IJSSP

المجلة الدولية لنشر الدراسات العلمية
المجلد الثاني عشر – العدد الثاني – البحث الأول ( ص: 1 - 53 )

15 – شباط – 2022م

www.ijssp.com ISSN: 2707-5184 International Journal of Scientific Studies Publishing

# [The Influence of Crude Oil Prices Differentials on The Canadian Economy from 1981 to 2014]

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**[Master Degree in Art of Economics – Lakehead University 2016]**

### Abstract

This paper focuses on analyzing the impact of oil prices on the Canadian economy from 1948 to 2014. The goal is to show how Canadian oil production varied during this period and examine the impact of oil price movements on oil production, Gross Domestic Product (GDP) growth, unemployment rates across Canadian Provinces.

This study includes six sections, the first section is Oil production in Canada, secondly is data description and summary statistics, after that is the descriptive analysis and time series patterns, the fourth section is examining the impact of oil price on GDP, and the last section is the empirical results.

The paper concluded that the rise of oil price will result in a shrinkage on the Canadian economy. It can be claimed that the regressions estimated show that if the oil price increase, supply of oil will also increase in the short run only in Alberta, Saskatchewan, and Manitoba. However, in the long run, the production of oil will decline in all provinces except for Manitoba. In addition, GDP will also rise in the short run while it will fall in the long run except for Prince Edward Island. Moreover, in term of the unemployment rate, the unemployment rate decline in the short run except for Ontario. On the other hand, in the long run, the unemployment rate will decrease if oil price increase in all provinces except in New Brunswick, British Columbia, and Quebec.

**Keyword:** Crude Oil, Petroleum Production, Oil Market, Employment Rate, Gross Domestic Product Growth.

## Section 1: Introduction

Canada considered being one of the richest lands in natural resources. In terms of revenue, crude oil has become the most important minerals. Due to the fact that estimated profit of petroleum production is more than $1,000,000,000 annually. Nowadays, Canadian oil market is one of the international concerns (Davis, E. M, 1969). Thousands of Canadian companies are engaged in the oil industry. In Western Canada, petroleum development results in an increase in business activities. For example, more opportunities of employment have been increased. And more industries have entered the market. In addition, a rise of exports diminishes the need for oil imports. As a consequence, crude oil has become a significant contributor in creating a balance to the international payments (Davis, E. M, 1969).

This paper focuses on analyzing the impact of oil prices on the Canadian economy from 1948 to 2014. The goal is to show how Canadian oil production varied during this period and examine the impact of oil price movements on oil production, Gross Domestic Product (GDP) growth, unemployment rates across Canadian Provinces.

## Section 2: Theoretical framework

### 2.1: Oil Production Market History:

Oil production differs accordingly with the type of oil produced during the last decades in Canada. In general, heavy oil is more expensive to produce when compared to light oil production costs. From the period 1984 to 2000, domestic light oil production decreased while heavy oil production increased. This increase depends on many factors including the size of reserve base, the cost of production, market price, light/heavy oil price differentials, refinery configuration, and the demand for refined products. All of these factors must be taken into consideration to evaluate the potential of heavy oil in the future market (CERI, 1985).

The following facts are noted from CERI (1985). Non-OPEC production grew reasonably by around 4% annually since the middle of the 1970s. On the other hand, OPEC oil production declined from 31.5 to 18.3

millions of barrels a day since 1979 until 1983. After that, the non-OPEC output of crude oil surpassed the productions of OPEC countries. In 1983, a huge surplus of productive capacity resulted in OPEC lowering oil prices to avoid supply shock. Because of the economic growth and the low rate of oil price, it was expected that oil demand would rise annually by almost 1.3 percent between 1984 and 2000. However, oil supply grew in relationship to a decrease in excess of production capacity during the 1990s. In addition, OPEC production rose while non-OPEC output stayed stable to the period 2000 (CERI, 1985).

Canada produced a small portion of crude oil from its main source, the Turner Valley, during the end of World War II. In 1946, imports had to meet more than 90 percent of domestic demand for petroleum. As a consequence, in 1947, a dramatic change happened when the large field of oil at Leduc, Alberta was discovered. There was a rise in Alberta's crude production from around 7.7 million barrels in 1946 to 10.5 million barrels in 1948 after the Leduc discovery (Appendix Table 17). This noticeable increase continued until reaching the highest point of 144 million per barrels in 1956 in Alberta. The expansion from 1946 to 1956 was almost 1800 per cent in total in Alberta. After this discovery, the domestic production increased significantly and that was the incentive to discover more fields (Shaffer E, 1983).

Consequently, Canada entered the market after a number of important new discoveries. All these discoveries gave Canada a chance to be a petroleum net exporter and to be self-sufficient. There was an overall increase in Canada's oil production between the period 1948 and 2014 (Appendix Table 18). All domestic production, exports, deliveries to refineries, and total supply rose during the given period, reaching their peak in 1970. Meanwhile, 80170.1 cubic meters were produced, but only 38853.7 cubic meters were exported to other countries. And 74242.7 cubic meters were delivered to refineries, which adds up to the total supply of 113286.8 cubic meters. It is clear that a big jump in exports from 365.7 cubic meters to 8787.9 cubic meters occurred between 1954 and 1957. In addition, it should be noticed that from 1958 to 1973, Canada's exports of crude oil grew dramatically by 1300 percent while production rose no more than 300 percent. However, Canadian imports slightly increased from 1948 to 2014 and fluctuated in a small portion of the given period (Ed Shaffer, 1983).

**2.2: Canadian Provincial Economic Conditions:**

During the last few years, the search for oil has increased, especially in the western provinces of Canada. The 1947 discovery of a well at Leduc led to an increase in oil production. Across British Columbia's Peace River district, Alberta, and Saskatchewan, oil became the largest industry in Canada (Davis, 1969).

The assessment of crude oil dependence is different across regions. For example, Northern Canada production depends on oil because of the low capacity of generating electricity from thermal, nuclear and hydro sources, and the lack of natural gas services. So the demand for oil in the northern region is the highest in Canada. However, the least crude oil dependence among Canada's regions is in the west due to the low population, small industrial base, and the multiplicity of energy options. British Columbia and Alberta consumption of the refined product are higher than double in Saskatchewan and Manitoba (Tanner and Reinsch, 1989).

As seen in Table 18, after 1970, oil production declined significantly, reaching the bottom in the 1980s when the second oil price shock happened. Domestic production decreased at the beginning of the 1980s to the lowest point of 79255.4 cubic meters; as well, exports reached a low of 9462.3 cubic meters. After that period, oil production gradually increased until the recent years when total supply was 218015.7 cubic meters in 2014.

Since 1973, oil production surpassed 70 million cubic meters as a result of a rise in heavy oil production. Alberta contributes 84% of total Canadian petroleum production while Saskatchewan accounts for 12%. Saskatchewan is considered to be the second largest producer of petroleum after Alberta. Saskatchewan has produced over one-quarter of Canada's light oil since 1981, but its total production represents over 10% of Canada's total production during the last ten years. In Alberta, heavy oil represents around 7 percent of the total production, but in 1967, a small portion of artificial crude has been produced and increased reaching 14% of total production in 1983 (CERI, 1985).

Generally, total and regional oil production has declined since 1973, and total output has decreased by 25 percent with fluctuations during the given period. However, a 40 percent rise in production of heavy oil has led to a significant increase in total production (CERI, 1985).

There was a general trend of rising in Canada's GDP from 40586 dollars in the year of 1961. In addition, in 2014, the GDP reached 1973043 dollars after a gradual increase. It is can be noticed that Ontario has the highest rate of GDP as it was 721970 dollars while Alberta, which is the largest producer of petroleum, has accounted for 375756 dollars. Quebec and British Columbia recorded 370064 and 237188 respectively at the same year (Table 2).

**2.3: Historical Oil Price Movements:**

The value of crude oil price differs between light and heavy oil. Generally, heavy oil is more expensive to produce, export or refine. Also, petroleum price differentials depend on dynamic elements such as demand and supply of oil, prices of the refined product, and yields of products. This differential shows that oil has different values of different quality (CERI,1985).

In 1970, international oil markets encountered significant changes in oil price market. Oil price and oil consumption have increased continuously from 1973 to 1980. Despite the supply disturbance and the rise of crude oil price, the consumption of crude oil fell by 11 percent between 1979 and 1983. In terms of supply, in contrast to non-OPEC, oil production of OPEC declined by 13.2 million barrels per day during the mentioned period. In 1983, OPEC became less of a crude oil producer because of the non-OPEC production. As a consequence, oil prices became lower than before. The low rates of oil price stimulate the rise of oil demand by 1.3 percent annually until 2000 (CERI,1985).

According to Baumeister and Kilian (2016), it has been forty years since the oil crisis in 1973-1974, which likewise corresponded with the rise of another administration in the worldwide business sector for unrefined petroleum, in which oil costs have been to a great extent allowed to change because of the powers of

supply and request. This crisis emerged when the cost of imported oil almost quadrupled through the span of a quarter, driving generous conformities in oil-devouring nations.

In the 1970s, oil prices increased sharply for a long time due to political reasons. Then they reached a peak at 1983, causing a global deficit. After 1999, the prices increased again and stayed high for three more years. During 2004, oil prices surged by 50 percent and this brought on concerns about how the price could influence industrial countries' imports. In the Euro zone, a permanent rise by 50% in the prices of oil led to a reduction of GDP at around .5% after four quarters. This decline is associated with the decrease of output, consumption, and investment. The decline of the economy, combined with the rise of inflation, is one of the fears that most importing countries had. This fear occurred as a consequence of what appeared in1973 to 1974 and in 1979 to 1980 (Roeger, 2005).

In the 1970s, the prices of crude oil increased rapidly. The response of crude oil supply and demand resulted in excess supply surplus in the global oil market, reaching a climax in 1986 when the decline of oil prices occurs. After that time, the oil markets experienced weakness and instability, which were also influenced by persistent surplus production, excess productive capacity, and low petroleum product demand growth until 1988 (Tanner and Reinsch,1989).

Werner Roeger (2005) points out the effects of oil price movement on the importing countries Specifically, it refers to the consequences of oil price increase on the economy's growth and the inflation in the European countries. Roeger (2005) used an open economy model DSGE to demonstrate the quantitative influence of a perpetual rise in oil price on output and inflation. His analysis was conducted in the long term and short term in the European countries. The industrial countries, especially the oil-importing ones, were concerned about the consequences of the business cycle of oil price after the 50% rise that occurred during 2004. One of the consequences is high inflation accompanied by economic shrinkage, similar to what occurred in 1973-74 and 1979-80 as a result of oil shocks. This phenomenon, called 'stagflation' in the 1970s, has remained a controversial topic until the present time. Roeger (2005) also claimed that an increase in oil prices could take

shape as the opposite: supply shock and huge macroeconomic effects. He also observed that the more oil is in demand, the more the price is pressured to stay high and that the situation is also influenced by emerging and changing Asian economies.

**Section 3: Applied Methodology:**

**3.1: Examining the Impact of Oil Price on GDP, Oil Production and Unemployment Rates:**

Testing the hypothesis of how does oil price oscillation effect on three variables: gross domestic product (GDP), production of oil (PRO), and unemployment rates (UR) in different provinces in Canada. To be specific, we will estimate the following:

1. The effect of oil price fluctuation on growth rate (GDP).
2. The oil price elasticity of the supply of oil (PRO).
3. The oil price elasticity of the unemployment rate (UR).

To apply that, the following models will be conducted:

1. $\log GDP = \alpha + \beta \log P$
2. $\log Pro = \alpha + \beta \log P$
3. $UR = \alpha + \beta \log P$
4. $\log GDP = \alpha + \beta \log P + \gamma D + \delta D . \log P$
5. $\log Pro = \alpha + \beta \log P + \gamma D + \delta D . \log P$
6. $UR = \alpha + \beta \log P + \gamma D + \delta D . \log P$

where **log GDP:** the logarithm of real gross domestic product, **log P:** the logarithm of real oil price, **D:** dummy variable takes value of one from period 1976 to period 1997 and value of zero from period 1998 to period 2014, **log Pro:** the logarithm of production of oil in quantity term, **UR:** unemployment rates, **α:** Intercept, **β:** coefficient on log(P) and it represents the price elasticity in the first period (1976- 1997), **γ:** coefficient on

dummy variable, **δ:** coefficient on dummy interact with log(p). **β+δ:** represents the elasticity of the second period (1998-2014).

**Section 4: Descriptive Analysis and Time-Series Patterns:**

**Section 4.1: Data description and Summary Statistics:**

This paper studies the hypothesis of how does the fluctuation of crude oil prices affect Canada's economy through three variables across Canada's provinces. These variables are Gross Domestic Product (GDP), Unemployment Rate (UR), and Production of Oil (PRO). The following table (Table 1) will briefly describe the details regarding the variables used in testing the hypothesis. It will show source, geography, year, and unit for each variable. The base year for all variables is 2007=100.

**Table 1: Sources of Data**.

| Variable | Source | Geography | Year | Unit |
|---|---|---|---|---|
| **Gross Domestic Product (constant price)** | Statistics Canada. Table 384-0038 - Gross domestic product, expenditure-based, provincial and territorial. | Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, and Yukon. | 1981-2014 | Annual (dollars x 1,000,000)<br>Base year (2007) |
| **Real Crude Oil Price** | BP Statistical Review of World Energy June 2015<br>http://www.bp.com/statisticalreview | | 1976-2014 | US dollars per barrel<br>Base year (2007) |
| **Exchange Rates** | This is non-Statistics Canada information. Table 176-0064 - Foreign exchange rates in Canadian dollars, Bank of Canada. | | 1976-2014 | Annual (dollars) |
| **Unemployment Rates** | Table 282-0002 Labour force survey estimates (LFS), by both sex and age group (15-64). | Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia. | 1976- 2015 | Annual rates. |

| | | | | |
|---|---|---|---|---|
| **Oil Production** | Table 126-0001 Supply and disposition of crude oil and equivalent, | Newfoundland and Labrador, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia and Northwest Territories | 1985- 2014 | Annual (cubic meters x 1,000) |

The first variable is Gross Domestic Product (constant price) for Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, and Yukon from 1981 to 2014 (Appendix Table 19). In order to bring the values of the GDP into a dollar, they were multiplied by 1,000,000. Table 2 shows a summary of provincial GDP.

**Table 2: Summary Statistics of Annual Gross Domestic Product by Province.**

| Province | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| **Alberta** | 188010.90 | 64091.51 | 104191.00 | 309851.00 |
| **Saskatchewan** | 43951.09 | 9289.24 | 29998.00 | 61202.00 |
| **Manitoba** | 41225.65 | 8599.58 | 28467.00 | 57435.00 |
| **New Brunswick** | 23203.82 | 4463.50 | 15386.00 | 29231.00 |
| **Nova Scotia** | 28852.41 | 5039.74 | 19336.00 | 36023.00 |
| **Prince Edward Island** | 3710.03 | 889.65 | 2328.00 | 5149.00 |
| **Newfoundland and Labrador** | 20911.00 | 5212.83 | 13719.00 | 29065.00 |
| **British Columbia** | 150485.50 | 41319.20 | 90777.00 | 224546.00 |
| **Ontario** | 465683.20 | 118880.60 | 272745.00 | 642265.00 |
| **Quebec** | 250740.90 | 52220.44 | 171823.00 | 332892.00 |
| **Yukon** | 1484.77 | 511.29 | 603.00 | 2427.00 |

It can be seen that the highest average is 465683.20 million dollars which recorded in Ontario. Following that Quebec with an average of 250740.90 million dollars while Alberta's average is 188010.90 million dollars appeared in 1999. The lowest GDP is 3710.03 million dollars at the province of Prince Edward Island (Table 2).

