The impact of fossil fuels subsidies in Canada during the time period 2016-2022

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Introduction

According to the International Institute for Sustainable Development , Fossil fuel subsidies are financial benefits from the government given to fossil fuel producers or consumers (*Corkal & Gass, 2020*). The Canadian's government subsidies to the fossil fuel industry have declined recently due to concerns over climate change, but their inconsistency to mitigate this externality still persist. These subsidies include tax breaks, crown royalty reductions, direct subsidies, and research and infrastructure support. It was approximated that the total amount of subsidies for the oil and gas sector for the year 2020 was approximately $18 billion (*Paying Polluter: Federal Financial Support to Oil and Gas in 2020, 2021*).

This paper seeks to explore the extent to which fossil fuel subsidies from the Canadian government has impacted Canadian stakeholders and the economy in the past six years. It will be evaluating the advantages and disadvantages in a balanced manner, to finish off with a conclusion of the findings.

This question is worthwhile researching because it has relevance to real-world dynamics.
It it is an economic and climate issue that spans time periods and continents, affecting firms, consumers, governments, institutions, and economies. In light of fossil fuel subsidies, it is important to acknowledge where our world is headed and what we can do to reduce its impacts while maximizing benefits for future generations.

Fossil fuel subsidies is a controversial topic in the Canadian market. Professor Mark Jaccard, and Nicholas Rivers, two Canadian economists argue that Canada should reduce their grants to this industry because of the environmental consequences that arise from promoting the fossil fuel industry, the opportunity costs created, the distortion of the energy market, the health impacts, and the international climate commitments (*Green & Meadowcraft, 2007*). On the other hand, The Canadian Climate Institute expresses arguments that demonstrate the positive effects for employment, economic growth and international competitiveness (*Arnold & Beugin & Hastings-Simon & Smith & Nicholson, 2023*).

The Canadian government has set climate objectives by signing the COP 26 statement in support of ending support to the fossil fuel industry by the end of 2022 and diverting funds to clean energy in 2023 (*Onifande, 2022*). Nevertheless, the governments still continues to subsidize companies to carry out these activities. "At the provincial level, there have been very few efforts to reform subsidies. At the federal level, Canada committed to phasing out "inefficient" fossil fuel subsidies way back in 2009, as part of the G20. In 2021, they moved up their deadline to complete this to 2023." (*Corkal & Gass, 2020*).

