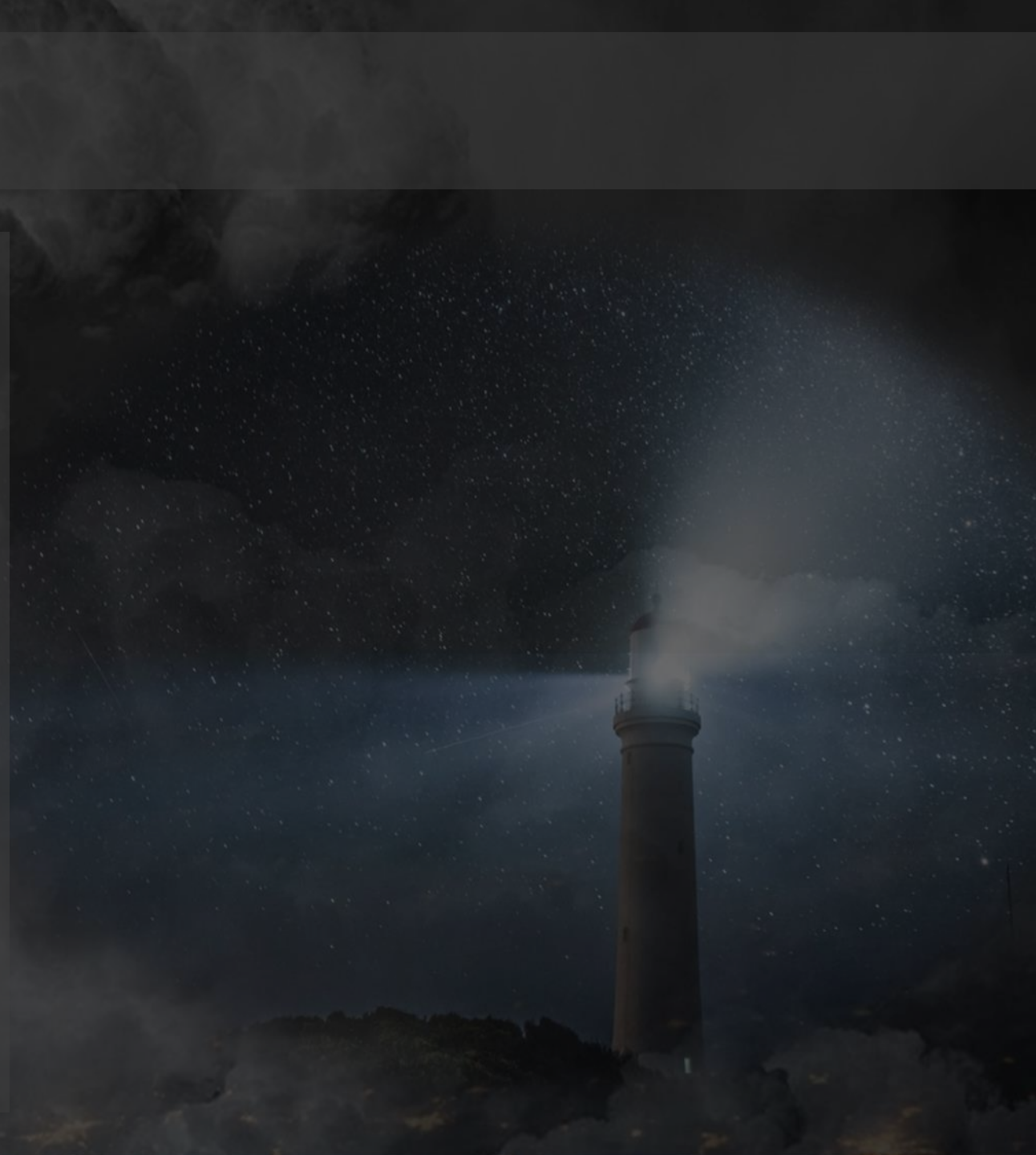# Lighthouse Labs Project

Data Visualization and Dashboards with Tableau

Sébastien Garneau

Agenda

- Project description

- Project flow structure

- Results
  - Visualizations
  - Key takeaways

- Biggest challenges

Project Description

Goals:

• Turn data into easily consumable visual insights using Tableau;

• Create impactful dashboards that help stakeholders make decisions, based on <u>business questions</u>; and

• Communicate insights with the correct visualizations.

Business questions (Option 1):

1. Show the trend of house prices across Canada in the last 40 years.

2. Compare the trend after 2005 with actual benchmark prices in table real_estate_prices to see if there are any differences.

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

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

5. Are the price differences between different districts increasing?

6. Compare the trend of house prices with earnings.

7. Did people spend more of their earnings in 2014 than they did in 2001?

8. There were several economic crises in the world in the last 40 years, show the effect of these crises on: Earnings; House prices; Office prices; House constructions; and Consumer index.

9. 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?

10. Find an interesting pattern, trend, outlier, etc. from the data used in the above questions.

Project Flow Structure

ORIENTATION

- Review assignment & business questions

- Download provided datasets
  - Identified housing_price_index.csv was missing. Mentor provided a replacement.

PREPARATION

- Import datasets as pd.dataframe into Jupyter Lab
- Data Cleaning:
  - consumer_index: 70x null index_value *(dropped)*
  - housing_price_index (pivot table)
  - office_realestate_index: 587x duplicate values *(dropped)*
  - real_estate_numbers : Dropped & renamed columns
  - real_estates_prices: NSTR
  - weekly_earnings: parsed json & dropped columns

- Import into Tableau
  - Issue joining tables -> datasets will be merged by year, month and region. Go back and create join columns (year, month, province).