The second variable is Real Crude Oil Price in US dollar per barrel from 1976 to 2014 (Appendix Table 20). This variable was multiplied by the exchange rate; that is the third variable on the table, for each year. Is

was also multiplied by 100 to bring it into dollar unit. Table 3 shows the highest price for oil was 140.47 US dollar, which occurred in 1980.

**Table 3: Summary Statistics of Crude Oil Price.**

| variable | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| price | 78.52 | 34.29 | 31.21 | 140.47 |

The third variable is the Foreign exchange rates in Canadian dollars, from 1976 to 2014. This variable was used in converting the currency of the crude oil price from US dollar to CA dollar (Appendix Table 21).

The fourth variable is the unemployment rate for Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia, by both sex and age group (15-64) from 1976 to 2014 (Table 22). The unemployment rate for a particular group is the number unemployed in that group expressed as a percentage of the labor force for that group (Statistics Canada, Labour force survey estimates). Table 4 provides a summary of the provincial unemployment rate.

**Table 4: Summary Statistics of Unemployment Rate by Province.**

| Province | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| Alberta | 6.37 | 2.32 | 3.50 | 11.40 |
| Saskatchewan | 5.98 | 1.44 | 3.90 | 8.50 |
| Manitoba | 6.48 | 1.61 | 4.20 | 9.70 |
| New Brunswick | 11.49 | 1.91 | 7.50 | 15.30 |
| Nova Scotia | 10.64 | 1.86 | 7.70 | 14.40 |
| Prince Edward Island | 12.66 | 2.17 | 9.30 | 17.90 |
| Newfoundland and Labrador | 16.23 | 2.47 | 11.50 | 20.30 |
| British Columbia | 8.69 | 2.53 | 4.30 | 15.10 |
| Ontario | 7.64 | 1.53 | 5.10 | 11.00 |
| Quebec | 10.11 | 1.97 | 7.30 | 14.30 |

The last variable is the annual production of oil in cubic meters per thousand for the net producer provinces: Newfoundland and Labrador, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia, from 1985 to 2014 (Appendix Table 23). The unit was converted into barrels by multiplying by (6.2898*1000). The next table will give a summary of provincial oil production.

**Table 5: Summary Statistics of Oil Production by Province.**

| Province | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| **Alberta** | 544000000 | 103000000 | 435000000 | 861000000 |
| **Saskatchewan** | 126000000 | 35800000 | 72200000 | 172000000 |
| **Manitoba** | 6067411 | 3653390 | 3655003 | 18600000 |
| **Newfoundland and Labrador** | 129905.3 | 26407.39 | 90573.12 | 172969.5 |
| **British Columbia** | 12300000 | 2712640 | 7282959 | 17400000 |
| **Ontario** | 1150944 | 424375.4 | 488717.5 | 1795109 |
| **Northwest Territories** | 8827959 | 2476074 | 3830488 | 12100000 |

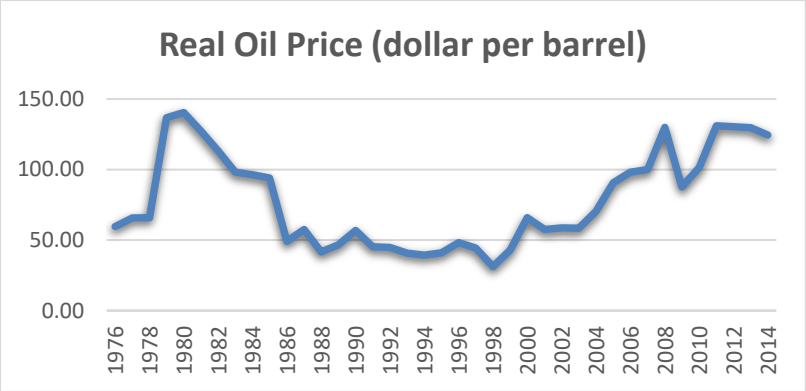
It is clear that Alberta is the highest net producer of petroleum in Canada as it recorded an average of 544 million per barrel. An average of 126 million per barrel was recorded by the second oil producer that is Saskatchewan. Manitoba and Northwest Territories produce almost the same quantity at around 6 million per barrel and 8 million per barrel respectively while British Colombia produces higher compared to them at a quantity of 12 million dollars per barrel. Both of Ontario and Newfoundland and Labrador considered being the smallest producers in terms of quantity of crude oil.

**Section 4.2: Graphs Illustration of the Variables:**

This section demonstrates the time series patterns of real oil prices, GDP, Unemployment Rate, and Oil production across the Canadian Provinces.

As shown in figure 1, from 1976 to 2014, oil price increased by almost half reaching 124.42 CA dollars per barrel (Appendix Table 20). However, the oil price fluctuates over the period and peaks in 1980 at 140.5 CA dollars per barrel. After that, a period of decline occurs and oil price reaches a low in 1998 at 31.21 CA dollar per barrel. Following that period, the oil price rises continuously until 2008 with a value of 129.83 CA dollar per barrel. Then it decreased again for almost two years and jumped up at 2010, then remain relatively stable since then.

**Figure 1: Real Oil Price (dollar per barrel).**




As can be seen in Figures 2,3,4,5,6,7,8,9,10,11, and 12, the level of the real GDP increased gradually in almost all the Canadian province between the year 1981 and the year 2014.

