High Oil Prices and Unemployment Rates Contributed to Unusually Low Canadian Automobile Sales in 1982*

Tim Stephens

21 April 2021

Abstract

The automobile industry has been the lifeblood of the Canadian economy since its inception in the early 20th century. Although domestic sales have generally increased over time, they were decimated in the early 1980s. Multiple oil crises in the 1970s led to skyrocketing oil prices, a global recession, and ultimately, a high unemployment rate for Canadians. With an increased price of fuel and a reduced number of jobs available, Canadian automobile manufacturers saw a dramatic decrease of sales in 1982.

Keywords: Automobile, Car, Vehicle, Canada, Unemployment, Oil, Sales, Economy

---

Contents

1.0 Introduction

1.1 History of the Automobile Industry in Canada

Canada has a rich automotive history that is deeply connected to its economy. Between the first Canadian automobile produced in 1867 and the early United States (US) imports in 1898 (Ruppenthal and Bonikowsky (2006)), Canada has been a player in the global market from the beginning. Canada welcomed the creation of Ford Motor Company of Canada Ltd in 1904, and by 1913, had roughly 50,000 vehicles on Canadian roads (Ruppenthal and Bonikowsky (2006)). In the early 1920s, Canada had strengthened its hold on the market and was the second largest producer of vehicles in the world (Canadian Vehicle Manufactuer's Association (2021a)).

Nowadays, Canada is still a significant competitor in the automobile market. However, it is not the behemoth it once was. Canada is the 8th largest automobile producer globally and is the third largest exporter after Japan and the US (Ruppenthal and Bonikowsky (2006)). Canada is home to many different manufacturing plants, such as Ford, General Motors, Toyota, Honda, and Fiat-Chrysler (Government of Canada (2019)). These plants make massive contributions to Canada's manufacturing sector, representing 12% of manufacturing gross domestic product (GDP) and 24% of manufacturing trade (Ruppenthal and Bonikowsky (2006)). The industry itself employs roughly 130,000 people, mostly located in Ontario, and indirectly employs another 370,000 (Canadian Vehicle Manufactuer's Association (2021b)).

Canadians (and the Canadian economy) are dependent on automobiles. Every year, Canada exports $65 billion worth of vehicles and $30 billion worth of parts (Ruppenthal and Bonikowsky (2006)). The entire country has been built around the automobile, with cities being designed around roads, highways, and parking lots. There are currently over 35 million registered vehicles in Canada (StatsCan (2021)), nearly one registered car for every Canadian. Clearly, the automotive industry is a cornerstone in the Canadian economy.

Although 80% of cars produced in Canada are exported (Ruppenthal and Bonikowsky (2006)), the high ratio of cars to people means domestic sales still make significant contributions to the economy. Since the beginning, there has been consistent growth in national sales for the Canadian auto industry – with a few exceptions (Development and Trade (2013)). In the early 1980s, there was a dramatic decrease in the number of new vehicles sold in Canada (Development and Trade (2013)). There are many factors that affect the number of vehicles sold in a country, but this paper will argue that high oil prices, inflation, and unemployment rates were associated with the dramatic decrease in Canadian automobile sales during the early 1980s.

1.2 Important Events in the 1970s and 1980s

The 1970s were a period that saw 2 significant oil crises, the second of which contributed to a global recession (Kose, Sugawara, and Terrones (2020)). After World War II, the Allied powers created the state of Israel in the Middle East. Since then, there have been numerous wars between the Arabic and Israeli people. One of these wars was the Yom-Kippur War. It began in 1973 when Egypt and Syria launched an attack on Israel (History.com Editors (2010)). The Soviet-Union supported Egypt and Syria and the US backed Israel (History.com Editors (2010)). As an act of retaliation, the Organization of Arab Petroleum Exporting Countries (OAPEC) significantly reduced their oil production and created an oil embargo on the US (History.com Editors (2010)). This ban on trade and reduced production dramatically affected the price of oil, from $2.70 USD per barrel in 1973 to $11.00 in 1974 (Organization of the Petroleum Exporting Countries (2021)). This increase in price was felt globally and was enough to send countries not directly affected by the embargo into an energy crisis (History.com Editors (2010)). Although the trade ban was lifted in 1974, the

price of oil stayed relatively high and did not fall back to pre-embargo levels (Organization of the Petroleum Exporting Countries (2021)).

In 1979, the second dramatic increase in the price of oil occurred. Prices more than doubled from 1978 - 1979, from $12.79 USD per barrel to $29.19 (Organization of the Petroleum Exporting Countries (2021)). The late 1970s saw more civil unrest in the Middle East. The Iranian Revolution started in 1978 and ended in 1979 with the Shah of Iran being ousted by Ayatollah Khomeini (Sawyers (2013), Downey (2020)). Khomeini drastically reduced oil production, which reduced global shipments of crude oil (Sawyers (2013)). Due to the reduced supply, gasoline prices skyrocketed.

Partly because of the dramatic increase in the price of oil, Canada was plunged into a deep recession during the early 1980s. The Iranian Revolution, paired with new monetary policy, led to a sharp decline in US production and an increase in unemployment rates (Kose, Sugawara, and Terrones (2020)). Since the US and Canadian economies were so tightly linked, Canadians felt the impact of the US' decreased production and saw a dramatic increase in the unemployment rate as well. In 1981, unemployment was at 7.6%, but by 1982, this number had jumped to 11.0% (Statistics Canada (2021)). As the CBC said, "If they're not building homes in Boston, they're not cutting timber in BC" (Mansbridge and Duffy (1983)). The increase in price of oil and new monetary policy eventually led to increasing rates of inflation around the world – including Canada (Kose, Sugawara, and Terrones (2020), Inflation.eu (2021)). Currently, the Bank of Canada tries to keep inflation between 1 and 3% (Canada (n.d.)). In the early 1980s, inflation was at just over 12% (Inflation.eu (2021)). Combining the high inflation rate with a high unemployment rate meant Canadians were having difficulty purchasing groceries, heating their homes, and financing significant life events (Mansbridge and Duffy (1983)). Without money for food, it is unlikely that many Canadians were considering purchasing a new automobile at this time.