VISUALIZATION

- Create 1-2x Tableau sheet/business question

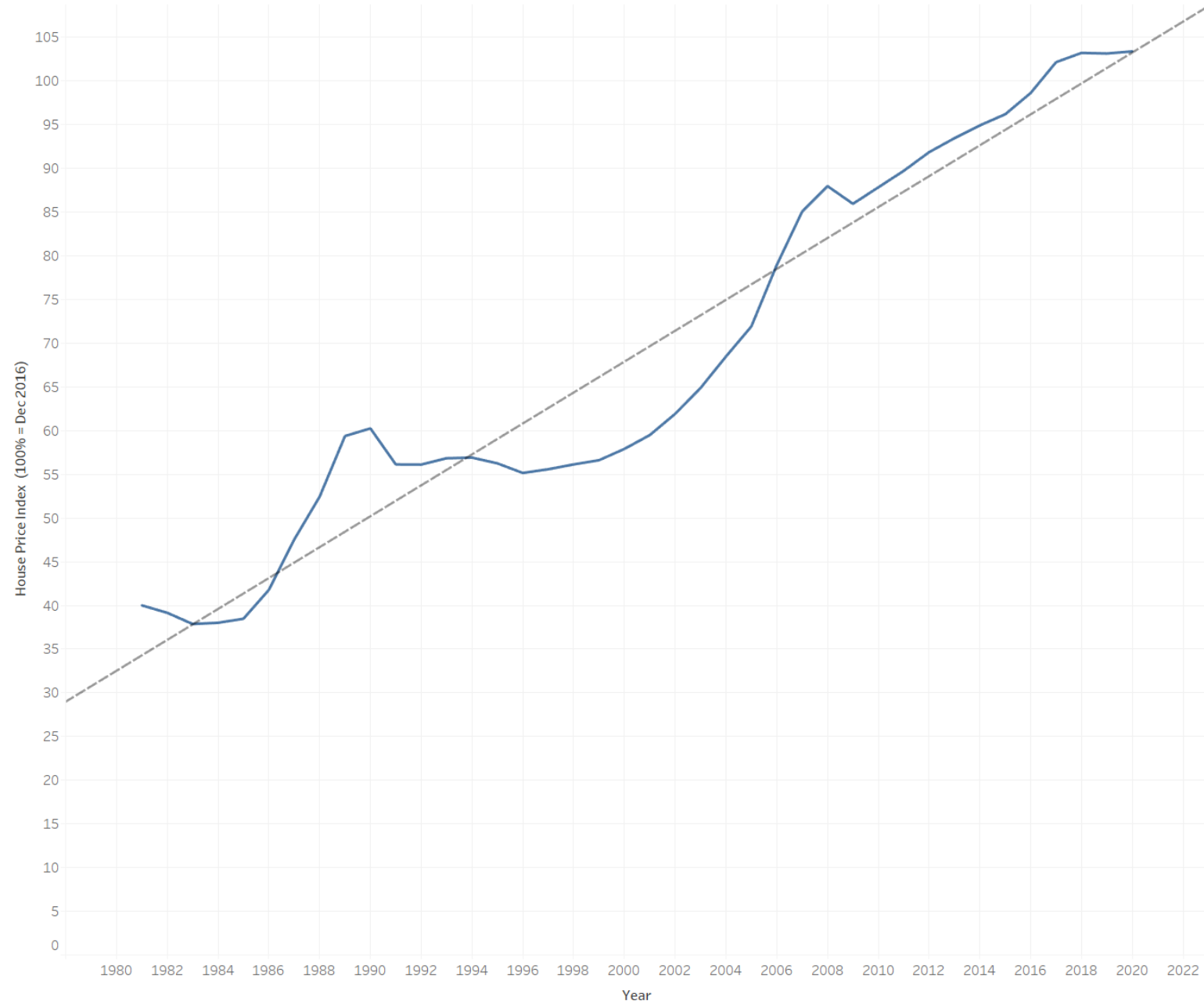- Create 1x dashboard/business question to help format for the screenshot.

Results

1. Show the trend of house prices across Canada in the last 40 years.

<u>**Key takeaways:**</u>

- 1981: HPI = 40%

- 2016: HPI = 100%

- 2020: HPI = 103%

The average price of single-family properties across Canada **increased by ~257%** from 1981 to 2020.

Trend of house prices across Canada (1981 - 2020)

Results

2. Compare the trend after 2005 with benchmark prices in real_estate_prices to see if there are any differences.

Key takeaways:

- **~143% increase** in HPI between 2005 and 2020.

- **~228% increase** in benchmark prices in the same timeframe.

Benchmark prices are based off a different HPI 100% index (2005 vs 2016), it is possible this is the cause for this difference in trend.