**Figure 2: Prince Edward Island's GDP (millions per barrel).**

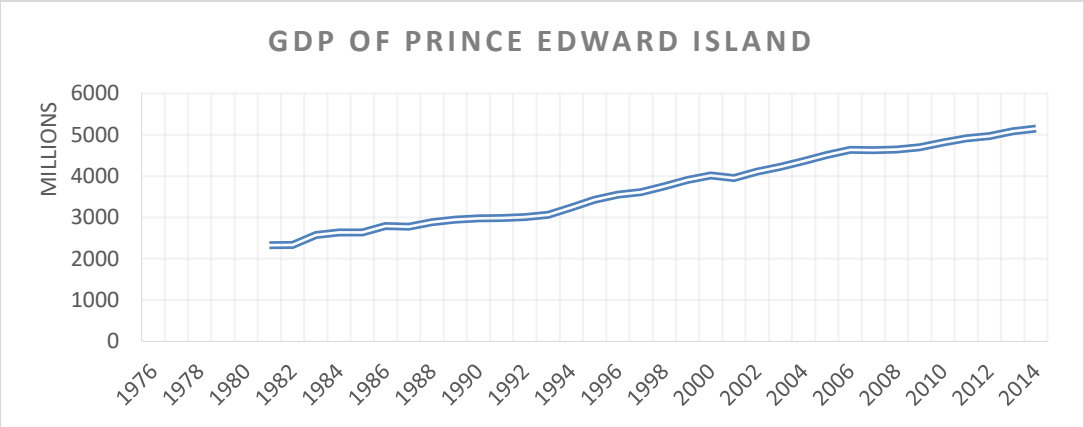



**Figure 3: Newfoundland and Labrador's GDP (millions per barrel).**

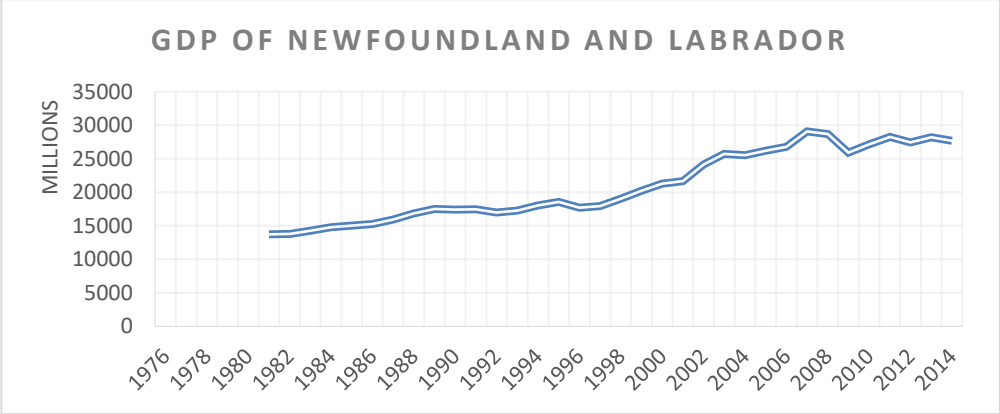



**Figure 4: Nova Scotia's GDP (millions per barrel).**

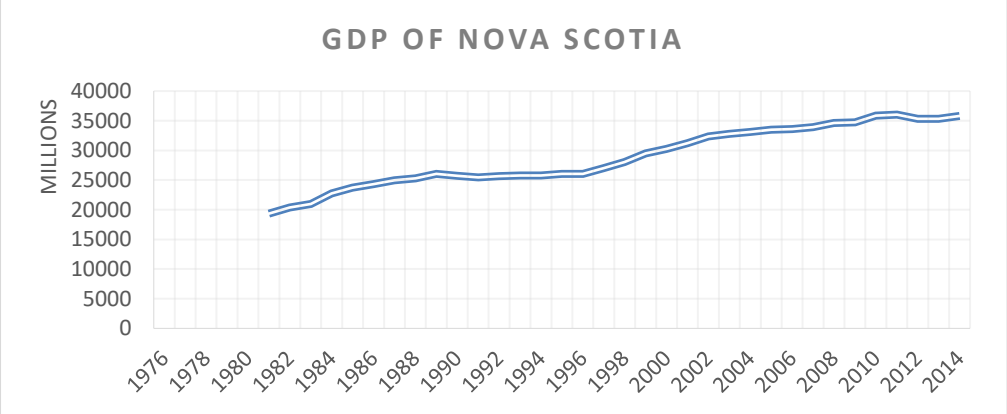



**Figure 5: New Brunswick's GDP (millions per barrel).**

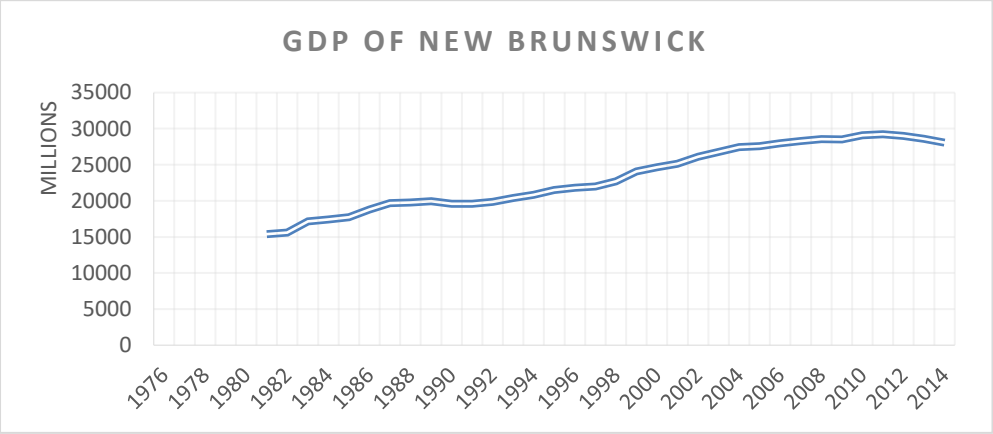



**Figure 6: Quebec's GDP (millions per barrel).**

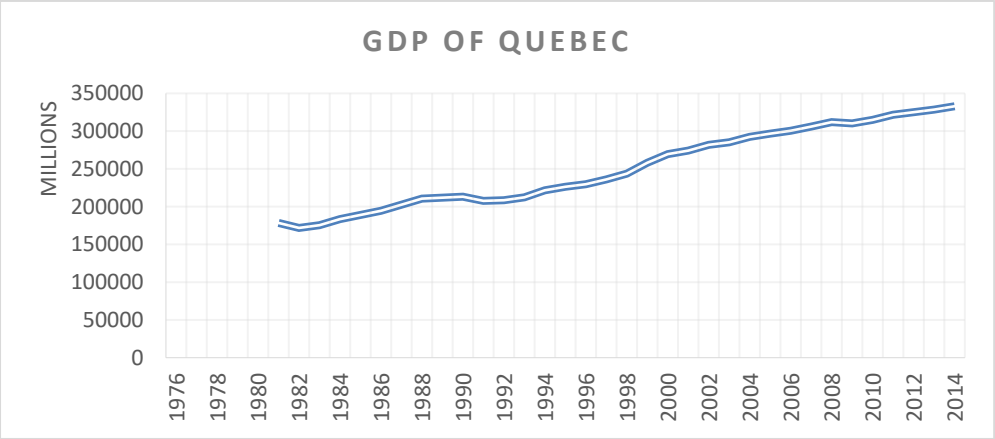



**Figure 7: Ontario's GDP (millions per barrel).**

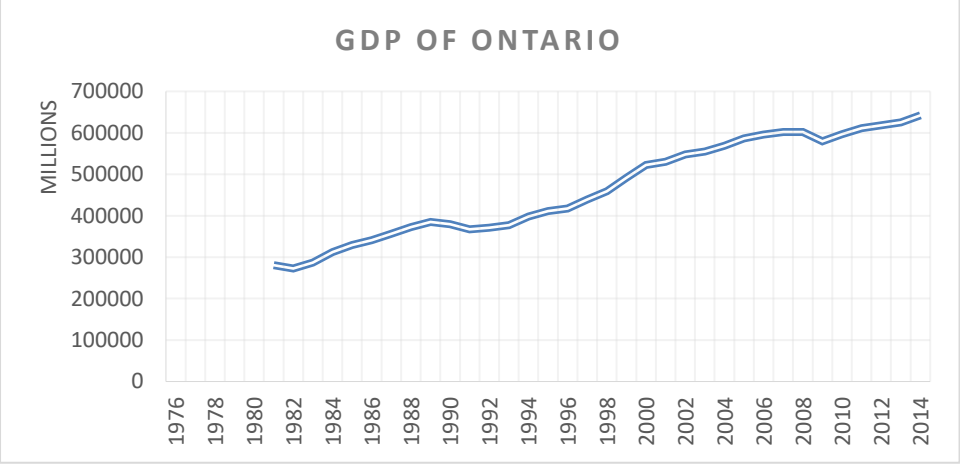


**Figure 8: Manitoba's GDP (millions per barrel).**

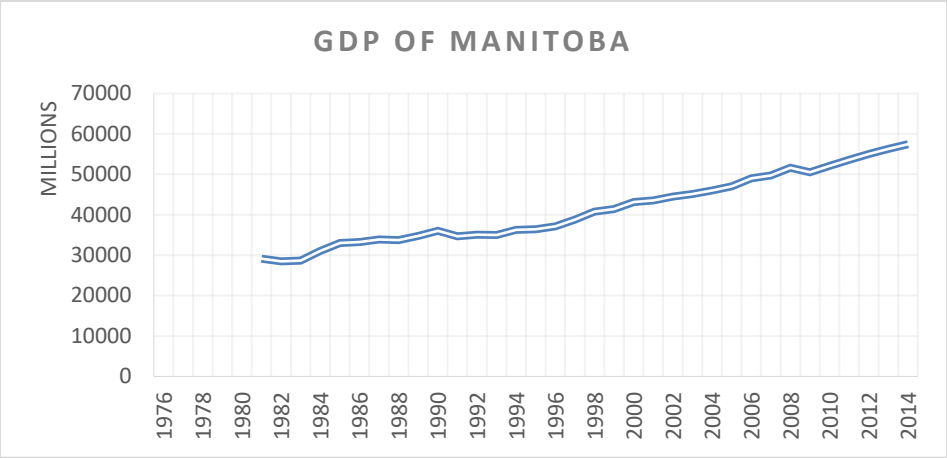



**Figure 9: Saskatchewan's GDP (millions per barrel).**

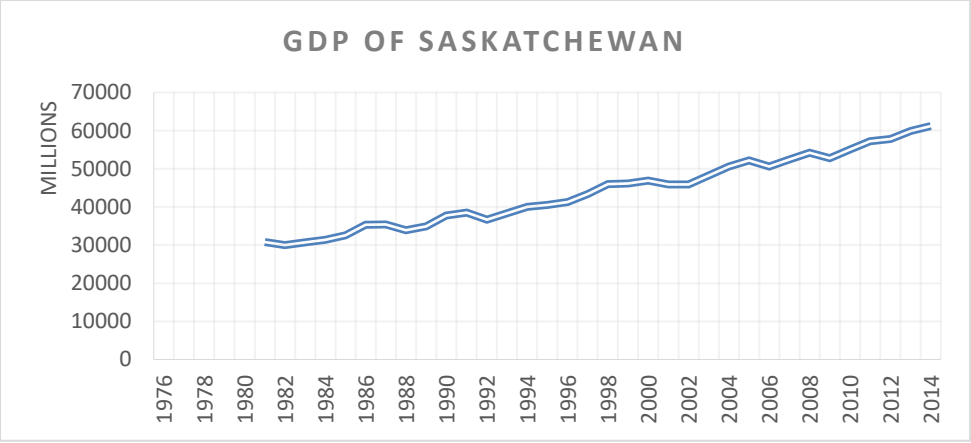



**Figure 10: Alberta's GDP (millions per barrel).**

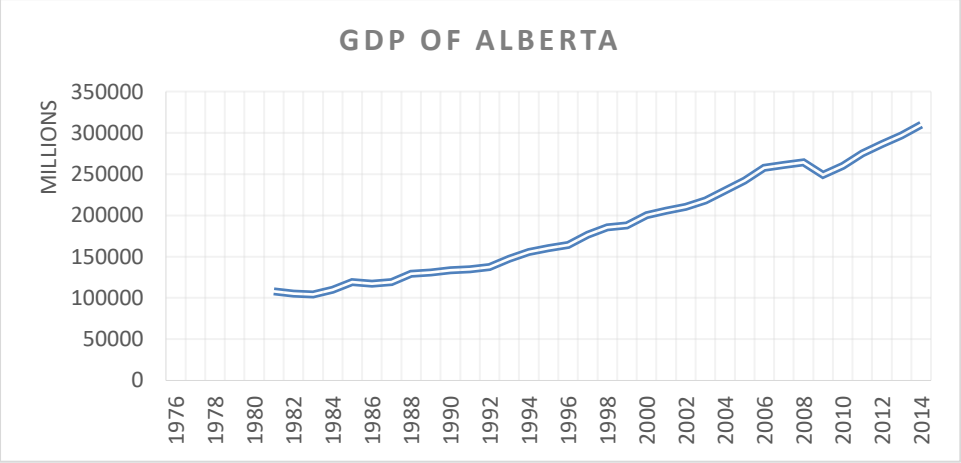


**Figure 11: British Columbia's GDP (millions per barrel).**

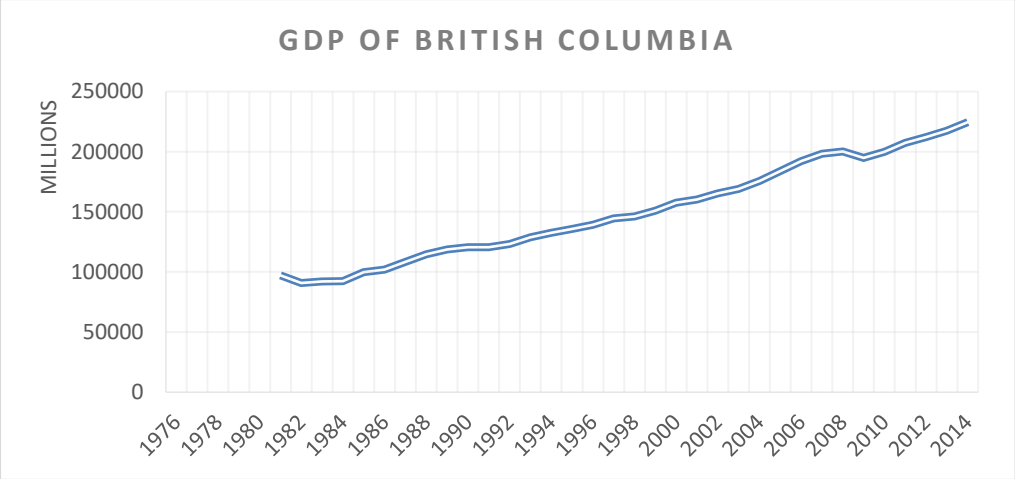



**Figure 12: Yukon's GDP (millions per barrel).**

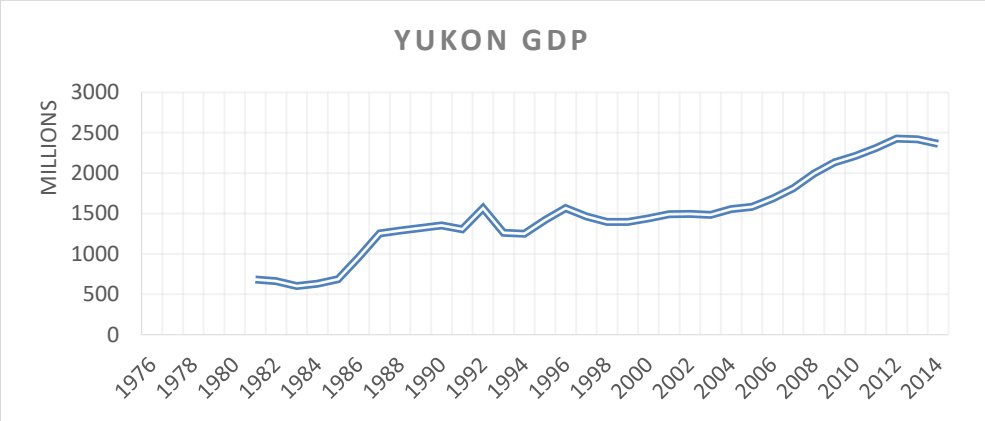



**Figure 13: Production of Oil (thousands per barrel) at Ontario.**

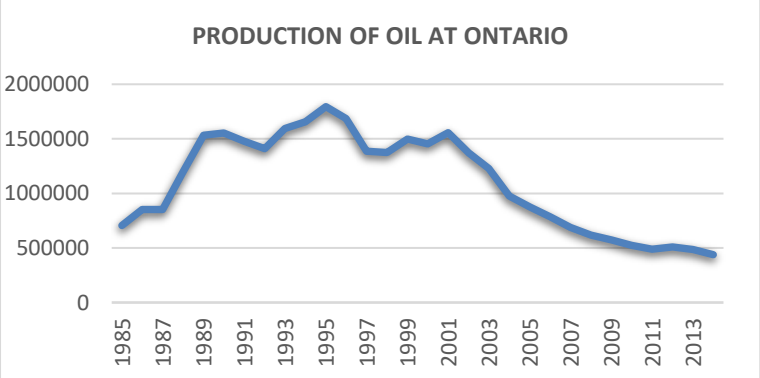
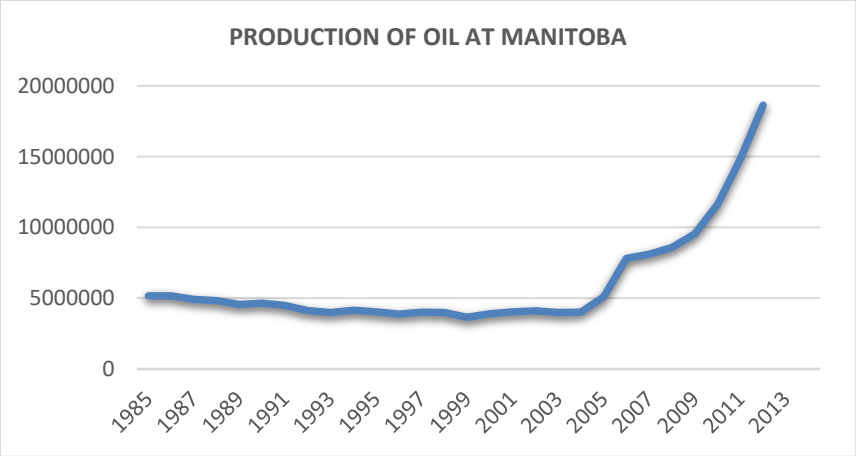


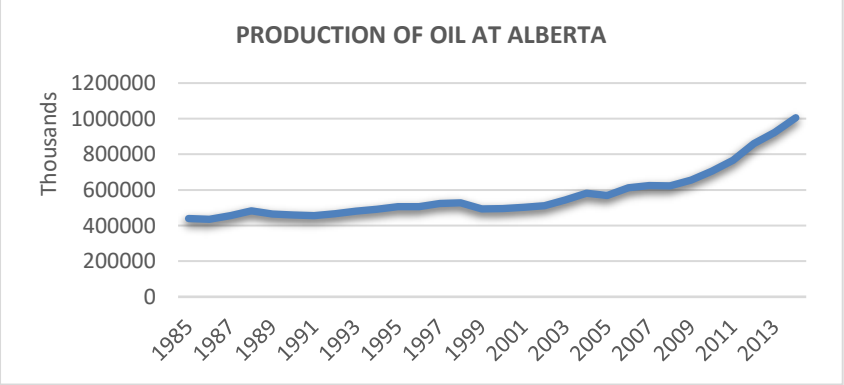
Figure 13 shows that the production of oil at Ontario declined from 1985 to 2014. Ontario started producing oil in 1985 at 706344.54 barrels. Since then, the production of oil fluctuated encountering peaks in 1990 and 1995 with a quantity of 1554838.56 barrels and 1795108.92 barrels respectively. After 2001, production of oil started to decline gradually. The amount of oil produced in 2014 was 438399.06 barrels.

**Figure 14: Production of Oil (thousands per barrel) at Manitoba.**



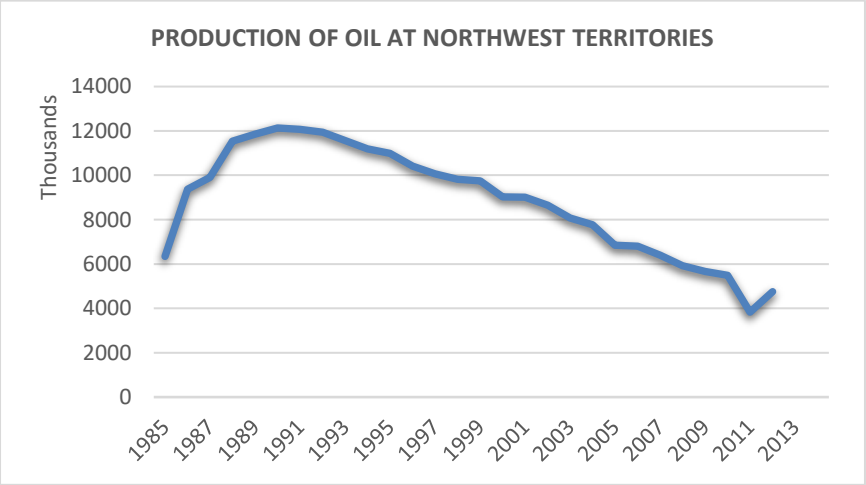

The figure above demonstrates that the production of oil at Manitoba was low at the first period since 1985. However, after 2003, it increased significantly recording 18638564.34 barrels in 2012. In 2008, the production of oil remained stable for one year.

**Figure 15: Production of Oil (thousands per barrel) at Alberta.**



The production of oil in Alberta grew significantly between the period 1985 and 2014 as shown in Figure 15. Despite that, it declined slightly in 1999 and rose again reaching 1005471075 barrels in 2014.

**Figure 16: Production of Oil at Northwest Territories.**




Production of oil at Northwest Territories in 1985 is almost higher than oil production in 2012 by 1.3 % as it is around 6343892.28 barrels in 1985 and 4757604.72 barrels in 2012. Despite that it rose during the first period with a peak in 1990 at 12131766.24 barrels then decrease gradually after that year as shown in figure 16.

**Figure 17: Production of Oil at British Columbia.**

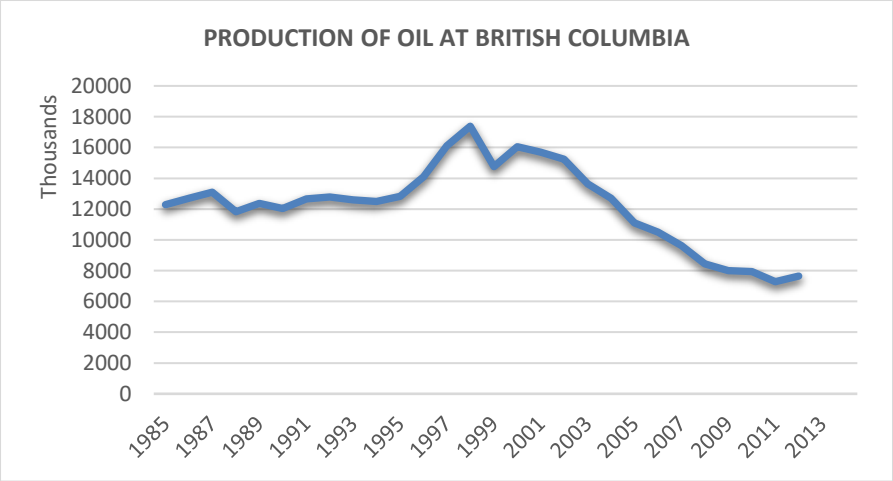


Figure 17 illustrates that the highest quantity of oil produced in British Columbia occurred in 1998 with a value of 17383120.26 barrels. Otherwise, the production of oil declined from the year 1985 the year 2012.

**Figure 18: Production of Oil at Saskatchewan.**

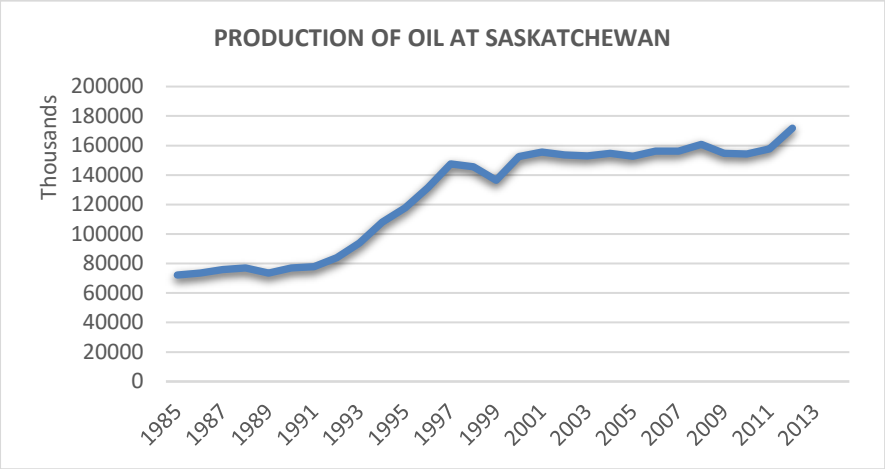



Figure 18 shows that there is a noticeable increase in the supply of oil at Saskatchewan since 1985 for the next ten years reaching the peak in 1997 at around 147491407.1 barrels. Then after that period, it decreased slightly for two years. And remain steady around almost 150000000 barrels. However, the production of oil increased again reaching the highest point at around 171778840.9 barrels in 2012.