During the 1970s and early 1980s, domestic gas-guzzlers were the most popular car in the market (Sawyers (2013)). Smaller and more fuel-efficient Japanese cars were just starting to gain traction (Sawyers (2013)). Because favourite automobiles used a lot of gas, the price of gas was skyrocketing, inflation rates were increasing, and people could not find jobs, "consumer confidence evaporated" (Sawyers (2013)), and automobile sales were decimated in the early 1980s.

1.3 Structure of paper and method of analysis

This paper will try to confirm the research above using datasets provided by various sources, which are discussed in the next section. A surface level investigation into Canadian automobile sales, world oil prices, unemployment rates, and inflation levels will then be done. Next, multiple Regression Discontinuity Design (RDD) models will be constructed to observe the dip in sales during the early 1980s. Later, linear regression models for oil prices and vehicle sales, unemployment rates and vehicle sales, and inflation rate and vehicle sales will be conducted. A multiple linear regression model will then be created to observe relationships between the different variables and total vehicle sales. The paper will then discuss results, possible weaknesses, and some next steps. Although the paper looks to draw a link between vehicle sales, oil prices, unemployment rates, and inflation, it will not be able to speak to causality of the dramatic decrease in automobile sales during the early 1980s. The reasoning behind why causality cannot be determined is talked about in the discussion section.

2.0 Data

2.1 Datasets used

In this analysis, four datasets were used. First, the "New Motor Vehicle Sales" dataset was used to determine the number of new vehicles sold in Canada (Development and Trade (2013)). Published by the Government of Alberta, this dataset records monthly provincial and national vehicle sales as far back as 1946; however, provincial data was not available until 1968. It was last updated in 2015, but the year is not complete. In order to allow for overlap with other datasets, only national data from 1960 to 2014 were included. Monthly vehicle sales were converted to yearly sales. This data comes from a reputable source, but only recorded new vehicle sales. Used car sales and gifted vehicles were not included in this analysis.

The second dataset used was historical oil prices from 1960 to 2021 (Organization of the Petroleum Exporting Countries (2021)). The dataset was pulled from Statista and was published by Mineralölwirtschaftsverband (MWV), a German company which "[represents] the petroleum industry in legal matters, particularly in the preparation of laws and regulations" (Pipeline Technology Conference (2021)). MWV monitors world oil prices, particularly the price of crude oil from the Organization of the Petroleum Exporting Countries (OPEC). In order to fit with other data used in this study, only the years 1960 to 2014 were selected. There are some discrepancies between this dataset and the study. This dataset monitors the oil price from OPEC – not historic Canadian prices. Unfortunately, data on historical Canadian oil prices (within the right time frame) could not be found. Regardless, trends are related between the two, and OPEC prices will hold as a valid substitute.

The third dataset used for this analysis was for Canadian unemployment rates (Statistics Canada (2021)). The dataset was published by Statistics Canada, drawing on information learned from Labour Force Surveys. Information from 1976 - 2018 was collected, which was all that was available. The original dataset was quite large, holding information about the entire Labour Force. It was trimmed to different variables of interest. First, only national unemployment rates were selected. Other labour force statistics were ignored, and provincial data was disregarded. In terms of demographics, unemployment rates for both sexes above the age of 15 were selected. This was chosen in order to get a good idea of how Canada's labour force was functioning at the time of interest. It is noted, though, that it is unlikely for 15 year olds to be purchasing new vehicles.

The last dataset was created by the analyst. Data was pulled from inflation.eu (Inflation EU (2021a)). Inflation.eu "contains current and historic data about inflation and the consumer price index", citing Statistics Canada as its source for Canadian data (Inflation EU (2021b)). Data was copied from the historic data web page into a csv file in order to run the analysis.

2.2 How Data was Analyzed

Data was analyzed using R(R Core Team (2020)). Many packages were used to study the data, with tidyverse doing much of the heavy lifting (Wickham et al. (2019)). Janitor (Firke (2021)) was used to clean datasets. Here (Müller (2020)) helped in locating and saving files. Ggplot2 (Wickham (2016)), gridExtra (Auguie (2017)), and huxtable (Hugh-Jones (2021)) were used to create graphs and figures. Tinytex (Xie (2021)) was used to help write the output to PDF and bibtex (Francois (2020)) was used for citations.

2.3 Show me the money!

First, automobile sales in Canada should be investigated. Figure 1 shows new yearly car sales in Canada from 1960 to 2014.
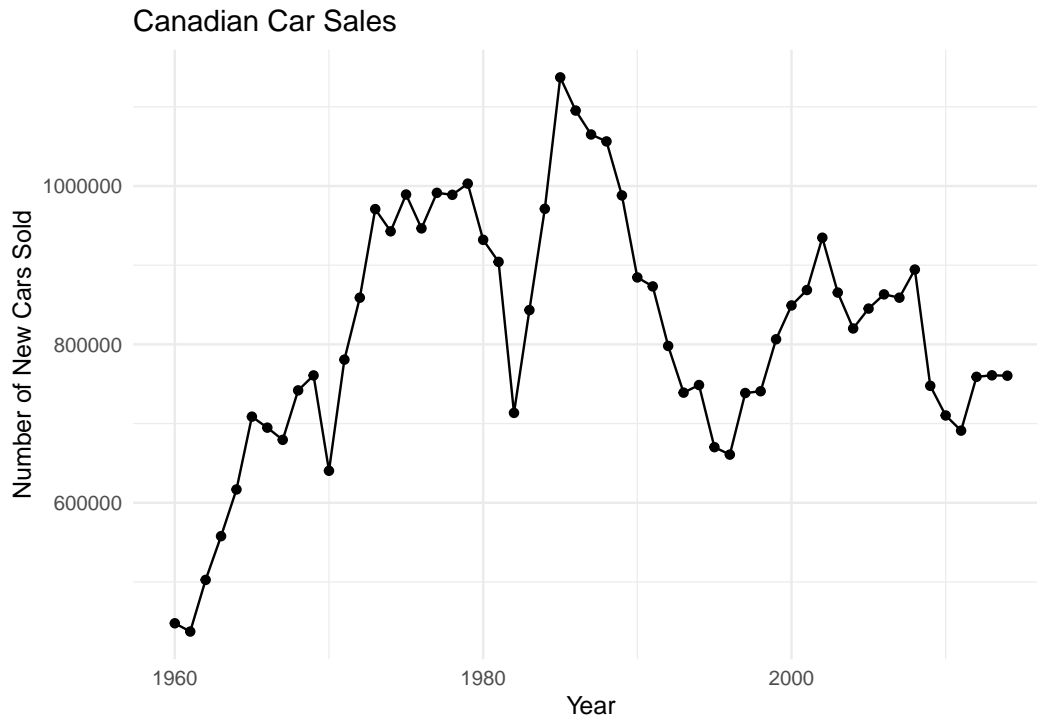

Figure 1: Historical Car Sales in Canada

Car sales generally increased from the period of 1960 to 1985, with a few dramatic drops in sales. There was a decrease in 1970 and in the early 1980s, but the drop in the 80s was much more sudden and dramatic. This is the area of interest for this study. After 1985, sales start to decrease until the mid 1990s, where sales slowly started to increase again. Sales leveled out for a few years, but eventually decreased just before 2010. This drop in sales could be attributed to the stock market collapse of 2008, but falls outside the scope of this study.