Comparison between HPI and benchmark prices from real_estate_prices
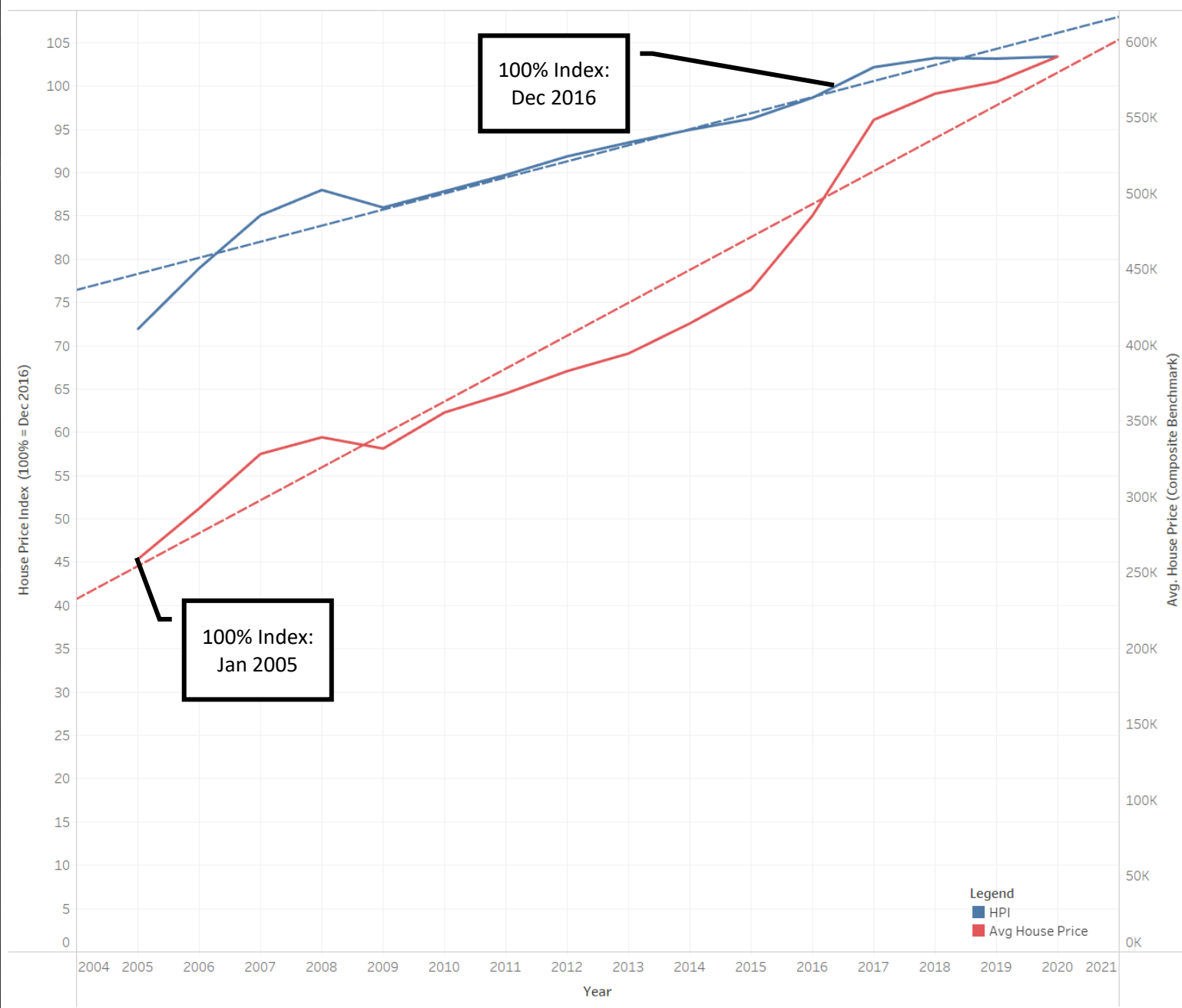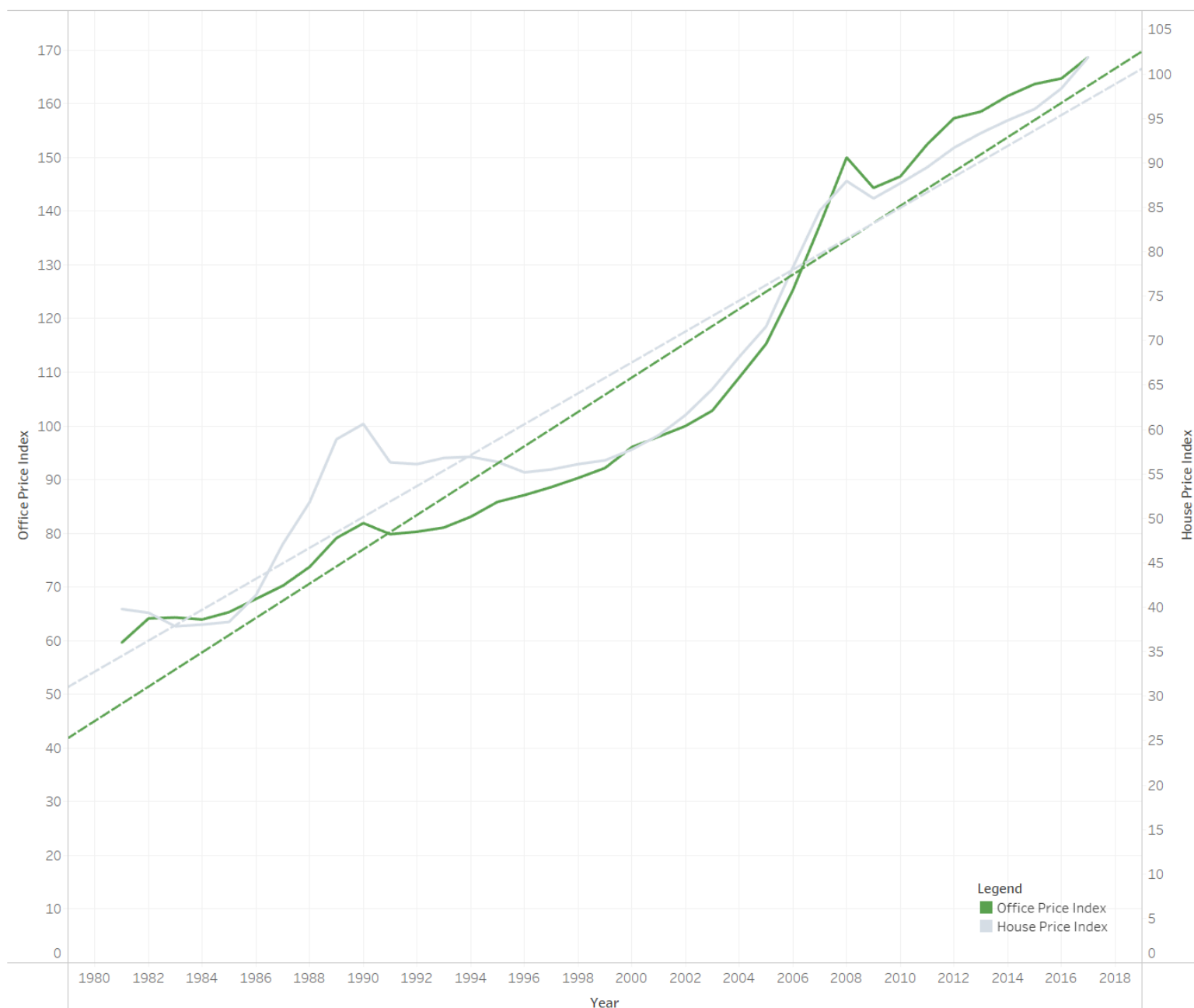
Results

