



Assessing the Economic Impact of Regulating CBD Products as Health Products

Institute of Fiscal Studies and Democracy
at the University of Ottawa

Assessing the Economic Impact of Regulating CBD Products as Health Products

Executive summary

The legalization of recreational cannabis has opened a great deal of opportunities for Canadian businesses and consumers. This legislation was welcomed by most Canadians as they looked forward to gaining legal access to recreational marijuana and other cannabis products, particularly cannabidiol (CBD). The government's intent was to reduce criminal involvement in the sale of marijuana and limit its availability to youth. The private sector has also been supportive as the legalization provided an opportunity for new business activities. However, provincially authorized stores are now the only businesses able to sell a variety of cannabis products on their shelves, including CBD.

The limited supply of CBD combined with the rise in its popularity has concerned many that the legal market is not at its full potential and is constrained by over-regulation. The law currently does not distinguish CBD from other cannabis products, even though they differ greatly in their effects and health outcomes. Notably, THC is intoxicating, whereas CBD is not. There are a growing number of studies that show CBD's potential benefits, including:

- Stress relief
- Reducing anxiety
- Sleep aid
- Temporary relief in muscle aches and pains

However, there needs to be further research to prove the therapeutic properties of CBD and that no harmful reactions occur while consuming CBD. This could be why the Canadian government remains wary of regulating CBD outside of the *Cannabis Act*.

The Canadian Health Food Association (CHFA) has engaged the Institute of Fiscal Studies and Democracy (IFSD) to estimate the potential size of the CBD market and its economic impact if the Government of Canada regulated CBD products as natural health products.

IFSD carefully analyzed the United States CBD market as they have recently loosened regulatory constraints on hemp production in the 2018 Farm Bill. Most of the market reports predicted enormous growth rates as more and more retailers and pharmacies enter the CBD market. Estimates by market analyst companies ArcView and BDS Analytics have estimated that the sales of CBD products doubled in the U.S from 2018 to 2019. A further policy of regulatory relaxation can spur even more growth according to most market analysts.

Our prediction for the market size of CBD products in Canada is based on data sourced from various U.S. reports and prevailing forecasting methodology. To estimate the economic impact of this new market, IFSD used an input-output model (see Table 1):

Table 1: Impact of a Change in Regulation on the CBD market in Canada

	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>
Market size - Consumer expenditure (\$bill.)	1.88	2.01	2.15	2.30	2.45
Real GDP (\$bill.)	1.59	1.70	1.81	1.94	2.07
Employment (FTE)	15,555	16628	17775	19002	20255

The estimates can be summarized as follows:

- The market for CBD products in Canada would be about \$1.9 billion if CBD was regulated outside of the *Cannabis Act* in 2019.
- The market is expected to grow at an average annual rate of 6.9 per cent a year, reaching \$2.45 billion by the fifth year.
- Assuming that Canadian consumers have similar preferences to American consumers, we predict that nutraceutical CBD¹ sales will represent one-third of the market by 2023.
- We estimate that real GDP will rise by a total of \$1.55 billion in 2019.
- The largest impact is on the wholesale and retail trade industries.
- The CBD industry is estimated to generate approximately 9,638 direct full-time equivalent positions (FTEs) plus an additional 5,917 FTEs through indirect and induced impacts in 2019.
- By 2023, the CBD market will raise real GDP by \$2.1 billion and generate 20255 more FTE jobs.

IFSD expects significant expansion of the agricultural sector since the main source of CBD is industrial hemp production. However, we could not estimate the impact on this sector due to data and model limitations. There is also considerable demand for CBD products in other countries, providing significant export opportunities for Canadian producers of CBD products.

The estimates are highly sensitive to the assumptions we have made as there is a lack of reliable Canadian data on the CBD market. Our estimates are closely based on the U.S. estimates and assumptions about the consumption per day and participation rate of Canadian consumers and should be considered indicative.

¹ A nutraceutical product is a natural product, like herbs and vitamins, that has potential medical benefits but is not regulated like pharmaceuticals.

Section 1: Context Overview

Introduction

In 2018, the *Cannabis Act* was passed by Parliament; removing cannabis from the controlled substances list and paving the way for the legalization of recreational marijuana.² Adults are now able to purchase, share, and grow cannabis with certain restrictions in place for the benefit of public safety. With the passage of this bill, an underestimated, lesser-known chemical substance also became available to the Canadian public. Cannabidiol (CBD), a cannabis derivative, can now be sold alongside other cannabis products.

Before the *Cannabis Act* came into effect, it was illegal to buy, sell, and produce CBD unless authorized by the federal government for medical or research purposes. The substance was a Schedule II drug under the *Controlled Drugs and Substances Act* which made it unavailable to the general public.

CBD is now legal, but it remains strictly controlled in terms of possession, production, distribution and sale. Health Canada is responsible for overseeing the production, distribution, and sale of cannabis and its derivatives. The provinces are tasked with determining how cannabis products are distributed and sold in their jurisdictions. The law currently does not distinguish between the various types of cannabis products, even though CBD and other cannabinoid products differ greatly in their effects, since CBD is a non-intoxicating phytocannabinoid.

Upon legalization, all phytocannabinoids, including CBD, were placed on the Prescription Drug List (PDL). Although CBD is available, it can only be sold without health claims as a recreational product, or through medical access – again, lacking any health claims.

The availability of legal CBD products continues to be limited since they can only be sold by provincially and territorially authorized retailers or by federally licensed medical cannabis sellers.³ To produce CBD to sell, you would need either a cultivation license to grow cannabis plants or an industrial hemp license to grow hemp. You would also need to get a processing license to manufacture products containing CBD for sale, regardless of the source. Moreover, there are many claims about the benefits of CBD that are not scientifically proven.