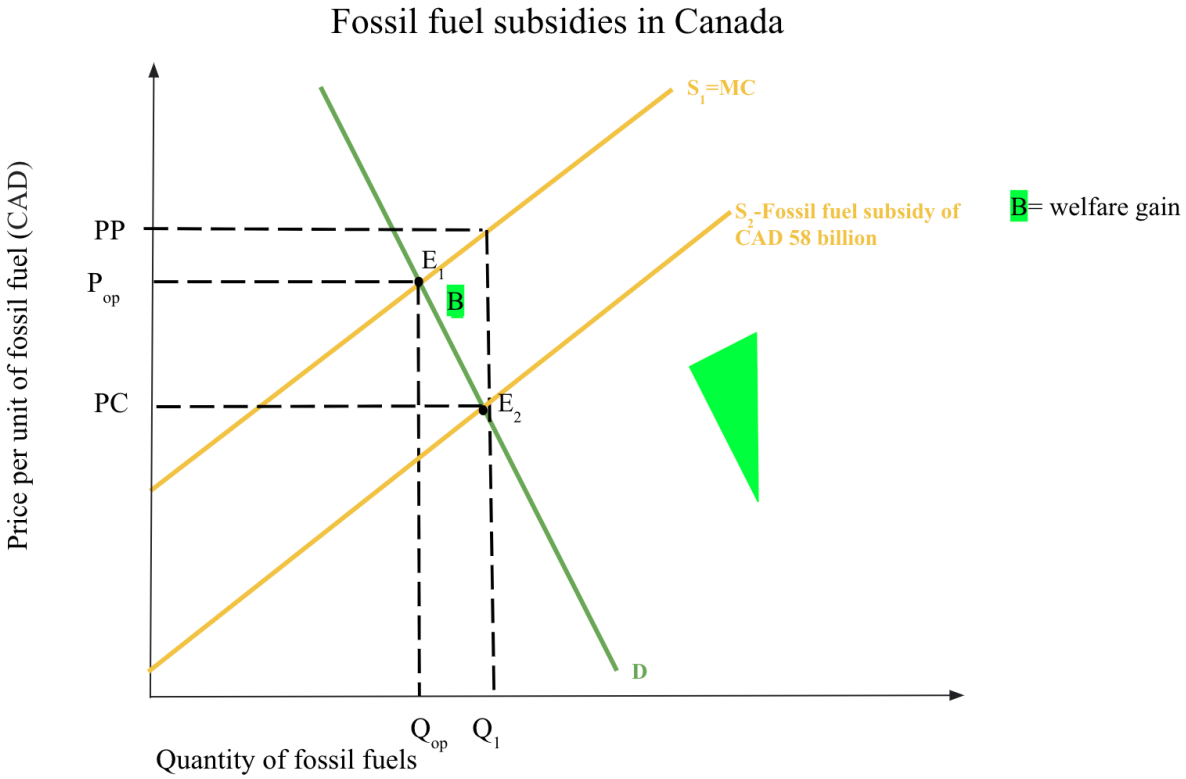
Hypothesis

The expected results to the question will most likely have positive and negative outcomes. I anticipate that from an environmental and social perspective, the subsidies will have shown a negative effect on society because of the spillover costs such as pollution and social inequality created by producers . On the other hand, from a development point of view, the outcomes will be seen as beneficial to the potential economic growth, and employment of the country. Canada's government has benefited from this by gaining revenue that has allowed them to invest into different social sectors.

Subsidy

A subsidy is an amount of money paid by the government to a firm per unit of output *(Blink & Dorton, 2020)*. In the fiscal year 2020-2021, the government allocated at least $44.02 billion or CAD 58 billion (June 2023 exchange rate) to the fossil fuel industry. (*Canada—Energy Policy Tracker*, 2022).

Figure 1



Note: Figure 1 showcases the effect of a government subsidy on the fossil fuel demand and supply in Canada

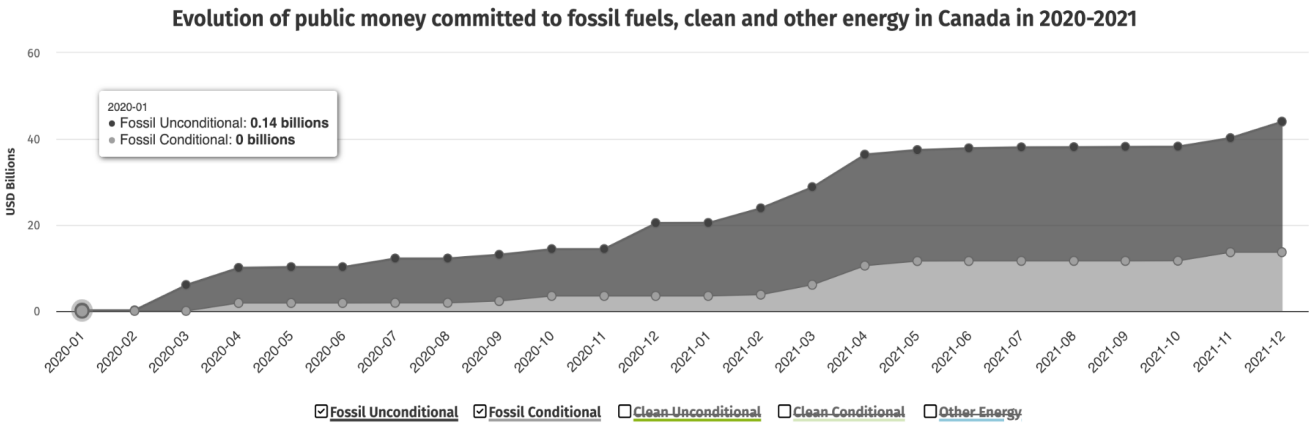
As seen in the diagram above, the CAD 58 billion has caused an outward shift of the supply curve from 'S_1' to 'S_2-Subsidy', which resulted in a shift of the equilibrium point in the energy market from 'E' to 'E_1'. Consequently, the quantity supplied of fossil fuels has risen from 'Q_{op}' to 'Q_1'. According to statistics from 2021, energy consumption increased in urban transportation (14.6%), and mining, oil and gas extraction (6.2%) *(Energy supply and demand 2021, 2022)*. That same year energy consumption increased in Canada by 2.8%, and the prime sector production increased by 4.5% *(Energy Supply and Demand, 2021, 2022)*. The new price for consumers lies at PC because it is cheaper for them to purchase more of this good in the form of energy. This effectively increases consumer surplus, allowing more consumer to be willing and able to consume at the new price. At point PP, producers receive a higher price for their product since their production costs have decreased, explaining the increases in producer surplus, as more producers are willing and able to produce at the new higher price *(Blink & Dorton, 2020)*. This is further explained by the $19 paid to producers per tonne of carbon

dioxide emitted in 2016 which was encouraged by Canada's government subsidies to Oil and Gas Companies *(Milman, 2016)*.