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

Key takeaways:

- Data indicates office price are getting more expensive, faster across Canada

Of note, this data ends in 2017. It is possible COVID and the increased trend of working from home had a significant impact on this conclusion.

Comparison: Office Price Index & House Price Index across Canada (1981 - 2017)

Results

**4. Create a heatmap of Canada with current house prices for each available district.**

Key takeaways:

- British Columbia is the province with the highest average house price (~760,000$). Other provinces are ranked as:

  2. Ontario (~500,000$);

  3. Alberta (~360,000$);

  4. Quebec (~320,000$);

  5. Manitoba & Saskatchewan (~270,000$);

  6. Newfoundland & Labrador (~265,000$); and

  7. New Brunswick (~200,000$).

No data available for the other provinces/territories.
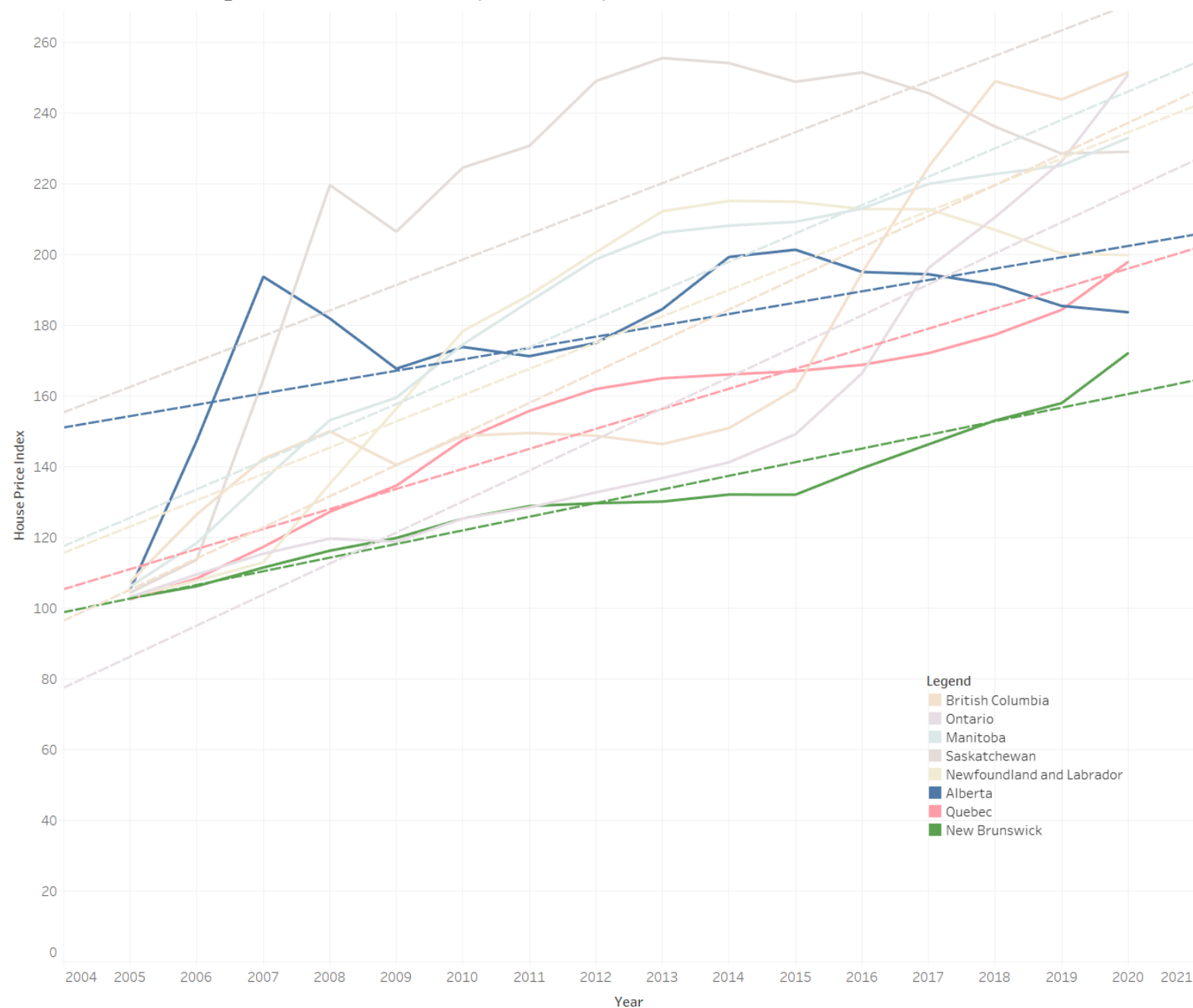