**Figure 19: Production of Oil at Newfoundland and Labrador.**

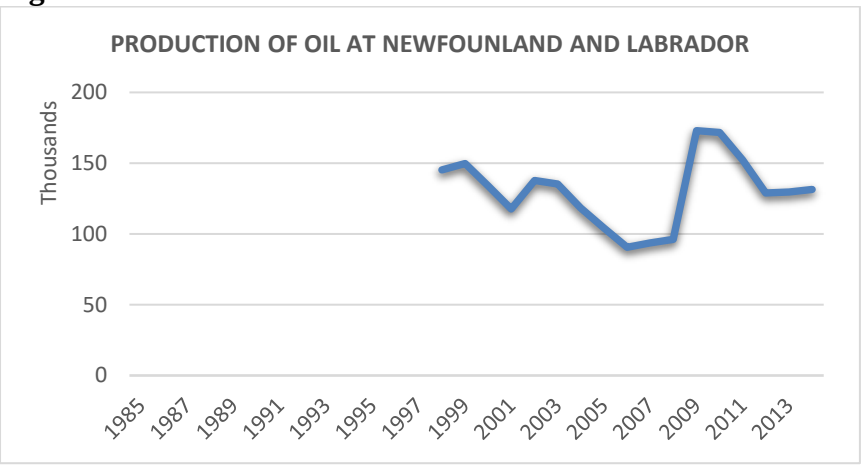
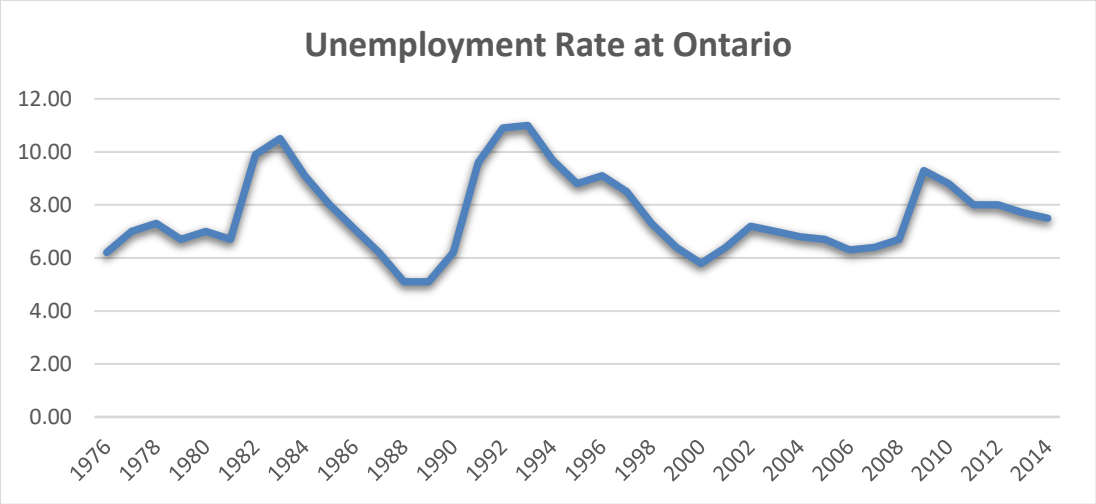



Figure 19 demonstrates the production of oil at Newfoundland and Labrador between 1998 and 2014. It can be seen that it decreased during the mentioned period but it peaked in 2010 at 171711.54 barrels.

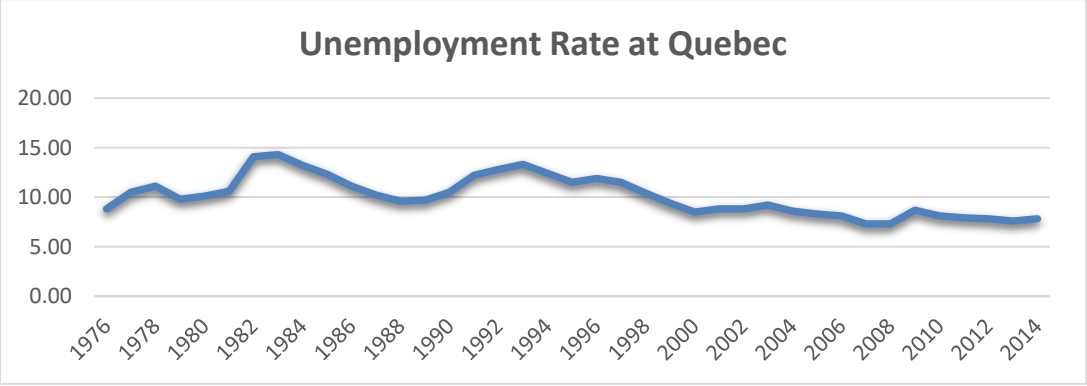
The following figures will give an illustration about the unemployment rate among regions in Canada.

**Figure 20: Unemployment Rate at Ontario.**



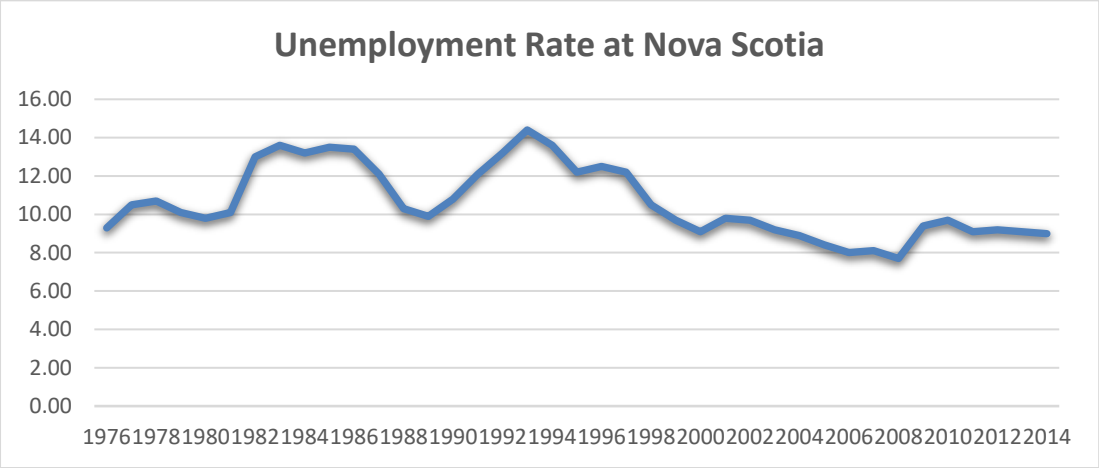

Unemployment rate at Ontario fluctuated around the lowest rate of 5.10% and the highest rate of 11% from 1976 to 2014. It reached the peak of 10% and 11% in 1983 and 1993 respectively. After that, it declined gradually to reach almost 7% in 2014 as shown in figure 20.

**Figure 21: Unemployment Rate at Quebec.**




The unemployment rate increased from 9% to reach the peak at 14% in 1983 then decreased back to 9% in 1989. After that, it rose again to 13% then declined gradually to reach 7% in 2014 at Quebec as shown in figure 21.

**Figure 22: Unemployment Rate at Nova Scotia.**




Similarly, figure 22 shows that unemployment rate increased in two periods 1983 and 1993 recording almost 14%. However, it declined gradually to reach the bottom of 7.70% in 2008 then increased slightly to 7% in 2014 at Nova Scotia.

**Figure 23: Unemployment Rate at Manitoba.**

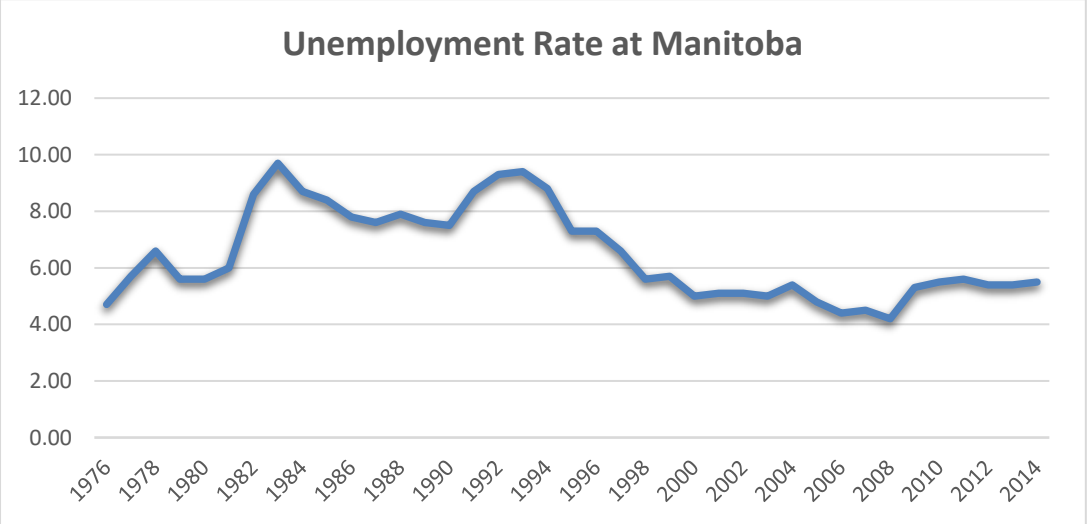


Figure 23 shows that unemployment rate fluctuated around 4.2 % and 9.7% from 1976 to 2014.

However, it remains almost stable at around 5% for the last sixteen years at Manitoba.

**Figure 24: Unemployment Rate at Alberta.**

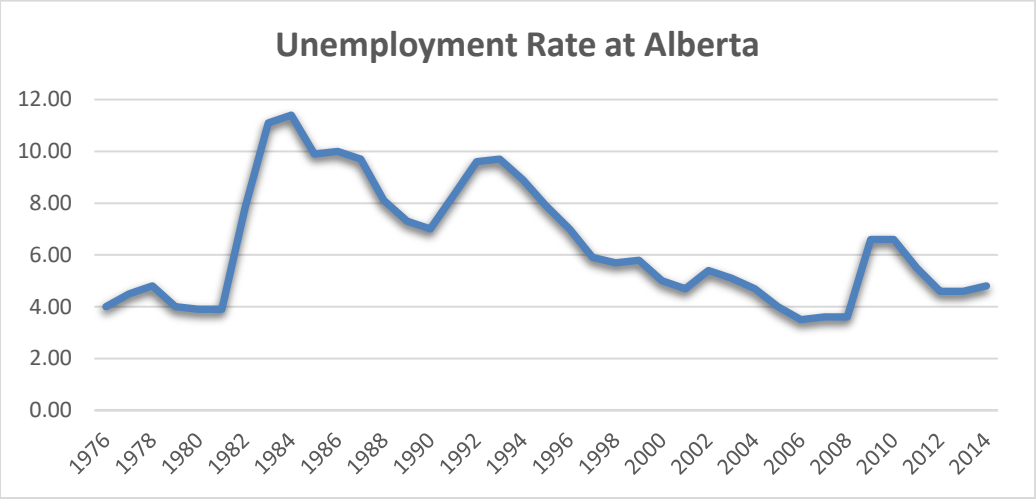
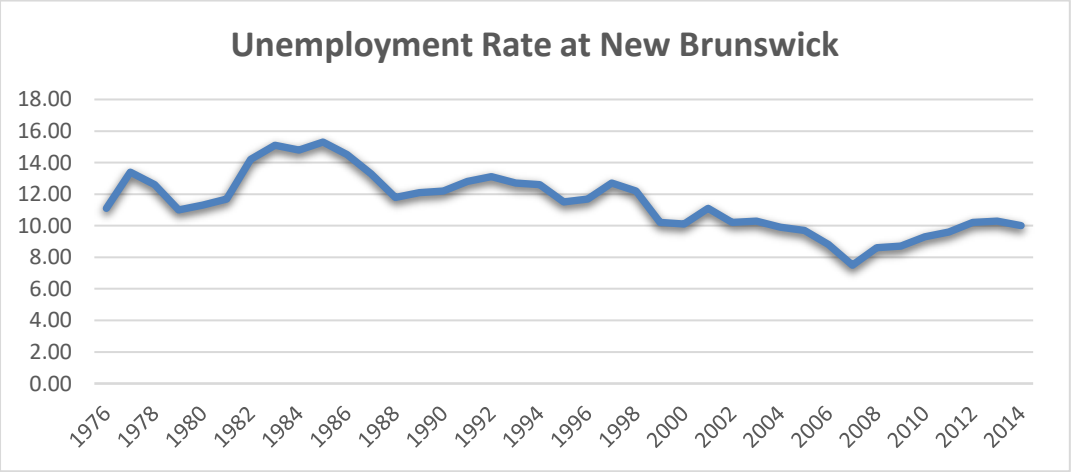



Figure 24 shows that unemployment rate considered to be low during the first five years as it was around 4% in Alberta. However, the unemployment rate in Alberta reached a high point of 11.4% in 1984.

**Figure 25: Unemployment Rate at New Brunswick.**



Unemployment rate at New Brunswick declined from 11.1% to 10% between periods 1976 and 2014 with a peak of 15.3% in 1985 as shown in figure 25.

**Figure 26: Unemployment Rate at British Columbia.**

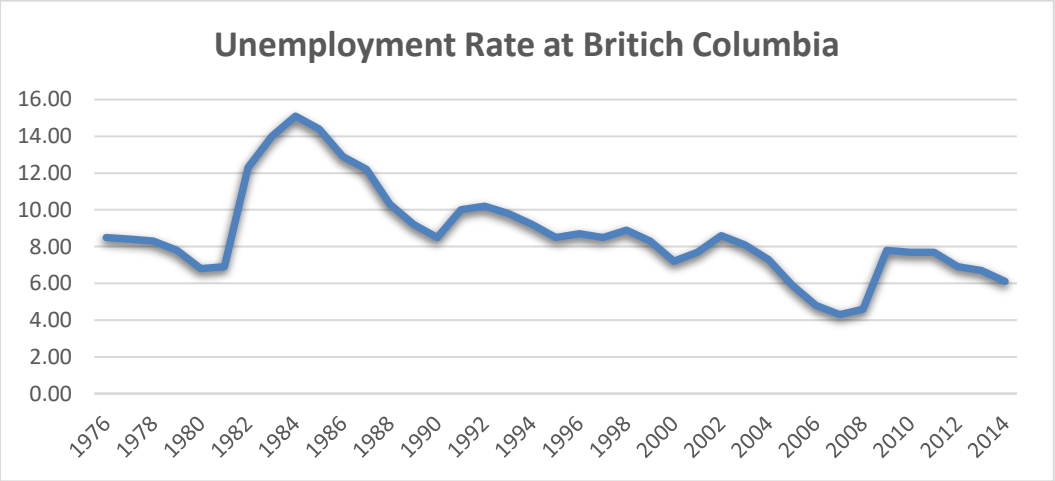



Figure 26 shows that unemployment rate fluctuated around 8.69% from 1976 to 2014. However, it reached the highest point of 15.1% in 1984 and the lowest point of 4.3% in 2007. After 2009, it declined to reach 6.1% in 2014 at British Columbia.