Although at first glance, it may seem that these subsidies have been effective in lowering prices, the emphasis has been placed on exploration and infrastructure of fossil fuels, suggesting that the implementation of subsidies in the fossil fuel industry have only been allocated to improve producer's surplus. This demonstrates that consumer are not better off with the implementation of the subsidy, instead they are negatively affected through continued price surges and pollution. As of April 2022, Canada had the highest gasoline prices in USD per liter in the world *(Inefficient Fossil Fuel Subsidies and Canada's G20 Commitment, 2022).* In an interview between CBC news and Joshua Buck, a senior Alberta program manager, Joshua argued that "Companies receiving subsidies for investments in growth which are job creators, allow research opportunities and innovation grants,". (*Joshua Buck on why subsidies are increasing in Alberta for fossil fuel companies, 2018*).

Lastly, government subsidies towards the fossil fuel industry could potentially lead to inflation in the long-term. Because firms are expanding production levels and investing into R&D, they will need employees. This could lead to a rise in wages, increasing cost of production for the firms, which is passed onto consumers in the form of an increase in price.

Figure 2



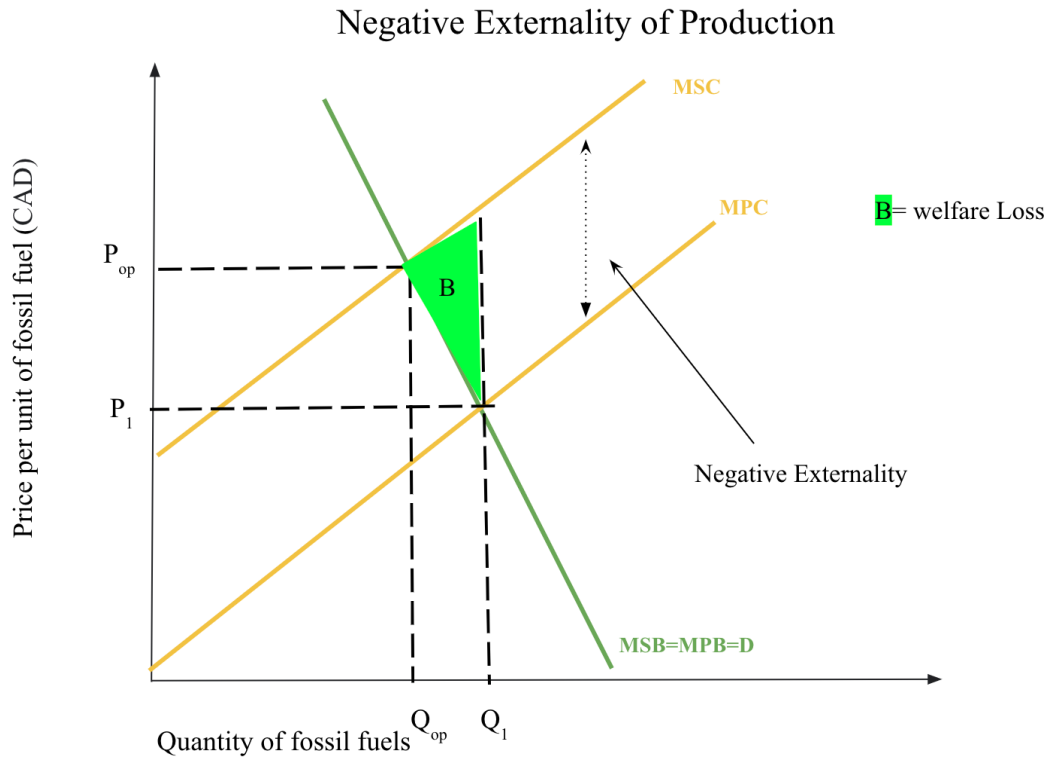
Note: Analysis of public money that has gone to unconditional and conditional fossil fuels in Canada between the years of 2020 and 2021. Figures are shown in months pear year (1-12).

As seen in figure 2, there is a clear correlation between the increase in total subsidies and the increase in total expenditures. The statistics demonstrate a clear preference for unconditioned fossil fuels over conditional fossil fuels. The term 'unconditional fossil fuels' refers to those fuels that are utilized for production or consumption without any regard to climate change or pollution targets (*Methodology, 2022)*. In contrast, conditional fossil fuels are those that have pollution limits (*Methodology, 2022)*. The area shown by the spending of unconditional fossil fuels is greater than that of the conditional fossil fuels. At least $30.36 billion were distributed to unconditional fossil fuels, in contrast to the $13.66 billion allocated to conditional fossil fuels. One of the reasons the Canadian government prefers spending on unconditional fossil fuels is because they are a significant contributor to the industry. By providing subsidies to producers

with no restriction, the government aims to drive economic growth without being limited by any policies that may disturb industry revenue or expansion, effectively showing Canada's reliance on fossil fuels.