Figure 2 shows Canadian truck sales between 1960 and 2014. The trend is more positive than that of Figure 1.

Canadian truck sales fared far better than Canadian car sales. The trend has been overwhelmingly positive, and has the market has steadily grown since 1960. Although the market sees dips in sales at the same time as car sales (1970, early 1980s, 1990s, and just before 2010), the changes are not as dramatic. The truck market is apparently less volatile than the car market in Canada. However, the number of new trucks sold is not as high as the number of new cars sold. The market is not as large, but is more stable.
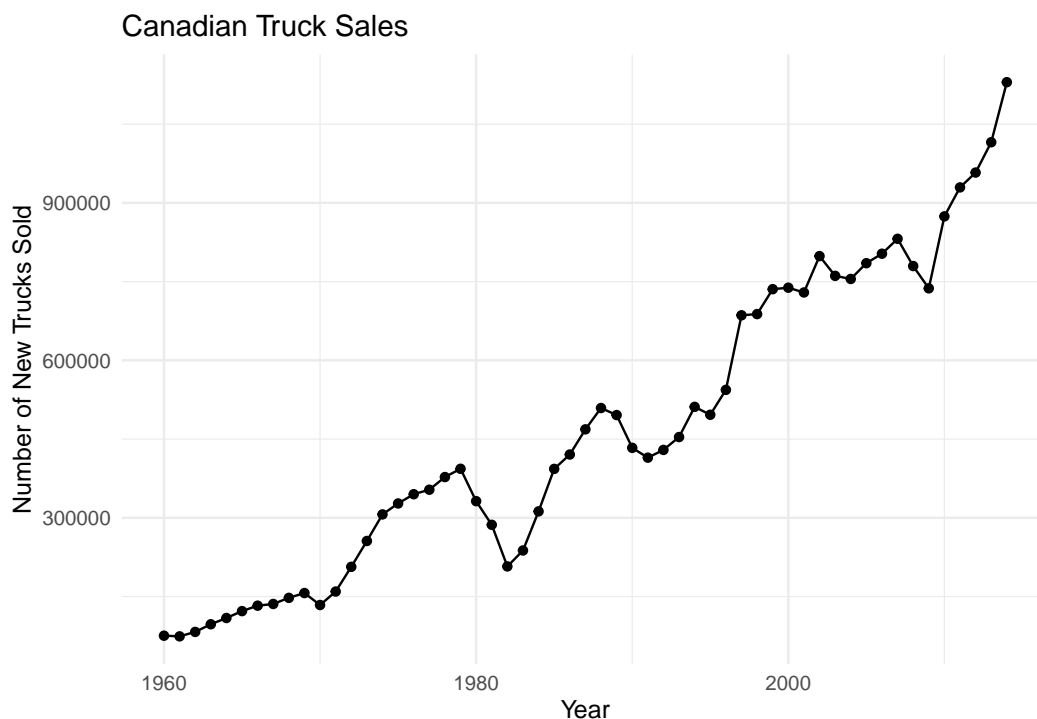
Figure 2: Historical Truck Sales in Canada

Although comparing the Canadian car and truck markets is interesting, the total number of vehicles sold in Canada was used for this analysis. Figure 3 shows the combined sales of cars and trucks.

The combined plot looks as one might expect: similar to the car sales plot, with less dramatic peaks and troughs. The truck sales have made the market less volatile. For the rest of this paper, this will be the dataset used when discussing vehicle sales in Canada.

The next variable of interest is historic oil prices. Although Canadian oil prices could not be found in the correct time frame, world oil prices follow similar trends, and will be sufficient for this study. Figure 4 shows historic oil prices of OPEC crude oil.

As discussed in the introduction, world oil prices saw 2 dramatic increases in the 1970s. The first was between 1973 and 1974, and the second was between 1978 and 1979, although prices peaked in 1980. After that, oil prices stayed relatively constant before deceasing again between 1985 and 1986. Oil prices then remained stable before undergoing a period of dramatic increase starting around 2000. For the purposes of this study, the period of interest is the 1970s and early 80s. The increase starting in the year 2000 will not be investigated.

Another factor thought to affect new automobile sales is the unemployment rate. Trends for this variable are shown in Figure 5.
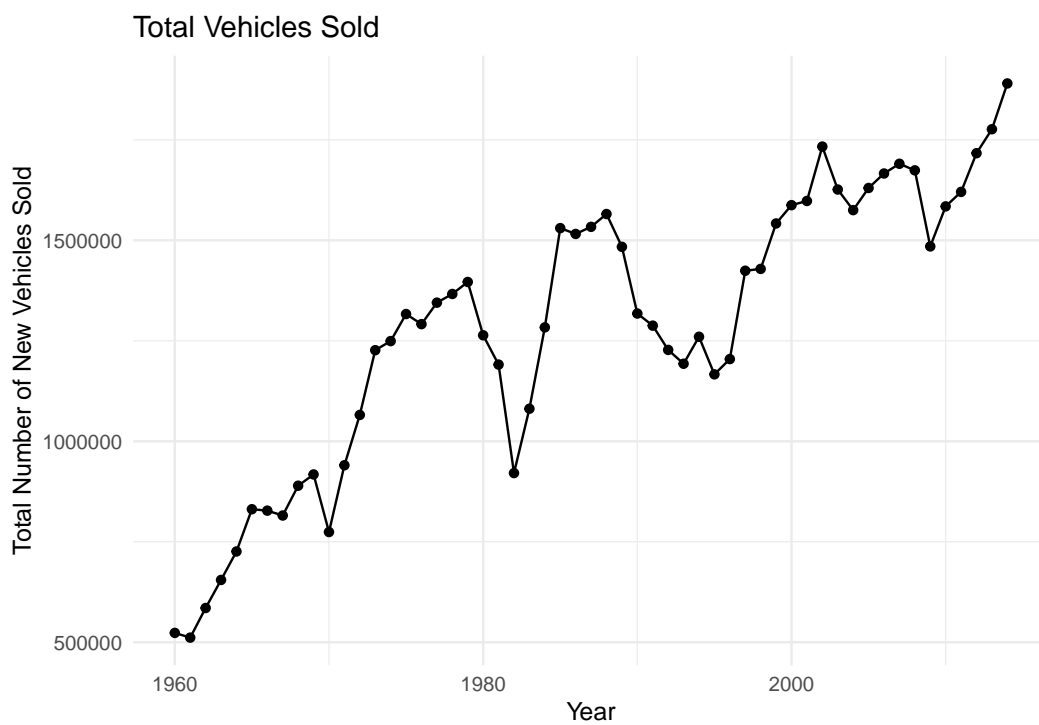
Total Vehicles Sold