Average house price across Canada (2020)
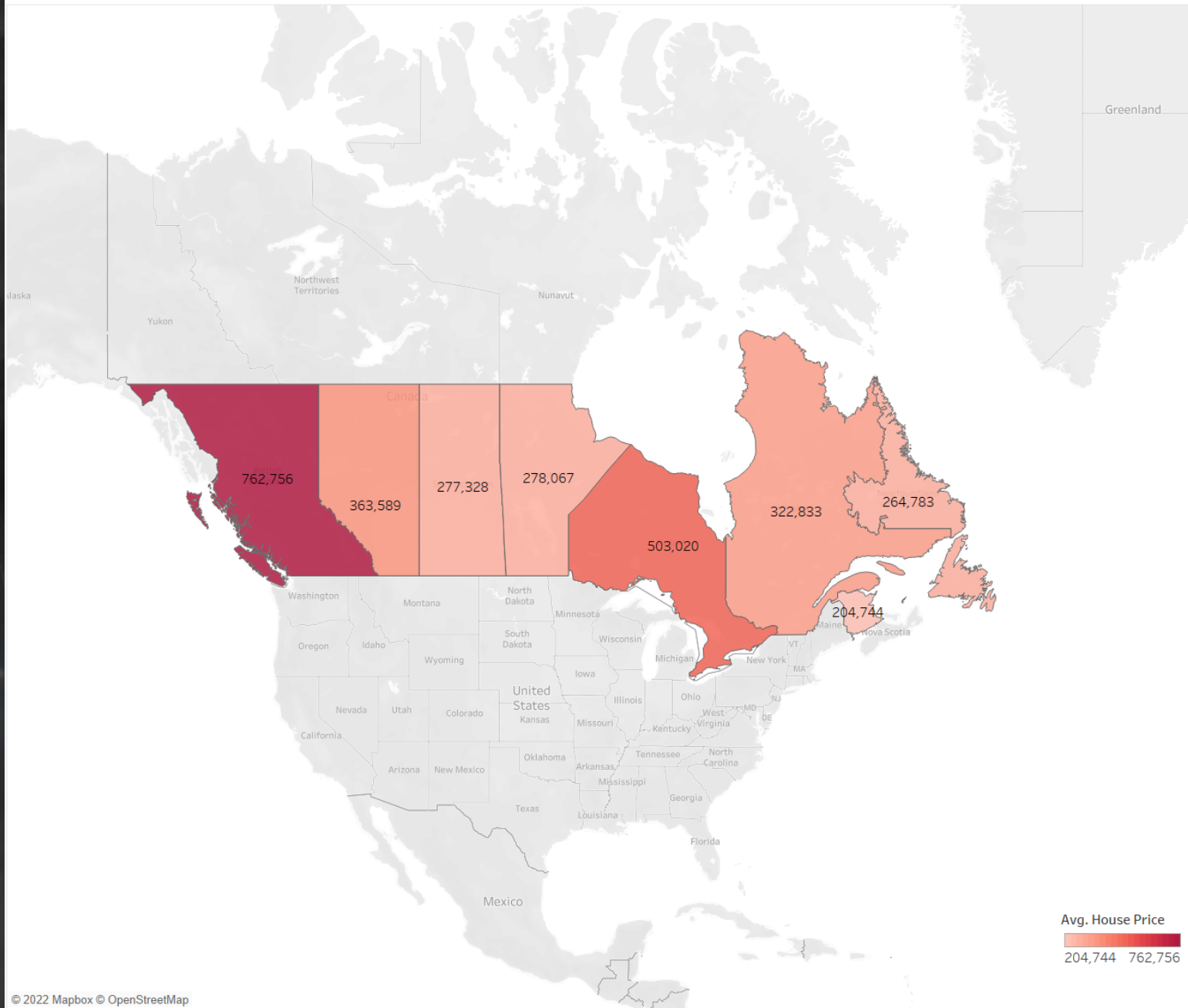
Results

5. Are the price differences between different districts increasing?

Key takeaways:

• Most provinces follow a similar trend in price increase, with the exception of Alberta, Quebec and New Brunswick.

• All three provinces' trends are lower than the other provinces, which is indicative of an increase in price difference between these three provinces and the others.

House Price Index per Province, Canada (2005 - 2020)

Legend
British Columbia
Ontario
Manitoba
Saskatchewan
Newfoundland and Labrador
Alberta
Quebec
New Brunswick

Results

6. Compare the trend of house prices with earnings.

Key takeaways:

- Average house price is increasing at a faster rate than the average weekly earnings