Negative Externality

Figure 3



Note: Figure 3 showcases a negative externality of production and it's effects on producers and consumers in Canada's fossil fuel industry.

A negative externality of production occurs when the production of a service or good create external costs to third parties that are damaging. This may occur due to the absence of any government intervention and because profit-maximizing producers only take into account their private costs, and are not concerned with the impact on other members of society . For this reason, MSC>MPC, as the costs to society of the economic activity is greater than the private costs. Because there is an extra cost to society, the firm will produce a quantity of fossil fuels of Q_1. At current output levels, producers are not producing at the socially efficient level of output of Q_{op} where the marginal social cost is equal to the marginal private cost, and so a market failure is created *(Blink & Dorton, 2020)*. This creates a missalocation of society's resources: too many fossil fuels are being produced at a low price of P_1, thus creating a welfare loss labeled as B in the diagram above. The optimal level in the fossil fuel industry only occurs if firms decrease supply from Q1 to Q_{op} and increase prices from P_1 to P_{op}.

As seen in figure 3, the gap between MSC and MPC demonstrates the presence of a negative externality of production, also known as spill over costs, which shows the external costs burdened by members of society. Firstly, the production of fossil fuels leads to air pollution which contaminates its surroundings. These fine-air particles such as sulfur oxide, and nitrogen oxide when inhaled cause serious health problems to its citizens, including respiratory, cardiovascular

problems and certain types of cancer *(Health impacts of air pollution in Canada, 2021)*. In the year 2016, it is estimated that there were 15,300 premature deaths attribute to above concentrations of particulate matter, specifically putting at risk older generations and young children *(Health impacts of air pollution in Canada, 2021)*. Based on these contamination levels, 42 deaths per 100,000 people were reported, and the total monetary costs due to pollution was estimated at CAD 120 billion per year, representing 6% of Canada's total GDP in 2016 *(Health impacts of air pollution in Canada, 2021).* This loss of potential economic growth is burdened by Canada's loss of government revenue, loss of potential investment for business, and a loss of increase spending for consumers, demonstrating health and monetary limitations generated by spillover costs. "According to the Canadian Medical Association, the burning of fossil fuels is responsible for annual health-related costs of CAD 53.5 billion in Canada." *(Buchman, 2019)*.

Additionally, total subsidies of at least CAD 4.8 billion to the fossil fuel industry in 2018 and 2019 represent an opportunity cost for other industries *(Corkal & Gass, 2020)*. Canada's subsidies could have instead been allocated to pay education for nearly 360,000 students, provided job training for 480,000 workers, helped reduce any structural unemployment in the country, and would have covered annual health cost cares for 880,000 people *(Corkal & Gass, 2020).* It is clear how the associated economic costs due to fossil fuel production have resulted in a loss of labor productivity as sick workers cannot contribute to the economy. Moreover, there is an increase in medical care needs, a decrease in quality of life and a higher risk of premature deaths. This effectively creates a market failure in the Canadian economy, leading to a loss in consumer and producer surplus.

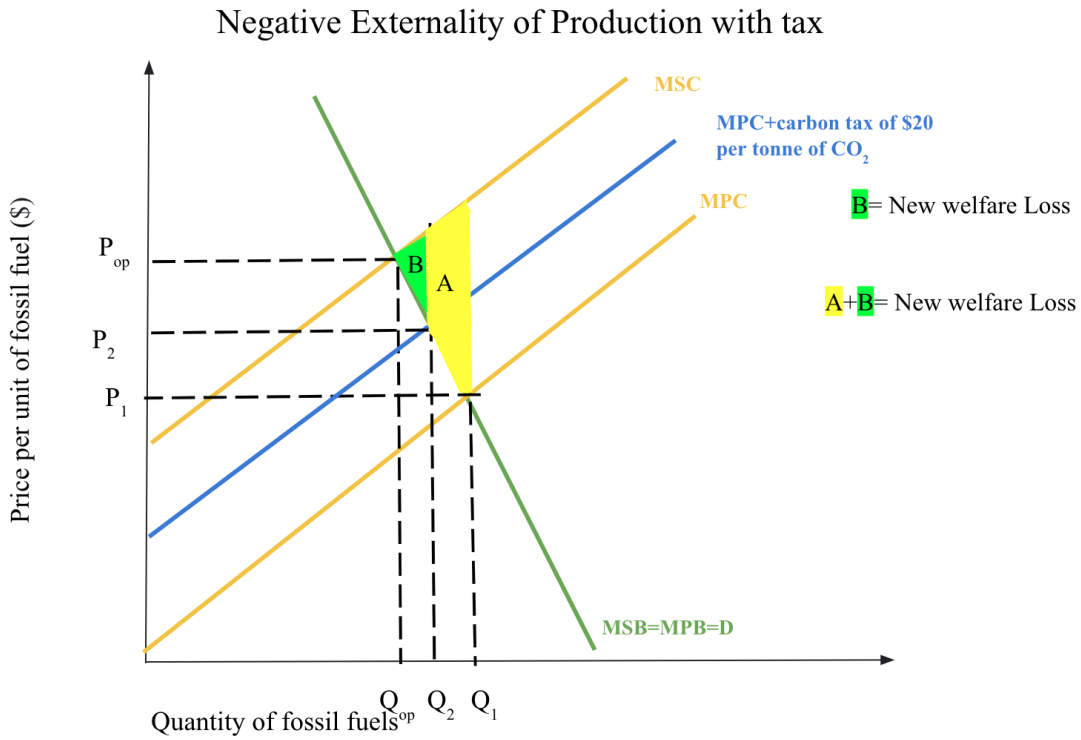
Furthermore, the negative externality of production has led to economic losses in the agriculture industry. As of 2021, the agricultural system represented 6.8% of Canada's GDP *(Overview of Canada's agriculture and agri-food sector, 2022)*. Increased air pollution levels from fossil fuels cost farmers millions of CAD per year because of a reduction in crop, plant, and forestry growth due to the high pollution levels. These costs can be translated into an increase in costs of production, a decrease in supply, an increase in prices, unemployment, and a loss of small businesses (*Effects of air pollution on agricultural crops, 2022)*. Moreover, wildlife can ingest pollutants and pass them onto humans.