² (2019, November 29). Cannabis Regulations - Laws.justice.gc.ca. Retrieved December 9, 2019, from <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2018-144/pa-ge-1.html>

³ (2019, August 6). 'It should be available': Natural health food stores ... - CBC.ca. Retrieved December 9, 2019, from <https://www.cbc.ca/news/canada/ottawa/natural-health-food-retailers-cannabis-cbd-market-1.5237911>

Since all phytocannabinoids were placed on the PDL, CBD can be sold legally as a recreational drug, through medical access, or as a prescription drug. This forces many Canadians interested in using CBD for their health to experiment with recreational products lacking claims, warnings and other important information. A lack of safety or efficacy data for the use of CBD in a health context appears to be why the Canadian government is reluctant to allow CBD to be regulated as a natural health product.

However, given that there is little evidence that CBD products would be harmful and that potential health benefits are believed to be significant, the need for and the type of regulation should be thoroughly examined. This could eventually lead to regulating CBD products as natural health products.

What is CBD?

A cannabis plant can produce over a hundred chemical substances known as phytocannabinoids. One of these cannabinoids is known as cannabidiol or CBD.⁴ Unlike THC, the psychoactive cannabinoid found in marijuana, CBD is non-intoxicating and thus does not produce a mind-altering high. Even though CBD is not intoxicating, it still influences the body and brain. There are many studies that state CBD could be used for anxiety⁵, pain relief⁶, and even schizophrenia.⁷

More research is continually being conducted on this substance. CBD's use as a treatment for many medical afflictions is still being studied and major conclusions cannot be made at this time. The many benefits and risks of CBD are still largely unproven and further research is needed.

Hemp plants, which are a different strain of cannabis, can produce CBD without a high THC content. Cannabis containing 0.3 percent or less of THC is considered hemp.⁸ This plant was originally used for producing textiles and clothing, but its potential for CBD production has never really been considered until now. Cultivation of industrial hemp has been legal in Canada

⁴ (2019, August 13). Cannabidiol (CBD), and industrial hemp - Canada.ca. Retrieved December 9, 2019, from <https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/about/cannabidiol.html>

⁵ Blessing, E. M., Steenkamp, M. M., Manzanares, J., & Marmar, C. R. (2015). Cannabidiol as a Potential Treatment for Anxiety Disorders. *Neurotherapeutics: the journal of the American Society for Experimental Neurotherapeutics*, 12(4), 825–836. doi:10.1007/s13311-015-0387-1

⁶ Xiong, W., Cui, T., Cheng, K., Yang, F., Chen, S. R., Willenbring, D., ... Zhang, L. (2012). Cannabinoids suppress inflammatory and neuropathic pain by targeting $\alpha 3$ glycine receptors. *The Journal of experimental medicine*, 209(6), 1121–1134. doi:10.1084/jem.20120242

⁷ (n.d.). A Critical Review of the Antipsychotic Effects of Cannabidiol Retrieved December 9, 2019, from <https://pdfs.semanticscholar.org/aa65/393b024cf93623c2a36cfd11708c4fb9c604.pdf>

⁸ (2019, March 22). Defining Hemp: A Fact Sheet - FAS.org. Retrieved December 10, 2019, from <https://fas.org/sgp/crs/misc/R44742.pdf>

since 1998.⁹ With the passing of the *Cannabis Act* in 2018, CBD extraction from hemp plants became permitted. However, this process remains highly regulated even though hemp plants contain low concentrations of the psychoactive substance known as THC.

Despite regulatory uncertainty, the demand for CBD has led to the development of many different unregulated products containing CBD. The substance can be taken orally, sublingually, intranasally, and topically. Nowadays you can find CBD infused into gummies, face cream, nasal spray, and even beer as new potential markets continue to open up.¹⁰ According to one analysis done for the U.S., the CBD craze market (mainly hemp driven) has the potential to generate \$22 billion in the United States alone by 2022.¹¹ Allowing private entities to market and sell CBD products could produce proportionally similar results for the Canadian economy.

The Beneficial and Harmful Effects of CBD

As discussed earlier, the potential health benefits of consuming CBD are extensive. Medical testing on this substance is now widespread with many claims of beneficial properties. Some of these results remain inconclusive as most of the studies that took place were solely done on mice and other animals. So far there is only one CBD product that the FDA has approved, Epidiolex, which is used for the treatment of seizures with individuals who have severe forms of epilepsy.¹²

Product	Studies	Results
Epidiolex (cannibidiol)	Epidiolex’s effectiveness was studied in three randomized, double-blind, placebo-controlled clinical trials involving 516 patients with either Lennox-Gastaut syndrome or Dravet syndrome.	Epidiolex, taken along with other medications, was shown to be effective in reducing the frequency of seizures when compared with placebo.

Source: U.S. FDA

⁹ (2019, August 30). Regulation of industrial hemp seed - Canadian Food Retrieved December 10, 2019, from <https://www.inspection.gc.ca/plants/cannabis/industrial-hemp-seed/eng/1532125745804/1532125788650>

¹⁰ (2018, July 31). Here Is Everything You Need to Know About CBD - Forbes. Retrieved December 10, 2019, from <https://www.forbes.com/sites/eveturowpaul/2018/07/31/get-to-know-the-trendiest-food-ingredient-youve-never-heard-of-with-infographic/>

¹¹ (n.d.). Hemp-Derived CBD Market to Reach \$22 Billion By 2022. Retrieved December 13, 2019, from <https://blog.brightfieldgroup.com/hemp-cbd-market-to-reach-22-billion-by-2022>

¹² (2018, June 25). FDA approves first drug comprised of an active ingredient Retrieved December 11, 2019, from <https://www.fda.gov/news-events/press-announcements/fda-approves-first-drug-comprised-active-ingredient-derived-marijuana-treat-rare-severe-forms>

Claims of positive health effects brought forward from some studies have raised the interest of the scientific community. The table below provides a summary of the studies that have taken place so far.