Figure 3: Historical Total Automobile Sales in Canada
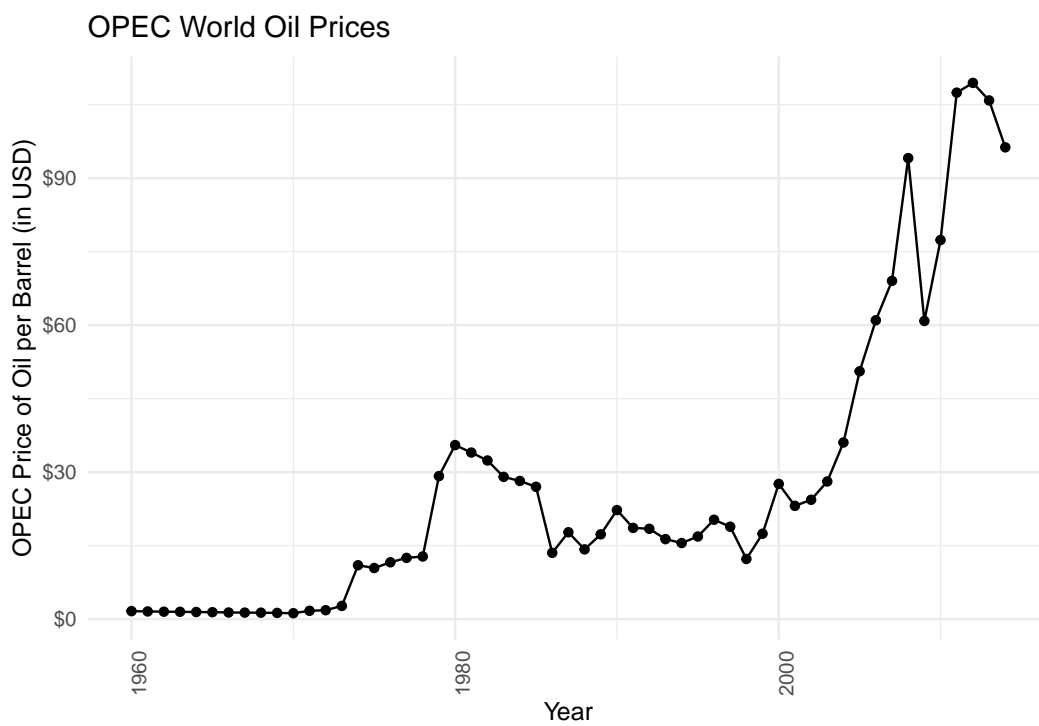
OPEC World Oil Prices

Figure 4: Historical Oil Prices

Figure 5: Unemployment Rates in Canada

Unemployment rates have fluctuated over time. Unfortunately, data was only available from 1976, so the x axis scale is not the same as other plots. There were two dramatic peaks in unemployment: 1983 and 1993. Also, unemployment was high in 2009 (but not as high as in '83 and '93). 1983 saw the highest unemployment rate at 12%. This is an extremely interesting point, as it falls within the scope of this study. The other peaks at 1993 and 2009 fall outside the time frame of this analysis.

The last variable studied was inflation rate. Historic levels are shown in Figure 6.

As stated in the intro, the Bank of Canada tries to keep inflation between 1 and 3%, which can be seen from 1991 onward. Before then, inflation seemed to run wild, peaking in 1974 with inflation at 12.65%. Inflation was also very high during the period of interest, with inflation at 12.12% in 1981.

Figure 7 compares all variables of interest in one place. It shows the total number of vehicle sales, world oil prices, unemployment rates, and inflation rates.