In the year 2020 the federal government invested $1 billion to clean up inactive oil and gas wells in Alberta. Many domestic companies have neglected to pay for the costs of cleaning up the wells they initially used for production, leaving them unattended for long periods and contaminating the environment. These costs have been passed onto the public sector to fix the industries clutter (*To Paying Polluters: Federal Support for Oil and Gas* , *2021).*

These spillover costs created by these contaminating firms transcend the health, agricultural and infrastructural sector, negatively affecting indigenous communities in the country. The Canada Census in 2016 revealed that there were 1.67 million people belonging to 630 indigenous communities, representing 4.9% of the Canadian population *(First Nations, 2021)*. The production of fossil fuels has constantly altered their diets due to changes in their ecosystem. Toxic fumes released from oil, coal, and natural gas production companies have contaminated their water and food sources (*The impacts of climate change on indigenous communities, 2020)* . With limited access to financial capital, health, and education, indigenous

communities face the challenge of being unprepared to deal with the consequences of pollution. Similarly, they have been obligated to migrate or change their transportation methods in order to adapt to the spillover costs created by private companies (*The impacts of climate change on indigenous communities, 2020).* According to NBC news, ExxonMobil has installed operations in the surrounding area of Fort McMurray, Alberta to mine the tar sands. Exxon has stripped away forest area from an indigenous communities area, whilst contaminating through air and water their surrounding environment *(Kusnetz, 2021)*. Additionally, the community has been disallowed to hunt their food in the area because they are “trespassing” Exxon Mobiles property. This has left them with no option but to leave the area with their sick family members *(Kusnetz, 2021)*. These subsidies are evidently diverting funds from social expenditures such as the fordable housing innovation fund, student subsidies, health funds, and public pensions, which benefit lower-income and vulnerable communities. Likewise, in order for the government to fund these subsidies, they have to tax elsewhere, consequently reducing the real-income of financially vulnerable communities, resulting in a loss of consumer surplus and purchasing power.

Tax Policy
Figure 4



Note: Figure 4 illustrates a negative externality of production with an implementation of a carbon tax to mitigate the externality caused by the fossil fuel industry in Canada.

In 2019, the Canadian government carried out a nationwide carbon tax on fossil fuels companies beginning at $20 per tonne of CO_2 emitted. In April 2022, the tax rose to $50 per tonne of carbon dioxide. “All provinces are expected to maintain and reinforce this legal requirement in order to combat climate change” (*British Columbia’s Carbon Tax – Province of British Columbia*, 2019). The carbon tax was set at a lower rate in the beginning and would gradually increase over time to allow Canadian producers and consumers to change their patterns of consumption and production. Furthermore, the Canadian government expects positive results for the long-term wellbeing of its citizens and economic growth. It is anticipated that in order for firms to maintain profitability, producers will invest in newer and cleaner technologies that emit less carbon (*British Columbia’s Carbon Tax – Province of British Columbia*, 2019). Similarly, at higher prices consumers will have an incentive to reduce their fossil fuel consumption and switch to renewable energy sources, thus decreasing demand for fossil fuels.