Table 2: Overview of diseases for which CBD may have therapeutic benefits taken from Pisanti et al (2017)

Disease	Effects	References
Alzheimer's disease	Anti-inflammatory, antioxidant, antiapoptotic in in vitro and in vivo models of A β -evoked neuroinflammatory and neurodegenerative responses.	Hayakawa et al. (2007), Esposito et al. (2006a), Esposito et al. (2006b), Martín-Moreno et al. (2011), Scuderi et al. (2014), Cheng et al. (2014)
Parkinson's disease	Attenuation of the dopaminergic impairment in vivo; neuroprotection; improvement of psychiatric rating and reduction of agitation, nightmares and aggressive behaviour in patients.	Lastres-Becker et al. (2005), Zuardi et al. (2009), Chagas, Eckeli, et al. (2014)
Multiple sclerosis	Improved signs of EAE in mice, anti-inflammatory and immunomodulatory properties.	Bucellato et al. (2011), Kozela et al. (2011, 2015), Mecha et al. (2013), Giacoppo et al. (2015)
Epilepsy	Anticonvulsant in vitro and in vivo; reduced seizure frequency in children and adults with treatment-resistant epilepsy.	Pertwee (2008), Devinsky et al. (2016)
Huntington's disease	Neuroprotective and antioxidant in mice transgenic models; no significant clinically important differences in patients.	Iuvone et al. (2009), Sagredo et al. (2011), Consroe et al. (1991)
Hypoxia-ischemia injury	Short term neuroprotective	Pazos et al. (2012, 2013),

	effects; inhibition of excitotoxicity, oxidative stress and inflammation in vitro and in rodent models.	Hayakawa et al. (2007, 2009), Valdepeñas et al. (2011)
Pain	Analgesic effect in patients with neuropathic pain resistant to other treatments.	Crippa et al. (2015), Gomes et al. (2015), Zuardi et al. (2006, 2012)
Psychosis	Attenuation of the behavioural and glial changes in animal models of schizophrenia; antipsychotic properties on ketamine-induced symptoms	Crippa, Hallak, Abílio, de Lacerda, & Zuardi, 2015
Anxiety	Reduction of muscular tension, restlessness, fatigue, problems in concentration, improvement of social interactions in rodent models of anxiety and stress; reduced social anxiety in patients.	Lemos et al. (2010), Almeida et al. (2013), Moreira et al. (2006), de Mello Schier et al. (2014), Bergamaschi et al. (2011), Marinho et al. (2015)
Depression	Antidepressant effect in genetic rodent model of depression.	El-alfy et al. (2010), Hsiao et al. (2012), Shoval et al. (2016)
Cancer	Antiproliferative and anti-invasive actions in a large range of cancer types; induction of autophagy-mediated cancer cell death; chemo preventive effects	Ligresti et al. (2006), McAllister et al. (2011), Shrivastava et al. (2011), Pisanti et al. (2013), Rocha et al. (2014), Ramer et al. (2014), Scott et al. (2014)
Nausea	Suppression of nausea and conditioned gaping in rats	Parker et al. (2002), Rock et al. (2008)
Inflammatory diseases	Anti-inflammatory properties in several in vitro and in vivo models; inhibition of inflammatory cytokines and pathways.	Ribeiro et al. (2012, 2015), Kozela et al. (2010, 2011), Mecha et al. (2012, 2013)

The number of studies concentrating on the harmful effects of CBD remain limited. The chemical does not seem to have any potential to be abused or cause harm.¹³ Cannabidiol has a low level of toxicity. No fatalities have been reported as a result of CBD use. Health Canada’s website does not mention any negative side effects of ingesting CBD; instead, it focuses on the downsides of THC consumption. In contrast, America’s FDA concentrates on the potential adverse effects of cannabidiol.¹⁴ The FDA seems to remain reluctant to approve any other forms of CBD infused products based on a few risks brought forth from some studies. These potential harms of CBD consumption are listed in the table below.

Table 3: Overview of adverse effects for which CBD may be responsible

Adverse Effect	Explanation	References
Liver injury	Mice that ingested large amounts of CBD experienced hepatotoxicity. Risk of liver damage is increased when taken with other drugs that impact the liver.	Ewing et al. (2019)
Adverse drug interactions	Taking CBD may increase or decrease the impact of other drugs you are taking.	Greyson et al. (2017), Gaston et al. (2017)
Male reproductive toxicity	A decrease in testicular size, inhibition of sperm growth and development, and a decrease of circulating testosterone has been reported in laboratory animals that have ingested CBD.	Carvalho et al. (2018), Huestis et al. (2019)
Fatigue	Persistent tiredness has been reported among some CBD users.	Iffland & Grotenherman. (2017), Bergamaschi et al. (2011).
Diarrhea	A few CBD users have reported having	Iffland & Grotenherman. (2017), Bergamaschi et al.

¹³ (n.d.). Cannabidiol (compound of cannabis) - WHO. Retrieved December 11, 2019, from <https://www.who.int/features/qa/cannabidiol/en/>

¹⁴ (2019, November 25). What You Need to Know (And What We're Retrieved December 10, 2019, from <https://www.fda.gov/consumers/consumer-updates/what-you-need-know-and-what-were-working-find-out-about-products-containing-cannabis-or-cannabis>

	gastrointestinal distress and diarrhea.	(2011).
Changes in appetite / weight	Another common side effect of CBD consumption is a change in appetite and / or weight.	Iffland & Grotenherman. (2017), Bergamaschi et al. (2011).

Many of these claims are untested in human trials. Further testing is needed in order to confirm or deny many of the allegations brought forward. The fact that many of CBD’s side effects are still unknown is the reason why the Canadian government is reluctant in regulating CBD infused products as natural health products. More information on the safety of cannabidiol consumption (and the possible negative side effects) is necessary before production and sale restrictions are alleviated.

In a study commissioned by the CHFA, research at the Centre for medicinal Cannabis Research of McMaster University concluded that:

“There is converging evidence that CBD is generally safe for human consumption in otherwise healthy individuals. It does not have psychoactive effects and or any reported adverse effects at low doses (e.g., 750 mg/day) when administered acutely. When used chronically for therapeutic purposes, its side effect profile is predominantly somnolence and GI disturbances. In spite of this wide margin of safety, gaps in the scientific literature remain present (e.g., long-term safety). As such, although the current evidence suggests that CBD is generally safe, ongoing surveillance and investigation remain warranted.”¹⁵

How is CBD Regulated in Other Jurisdictions?