Figure 7 shows some preliminary relationships. It appears than in the early 1980s, vehicle sales were low. At the same time, oil prices had seen a significant increase, unemployment rates were at an all time high at 12%, and inflation rates were just over 12%. With everything lining up, it seems as if all 4 of these variables are
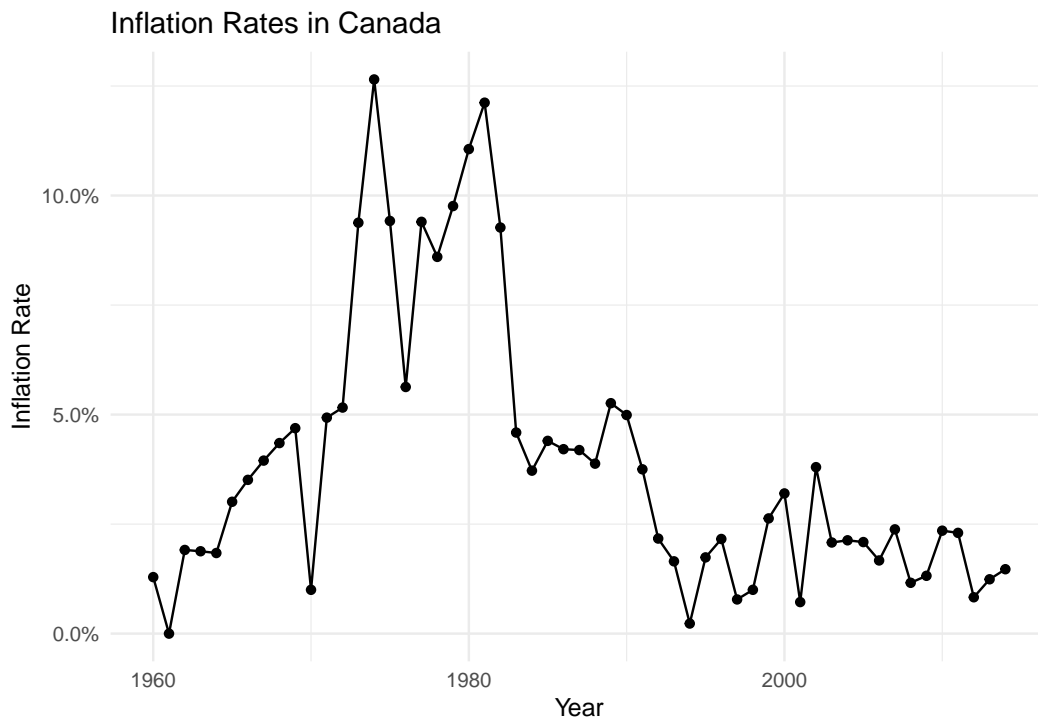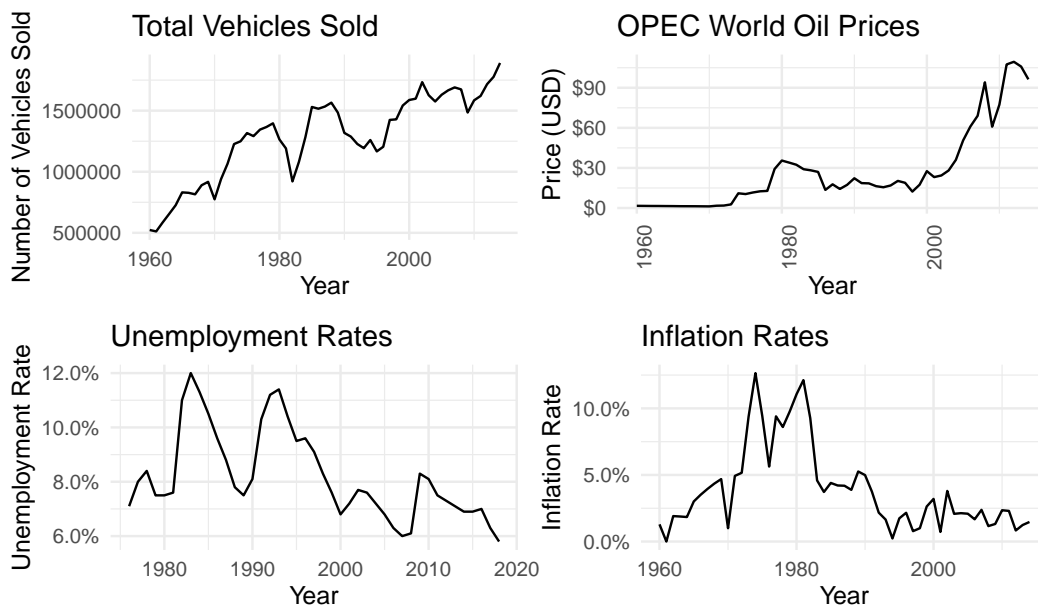
Figure 6: Inflation Rates in Canada

Figure 7: All plots

correlated in some way. In the next section, an RDD model will be developed to further investigate the drop in sales in the early 1980s, and linear models will be constructed to statistically determine if the 4 variables are related.

3.0 Model

3.1 Regression Discontinuity Design

In order to further investigate the dramatic drop in sales during the early 1980s, four different regression discontinuity design (RDD) models were created. Each model had time on the x axis and vehicle sales on the y axis. Each individual variable (price of oil, unemployment rate, and inflation) was inspected, and the year where the peak or trough occurred (within the time frame of the study) was chosen as the distinct cutoff point for the model. Oil prices peaked in 1980, unemployment rates were highest in 1983, inflation was high in 1981, and vehicle sales were lowest in 1982. Figure 8 shows an RDD model with 1980 as the cutoff, representing the year when oil prices were relatively high.
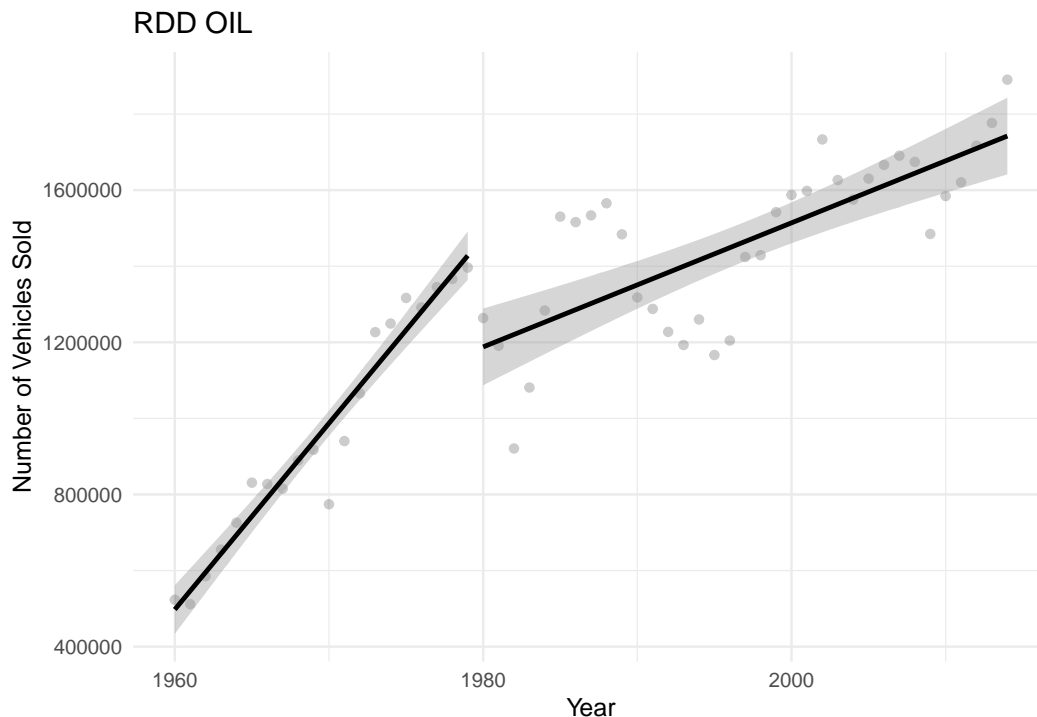

Figure 8: RDD for Oil prices

The RDD model with 1980 selected as a cutoff point shows a distinct drop in automobile sales. However, there were many other factors at play, so there is not enough evidence to show that oil prices alone are what caused a dramatic drop in sales during this year. The light grey bars represent error, and this plot does not have any overlap, showing that the year of 1980 did have a significant drop in automobile sales when compared to pre-1980 levels.