As seen in figure 4, at current levels in the industry, firms are producing a quantity of Q_1 set at a price of P_1. This price does not reflect the external costs, as there is an over production of fossil fuels in the market, causing the Canadian government to intervene. Producers must now pay $20 per tonne of carbon dioxide emitted, provoking a rise in their cost of production from MPC to MPC+ tax. This raises the price of fossil fuels to P_2. Consumption then falls to Q_2, moving the market closer to the socially efficient level of output at Q_{op}, and reducing the welfare loss from

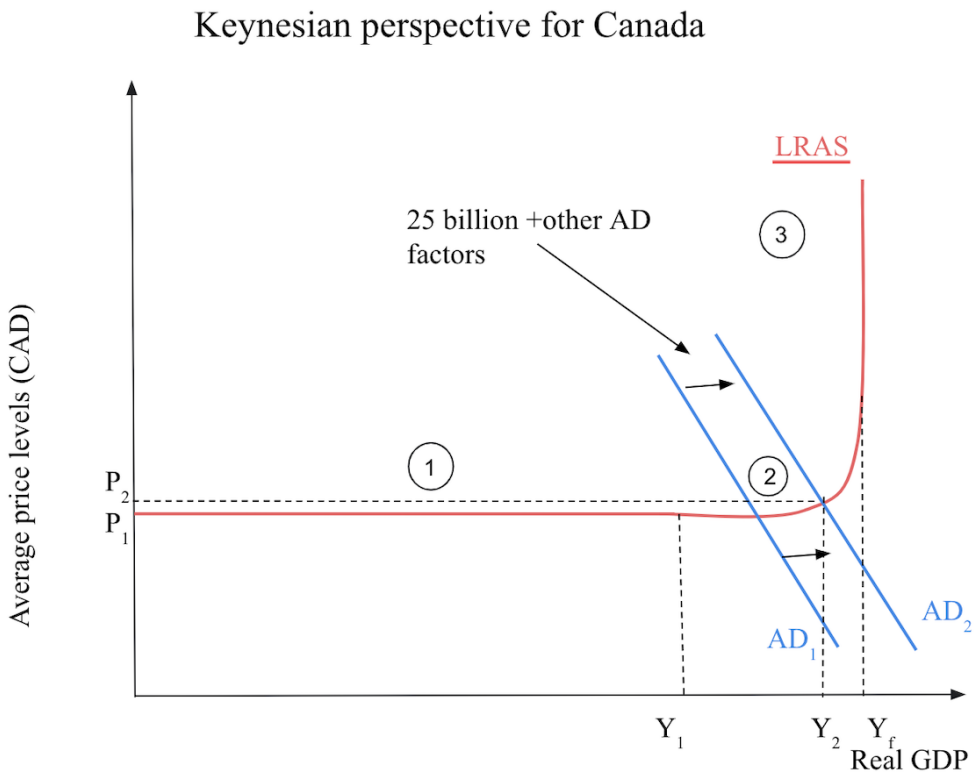
A+B to B *(Blink & Dorton, 2020)* . The government's aim of this taxation is to reduce national dependence on fossil fuels, as they are being pressured by their citizens, the media, and international climate change groups such as the IPCC.

The implementation of this carbon tax will generate government revenue utilized for social expenditure. In 2018, it was concluded that the Canadian government gained $29 billion in revenue from environmental taxes, including the $290 million (1%) coming from pollution taxes *(Environmental taxes in Canada, experimental estimates- 2010 to 2018, 2018).* Additionally, because there is a national carbon tax, it prevents firms from moving to other provinces to avoid paying pollution fees, and forces multinational companies from gaining any advantage over domestic fossil fuel companies. Furthermore, the collected revenue could be allocated to help protect vulnerable communities such as indigenous groups, support small businesses, provide climate action incentive payments to its citizens, and encourage new green research and development initiatives to transition to a more sustainable economy and society.

Likewise, the government utilized other forms of intervention to attempt to fix the market failure. These include setting a national minimum price on carbon pollution of $20 per tonne, setting a maximum emission cap, subsiding renewable energy projects, and implementing environmental regulations that assess pollution levels *(The federal carbon pollution pricing benchmark, 2019).* One disadvantage of implementing these methods to reduce fossil fuel pollution is the large expenditure businesses need to make in order to meet the environmental policies. Canadian businesses spent around $21.1 billion to reduce environmental impacts in 2019, a 21% increase from 2018 *(Environmental protection expenditure by business, 2019).* Provinces, such as Alberta spend close to $3.4 billion in environmental protection expenditure, due to the large amount of oil and gas extracted in this province (*Environmental protection expenditures by businesses- 2019, 2022*). Half of the total expenditure was allocated to waste water management activities, leaving firms with less revenue they could invest into expansion, research and development, employment, and renewable energy sources.