Cannabidiol regulations around the world are either complex or lenient as many countries are still figuring out what to make of this cannabinoid.

The potential benefits of CBD have made the product popular worldwide. Other countries have dealt with this phenomenon in a variety of different ways. The table presented below is a list of countries that have different methods of regulating CBD products.

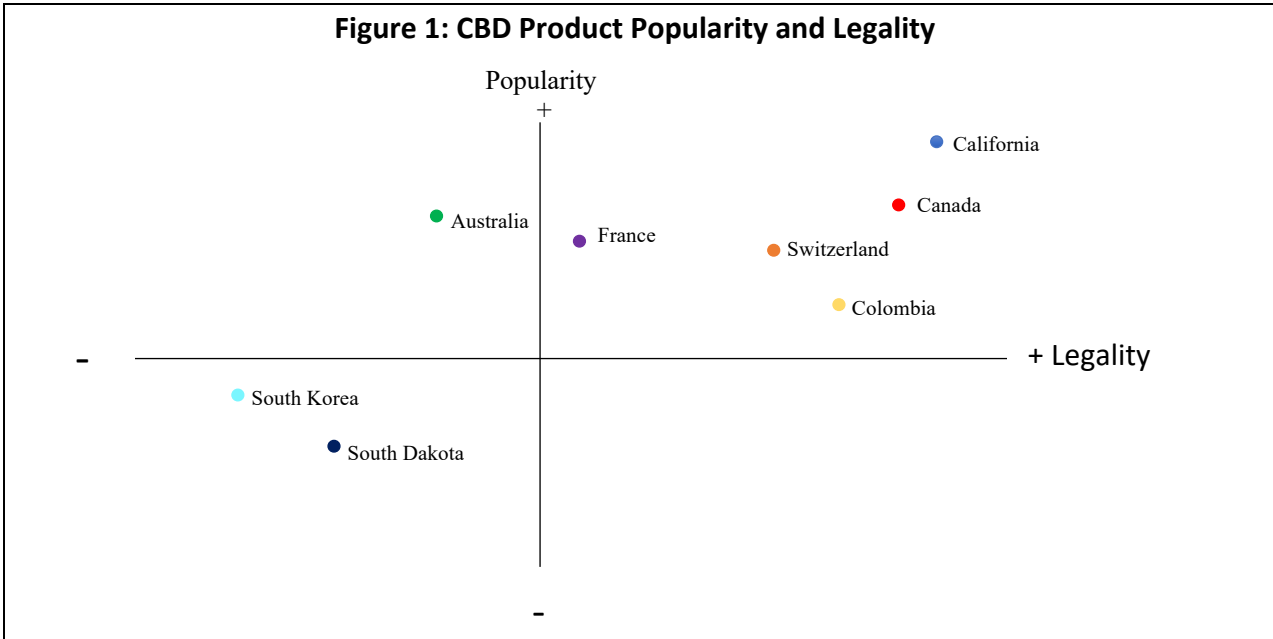
¹⁵ <https://chfa.ca/Portals/30/RegAffairs/white-paper/Cannabidol%20Safety%20Knowledge%20Synthesis%20-%20June%2013%202019%20-%20FINAL.pdf?ver=2019-07-16-160414-057In>

Table 4: CBD regulations in other countries

Country	CBD Regulations
Canada	Canada legalized cannabis for recreational use in October 2018. At this time, the Government placed all phytocannabinoids on the Prescription Drug List (PDL). Any products containing CBD making a health claim must be approved for sale as a prescription drug. At this time, no prescription drugs containing CBD only are approved for sale in Canada. Recreational cannabis products, including CBD, are available from provincially licensed retailers. Alternatively, CBD-containing products are also available through medical access. Neither products carry health claims.
United States	CBD is considered a schedule 1 drug in the Controlled Substances Act. The substance remains illegal to sell and produce if obtained from a cannabis plant that is over 0.3% THC. The 2018 Farm Bill legalized the sale and production of hemp and its extracts. CBD products made from hemp are legal if they are approved by the FDA. In states such as California, CBD products are sold in private shops and pharmacies. But the legality of CBD is somewhat of a grey area. States like Idaho and South Dakota prohibit the purchase and sale of any products containing CBD.
Australia	CBD products are legal in Australia under certain conditions. Individuals would need to go through a government access pathway known as the Special Access Scheme. ¹⁶ This is the only way to get access to medicinal CBD products.
France	CBD products are legal if they come from a hemp plant with a content of less than 0.2%

¹⁶ (n.d.). Special Access Scheme | Therapeutic Retrieved December 12, 2019, from <https://www.tga.gov.au/form/special-access-scheme>

	THC. ¹⁷
Switzerland	Forms of cannabis plants that contain less than 1% THC are not banned under Swiss narcotics legislation. ¹⁸ CBD products are not illegal if they contain less than 1% THC.
South Korea	The use of medical cannabis became legal in South Korea in 2018 after amendments to the Act on the Management of Narcotic Drugs. Medical cannabis imports are now legal. ¹⁹ However, using products containing any cannabinoids for recreational reasons remains strictly illegal.
Colombia	CBD products are legal through licensed retailers provided they contain less than 1% THC. The high cost of these products mean that most people refrain from purchasing.



¹⁷ (2018, June 11). Cannabidiol (CBD) le point sur la législation | Mildeca. Retrieved December 12, 2019, from <https://www.drogues.gouv.fr/actualites/cannabidiol-cbd-point-legislation>

¹⁸ (n.d.). Cannabis: What is allowed, what is not allowed in ... - ch.ch. Retrieved December 12, 2019, from <https://www.ch.ch/en/cannabis/>

¹⁹ (2018, November 29). Korea to import medical marijuana starting early next year Retrieved December 12, 2019, from <http://www.koreaherald.com/view.php?ud=20181129000668>

While CBD is legal in the jurisdictions in the upper right quadrant, it is not regulated as a health product. CBD is still treated as a controlled substance in most jurisdictions and governments remain wary of a change in regulation.