The next variable studied was unemployment. Figure 9 shows an RDD for the year unemployment was at its
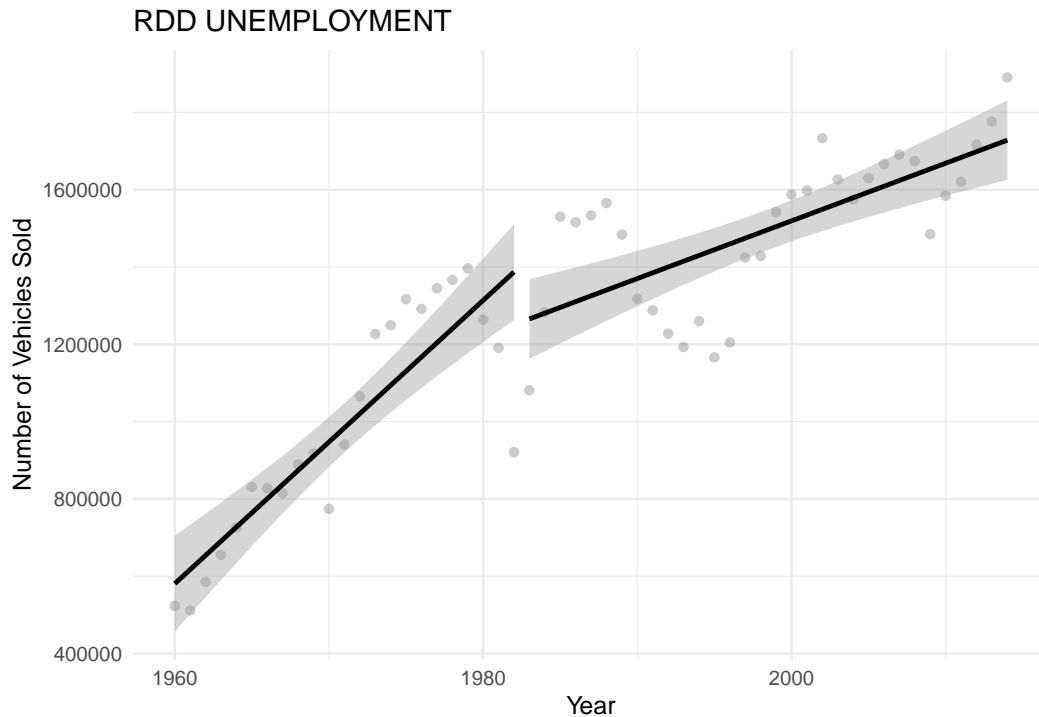
highest: 1983.

RDD UNEMPLOYMENT

Figure 9: RDD for unemployment prices

Figure 9 shows a drop in sales during the year of 1983, but there is significant overlap in the error bars in this model. 1983 is not a good year to represent the dramatic drop in automobile sales in the early 1980s. However, the effects of unemployment on vehicle sales will still be inspected using a linear model in the next section.

The next variable of interest is inflation, which had its highest value (in the given time frame) in 1981. Figure 10 shows an RDD model with 1981 as the cutoff point, representing the year inflation was high.

&nsbp;

Figure 10 shows a significant drop in automobile sales during 1981. This shows that inflation could potentially affect automobile sales. However, there are many different factors at work behind the scenes, and it cannot be said with confidence that inflation is what caused the drop in sales. Nonetheless, the error bars do not overlap in this model, showing that the year of 1981 saw significant drops in automobile sales when compared to pre-1981 levels.

The final RDD model was when vehicle sales were at their lowest: 1982. Figure 11 shows this model.