**Figure 27: Unemployment Rate at Newfoundland and Labrador.**

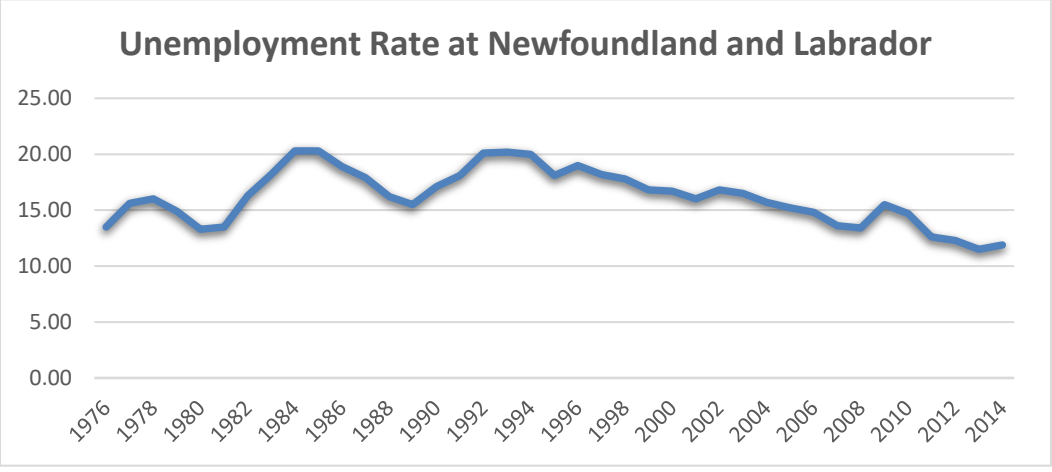


Figure 27 shows that unemployment rate declined from 13.5% to 11.9% between 1976 to 2014. Though it fluctuated between the given periods and peaked in 1985 and 1993 with a percentage of 20. However, it decreased after 1994 at Newfoundland.

**Figure 28: Unemployment Rate at Prince Edward Island.**

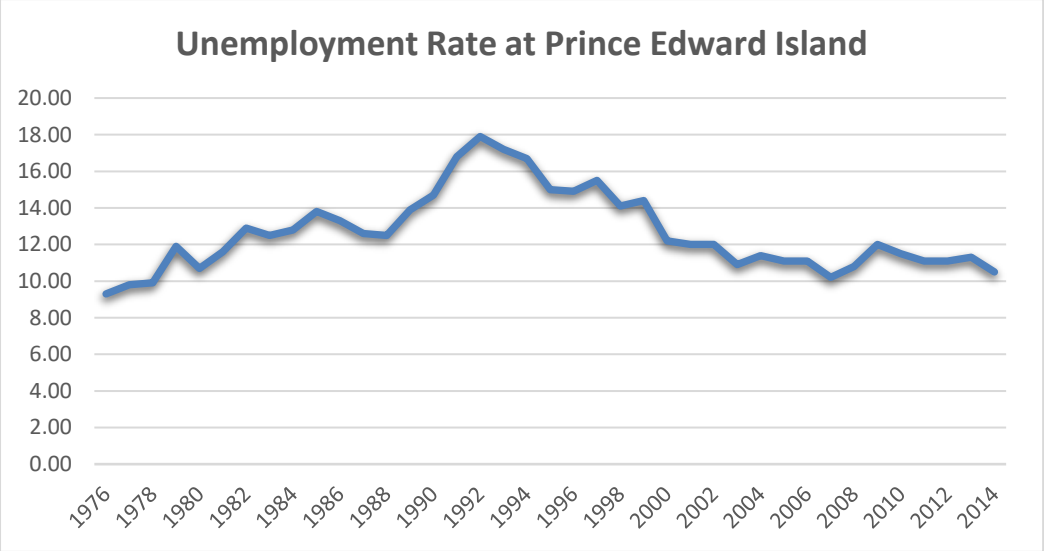



Figure 28 shows that unemployment rate increased in the first sixteen years to reach the highest rate of 17.9%. After that, it decreased gradually to reach 10.5% in 2014 at Prince Edward Island.

**Figure 29: Unemployment Rate at Saskatchewan.**

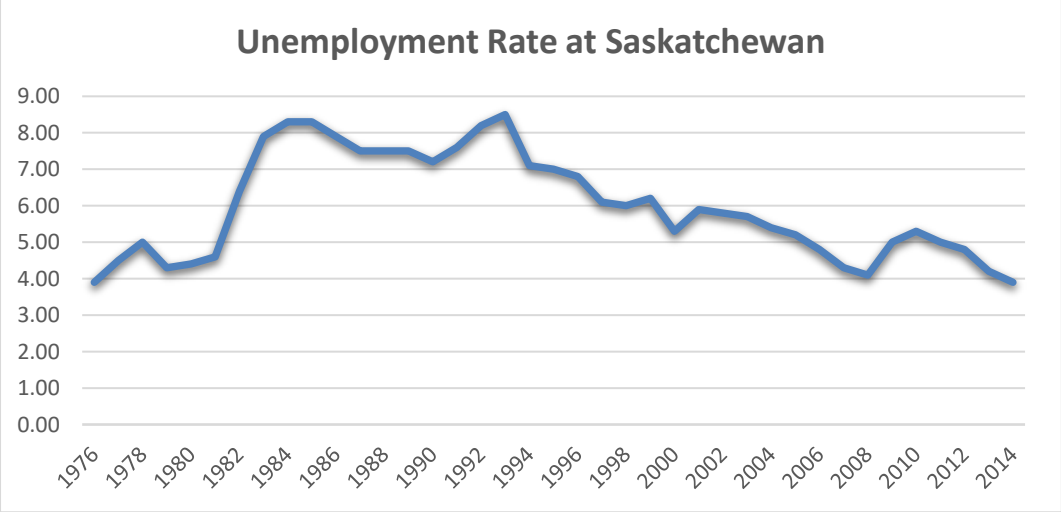


Figure 29 shows that in Saskatchewan, the unemployment rate was low as the average was 5.98%. In 1976, it was 3.9% and increased slightly during the first five years. Then, it increased significantly to peak at around 8.3% and 8.5% in 1984 and 1993 respectively. However, it declined for the following years reaching 3.9% in 2014.

**Section 4.3: Correlation of Variables:**

**Table 6: Correlation between the oil price with GDP, Oil production and Unemployment.**

| province | Variable | | |
|---|---|---|---|
| | GDP | Oil Production | UR |
| **Newfoundland and Labrador** | 0.47 | -0.19 | -0.68 |
| **Prince Edward Island** | 0.42 | | -0.59 |
| **Nova Scotia** | 0.36 | | -0.4 |
| **New Brunswick** | 0.35 | | -0.31 |
| **Quebec** | 0.43 | | -0.35 |
| **Ontario** | 0.38 | -0.87 | -0.04 |
| **Manitoba** | 0.48 | 0.83 | -0.36 |
| **Saskatchewan** | 0.42 | 0.53 | -0.58 |
| **Alberta** | 0.5 | 0.82 | -0.4 |
| **British Columbia** | 0.45 | -0.79 | -0.29 |
| **Yukon** | 0.34 | | |
| **Northwest Territories** | | -0.9 | |

Tables 6 shows the correlation between oil price with three variables: (I) GDP; (II) oil production; (III) unemployment rate. First of all, there is a positive relationship between the real GDP and the price of oil in Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, and Yukon. Which means that if the oil

price goes up, the real GDP will grow and that economically make sense. Secondly, the production of oil is negatively correlated with the price of oil in Newfoundland and Labrador, Ontario, British Columbia, and Northwest Territories. However, the oil price and oil production are positively correlated in Manitoba, Saskatchewan, and Alberta. In other words, the production of oil falls when the price of oil rises in the former four provinces, but oil production rises when oil price rises in the latter three provinces. Lastly, it is obvious that the unemployment rate is negatively correlated with the oil price in Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, Newfoundland, Prince Edward Island, Nova Scotia, and New Brunswick. From an economic point of view, it makes sense because as oil price increase, more jobs will be available and more workers will be employed. Thus, the unemployment rate will fall.

**Section 4.4: Unit Root Tests:**

In this section, I perform Augmented Dickey-Fuller Tests to check the stationarity of the variables. For each variable, the Augmented Dickey-Fuller Tests whether the variable has a unit root. I consider two cases: (i) with a time trend; and (ii) without a time trend.

**Table 7-a: Augmented Dickey-Fuller Test for Unit Root of Oil Price.**

| province | With Time Trend | | | | Without Time Trend | | | |
|---|---|---|---|---|---|---|---|---|
| | Test Statistic | 5% Critical Value | Number of Lags | Decision | Test Statistic | 5% Critical Value | Number of Lags | Decision |
| Real Oil Price | -1.43 | -3.552 | 1 | Stationary | -1.383 | -2.966 | 1 | stationary |

**Table 7-b: Augmented Dickey-Fuller Test for Unit Root of GDP.**

| province | With Time Trend | | | | Without Time Trend | | | |
|---|---|---|---|---|---|---|---|---|
| | Test Statistic | 5% Critical Value | Number of Lags | Decision | Test Statistic | 5% Critical Value | Number of Lags | Decision |
| Newfoundland and Labrador | -1.945 | -3.572 | 1 | Stationary | -0.754 | -2.98 | 1 | Stationary |
| Prince Edward Island | -2.025 | -3.572 | 1 | Stationary | -0.285 | -2.98 | 1 | Stationary |
| Nova Scotia | -2.813 | -3.576 | 2 | Stationary | -1.17 | -2.983 | 2 | Stationary |
| New Brunswick | -0.776 | -3.576 | 2 | Stationary | -1.055 | -2.983 | 2 | Stationary |
| Quebec | -1.888 | -3.576 | 2 | Stationary | -0.357 | -2.983 | 2 | Stationary |
| Ontario | -2.049 | -3.576 | 2 | Stationary | -0.731 | -2.983 | 2 | Stationary |
| Manitoba | -1.215 | -3.572 | 1 | Stationary | 0.867 | -2.98 | 1 | Not Stationary |
| Saskatchewan | -2.414 | -3.58 | 3 | Stationary | 0.69 | -2.986 | 3 | Not Stationary |
| Alberta | -2.167 | -3.572 | 1 | Stationary | 1.148 | -2.98 | 1 | Not Stationary |
| British Columbia | -2.396 | -3.572 | 1 | Stationary | 0.569 | -2.98 | 1 | Not Stationary |
| Yukon | -2.103 | -3.572 | 1 | Stationary | -0.767 | -2.98 | 1 | Stationary |

**Table 7-c: Augmented Dickey-Fuller Test for Unit Root of Oil Production.**

| variable | With Time Trend | | | | Without Time Trend | | | |
|---|---|---|---|---|---|---|---|---|
| | Test Statistic | 5% Critical Value | Number of Lags | Decision | Test Statistic | 5% Critical Value | Number of Lags | Decision |
| Newfoundland and Labrador | -1.621 | -3.6 | 3 | Stationary | -1.584 | -3 | 3 | Stationary |
| Ontario | -4.123 | -3.592 | 2 | Not Stationary | -0.844 | -2.994 | 2 | Stationary |
| Manitoba | -2.979 | -3.588 | 1 | Stationary | -2.568 | -2.992 | 1 | Stationary |
| Saskatchewan | -1.972 | -3.6 | 3 | Stationary | -1.136 | -3 | 3 | Stationary |
| Alberta | 1.126 | -3.596 | 3 | Not Stationary | 2.756 | -2.997 | 3 | Not Stationary |
| British Columbia | -0.996 | -3.596 | 1 | Stationary | -0.414 | -2.997 | 1 | Stationary |
| Northwest Territories | -7.993 | -3.596 | 1 | Not Stationary | 0.133 | -2.997 | 1 | Not Stationary |

**Table 7-d: Augmented Dickey-Fuller Test for Unit Root of Unemployment Rate.**

| province | With Time Trend | | | | Without Time Trend | | | |
|---|---|---|---|---|---|---|---|---|
| | Test Statistic | 5% Critical Value | Number of Lags | Decision | Test Statistic | 5% Critical Value | Number of Lags | Decision |
| Quebec | -2.837 | -3.556 | 2 | Stationary | -1.519 | -2.969 | 2 | Stationary |
| Ontario | -3.416 | -3.556 | 2 | Stationary | -3.447 | -2.969 | 2 | Not Stationary |
| British Columbia | -3.299 | -3.552 | 1 | Stationary | -2.25 | -2.966 | 1 | Stationary |
| Newfoundland | -2.324 | -3.552 | 1 | Stationary | -1.89 | -2.966 | 1 | Stationary |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Prince Edward Island | -1.859 | -3.552 | 1 | Stationary | -1.576 | -2.966 | 1 | Stationary |
| Nova Scotia | -2.564 | -3.556 | 2 | Stationary | -1.582 | -2.969 | 2 | Stationary |
| New Brunswick | -2.629 | -3.552 | 1 | Stationary | -1.749 | -2.966 | 1 | Stationary |
| Manitoba | -2.138 | -3.556 | 2 | Stationary | -1.404 | -2.969 | 2 | Stationary |
| Saskatchewan | -2.241 | -3.552 | 1 | Stationary | -1.554 | -2.966 | 1 | Stationary |
| Alberta | -2.522 | -3.556 | 2 | Stationary | -1.877 | -2.969 | 2 | Stationary |

Tables 7-a, 7-b, 7-c, and 7-d illustrate the Augmented Dickey-Fuller Test for Unit Root (ADF) which was conducted to test the stability of four variables: (I) Oil Price; (II) GDP; (III) Oil Production; (IV) Unemployment Rate, respectively. In addition, Akaike Information Criterion was used to set the number of lags (AIC). Moreover, there are two cases to demonstrate the results. The first case shows that with time trend, all the variables are stationary except the production of oil in Ontario, Alberta, Northwest Territories. The second case, on the other hand, without time trend, it seems that production of oil in all provinces is stationary while in Alberta, and in Northwest Territories is still not stationary. In addition, the unemployment rate in Ontario is not stationary unlike all the unemployment rate of the remaining provinces. Moreover, the gross domestic product is stationary in almost all the provinces except in Manitoba, Saskatchewan, Alberta, and British Columbia.

**Section 5: Empirical Results:**

**Section 5.1: The Effect of Oil Price on Gross Domestic Product:**

**Table 8: Regression of the endogenous variable (log GDP) on log(P).**

| province | Regression | log(p) (β) | R-squared | Durbin-Watson |
|---|---|---|---|---|
| **New Brunswick** | Coefficient | 0.05 | 0.08 | 0.05 |
| | t-statistic | 1.67 | | |
| | Standard Error | 0.03 | | |
| **Manitoba** | Coefficient | 0.08 | 0.16 | 0.05 |
| | t-statistic | 2.43 | | |
| | Standard Error | 0.03 | | |
| **Prince Edward Island** | Coefficient | 0.08 | 0.10 | 0.05 |
| | t-statistic | 1.92 | | |
| | Standard Error | 0.04 | | |
| **Nova Scotia** | Coefficient | 0.05 | 0.09 | 0.05 |
| | t-statistic | 1.73 | | |
| | Standard Error | 0.03 | | |
| **Saskatchewan** | Coefficient | 0.07 | 0.11 | 0.06 |
| | t-statistic | 1.95 | | |
| | Standard Error | 0.03 | | |
| **Alberta** | Coefficient | 0.13 | 0.14 | 0.05 |
| | t-statistic | 2.29 | | |
| | Standard Error | 0.06 | | |
| **Ontario** | Coefficient | 0.07 | 0.08 | 0.04 |
| | t-statistic | 1.68 | | |
| | Standard Error | 0.04 | | |

| | | | | |
|---|---|---|---|---|
| **Quebec** | Coefficient | 0.07 | 0.13 | 0.05 |
| | t-statistic | 2.15 | | |
| | Standard Error | 0.03 | | |
| **British Columbia** | Coefficient | 0.09 | 0.11 | 0.04 |
| | t-statistic | 2.01 | | |
| | Standard Error | 0.05 | | |
| **Newfoundland and Labrador** | Coefficient | 0.10 | 0.16 | 0.07 |
| | t-statistic | 2.47 | | |
| | Standard Error | 0.04 | | |
| **Yukon** | Coefficient | 0.04 | 0.01 | 0.08 |
| | t-statistic | 0.65 | | |
| | Standard Error | 0.07 | | |

Table 8 shows estimates from the regression model (1) which is the relationship between GDP and real oil price across the provinces. The results show that the coefficients are not significant since their value is less than one. In addition, R-squared is small as it ranges between 0.01 and 0.16 which implies that the data was not well-explained by the regression model. Moreover, Durbin-Watson seems to be almost zero which means there is a positive autocorrelation. Lastly, standard error of the regression is less than one which indicates that the model regression is good.