Macroeconomics: Keynesian Diagram

Figure 5



Note: Figure 5 showcases a Keynesian perspective diagram that shows the impact of fossil fuel subsidies on the macroeconomy of Canada

The Keynesian aggregate supply diagram exhibits three possible phases in the economy and does not distinguish the difference between the short and the long run. In phase 1, aggregate supply will be perfectly elastic. Producers can raise levels of output without incurring higher average costs because of the existence of unused factors of production. In phase 2, as the economy approaches its potential output, factors of production become more scarce. Producers will have to bid more for the factors of production, translating into higher costs of production. In phase 3, the economy reaches its maximum capacity. All factors of production are fully employed, shown by the inelastic portion of the diagram. At this stage, output cannot increase without an improvement in quality or quantity of the factors of production *(Blink & Dorton, 2020)*. At current levels of output in the Canadian economy, equilibrium occurs at a real output of Y_1 with an average price level of P_1. It is vital to highlight that in this case, the equilibrium level of output is below the full-employment level of output *(Blink & Dorton, 2020)*. In the Keynesian diagram, aggregate demand can increase such that there is an increase in the level of real output and average prices. In Canada, a shift of aggregate demand to the right is caused by the government spending and investment to the fossil fuel industry. Total capital expenditure in the oil and gas extraction industry for 2019 was $25 billion *(Oil and has extraction, 2021),* which is shown by the shift from AD_1 to AD_2 and the rise in prices from P_1 to P_2.

Another reason for the shift in AD is Canada's low net debt-to GDP ratio because of its government debt management strategies. In 2019, Canada's net debt levels represented only 26% of GDP *(Debt management strategy for 2020-2021)*. Lower levels of debt allowed the government to increase their spending in a variety of sectors within the economy, including the fossil fuel industry. Another factor that caused a shift in AD to the right is business confidence. Large oil and gas companies such as Shell, which is located in Alberta, believes that fossil fuels will be omnipresent in the future, and the transition to 100% renewable energy sources will take time. "A century is a long time, but perhaps the minimum period required to see a complete evolution of the energy system. Society may eventually achieve a world where everything is renewable, but it is an unlikely outcome for the 21st century alone." *(Could renewable energy completely replace fossil fuels?, 2023)*. Shell is very confident about the future of the fossil fuel industry and expects consumer demand to maintain. In order to meet this demand, they have invested into projects and expanding to increase output and productivity, which is also a factor that could potentially shift the LRAS for the Canadian economy. An example of this is Shell's Brockville lubricant plant, providing oil to Canada's transportation. Shell invested $16 million into the project in 2019, using new technological equipment to make production more efficient *(Shell invest $16 million into local plant, 2017).*

Figure 6&7

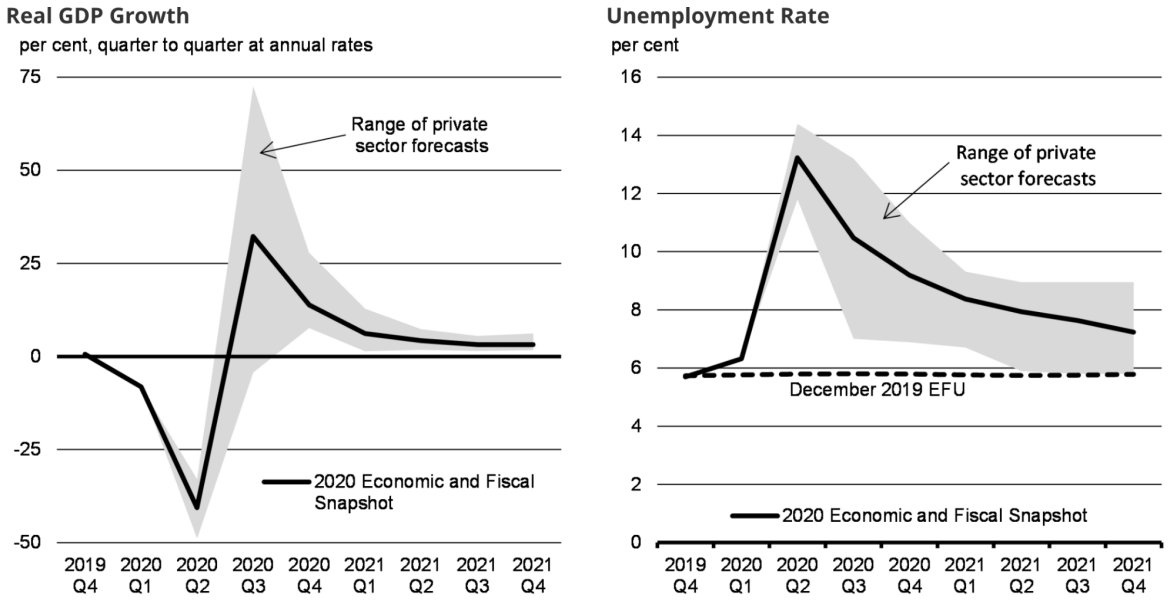


Figure 6 provides a visual representation of real GDP growth in Canada per quarter between 2019 and 2021. Figure 7 illustrates the unemployment rate as a percentage in Canada per quarter between 2019 and 2021.