Canada has legalized the sale and production of cannabis products and its derivatives. However, the market for CBD products is still heavily regulated as only provincially or territorially authorized retailers may sell recreational cannabis products. Licenses are also required in order to cultivate cannabis and hemp plants for the purpose of sale. CBD, and all other phytocannabinoids, were added to Schedule 2 of the *Natural Health Products Regulations - Excluded Natural Health Product Substances* - since it is regulated under the *Cannabis Act*.²⁰

Despite these restrictions, table 4 shows that Canada has more progressive laws in comparison to other jurisdictions (partly because it is a first mover among all countries in this type of legislation), though other countries are moving in a similar direction. The substance continues to be an area of interest for most individuals, but many governments continue to be wary of broad legalization.

Black market activities continue to persist despite the passage of the *Cannabis Act*. A large number of Canadians continue to purchase cannabis products from the black market since there is a limited amount of government run stores in some locations and the prices they offer are unusually high.²¹ Allowing for CBD to be regulated outside of the *Cannabis Act* could potentially increase employment as there will be a transfer of business from the black market to the legal market. This will likely drive out most of the black-market activities relating to cannabis in Canada.

CBD Products and Production in Canada

CBD products have been growing in popularity after the discovery of its calming and pain-relieving effects. Some of this popularity may be due to some of the unproven statements made by a couple of U.S. companies, claiming that CBD contains anti-tumor properties²² and that the cannabinoid could be used to treat major depressive disorder. These claims were

²⁰ (2019, November 14). Natural Health Products Regulations - Laws.justice.gc.ca. Retrieved December 12, 2019, from <https://laws-lois.justice.gc.ca/eng/regulations/sor-2003-196/page-14.html>

²¹ (2019, October 17). One year after Canada legalized weed.... Business Insider. Retrieved March 10, 2020, from <https://www.businessinsider.com/canada-weed-black-market-boom-despite-legalization-2019-10>

²² (2017, November 1). FDA warns companies marketing unproven products, derived Retrieved December 12, 2019, from <https://www.fda.gov/news-events/press-announcements/fda-warns-companies-marketing-unproven-products-derived-marijuana-claim-treat-or-cure-cancer>

further advanced due to the influence of social media and the internet. This has led to a crackdown by the FDA on a couple of companies selling CBD products.

Despite the legal difficulties, the diversification and expansion of CBD related products has only increased. Bath bombs, ice cream, and dog treats²³ are just a few examples of the plethora of products that are now for sale in this new burgeoning market. Further deregulation can spur more innovation as more investment from private entities will be injected into the market. Government restrictions and controls on CBD will impede the entry of more CBD based firms as they will need to acquire a license and sell their products only to government approved retail stores.

Production of CBD in Canada is difficult to measure. The only sources of data we have for hemp production are Health Canada and the Canadian Hemp Trade Alliance (CHTA). Both of which only measure the number of industrial hemp permits and the amount of acreage used for production. According to the CHTA, industrial hemp acreage and permits have been increasing since cultivation became legal in 1998.²⁴ Canadian exports of hemp have also been increasing, despite a short fall in 2017 possibly due to trade disputes between China and the United States. Industrial hemp has been used for producing food, fiber, and animal feed products. Classifying CBD as a natural health product could significantly expand hemp cultivation given that farmers can gain a much higher rate of return by using hemp to produce CBD.

The cannabis cultivation industry has also increased after the passing of the *Cannabis Act* in 2018. Cannabis production for licensed sources has multiplied since legalization, whereas unlicensed sources have experienced a small decrease.²⁵ A majority of the production of cannabis goes into the creation of products with high levels of THC, so it is not known how much CBD this industry produces. Legalization has only happened recently and most of the cannabis related data is brand new.

In conclusion, the CBD industry has significant potential for growth. Studies have shown the many potential benefits this substance has, and it is already being used to treat illnesses we could not treat before. The long-term side effects for CBD are not yet fully known and a cautious approach is still being taken by many governments until further scientific evidence supporting claims of health impacts and safety are available. Canada is relatively lenient in its

²³ 2018, October 27). Why Is CBD Everywhere? - The New York Times. Retrieved December 12, 2019, from <https://www.nytimes.com/2018/10/27/style/cbd-benefits.html>

²⁴ (n.d.). Canadian Industrial Hemp Industry - Canadian Seed Trade. Retrieved December 13, 2019, from <https://seedinnovation.ca/wp-content/uploads/2018/07/Canadian-Industrial-Hemp-Industry-Keanan-Stone-.pdf>

²⁵ (n.d.). Cannabis industry production account - Statistics Canada. Retrieved December 13, 2019, from <https://www150.statcan.gc.ca/t1/tb11/en/tv.action?pid=3610059901>

laws regarding CBD products as most countries are still grappling with what to make of this cannabinoid. CBD infused products are now available on the market and the production of hemp and cannabis have been increasing in Canada. The full economic potential of the market has not yet been estimated. However, classifying CBD infused products as natural health products could significantly expand the market and drive investments in research to support health claims and innovative products.

Section 2: Estimates of U.S. CBD market

Several U.S. states legalized the use and production of Cannabis before Canada did. The legalization raised awareness about different cannabis products, including CBD, and their potential health benefits. This has led to a surge in the availability and popularity of CBD products, but the legality and regulations surrounding the cultivation of hemp and hemp-based CBD remain complex, even after the passage of the 2018 Farm Bill by the United States Congress.