**Table 9: Regression of the endogenous variable (log GDP) on the log(P), Dummy Variable, and Dummy interact with log(P).**

| **province** | **Regression** | **log(p) (β)** | **D (γ)** | **D.log(p) (δ)** | **R-squared** | **Durbin-Watson** |
|---|---|---|---|---|---|---|
| **New Brunswick** | Coefficient | 0.07 | 0.58 | -0.17 | 0.97 | 1.42 |
| | t-statistic | 7.44 | 10.05 | -12.79 | | |
| | Standard Error | 0.01 | 0.06 | 0.01 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Manitoba** | Coefficient | 0.10 | 0.63 | -0.19 | 0.96 | 1.31 |
| | t-statistic | 9.23 | 9.31 | -11.61 | | |
| | Standard Error | 0.01 | 0.07 | 0.02 | | |
| **Prince Edward Island** | Coefficient | 0.09 | 0.70 | -0.21 | 0.95 | 0.83 |
| | t-statistic | 6.57 | 7.88 | -10.07 | | |
| | Standard Error | 0.01 | 0.09 | 0.02 | | |
| **Nova Scotia** | Coefficient | 0.07 | 0.56 | -0.16 | 0.97 | 1.60 |
| | t-statistic | 7.93 | 10.37 | -13.02 | | |
| | Standard Error | 0.01 | 0.05 | 0.01 | | |
| **Saskatchewan** | Coefficient | 0.09 | 0.64 | -0.19 | 0.94 | 0.82 |
| | t-statistic | 6.15 | 7.27 | -9.16 | | |
| | Standard Error | 0.01 | 0.09 | 0.02 | | |
| **Alberta** | Coefficient | 0.15 | 0.97 | -0.29 | 0.95 | 0.84 |
| | t-statistic | 7.44 | 7.72 | -9.84 | | |
| | Standard Error | 0.02 | 0.13 | 0.03 | | |
| **Ontario** | Coefficient | 0.09 | 0.73 | -0.22 | 0.97 | 1.57 |
| | t-statistic | 7.05 | 9.52 | -12.35 | | |
| | Standard Error | 0.01 | 0.08 | 0.02 | | |
| **Quebec** | Coefficient | 0.09 | 0.59 | -0.18 | 0.97 | 1.42 |
| | t-statistic | 9.04 | 9.96 | -12.78 | | |
| | Standard Error | 0.01 | 0.06 | 0.01 | | |
| **British Columbia** | Coefficient | 0.13 | 0.93 | -0.27 | 0.95 | 1.04 |
| | t-statistic | 7.72 | 9.01 | -11.09 | | |
| | Standard Error | 0.02 | 0.10 | 0.02 | | |
| **Newfoundland and Labrador** | Coefficient | 0.12 | 0.74 | -0.22 | 0.97 | 1.18 |
| | t-statistic | 9.76 | 9.68 | -12.17 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Standard Error | 0.01 | 0.08 | 0.02 | | |
| **Yukon** | Coefficient | 0.19 | 1.98 | -0.53 | 0.89 | 1.39 |
| | t-statistic | 5.54 | 9.54 | -10.77 | | |
| | Standard Error | 0.03 | 0.21 | 0.05 | | |

Based on the regression model of the endogenous variable (log GDP) on log(P), Dummy variable, and Dummy interact with log(P) (4), the results show that in Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, and Yukon that there is a positive contribution to the oil price elasticity and real GDP in the first period (1976-1997) as seen from the first coefficient **(β)**. However, in the second period (1998-2014) when a price goes up significantly, the rest of the economy will be affected negatively except for Prince Edward Island. That is if oil price rises mildly, it positively impacts real GDP, but if it rises sharply, it negatively impacts the economy in the long run. In addition, R-squared (Goodness of fit) is very high as it ranges around 0.90 which implies that the regression model strongly explains the data. Also, the slope dummy is significant as it is close to one. Moreover, Durbin-Watson test for autocorrelation is close to one that implies oil price and GDP move together.

**Table 10: The effect of real oil price on GDP.**

| **province** | **First Period (1976-1997)** **(β)** | **Second Period (1998-2014)** **(β+δ)** |
|---|---|---|
| **New Brunswick** | 0.07 | -0.10 |
| **Manitoba** | 0.10 | -12.69 |
| **Prince Edward Island** | 0.70 | 0.49 |
| **Nova Scotia** | 0.07 | -0.10 |
| **Saskatchewan** | 0.09 | -0.10 |
| **Alberta** | 0.15 | -0.14 |
| **Ontario** | 0.09 | -0.14 |

| | | |
|---|---|---|
| **Quebec** | 0.09 | -0.09 |
| **British Columbia** | 0.13 | -0.14 |
| **Newfoundland and Labrador** | 0.12 | -0.10 |
| **Yukon** | 0.19 | -0.34 |

Table 10 presents the impact of a change in real oil price on real GDP through calculating the elasticity in two periods based on regression (4). First of all, the elasticity in the first period is equal to the coefficient of log(P). It is smaller than one and positive which means that oil price differential has a small positive impact on GDP. Second, the elasticity in the second period is equal to the sum of the coefficient of log(P) and coefficient of dummy interact with log(P). It is also smaller than one but negative. This implies that the change in oil price will negatively affect real GDP. So real GDP will change by less amount if oil price changes in the long run.

**Section 5.2: The Effect of Oil Price on Supply for Oil (Production of Oil):**

**Table 11: Regression of the endogenous variable (log Pro) on log(P).**

| **province** | **Regression** | **log(p) (β)** | **R-squared** | **Durbin-Watson** |
|---|---|---|---|---|
| **Manitoba** | Coefficient | 0.06 | 0.01 | 0.83 |
| | t-statistic | 0.45 | | |
| | Standard Error | 0.14 | | |
| **Saskatchewan** | Coefficient | 0.16 | 0.22 | 0.13 |
| | t-statistic | 2.68 | | |
| | Standard Error | 0.06 | | |
| **Alberta** | Coefficient | 0.17 | 0.61 | 0.59 |
| | t-statistic | 6.62 | | |
| | Standard Error | 0.03 | | |
| **Ontario** | Coefficient | -0.41 | 0.80 | 1.03 |

| | | | | |
|---|---|---|---|---|
| | t-statistic | -10.57 | | |
| | Standard Error | 0.04 | | |
| **British Columbia** | Coefficient | -0.20 | 0.62 | 0.64 |
| | t-statistic | -6.54 | | |
| | Standard Error | 0.03 | | |
| **Newfoundland and Labrador** | Coefficient | -0.05 | 0.06 | 0.75 |
| | t-statistic | -0.97 | | |
| | Standard Error | 0.05 | | |
| **Northwest Territories** | Coefficient | -0.30 | 0.83 | 1.12 |
| | t-statistic | -11.25 | | |
| | Standard Error | 0.03 | | |

Table 11 shows the regression model (2) to find the relationship between production of oil and real oil price in Manitoba, Saskatchewan, Alberta, Ontario, British Columbia, Newfoundland and Labrador, Northwest Territories. The results show that the coefficients are not significant since their value is less than one. In addition, R-squared is small as it ranges between 0.01 and 0.22 in Manitoba, Saskatchewan, and Newfoundland and Labrador which implies that the data was not well-explained by the regression model. However, it is high in other provinces which means that the model explains that data very well. Moreover, Durbin-Watson ranges between 0.13 and 1.12 and that implies the two variables move together. Lastly, standard error of the regression is less than one which indicates that the model regression is good.

**Table 12: Regression of the endogenous variable (log Pro) on the log(P), Dummy Variable, and Dummy interact with log(P).**

| **province** | **Regression** | **log(p) (β)** | **D (γ)** | **D.log(p) (δ)** | **R-squared** | **Durbin-Watson** |
|---|---|---|---|---|---|---|
| **Manitoba** | Coefficient | 0.06 | -0.22 | 0.06 | 0.01 | 0.84 |
| | t-statistic | 0.31 | -0.11 | 0.12 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Standard Error | 0.20 | 1.90 | 0.48 | | |
| **Saskatchewan** | Coefficient | 0.04 | 0.70 | -0.24 | 0.78 | 0.68 |
| | t-statistic | 0.88 | 1.83 | -2.45 | | |
| | Standard Error | 0.04 | 0.39 | 0.10 | | |
| **Alberta** | Coefficient | 0.18 | 0.90 | -0.24 | 0.77 | 0.67 |
| | t-statistic | 6.25 | 3.37 | -3.58 | | |
| | Standard Error | 0.03 | 0.27 | 0.07 | | |
| **Ontario** | Coefficient | -0.42 | -0.03 | 0.00 | 0.80 | 1.11 |
| | t-statistic | -7.61 | -0.06 | 0.03 | | |
| | Standard Error | 0.05 | 0.52 | 0.13 | | |
| **British Columbia** | Coefficient | -0.28 | -1.09 | 0.26 | 0.78 | 1.40 |
| | t-statistic | -8.70 | -3.77 | 3.62 | | |
| | Standard Error | 0.03 | 0.29 | 0.07 | | |
| **Newfoundland and Labrador** | Coefficient | -0.05 | 0.00 | 0.00 | 0.06 | 0.75 |
| | t-statistic | -0.97 | | | | |
| | Standard Error | 0.05 | | | | |
| **Northwest Territories** | Coefficient | -0.25 | 0.12 | -0.01 | 0.87 | 1.02 |
| | t-statistic | -7.57 | 0.42 | -0.20 | | |
| | Standard Error | 0.03 | 0.30 | 0.07 | | |

Based on the regression model (5) of the endogenous variable (log Pro) on log(P), dummy variable, and dummy interact with log(P), The results show that the coefficient of log price **(β)** in Manitoba, Saskatchewan, and Alberta, is small and positive which implies that there is a positive relationship between the elasticity of oil price and production of oil in the first period (1976-1997) (Table 12). However, in Ontario, British Columbia, Newfoundland and Labrador, and Northwest Territories, (β) is small and negative which means that the relationship between the elasticity of oil price and oil production is negative in the first period (1976-1997). In

addition, R-squared (Goodness of fit) is high in all province except in Manitoba and Newfoundland and Labrador. It ranges around 0.90 which implies that the regression model explains the data except for Manitoba and Newfoundland and Labrador as it is 0.01 and 0.06 respectively. Moreover, Durbin-Watson is approximately one in all province which means the two variables move together. Furthermore, the standard error of the regression is small which implies that the model regression is good. Lastly, it can be noted that in Newfoundland and Labrador, the value of t-statistic and standard error are omitted because of missing data.

**Table 13: The effect of real oil price on production of oil.**

| province | First Period (1976-1997) (β) | Second Period (1998-2014) (β+δ) |
|---|---|---|
| **Manitoba** | 0.06 | 0.12 |
| **Saskatchewan** | 0.04 | -0.20 |
| **Alberta** | 0.18 | -0.06 |
| **Ontario** | -0.42 | -0.41 |
| **British Columbia** | -0.28 | -0.02 |
| **Newfoundland and Labrador** | -0.05 | -0.05 |
| **Northwest Territories** | -0.25 | -0.27 |

Table 13 presents the impact of a change in real oil price on production of oil through calculating the elasticity in two periods based on regression (5). First of all, the elasticity in the first period is equal to the coefficient of log(P). It can be seen that there is a positive contribution to oil price elasticity and production of oil in the first period (1976-1997) in Manitoba, Saskatchewan, and Alberta. On the other hand, the relationship between oil price and production of oil is negative in Ontario, British Columbia, Newfoundland and Labrador, and Northwest Territories. Second, the elasticity in the second period is equal to the sum of the coefficient of log(P) and coefficient of dummy interact with log(P). In the second period (1998-2014) when a price goes up significantly, the rest of the economy will be affected negatively except for Manitoba. That is if oil price rises

mildly, it positively impacts the oil supply, but if it rises sharply, it negatively impacts the amount of oil supplied but not in Manitoba. That is whether oil price rises mildly or sharply, it will positively impact the amount of oil supplied in Manitoba in the long run. The reason behind that is because of the importance of crude oil in Manitoba and the cost of production. Oil price increases lead to more oil produced and more employment. Moreover, the elasticity is smaller than one which implies production of oil will change by less amount if oil price changes.

**Section 5.3: The Effect of Oil Price on Unemployment Rates:**

**Table 14: Regression of the endogenous variable (UR) on log(P).**

| province | Regression | log(p) (β) | R-squared | Durbin-Watson |
|---|---|---|---|---|
| New Brunswick | Coefficient | -1.32 | 0.09 | 0.28 |
| | t-statistic | -1.95 | | |
| | Standard Error | 0.67 | | |
| Manitoba | Coefficient | -1.36 | 0.14 | 0.24 |
| | t-statistic | -2.47 | | |
| | Standard Error | 0.55 | | |
| Prince Edward Island | Coefficient | -3.14 | 0.41 | 0.56 |
| | t-statistic | -5.11 | | |
| | Standard Error | 0.61 | | |
| Nova Scotia | Coefficient | -1.75 | 0.18 | 0.31 |
| | t-statistic | -2.80 | | |
| | Standard Error | 0.63 | | |
| Saskatchewan | Coefficient | -1.87 | 0.33 | 0.27 |
| | t-statistic | -4.28 | | |
| | Standard Error | 0.44 | | |

| | | | | |
|---|---|---|---|---|
| **Alberta** | **Coefficient** | -2.02 | 0.15 | 0.28 |
| | **t-statistic** | -2.55 | | |
| | **Standard Error** | 0.79 | | |
| **Ontario** | **Coefficient** | -0.21 | 0.00 | 0.52 |
| | **t-statistic** | -0.36 | | |
| | **Standard Error** | 0.57 | | |
| **Quebec** | **Coefficient** | -1.58 | 0.13 | 0.27 |
| | **t-statistic** | -2.31 | | |
| | **Standard Error** | 0.68 | | |
| **British Columbia** | **Coefficient** | -1.53 | 0.07 | 0.27 |
| | **t-statistic** | -1.70 | | |
| | **Standard Error** | 0.90 | | |
| **Newfoundland and Labrador** | **Coefficient** | -3.70 | 0.44 | 0.57 |
| | **t-statistic** | -5.43 | | |
| | **Standard Error** | 0.68 | | |

Table 14 presents the regression model (3) to find the relationship between unemployment rate and real oil price in New Brunswick, Manitoba, Prince Edward Island, Nova Scotia, Saskatchewan, Alberta, Ontario, Quebec, British Columbia, and Newfoundland and Labrador. The results show that the coefficients are not significant since their value is less than one and negative. In addition, R-squared is small in New Brunswick, Ontario, and British Columbia which implies that the data was not well-explained by the regression model. However, it is high in other provinces which means that the model explains that data very well. Moreover, Durbin-Watson ranges between 0.24 and 0.57 and that implies the two variables move together. Lastly, standard error of the regression is less than one which indicates that the model regression is good.