As seen by figure 6, in between Q4 in 2019 and Q2 in 2020 there was a significant decline in GDP due to the effects of the pandemic on the global economy. Similarly, in figure 7 the unemployment rate reached an all-time high in Q2 (13.2%) for the year 2020. In efforts to support the domestic economy, the Canadian government implemented a response plan to get GDP, and employment to pre-pandemic levels. This effect can be seen by the spike in Q3 of

2020 in figure 6. This response plan included subsidies to the fossil fuel industry to protect jobs and production. It allowed the different firms in this industry to increase production and employment, which encouraged GDP growth, shown by the 7.65% increase in Q4 of 2020 in comparison to pandemic levels (figure 6). “The oil and gas industry alone generated $105 billion to Canada's GDP in the year 2020 and provided jobs to over 400,000 Canadians” *(The Canada's Association of Petroleum Producers, 2020)*. This allowed the percentage of real GDP growth to eventually break even and stabilize the economy (figure 6).

In part, the governments $275 million investment into the LNG project has also driven the fossil fuels industry's growth. The $40 billion initiative owned by major fossil fuel oligopolies such as shell and PETRONAS envisions the storage, transportation, and production of liquid natural gas across various provinces. It is estimated that the project will provide 20,000 jobs a year in British Columbia, and will supply the local government with an estimated $475 million in annual payments (*What does LNG mean for Canada, 2018*). The royalties and polluting taxes collected will also help fund health care, education, social services, and small indigenous businesses. The increase in jobs will help achieve the macroeconomics government goal of having low unemployment, as it will provide firms with factors of production that they can use to increase output or productivity and grant workers with real income that they can use for expenditure on goods and services, thus further growing the national economy.

Due to high demand from countries that don’t have the abundant energy sources such as China and India, LNG provides an opportunity for Canada to increase natural gas exports, and therefore receiving more revenue that can be diverted into funding LNG’s Cedar project, which is Canada’s and the world's first indigenous owned LNG facility (*Lee & Detomasi, 2023*). Furthermore, this revenue can be reinvested in Canada and lead to the Keynesian multiplier effect in the economy where there is a proportionally greater increase in consumer and business confidence, government spending with lower levels of debt, higher levels of investment from firms, and trade surplus.

Conclusion

Overall, the Canadian's government subsidies to the fossil fuel industry have seen benefits and consequences for its stakeholders and the economy. It may be said that these consequences outweigh the benefits brought forth by these government grants. On one hand, these subsidies are disadvantageous to Canada's environment, polluting their bodies of water, damaging plants and wildlife, resulting in a loss of biodiversity, and contributing to climate change. Likewise, the high levels of air pollution has caused numerous mortalities each year. This can be associated with a loss of productivity and health costs incurred by firms and consumers. The encouragement to produce more fossil fuels by investing into new projects have affected many indigenous communities. Their territories and habits have been altered due to the spillover costs. This constant support to the production of fossil fuels evidently delays Canada's transition to a more sustainable economy and society.

On the other hand, the fossil fuel industry has been a beneficial sector to Canada. Firstly, it has contributed to Canada's real GDP growth. Since GDP is an increase in national output, there is also an increase in national income. If GDP per capita rises, the income of the population would increase, which could translate into higher living standards. Additionally, higher income could lead to greater tax revenue, technological advances, and higher productivity and competitiveness of Canada's exports, resulting in a shift of aggregate demand and long run aggregate supply. In order to accommodate this new expansion, employment prospects have been created within the fossil fuel industry. Canada's oil and natural gas industry supported 533,000 jobs in 2017 *(How many jobs does Canadian oil and natural gas support, 2018)*. This has resulted in an increase in productivity, poverty reduction, and human capital development. Finally, the subsidies towards the fossil fuel industry creates energy security and equal distribution to all provinces. This allows Canada's population to always have access to a reliable source of energy to produce or consume, and permits lower income communities or regions where energy is scarce, to have a constant supply of energy.

Further investigation into subsidies to the fossil fuel industry and the regulations being implemented would be highly advantageous, as it could aid in assessing the suitability of alternative policies that may not exist in Canada. It is also crucial to understand the government's roles in intervening in different sectors and the micro and macro effects these policies can have. In order to incentivize a word where social surplus is maximized, the Canadian government has to be more transparent with members of society about expenditure patterns. These findings matter because a government expenditure report is crucial to provide Canadians with consolidated information about what these spendings are accomplishing and where the countries economy and society is headed to.

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