The 2018 Farm Bill designated hemp as an agricultural product and removed hemp-based CBD from Schedule I of the Controlled Substances Act. This led to a significant increase in hemp cultivation and production. However, since hemp and hemp-based CBD are no longer controlled substances they come under FDA regulations. The FDA has not yet deregulated CBD products. In the US, health and food products that contain CBD cannot claim medical and health benefits unless they are approved by the FDA. There has been so far only one CBD product, Epidiolex, which has received FDA approval (See Box 1 for more information on the evolution of cannabis and CBD regulations in the U.S.)

Despite the continued regulatory constraints, the CBD market in the US has thrived both through the licensed dispensaries that can sell products with various combination of CBD and THC content and traditional retail that should only sell hemp-based CBD products with a THC content of less than 0.3 per cent.

According to estimates by ArcView and BDS Analytics, the sale of CBD products doubled in 2019 in the U.S.²⁶ This was driven by the states that have moved to deregulate CBD and allow it to be used as a food additive. However, because of the FDA regulations, most of the growth so far has been generated by licensed dispensaries in the states where cannabis has been legalized.

Several U.S. studies project significant growth in the CBD market if the FDA relaxes its regulation of CBD products. Under that scenario, it is expected that CBD product sales will grow rapidly over the next five years as consumers become more informed about potential benefits of CBD products. In addition, it is expected that large retailers and chain pharmacies will enter

²⁶ ArcView Market Research in partnership with BDS Analytics, *“Cannabis Intelligence Briefing: CBD: Cannabinoids Escape the Dispensary”*.

the market once the FDA determines appropriate regulations, significantly increasing the share of traditional retail relative to licensed dispensaries.

Forecasts of the size of the CBD market in the U.S. range from \$16 to \$24 billion by 2025 (See Table 5).

Table 5: Forecasts of CBD market size in the United States (US \$billions)							
	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>	<u>2025</u>
ArcView/ BDS Analytics	4.1	6.5	9.2	12.3	15.9	20.0	-
Motley Field / Brightfield Group	5.0	7.38	10.89	16.06	23.7	-	-
Canaccord Genuity	2.9	4.7	6.6	11.2	15.2	18.4	
Cowen Report	-	-	-	-	-	-	16

Given the expected growth in this industry, one would expect that the CBD market will also have an important impact on U.S. GDP and employment.

Box 1

Hemp and CBD Regulation in the United States

The history of hemp production in the United States goes way back to the early European settlers. King James I of England even required every landowner of the Jamestown colony to grow 100 plants of hemp specifically for export.¹ Hemp was mostly used to produce clothing, paper, and textiles which made cultivation of the plant widespread across the states. In 1937, U.S. Congress passed the Marihuana Tax Act after a massive public scare due to many fear mongering reports linking cannabis as the cause of several social problems. The legislation criminalized and banned the usage of hemp across the United States, except for industrial and medical uses. An excise tax on all sales of hemp was used to make the cultivation of hemp more costly and difficult to sell.²

In 1996, the government of California passed Proposition 215 after a referendum was held in order to determine the legality of medical marijuana. This event was an important breakthrough for those who advocated cannabis legalization. Other states such as Oregon, Alaska, Washington, and Maine soon followed California's example and legalized medical marijuana in the years 1998 and 1999. Now that people had access to medical marijuana, researchers were able to conduct further studies into the effects of CBD. The social stigma for using cannabis also began to decline after the turn of the century. According to Pew Research, two-thirds of Americans now believe that marijuana use should be legal.³ This contrasts with the numbers in 2000, where only 31% of American adults believed that marijuana should be legal.

The relationship between CBD and cannabis, which was widely known by the scientific community, was unknown to the general public. Which is why it may have taken a long time to develop proper regulatory laws on CBD. Things began to change as people began to bring forward medical studies and personal experiences. Charlotte Figi, a girl with a severe form of epilepsy (Dravet Syndrome), was treated with CBD-dominant cannabis strain. Her seizures dropped from 300 a week to 2 or 3 every month.⁴ Other medical claims about CBD, such as anxiety relief and sleep assistance, have been brought up but not yet substantiated by rigorous scientific trials.

After CBD's effects on epilepsy were discovered, 17 states passed laws allowing for CBD extracts with minimal THC content for medical use.⁵ Currently, there are 33 states where medical marijuana is legal and 11 of those states have legalized recreational marijuana consumption.⁶ Hemp-derived CBD became legal in most states when the 2018 Farm Bill was passed by Congress. A few states, Mississippi, Iowa, South Dakota, and Hawaii have chosen to limit the sales of CBD to just medical products.⁷ With the passage of this new bill, CBD-infused products began to fill store shelves at a rapid rate, while market size continued to increase sharply as businesses sought ways to profit from the situation.

A grey area remains in the legality of CBD. Although the 2018 Farm Bill did remove hemp-derived products from its Schedule I drug status, CBD continues to remain a Schedule I drug since it can also be derived from cannabis. A hemp plant must contain under 0.3% THC in order to be legal under current regulations. Also, all state legal cannabis programs continue to remain illegal under federal law.⁷ The FDA reserves the right to intervene in states that are noncompliant with its measures. The only CBD product that is legal federally is Epidiolex, which is specifically used to treat severe forms of epilepsy. A massive amount of constraints still exist in this industry and the 2018 Farm Bill is just one large step in the direction of cannabis and CBD product legalization.

1 [Hemp: American History Revisited: The Plant with a Divided History](#)

2 [The Marihuana Tax Act of 1937 - Full Text of the Act](#)

3 [Two-thirds of Americans support marijuana legalization](#)

4 [Charlotte Figi: The Girl Who is Changing Medical Marijuana Laws Across America](#)

5 [States with Legal Cannabidiol \(CBD\)](#)

6 [Legal Medical Marijuana States and DC](#)

7 [The Farm Bill, hemp legalization and the status of CBD: An explainer](#)

Section 3: Estimates of the CBD Market Size in Canada

Currently in Canada, CBD products can be legally purchased only from licensed cannabis retailers. If the Government changes its approach to the regulation of CBD products, there will be potential for significant growth in their production and sales similar to what U.S. studies are expecting.