**Table 15: Regression of the endogenous variable (UR) on log(P), Dummy Variable, and Dummy interact with log(P).**

| province | Regression | log(p) (β) | D (γ) | D.log(p) (δ) | R-squared | Durbin-Watson |
|---|---|---|---|---|---|---|
| **New Brunswick** | **Coefficient** | -1.50 | -5.26 | 1.89 | 0.67 | 0.77 |
| | **t-statistic** | -2.23 | -1.38 | 2.15 | | |
| | **Standard Error** | 0.67 | 3.82 | 0.88 | | |
| **Manitoba** | **Coefficient** | -0.26 | 5.18 | -0.69 | 0.59 | 0.52 |
| | **t-statistic** | -0.42 | 1.45 | -0.84 | | |
| | **Standard Error** | 0.63 | 3.56 | 0.82 | | |
| **Prince Edward Island** | **Coefficient** | -2.11 | 6.10 | -1.15 | 0.49 | 0.58 |
| | **t-statistic** | -2.25 | 1.14 | -0.93 | | |
| | **Standard Error** | 0.94 | 5.36 | 1.24 | | |
| **Nova Scotia** | **Coefficient** | -1.07 | 1.68 | 0.19 | 0.60 | 0.52 |
| | **t-statistic** | -1.50 | 0.41 | 0.21 | | |
| | **Standard Error** | 0.72 | 4.08 | 0.94 | | |
| **Saskatchewan** | **Coefficient** | -1.40 | 1.87 | -0.16 | 0.49 | 0.33 |
| | **t-statistic** | -2.23 | 0.52 | -0.19 | | |
| | **Standard Error** | 0.63 | 3.58 | 0.83 | | |
| **Alberta** | **Coefficient** | -0.77 | 6.27 | -0.94 | 0.37 | 0.42 |
| | **t-statistic** | -0.69 | 0.99 | -0.64 | | |
| | **Standard Error** | 1.12 | 6.37 | 1.47 | | |
| **Ontario** | **Coefficient** | 0.72 | 5.85 | -1.17 | 0.09 | 0.60 |
| | **t-statistic** | 0.81 | 1.16 | -1.00 | | |
| | **Standard Error** | 0.89 | 5.06 | 1.17 | | |
| **Quebec** | **Coefficient** | -1.75 | -5.21 | 1.88 | 0.66 | 0.62 |
| | **t-statistic** | -2.52 | -1.32 | 2.05 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **Standard Error** | 0.69 | 3.96 | 0.91 | | |
| **British Columbia** | **Coefficient** | -2.08 | -7.99 | 2.53 | 0.42 | 0.43 |
| | **t-statistic** | -1.78 | -1.20 | 1.64 | | |
| | **Standard Error** | 1.17 | 6.65 | 1.54 | | |
| **Newfoundland and Labrador** | **Coefficient** | -4.13 | -5.60 | 1.70 | 0.58 | 0.64 |
| | **t-statistic** | -4.25 | -1.01 | 1.33 | | |
| | **Standard Error** | 0.97 | 5.55 | 1.28 | | |

Based on the regression model (6) of the endogenous variable (UR) on log(P), Dummy variable, and Dummy interact with log(P), the results show that in Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia, there is a negative contribution between the oil price elasticity and unemployment rate in the first period (1976-1997) as seen from the coefficient of log price ($\beta$) except in Ontario. The reason behind that is because Ontario is not a net producer of oil. So as oil price increase, oil production decrease and the marginal product of labor decrease and thus unemployment rates will increase. In addition, R-squared (Goodness of fit) is very high as it ranges between 0.37 and 0.67 which implies that the regression model strongly explains the data except in Ontario. Moreover, Durbin-Watson test for autocorrelation is around 0.60 that implies oil price and unemployment rates move together. Lastly, standard error of the regression is close to one which means the distance between the values and the line of the regression model is far.

**Table 16: The effect of oil price on unemployment rate.**

| **province** | **First Period (1976-1997)** ($\beta$) | **Second Period (1998-2014)** ($\beta+\delta$) |
|---|---|---|
| **New Brunswick** | -1.50 | 0.40 |
| **Manitoba** | -0.26 | -0.95 |
| **Prince Edward Island** | -2.11 | -3.26 |
| **Nova Scotia** | -1.07 | -0.88 |

| | | |
|---|---|---|
| **Saskatchewan** | -1.40 | -1.56 |
| **Alberta** | -0.77 | -1.71 |
| **Ontario** | 0.72 | -0.45 |
| **Quebec** | -1.75 | 0.13 |
| **British Columbia** | -2.08 | 0.45 |
| **Newfoundland and Labrador** | -4.13 | -2.43 |

Table 16 presents the impact of a change in real oil price on unemployment rate through calculating the elasticity in two periods based on regression (6). First of all, the elasticity in the first period is equal to the coefficient of log(P). It can be seen that there is a negative contribution to oil price elasticity and the unemployment rate in the first period (1976-1997) in all provinces except in Ontario since it is not a net producer of crude oil. Second, the elasticity in the second period is equal to the sum of the coefficient of log(P) and coefficient of dummy interact with log(P). In the second period (1998-2014) when a price goes up significantly, the rest of the economy will be affected positively except for New Brunswick, Quebec, and British Columbia. That is if oil price rises mildly, it positively impacts the labor force, as well as if it rises sharply, it positively impacts the employment rate but not in New Brunswick, Quebec, and British Columbia in the long run. The reason behind that is because these provinces do not produce oil as much as Alberta and Saskatchewan. For example, as oil price increase, less oil is produced, which causes employment and a fall in the unemployment rate.

**Section 6: Reference:**

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**Section 7: Appendix:**

**7.1: Tables:**

**Table 17. Crude Oil Production in Alberta (1946-1956).**

| YEAR | PRODUCTION ( Million of Barrels) | Per Cent Change over Previous year |
|---|---|---|
| **1946** | 7.7 | ----- |
| **1948** | 10.5 | 36.4 |
| **1949** | 19.8 | 88.6 |
| **1950** | 27.1 | 37.6 |
| **1951** | 45.8 | 69 |
| **1952** | 58.8 | 28.4 |
| **1953** | 76.7 | 30.4 |
| **1954** | 87.6 | 14.2 |
| **1955** | 112.9 | 28.9 |
| **1956** | 143.7 | 27.3 |
| **change, 1946-56** | 136 | |

**Table 18. Annual Crude Oil and Equivalent Supply and Disposition (cubic meters), Source: Statistics Canada. Table 126-0002.**

| Year | Total supply | Domestic production | Deliveries to refineries | Total exports | Total imports |
|---|---|---|---|---|---|
| **1948** | N/A | 1954.5 | N/A | N/A | N/A |
| **1949** | N/A | 3384.6 | N/A | N/A | N/A |
| **1950** | N/A | 4608.3 | N/A | N/A | N/A |
| **1951** | N/A | 7643.7 | N/A | N/A | N/A |
| **1952** | 22724.1 | 9820.7 | N/A | 222.6 | 12903.4 |
| **1953** | 25584.5 | 12951.2 | N/A | 397.5 | 12633.3 |
| **1954** | 27888.7 | 15366.6 | N/A | 365.7 | 12522.1 |
| **1955** | 34483.6 | 20705.9 | N/A | 2654.1 | 13777.7 |
| **1956** | 44399.4 | 27475.5 | N/A | 6738 | 16923.9 |
| **1957** | 46846.6 | 29064.8 | N/A | 8787.9 | 17781.8 |
| **1958** | 43032.8 | 26506.3 | N/A | 4719.9 | 16526.5 |
| **1959** | 48054.5 | 29732 | N/A | 5355.3 | 18322.5 |
| **1960** | 50914.8 | 30955.8 | N/A | 6563.1 | 19959 |
| **1961** | 57652.6 | 36485.8 | 46751.2 | 10694.7 | 21166.8 |
| **1962** | 63103.2 | 41586.8 | 49119.1 | 13682.3 | 21516.4 |
| **1963** | 67695.6 | 44399.3 | 52774.1 | 14397.4 | 23296.3 |
| **1964** | 70508.5 | 47657.1 | 54172.5 | 16161 | 22851.4 |
| **1965** | 73702.4 | 50787.8 | 56031.7 | 17114.6 | 22914.6 |
| **1966** | 80678.6 | 55475.6 | 60179.1 | 20149.9 | 25203 |
| **1967** | 86494.7 | 60576.6 | 61577.7 | 24058.8 | 25918.1 |
| **1968** | 93788.6 | 65439.1 | 65836.4 | 26887.6 | 28349.5 |
| **1969** | 101575.3 | 71302.9 | 68728.4 | 32211.2 | 30272.4 |
| **1970** | 113286.8 | 80170.1 | 74242.7 | 38853.7 | 33116.7 |
| **1971** | 124426.6 | 85604.8 | 80646.8 | 43350.6 | 38821.8 |
| **1972** | 144655.6 | 98778.4 | 89307.5 | 55364.2 | 45877.2 |
| **1973** | 163756.7 | 113843.2 | 97602.6 | 65788.7 | 49913.5 |
| **1974** | 154524.1 | 106946.5 | 102592.2 | 52535.7 | 47577.6 |
| **1975** | 139157.5 | 91405 | 98778.3 | 40903.4 | 47752.5 |
| **1976** | 125475.3 | 83554.7 | 98635.4 | 27268.7 | 41920.6 |
| **1977** | 122996.3 | 84158.8 | 104324.4 | 18942.1 | 38837.5 |
| **1978** | 118626.2 | 82919.1 | 103927.1 | 15430.1 | 35707.1 |
| **1979** | 128927.3 | 93487.6 | 112923.6 | 16749.6 | 35439.7 |
| **1980** | 121602.1 | 89425.5 | 109833.7 | 11939.1 | 32176.6 |
| **1981** | 109853.6 | 80328.7 | 101081.7 | 9462.3 | 29524.9 |
| **1982** | 98917.5 | 79255.4 | 86247.9 | 12397.2 | 19662.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **1983** | 98285.8 | 83933.3 | 81706.4 | 16954.6 | 14352.5 | |
| **1984** | 103317.9 | 89088.2 | 82645.2 | 20672.9 | 14229.7 | |
| **1985** | 107569.6 | 91134.8 | 79771.2 | 28300.4 | 16434.8 | |
| **1986** | 112004.2 | 91426.9 | 78204.6 | 33957 | 20577.3 | |
| **1987** | 118925.6 | 95453.2 | 81811.2 | 36024 | 23472.4 | |
| **1988** | 126410.4 | 100376.7 | 85972.1 | 41284.2 | 26033.7 | |
| **1989** | 125513.9 | 97267.4 | 87789.4 | 37547.9 | 28246.5 | |
| **1990** | 127909.4 | 96741.7 | 90207 | 37975.8 | 31167.7 | |
| **1991** | 128290.5 | 96748.3 | 84359.4 | 44239.9 | 31542.2 | |
| **1992** | 130726.3 | 100883.8 | 81363.8 | 48725.1 | 29763.3 | |
| **1993** | 140158.2 | 105779.6 | 86300.4 | 53284.8 | 34378.6 | |
| **1994** | 146542.1 | 110451.5 | 89537.6 | 57001.1 | 36090.6 | |
| **1995** | 148623.7 | 114360.5 | 87644 | 61373.8 | 34263.2 | |
| **1996** | 157351.7 | 117620.5 | 92687 | 65258.1 | 39731.2 | |
| **1997** | 168016.8 | 123826.7 | 96431.1 | 70711.3 | 44190.1 | |
| **1998** | 173088.1 | 128400.2 | 95434.8 | 77376.1 | 44687.9 | |
| **1999** | 169969.6 | 122287 | 96946.5 | 72823.6 | 47682.6 | |
| **2000** | 180806.8 | 127769.2 | 100564 | 80316.5 | 53037.6 | |
| **2001** | 182468.4 | 128951 | 103076.2 | 79571.2 | 53517.4 | |
| **2002** | 188043.2 | 136969.8 | 104173.3 | 84917 | 51073.4 | |
| **2003** | 197465.8 | 144813.2 | 105895.1 | 89512.4 | 52652.6 | |
| **2004** | 203434 | 149159.6 | 110414.1 | 94149.7 | 54274.4 | |
| **2005** | 200004.8 | 146207.9 | 107375.2 | 91641.6 | 53796.9 | |
| **2006** | 203402.2 | 154099.1 | 103349 | 102770.5 | 49303.1 | |
| **2007** | 209425.6 | 159569.1 | 107994.8 | 106231.3 | 49856.5 | |
| **2008** | 207259 | 158016 | 103576.4 | 108693 | 49243 | |
| **2009** | 203805.3 | 156955 | 99905.1 | 108574.9 | 46850.3 | |
| **2010** | 210049.9 | 165335.5 | 100801.7 | 113093.4 | 44714.4 | |
| **2011** | 214753.4 | 175337.1 | 95818.9 | 128645.2 | 39416.3 | |
| **2012** | 231836.4 | 189133.5 | 100839.2 | 139286.8 | 42702.9 | |
| **2013** | 239965.6 | 202293.7 | 95237.9 | 152027.9 | 37671.9 | |
| **2014** | 249478 | 218015.7 | 90801.3 | 165411 | 31462.3 | |

**Table 19. Annual Gross Domestic Product by Province (dollars x 1,000,000), Statistics Canada: Table 384-0038.**

| year | Newfoundland and Labrador | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia | Yukon |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1981 | 13719 | 2328 | 19336 | 15386 | 178261 | 280993 | 29132 | 30811 | 107829 | 97206 | 682 |
| 1982 | 13767 | 2336 | 20376 | 15609 | 171823 | 272745 | 28467 | 29998 | 105163 | 90777 | 665 |
| 1983 | 14271 | 2575 | 20983 | 17163 | 175229 | 286618 | 28636 | 30668 | 104191 | 91979 | 603 |
| 1984 | 14787 | 2634 | 22765 | 17435 | 183683 | 312640 | 30997 | 31386 | 109687 | 92380 | 633 |
| 1985 | 15027 | 2637 | 23692 | 17748 | 189140 | 329738 | 32981 | 32526 | 119286 | 99717 | 687 |
| 1986 | 15279 | 2789 | 24292 | 18797 | 194416 | 340759 | 33213 | 35341 | 117301 | 101959 | 959 |
| 1987 | 15922 | 2779 | 24961 | 19689 | 202513 | 356435 | 33895 | 35418 | 119246 | 108362 | 1254 |
| 1988 | 16808 | 2888 | 25279 | 19781 | 210608 | 372851 | 33754 | 33876 | 129202 | 114636 | 1290 |
| 1989 | 17492 | 2943 | 26028 | 19943 | 211810 | 384656 | 34729 | 34873 | 130734 | 118635 | 1323 |
| 1990 | 17388 | 2976 | 25695 | 19584 | 212952 | 379787 | 36016 | 37793 | 133676 | 120431 | 1354 |
| 1991 | 17448 | 2988 | 25427 | 19595 | 207724 | 366953 | 34673 | 38520 | 134818 | 120430 | 1307 |
| 1992 | 16987 | 3012 | 25651 | 19866 | 208328 | 370827 | 35048 | 36625 | 137257 | 123281 | 1566 |
| 1993 | 17242 | 3060 | 25775 | 20409 | 212146 | 376974 | 34949 | 38333 | 147331 | 128930 | 1260 |
| 1994 | 18001 | 3237 | 25777 | 20852 | 221628 | 398037 | 36278 | 40012 | 155640 | 132638 | 1249 |
| 1995 | 18547 | 3429 | 26032 | 21485 | 226271 | 411080 | 36372 | 40530 | 160197 | 135729 | 1422 |
| 1996 | 17670 | 3548 | 26063 | 21805 | 229741 | 417309 | 37114 | 41267 | 164296 | 139152 | 1566 |
| 1997 | 17906 | 3615 | 26993 | 21968 | 236228 | 438769 | 38800 | 43357 | 176491 | 144414 | 1464 |
| 1998 | 19032 | 3749 | 28038 | 22712 | 243482 | 459367 | 40774 | 46003 | 185661 | 146049 | 1398 |
| 1999 | 20227 | 3908 | 29505 | 24091 | 258287 | 491222 | 41388 | 46155 | 188012 | 150835 | 1395 |
| 2000 | 21279 | 4015 | 30266 | 24634 | 269554 | 522569 | 43135 | 46934 | 200067 | 157647 | 1442 |
| 2001 | 21637 | 3957 | 31213 | 25133 | 273985 | 530526 | 43539 | 45880 | 205628 | 160226 | 1490 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2002 | 24117 | 4109 | 32357 | 26130 | 281930 | 547988 | 44476 | 45906 | 210396 | 165378 | 1496 |
| 2003 | 25696 | 4222 | 32775 | 26778 | 285228 | 554668 | 45137 | 48232 | 217919 | 169048 | 1482 |
| 2004 | 25511 | 4364 | 33082 | 27450 | 292297 | 569115 | 45977 | 50597 | 230247 | 175617 | 1555 |
| 2005 | 26186 | 4510 | 33491 | 27587 | 296564 | 586743 | 47040 | 52161 | 242118 | 183872 | 1581 |
| 2006 | 26744 | 4635 | 33594 | 27963 | 300400 | 596231 | 49010 | 50617 | 257734 | 192253 | 1685 |
| 2007 | 29065 | 4630 | 33938 | 28284 | 306083 | 601844 | 49720 | 52402 | 260984 | 198330 | 1814 |
| 2008 | 28670 | 4644 | 34595 | 28548 | 311988 | 601883 | 51611 | 54178 | 264382 | 200261 | 1995 |
| 2009 | 25917 | 4698 | 34731 | 28502 | 310195 | 579552 | 50493 | 52742 | 249037 | 194896 | 2133 |
| 2010 | 27141 | 4815 | 35845 | 29076 | 314792 | 596967 | 52095 | 55035 | 259811 | 199836 | 2211 |
| 2011 | 28234 | 4910 | 36023 | 29231 | 321727 | 611505 | 53557 | 57206 | 275258 | 207339 | 2310 |
| 2012 | 27411 | 4966 | 35300 | 29015 | 324925 | 618225 | 54975 | 57812 | 286233 | 212125 | 2427 |
| 2013 | 28193 | 5086 | 35316 | 28596 | 328360 | 625388 | 56256 | 59941 | 296686 | 217594 | 2420 |
| 2014 | 27653 | 5149 | 35788 | 28085 | 332892 | 642265 | 57435 | 61202 | 309851 | 224546 | 2364 |