When selecting 1982 as the cutoff point, the results are similar to that of 1980 and 1981. The error bars do not overlap, and there is a significant drop in automobile sales. It is likely that all 3 factors contributed to this dramatic drop in sales in 1982. It is important to note that even though unemployment did not have an
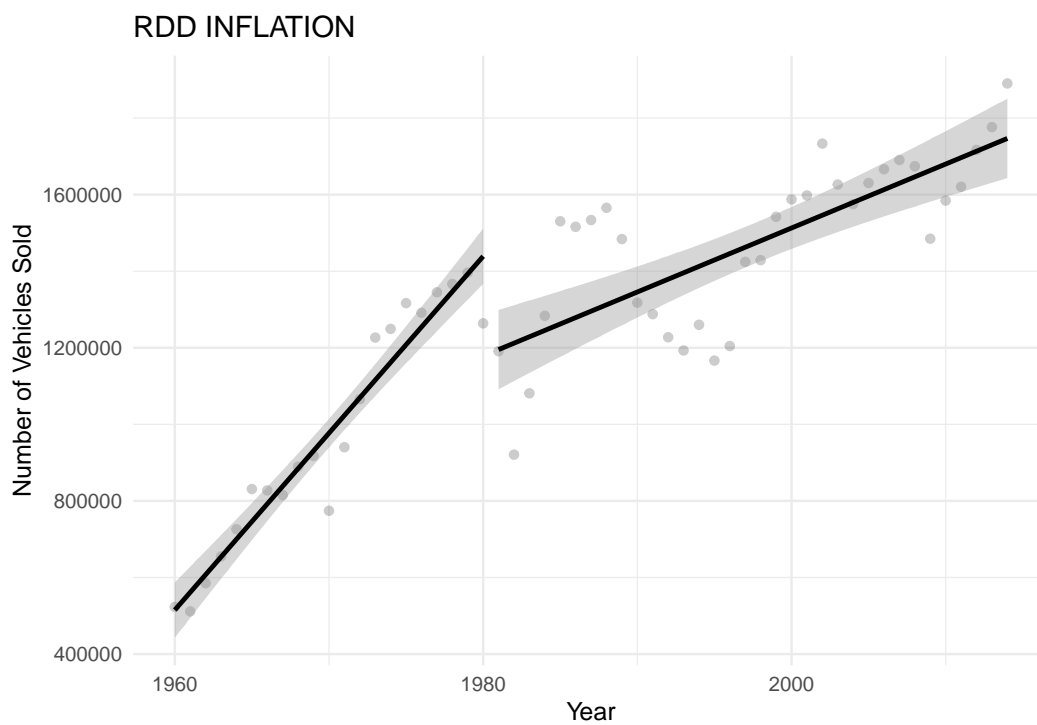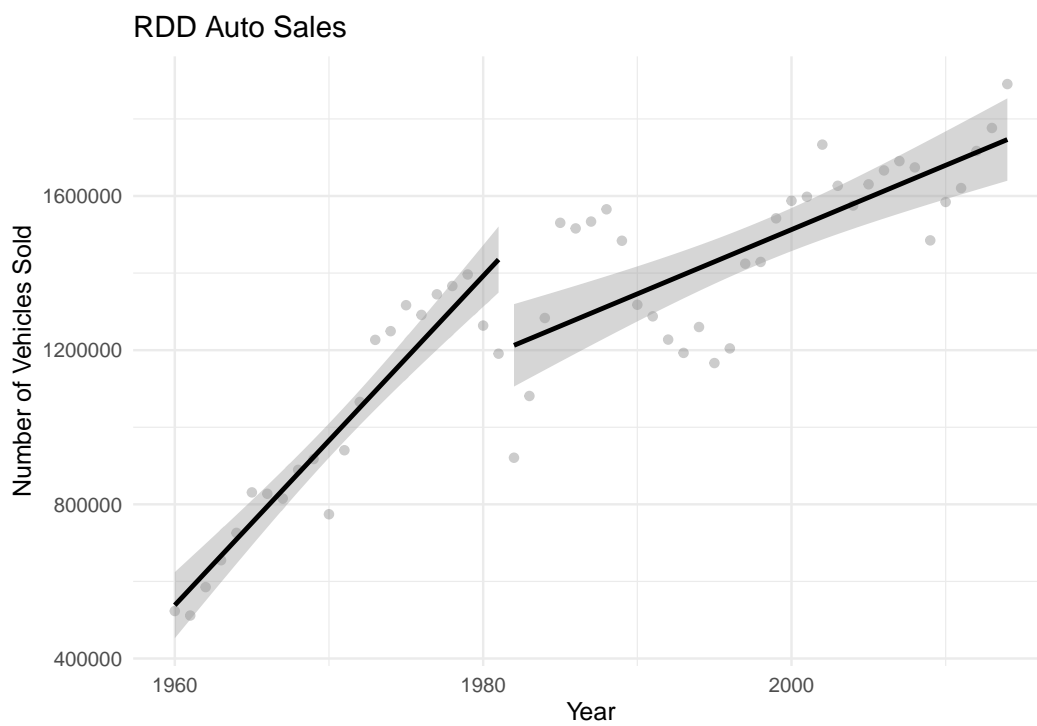
Figure 10: RDD for inflation

Figure 11: RDD for Sales

incredibly significant and clear finding, unemployment rates were high in 1982 as well. The auto industry could have started to rebound by 1983, after a period of low sales during 1980-1982. These different RDD models show that the years of 1980, 1981, and 1982 all saw a significant drop in sales when compared to pre 1980 levels. What caused those sales cannot be determined with these RDD models, though, since it is likely that all 3 factors are affecting each other, and in turn, affecting automobile sales. Linear models are developed in the next section to see if the variables are statistically correlated to sales.

3.2 Linear Models

In this section, three linear regression models and one multiple linear regression model were constructed. Linear models for each variable of interest were created to inspect their correlation to automobile sales. Then, all three were combined to see if any variables were interacting with one another.

The first linear model created was for oil prices. Figure 12 shows a visualization of the data, and Table 1 shows the linear regression results.
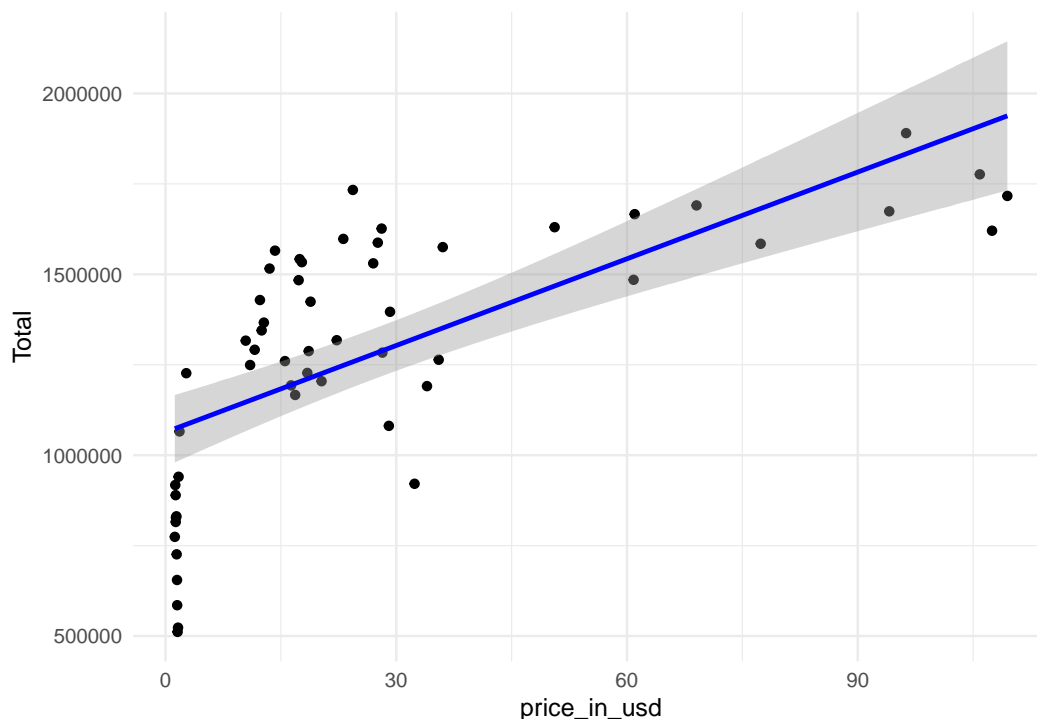

Figure 12: Linear Model for Oil and Auto Sales

Table 1: Linear Regression Results for Oil and Auto Sales

4.0 Results

- high correlation between all three variables invidividually
- multiple regression shows that all 3 variables are working on car sales
- why are oil prices postiively correlated with auto sales?
- when adding the other factors into affect, oil prices lose their significance. Why?
- As discussed in introductrion, oil prices launched Canada into a recession, which caused high unemployment, etc. All these variables are heavily intertwined.