Comparison: Avg Weekly Earnings & Avg House Price across Canada (2005 - 2015)
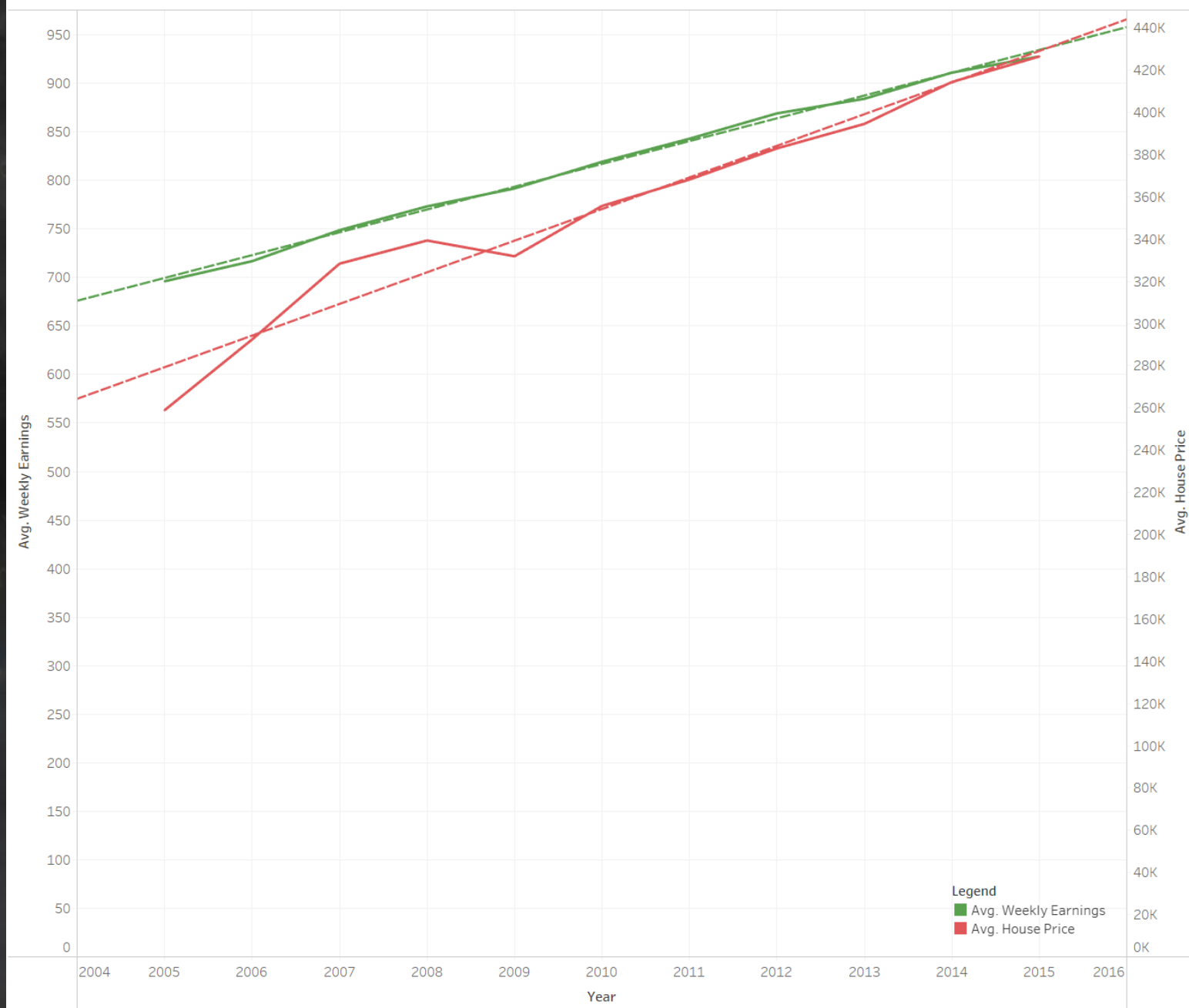
Results

7. Did people spend more of their earnings in 2014 than they did in ~~2001~~ 2005?

Key takeaways:

- In 2005, Canadians were spending an average of 29% of their earnings to pay the estimated capital portion of their mortgage.

- In 2014, Canadians were spending an average of 35%.

This calculation is not taking into account the interest portion of the mortgage payment. As interest rates decreased from 2005 to 2014, it is possible Canadians did not spend more of their earnings as represented here.

Comparison: Avg Weekly Earnings & Est. Weekly Capital Paid on Avg House Price across Canada

| 2005	2014
Average Weekly Earning: 696.10$	Average Weekly Earning: 911.10$

Results

8. There were several economic crises in the world in the last 40 years, show the effect of these crises on: earnings; house prices; office prices; house constructions; and consumer index.

Key takeaways:

• **Weekly earnings**: Limited data, but slight disruption in trend can be observed.

• **HPI** & **Office Price Index**: Slight decrease in price can be observed during an economic crisis

• **House constructions**: Significant disruption can be observed during an economic crisis and many years afters, especially in the early-90s. *Slight decrease can be observed prior to a crisis, for example in 1989.

• **Consumer index**: Slight decrease can be observed, but other factors seem to be affecting the index (see 1997).