**Table 20. Real Crude Oil Price 1976-2014, source: BP Statistical Review of World Energy June 2015, (US dollar per barrel).**

| Year | Real Oil Price |
|---|---|
| **1976** | 0.60 |
| **1977** | 0.66 |
| **1978** | 0.66 |
| **1979** | 1.37 |
| **1980** | 1.40 |
| **1981** | 1.27 |
| **1982** | 1.13 |
| **1983** | 0.98 |
| **1984** | 0.96 |
| **1985** | 0.94 |
| **1986** | 0.49 |
| **1987** | 0.58 |
| **1988** | 0.42 |
| **1989** | 0.47 |
| **1990** | 0.57 |
| **1991** | 0.45 |
| **1992** | 0.45 |
| **1993** | 0.41 |
| **1994** | 0.39 |
| **1995** | 0.41 |
| **1996** | 0.48 |
| **1997** | 0.44 |
| **1998** | 0.31 |
| **1999** | 0.43 |
| **2000** | 0.66 |
| **2001** | 0.58 |
| **2002** | 0.59 |
| **2003** | 0.58 |
| **2004** | 0.70 |
| **2005** | 0.91 |
| **2006** | 0.98 |
| **2007** | 1.00 |
| **2008** | 1.30 |
| **2009** | 0.88 |
| **2010** | 1.01 |
| **2011** | 1.31 |
| **2012** | 1.30 |
| **2013** | 1.30 |
| **2014** | 1.24 |

**Table 21: Annual Foreign Exchange Rates in Canadian Dollars, Bank of Canada, (closing spot rate) 1976-2014, source: Table 176-0064, Cansim.**

| year | United States dollar, closing spot rate |
|---|---|
| **1976** | 0.99 |
| **1977** | 1.07 |
| **1978** | 1.14 |
| **1979** | 1.17 |
| **1980** | 1.17 |
| **1981** | 1.20 |
| **1982** | 1.24 |
| **1983** | 1.23 |
| **1984** | 1.30 |
| **1985** | 1.37 |
| **1986** | 1.39 |
| **1987** | 1.32 |
| **1988** | 1.23 |
| **1989** | 1.18 |
| **1990** | 1.17 |
| **1991** | 1.15 |
| **1992** | 1.21 |
| **1993** | 1.29 |
| **1994** | 1.37 |
| **1995** | 1.37 |
| **1996** | 1.36 |
| **1997** | 1.39 |
| **1998** | 1.49 |
| **1999** | 1.48 |
| **2000** | 1.49 |
| **2001** | 1.55 |
| **2002** | 1.57 |
| **2003** | 1.39 |
| **2004** | 1.30 |
| **2005** | 1.21 |
| **2006** | 1.13 |
| **2007** | 1.07 |
| **2008** | 1.07 |
| **2009** | 1.14 |
| **2010** | 1.04 |
| **2011** | 0.99 |
| **2012** | 1.00 |
| **2013** | 1.03 |
| **2014** | 1.11 |

**Table 22: Unemployment Rate by Province, Statistics Canada: Table 282-0002 – (Labour force survey estimates).**

| year | UR-Newfoundland and Labrador | UR-Prince Edward Island | UR-Nova Scotia | UR-New Brunswick | UR-Quebec | UR-Ontario | UR-Manitoba | UR-Saskatchewan | UR-Alberta | UR-British Columbia |
|---|---|---|---|---|---|---|---|---|---|---|
| **1976** | 13.5 | 9.3 | 9.3 | 11.1 | 8.8 | 6.2 | 4.7 | 3.9 | 4 | 8.5 |
| **1977** | 15.6 | 9.8 | 10.5 | 13.4 | 10.5 | 7 | 5.7 | 4.5 | 4.5 | 8.4 |
| **1978** | 16 | 9.9 | 10.7 | 12.6 | 11.1 | 7.3 | 6.6 | 5 | 4.8 | 8.3 |
| **1979** | 14.9 | 11.9 | 10.1 | 11 | 9.8 | 6.7 | 5.6 | 4.3 | 4 | 7.8 |
| **1980** | 13.3 | 10.7 | 9.8 | 11.3 | 10.1 | 7 | 5.6 | 4.4 | 3.9 | 6.8 |
| **1981** | 13.5 | 11.6 | 10.1 | 11.7 | 10.6 | 6.7 | 6 | 4.6 | 3.9 | 6.9 |
| **1982** | 16.3 | 12.9 | 13 | 14.2 | 14.1 | 9.9 | 8.6 | 6.4 | 7.8 | 12.3 |
| **1983** | 18.2 | 12.5 | 13.6 | 15.1 | 14.3 | 10.5 | 9.7 | 7.9 | 11.1 | 14 |
| **1984** | 20.3 | 12.8 | 13.2 | 14.8 | 13.2 | 9.1 | 8.7 | 8.3 | 11.4 | 15.1 |
| **1985** | 20.3 | 13.8 | 13.5 | 15.3 | 12.3 | 8 | 8.4 | 8.3 | 9.9 | 14.4 |
| **1986** | 18.9 | 13.3 | 13.4 | 14.5 | 11.1 | 7.1 | 7.8 | 7.9 | 10 | 12.9 |
| **1987** | 17.9 | 12.6 | 12.1 | 13.3 | 10.2 | 6.2 | 7.6 | 7.5 | 9.7 | 12.2 |
| **1988** | 16.2 | 12.5 | 10.3 | 11.8 | 9.6 | 5.1 | 7.9 | 7.5 | 8.1 | 10.3 |
| **1989** | 15.5 | 13.9 | 9.9 | 12.1 | 9.7 | 5.1 | 7.6 | 7.5 | 7.3 | 9.2 |
| **1990** | 17.1 | 14.7 | 10.8 | 12.2 | 10.5 | 6.2 | 7.5 | 7.2 | 7 | 8.5 |
| **1991** | 18.1 | 16.8 | 12.1 | 12.8 | 12.2 | 9.6 | 8.7 | 7.6 | 8.3 | 10 |
| **1992** | 20.1 | 17.9 | 13.2 | 13.1 | 12.8 | 10.9 | 9.3 | 8.2 | 9.6 | 10.2 |
| **1993** | 20.2 | 17.2 | 14.4 | 12.7 | 13.3 | 11 | 9.4 | 8.5 | 9.7 | 9.8 |
| **1994** | 20 | 16.7 | 13.6 | 12.6 | 12.4 | 9.7 | 8.8 | 7.1 | 8.9 | 9.2 |
| **1995** | 18.1 | 15 | 12.2 | 11.5 | 11.5 | 8.8 | 7.3 | 7 | 7.9 | 8.5 |
| **1996** | 19 | 14.9 | 12.5 | 11.7 | 11.9 | 9.1 | 7.3 | 6.8 | 7 | 8.7 |
| **1997** | 18.2 | 15.5 | 12.2 | 12.7 | 11.5 | 8.5 | 6.6 | 6.1 | 5.9 | 8.5 |
| **1998** | 17.8 | 14.1 | 10.5 | 12.2 | 10.4 | 7.3 | 5.6 | 6 | 5.7 | 8.9 |
| **1999** | 16.8 | 14.4 | 9.7 | 10.2 | 9.4 | 6.4 | 5.7 | 6.2 | 5.8 | 8.3 |
| **2000** | 16.7 | 12.2 | 9.1 | 10.1 | 8.5 | 5.8 | 5 | 5.3 | 5 | 7.2 |
| **2001** | 16 | 12 | 9.8 | 11.1 | 8.8 | 6.4 | 5.1 | 5.9 | 4.7 | 7.7 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **2002** | 16.8 | 12 | 9.7 | 10.2 | 8.8 | 7.2 | 5.1 | 5.8 | 5.4 | 8.6 |
| **2003** | 16.5 | 10.9 | 9.2 | 10.3 | 9.2 | 7 | 5 | 5.7 | 5.1 | 8.1 |
| **2004** | 15.7 | 11.4 | 8.9 | 9.9 | 8.6 | 6.8 | 5.4 | 5.4 | 4.7 | 7.3 |
| **2005** | 15.2 | 11.1 | 8.4 | 9.7 | 8.3 | 6.7 | 4.8 | 5.2 | 4 | 5.9 |
| **2006** | 14.8 | 11.1 | 8 | 8.8 | 8.1 | 6.3 | 4.4 | 4.8 | 3.5 | 4.8 |
| **2007** | 13.6 | 10.2 | 8.1 | 7.5 | 7.3 | 6.4 | 4.5 | 4.3 | 3.6 | 4.3 |
| **2008** | 13.4 | 10.8 | 7.7 | 8.6 | 7.3 | 6.7 | 4.2 | 4.1 | 3.6 | 4.6 |
| **2009** | 15.5 | 12 | 9.4 | 8.7 | 8.7 | 9.3 | 5.3 | 5 | 6.6 | 7.8 |
| **2010** | 14.7 | 11.5 | 9.7 | 9.3 | 8.1 | 8.8 | 5.5 | 5.3 | 6.6 | 7.7 |
| **2011** | 12.6 | 11.1 | 9.1 | 9.6 | 7.9 | 8 | 5.6 | 5 | 5.5 | 7.7 |
| **2012** | 12.3 | 11.1 | 9.2 | 10.2 | 7.8 | 8 | 5.4 | 4.8 | 4.6 | 6.9 |
| **2013** | 11.5 | 11.3 | 9.1 | 10.3 | 7.6 | 7.7 | 5.4 | 4.2 | 4.6 | 6.7 |
| **2014** | 11.9 | 10.5 | 9 | 10 | 7.8 | 7.5 | 5.5 | 3.9 | 4.8 | 6.1 |
| **2015** | 12.7 | 10.4 | 8.7 | 10 | 7.6 | 6.9 | 5.7 | 5.1 | 6.1 | 6.2 |

**Table 23: Annual Crude Oil Production by Province (cubic meters), Statistics Canada Table 126-0001.**

| year | Newfoundland and Labrador | Ontario | Manitoba | Saskatchewan | Alberta | British Columbia | Northwest Territories |
|---|---|---|---|---|---|---|---|
| **1985** | | 112.3 | 820.5 | 11479.6 | 69763 | 1951.7 | 1008.6 |
| **1986** | | 135.5 | 823 | 11687.6 | 69212.8 | 2019.2 | 1490.5 |
| **1987** | | 135.5 | 781.4 | 12085.2 | 72373.3 | 2083.3 | 1573.8 |
| **1988** | | 190.6 | 768.8 | 12249.3 | 76728.7 | 1881.9 | 1833.1 |
| **1989** | | 243.6 | 722.4 | 11702.9 | 73845.8 | 1965.2 | 1884.5 |
| **1990** | | 247.2 | 737.5 | 12249.2 | 72919.4 | 1912.9 | 1928.8 |
| **1991** | | 235 | 712.8 | 12390.2 | 72385.9 | 2014.5 | 1918.5 |
| **1992** | | 224.3 | 656.4 | 13345.2 | 74312.5 | 2032.8 | 1899 |
| **1993** | | 253.4 | 634.7 | 14939.2 | 76355.7 | 2004.4 | 1837.8 |
| **1994** | | 263.1 | 657.9 | 17184 | 78197.5 | 1986.9 | 1779.3 |
| **1995** | | 285.4 | 642.6 | 18741.6 | 80345.1 | 2038.5 | 1745.9 |
| **1996** | | 267.9 | 616.1 | 20918.9 | 80597.1 | 2239.4 | 1656.3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **1997** | | 220.6 | 636.8 | 23449.3 | 83422 | 2561.1 | 1599.9 |
| **1998** | 3783.9 | 218.6 | 633.7 | 23153.4 | 84010.6 | 2763.7 | 1561.7 |
| **1999** | 5785.8 | 238.3 | 581.1 | 21699.5 | 78479.6 | 2347.6 | 1549.2 |
| **2000** | 8394.2 | 231.2 | 620.8 | 24234.6 | 78892.8 | 2552.3 | 1434.2 |
| **2001** | 8632.8 | 247.5 | 642.9 | 24750 | 79949.7 | 2495.6 | 1432.1 |
| **2002** | 16587.3 | 218 | 650.8 | 24415.9 | 81204.9 | 2423.7 | 1376 |
| **2003** | 19550 | 195.2 | 633 | 24331.4 | 86585.7 | 2168.2 | 1284.3 |
| **2004** | 18249.2 | 155.1 | 637.4 | 24584.1 | 92405.1 | 2019 | 1235.4 |
| **2005** | 17677.6 | 139.2 | 811.9 | 24292.8 | 90400.1 | 1765.7 | 1089.6 |
| **2006** | 17620.4 | 125 | 1240.6 | 24838.2 | 97210 | 1670.6 | 1082.8 |
| **2007** | 21380.6 | 109.4 | 1289.1 | 24822.3 | 99441.9 | 1529.2 | 1016.9 |
| **2008** | 19912.4 | 98.4 | 1364.7 | 25574.3 | 99180.1 | 1341.8 | 941.6 |
| **2009** | 15531 | 91.3 | 1520.3 | 24590.3 | 104091 | 1272.5 | 901.3 |
| **2010** | 16008.7 | 83.3 | 1849.5 | 24511.3 | 112137.6 | 1261.9 | 872.5 |
| **2011** | 15464.7 | 77.7 | 2360 | 25083.4 | 122008.7 | 1157.9 | 609 |
| **2012** | 11475.9 | 81 | 2963.3 | 27310.7 | 136883.1 | 1217.4 | 756.4 |
| **2013** | 13288.9 | 77.4 | 0 | 0 | 146725.8 | 0 | 0 |
| **2014** | 12534.7 | 69.7 | 0 | 0 | 159857.4 | 0 | 0 |

**7.2: Figures:**

**Figure 16. Annual Crude Oil and Equivalent Supply and Disposition (cubic meters), Source: Statistics Canada. Table 126-0002.**