	(1)
(Intercept)	1063499.715 ***
	(47452.091)
price_in_usd	7991.364 ***
	(1178.414)
N	55
R2	0.465
logLik	-762.355
AIC	1530.709

*** p < 0.001; ** p < 0.01; * p < 0.05.

5.0 Discussion

5.1 Ethics

- this data only focusses on new vehicle sales. Lots of people will never purchase a new vechile in their life. It is possible that those who are buying new cars are wealthy enough to not be as affected by factsors such as inflation and oil prices.

5.2 Causality

- a year is not a reason for something to happen.

-

5.3 Weaknesses

- used new car sales only
- used inflation rates and unemployment rates from datasets who cite stats canada, but data is not directly from the horses mouth
- oil prices are world oil prices, not CDN
- cannot speak to causality

-

5.4 Next Steps

- 1990s period, just before 2010
- develop a model with causality to be able to predict automobile sales

6.0 Conclusion

References

Auguie, Baptiste. 2017. *GridExtra: Miscellaneous Functions for "Grid" Graphics*. https://CRAN.R-project.org/package=gridExtra.

Canada, Bank of. n.d. *Inflation*. https://www.bankofcanada.ca/core-functions/monetary-policy/inflation/#:~:text=The%20Bank%20of%20Canada%20aims,consumer%20price%20index%20(CPI).

Canadian Vehicle Manufactuer's Association, CVMA. 2021a. *A Canadian Story of Change, Resilience and Success*. https://www.cvma.ca/industry/history/.

———. 2021b. *Important Facts*. https://www.cvma.ca/industry/facts/.

Development, Economic, and EDT Trade. 2013. *New Motor Vehicle Sales*. Alberta, Canada: Government of Alberta. https://open.canada.ca/data/en/dataset/28caed1c-12cf-48ea-80b3-2a518cd58be8.

Downey, Lucas. 2020. *1979 Energy Crisis*. https://www.investopedia.com/terms/1/1979-energy-crisis.asp.

Firke, Sam. 2021. *Janitor: Simple Tools for Examining and Cleaning Dirty Data*. https://CRAN.R-project.org/package=janitor.

Francois, Romain. 2020. *Bibtex: Bibtex Parser*. https://CRAN.R-project.org/package=bibtex.

Government of Canada, GC. 2019. *Vehicles Made in Canada 2018*. https://www.ic.gc.ca/eic/site/auto-auto.nsf/eng/am00767.html.

History.com Editors, History Channel. 2010. *Energy Crisis (1970s)*. https://www.history.com/topics/1970s/energy-crisis.

Hugh-Jones, David. 2021. *Huxtable: Easily Create and Style Tables for Latex, Html and Other Formats*. https://CRAN.R-project.org/package=huxtable.

Inflation.eu. 2021. *Inflation Canada 1981*. https://www.inflation.eu/en/inflation-rates/canada/historic-inflation/cpi-inflation-canada-1981.aspx.

Inflation EU, InflationEU. 2021a. *Historic Inflation Canada - Cpi Inflation*. (https://www.inflation.eu/en/inflation-rates/canada/historic-inflation/cpi-inflation-canada.aspx).

———. 2021b. *Inflation.eu Information Sources*. https://www.inflation.eu/en/information-sources.aspx).

Kose, Ayhan. M., N. Sugawara, and M. E. Terrones. 2020. "Global Recessions." Report Policy Research Working Paper 9172. World Bank Group.

Mansbridge, P., and M. Duffy. 1983. *Unemployment Reaches All-Time High in 1982*. https://www.cbc.ca/archives/entry/unemployment-reaches-all-time-high-in-1982.

Müller, Kirill. 2020. *Here: A Simpler Way to Find Your Files*. https://CRAN.R-project.org/package=here.

Organization of the Petroleum Exporting Countries, OPEC. 2021. *Average Annual Opec Crude Oil Price from 1960 to 2021*. Germany: Sönnichsen, N.; MWV. https://www.statista.com/statistics/262858/change-in-opec-crude-oil-prices-since-1960/.

Pipeline Technology Conference. 2021. *MWV - Association of the German Petroleum Industry*. https://www.pipeline-conference.com/companies/mwv-association-german-petroleum-industry#:~:text=Association%20was%20founded%20in%201946,preparation%20of%20laws%20and%20regulations.

R Core Team. 2020. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Ruppenthal, K. M., and Laura N. Bonikowsky. 2006. *Automobile*. https://www.thecanadianencyclopedia.ca/en/article/automobile.

Sawyers, Arlena. 2013. *1979 Oil Shock Meant Recession for U.s., Depression for Autos.* https://www.autonews.com/article/20131013/GLOBAL/310139997/1979-oil-shock-meant-recession-for-u-s-depression-for-autos.

Statistics Canada, StatsCan. 2021. *Archived - Unemployment Rate, Participation Rate, and Employment Rate by Sex, Annual, Inactive.* Canada: Government of Canada. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410001802&cubeTimeFrame.startYear=1976&cubeTimeFrame.endYear=2018&referencePeriods=19760101%2C20180101.

StatsCan. 2021. *Vehicle Registrations, by Type of Vehicle.* https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=2310006701.

Wickham, Hadley. 2016. *Ggplot2: Elegant Graphics for Data Analysis.* Springer-Verlag New York. https://ggplot2.tidyverse.org.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D'Agostino McGowan, Romain François, Garrett Grolemund, et al. 2019. "Welcome to the tidyverse." *Journal of Open Source Software* 4 (43): 1686. https://doi.org/10.21105/joss.01686.

Xie, Yihui. 2021. *Tinytex: Helper Functions to Install and Maintain Tex Live, and Compile Latex Documents.* https://github.com/yihui/tinytex.