Effects of economic crises on key economic factors across Canada (1984 - 2019)
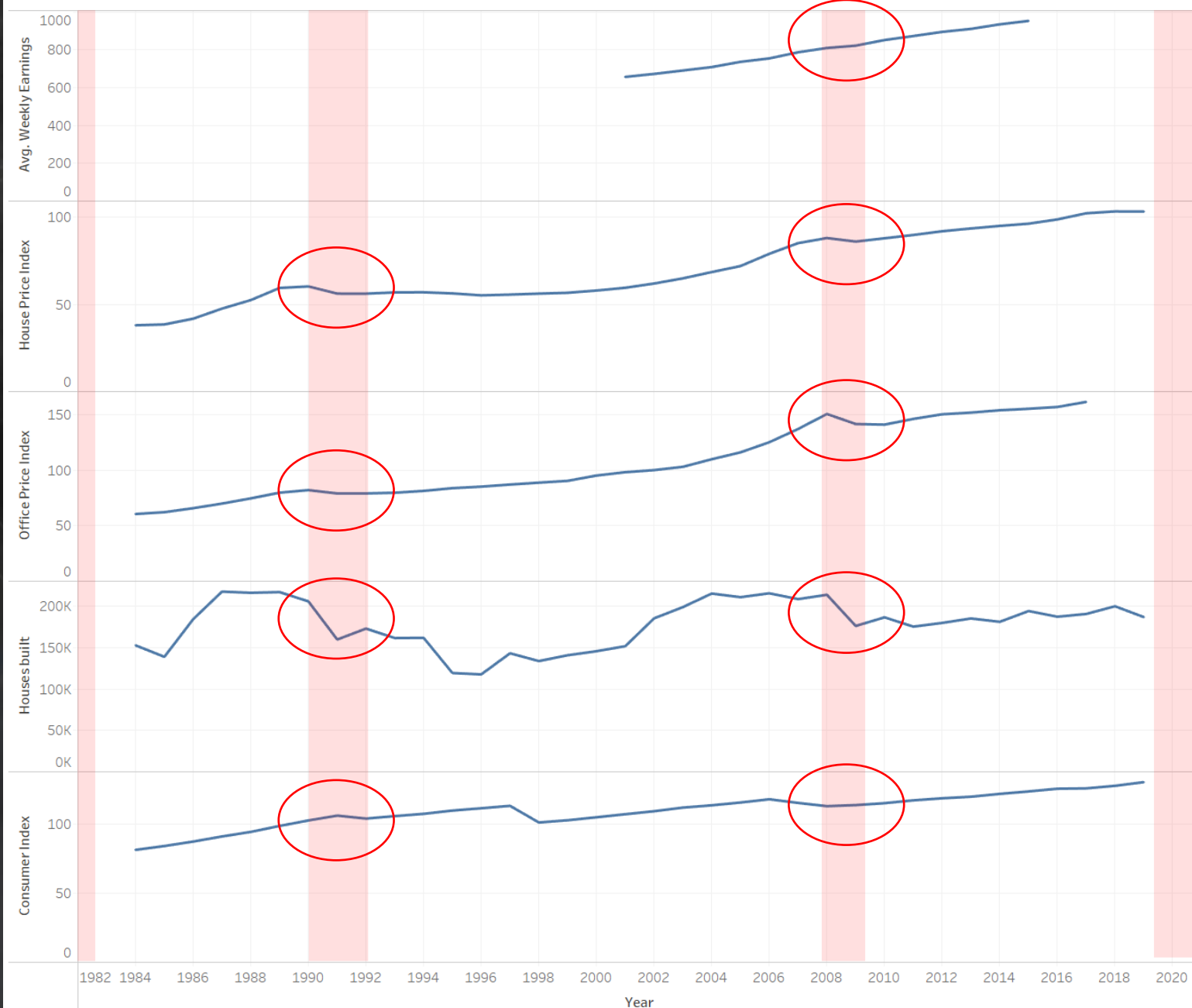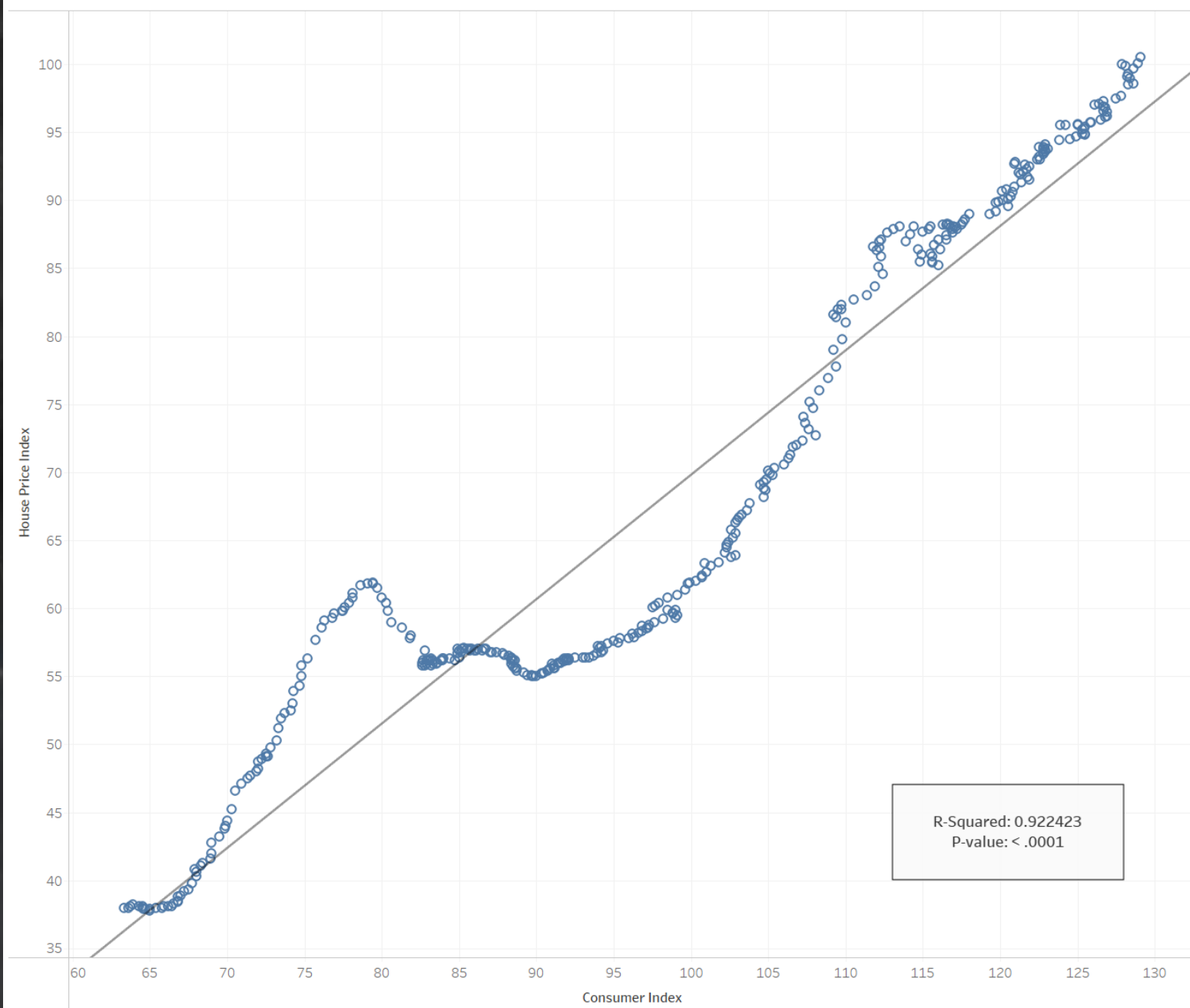
Results

9. 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?