Since the legalization of cannabis and CBD products is a recent phenomenon in Canada, there is not yet reliable data on demand for and sales of CBD products. To estimate the potential size of the CBD market we have relied on the experience of other jurisdictions, particularly the U.S. States that legalized cannabis before Canada did. As was shown in Section 2, all U.S. studies project sharp increases in the market size over the next 5 years if CBD products are regulated as natural health products.

The Canadian CBD forecast is based on prevailing forecasting methodology. By using exogenous variables (e.g., usage by age, spending per day, etc.) sourced from various secondary reports, the IFSD was able to produce medium- and long-term estimates that project the CBD market size, and breakdown by product type over time. Although, it should be mentioned that while the age-based forecasts experience a changing structure over time, the product categories do not. This is because we were unable to locate longitudinal data that could provide a basis for forecasting shifting demand in the product categories.

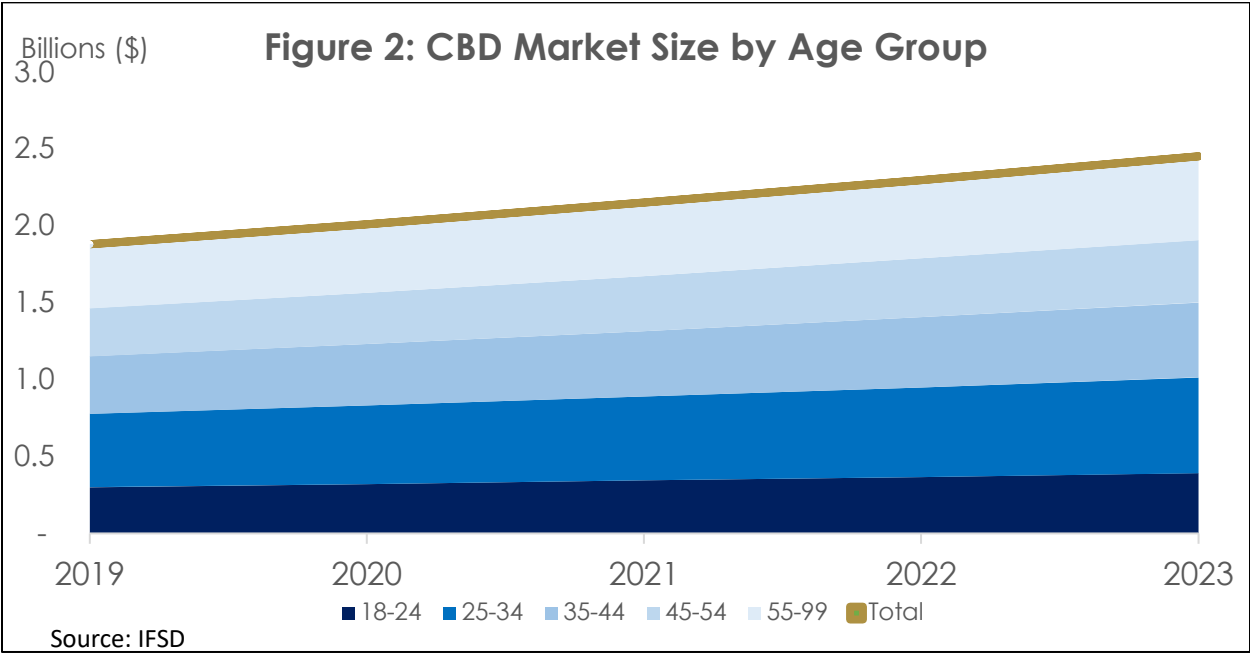
By using data sourced from various reports (Cowen Inc., BDS Analytics, etc.) we were able to create a participation rate, and spending profile, that contributed to the forecast by age group and product category. These rates provided a market size to use as the basis for the forecast. The estimate was then subject to year-over-year inflationary changes, population changes, and a participation modifier.

The inflation calculation was based on the latest IFSD Long-term economic forecast, allowing for short-term rates to converge to their long-term trends over the course of the forecast. The population changes were based on the Statistics Canada M1 population growth scenario. These two factors provided our expected *unadjusted* year-over-year growth.