Key takeaways:

• R-Squared: 0.922423

• P-Value: < 0.0001

Consumer index can likely be predicted by housing price index.

Regression Line between House Price Index & Consumer Index

R-Squared: 0.922423
P-value: < .0001

Results

10. Find an interesting pattern, trend, outlier, etc. from the data used in the above questions.

Decided to further investigate why the number of house built started to decrease a year prior (1989) an economic crisis.

Key takeaways:

• The number of 'housing started' began to decrease in 1987, particularly in the province of Ontario and Quebec for almost ten years.

• A trend reversal from positive to negative of 'housing started' **could** be used as an early indicator of economic crisis.

Effects of economic crises on House construction across Canada (1980 - 2019)
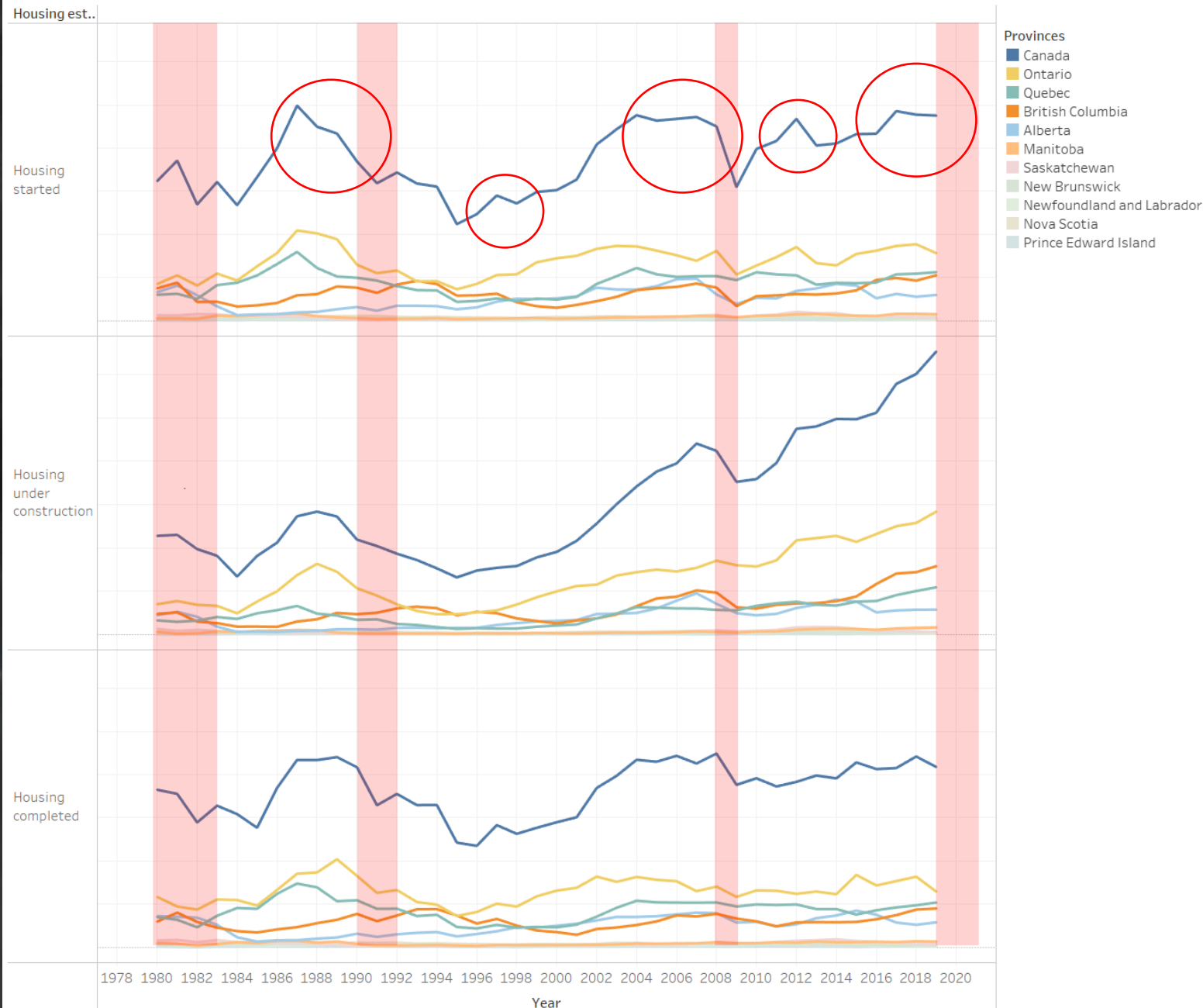
Biggest Challenges

- Parsing the json file
  - Made it work, but it was a messy process

- Creating relations in Tableau
  - Had to go back and create join fields

- Understanding the different type of indexes
  - Percent, 201610=100, 200511=100, etc.

- Field names were not properly renamed during data cleaning
  - Sometime got lost…
  - Probably would be disoriented if going back to this workbook in a few weeks.
  - Had to use a lot of aliases for dashboard views.

QUESTIONS ?