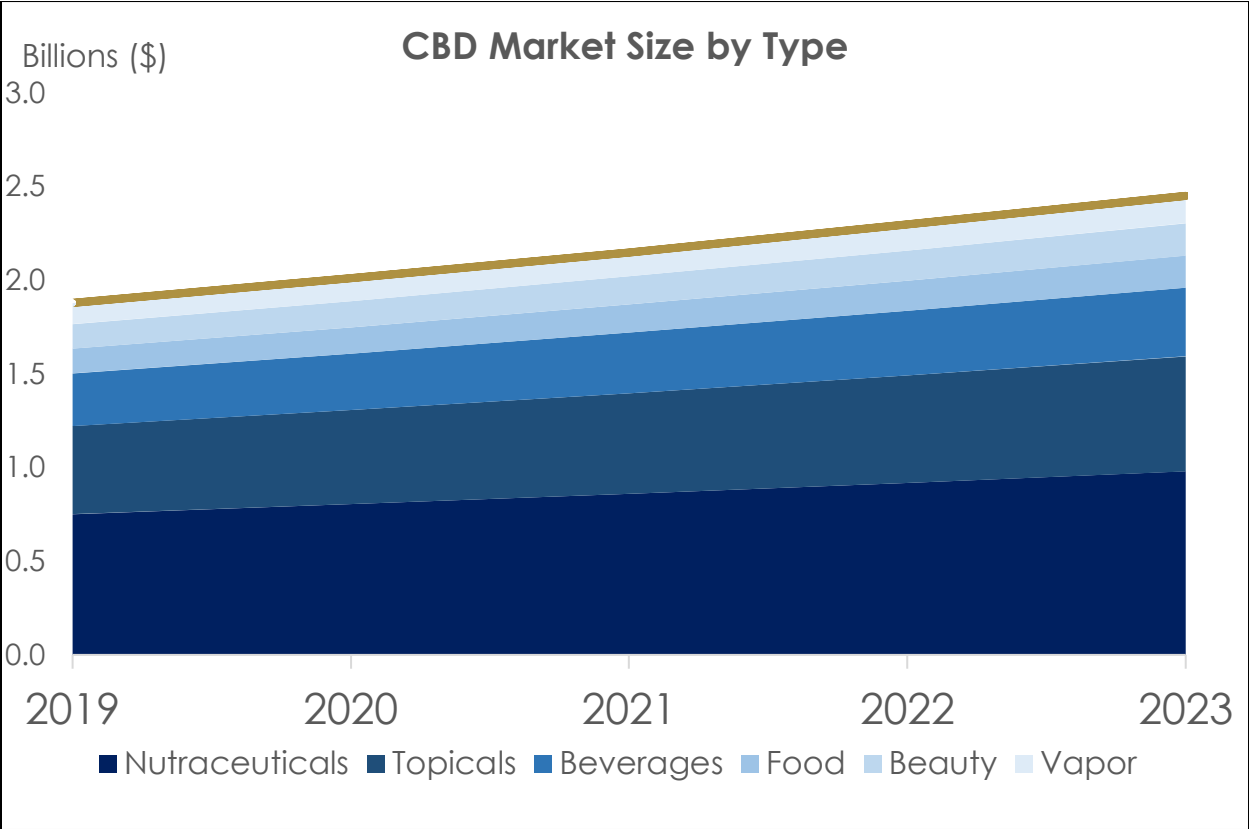
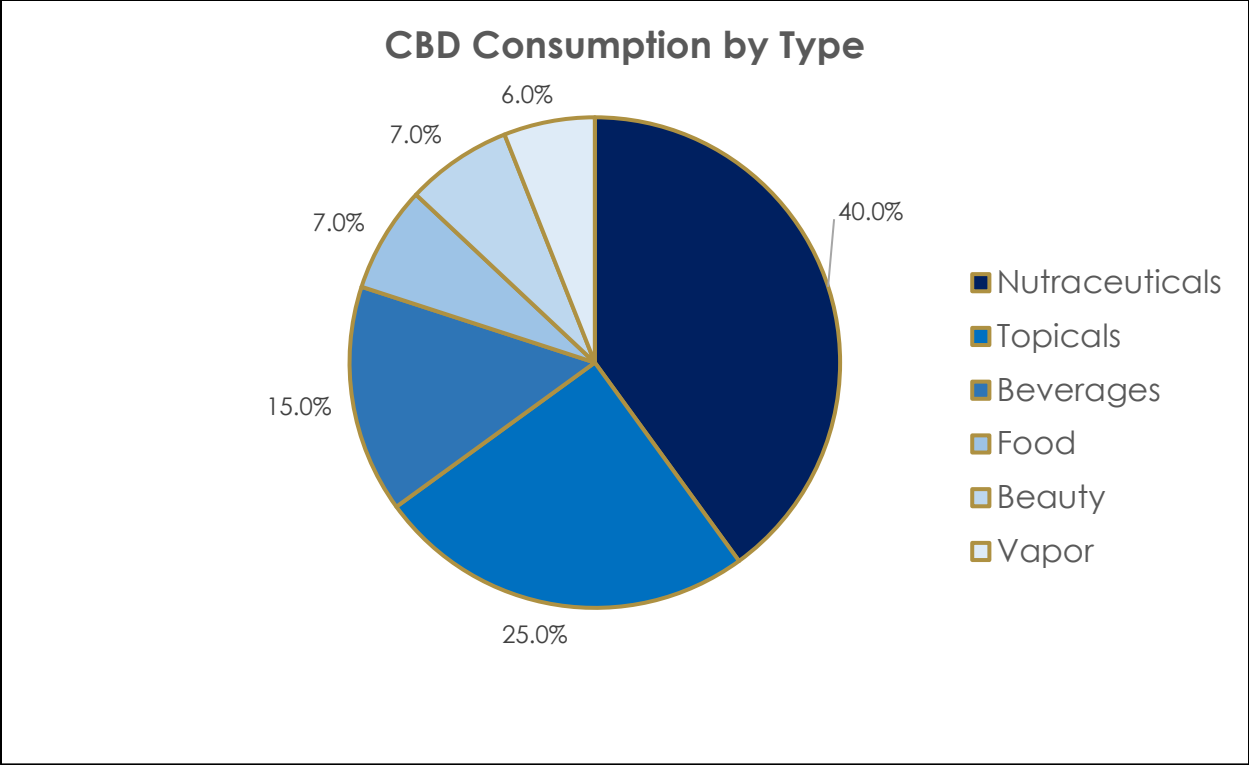
It is reasonable to expect that, as the CBD market matures and more information about CBD's health benefits become available, more people in every age group will demand CBD products. To take this effect into account, a participation modifier was created to adjust the market size upwards. Each age group was assumed to start at a participation rate that was sourced from leading CBD reports. Each group's participation rate was assumed to converge to 10% over time. This means demand will grow until approximately 2033, after which the participation modifier no longer boosts growth above its unadjusted rate of growth.

The estimates are based on a hypothetical case where the change in CBD regulation occurred in 2019.

Our estimates show that in the first year after a new regulatory approach the market for CBD products will be about \$1.88 billion. The market is expected to grow at an average annual rate of 6.9 per cent a year, reaching \$2.45 billion by the fifth year. Figure 2 presents projected market size by age group.



CBD consumers have shown preference for certain types of CBD products. Figure 3 shows the composition of CBD sales in the U.S. Nutraceuticals, beverages and topicals represent 70 per cent of the sales. Assuming that Canadian consumers have similar preferences for CBD products and their tastes do not change over time, we can project the rise in demand for each type of CBD products over time (Figure 4). By 2023, nutraceuticals are expected to represent one-third of the market or about \$1 billion.



Section 4: Economic impacts of a potential CBD market

Methodology

To estimate the economic impacts of a potential CBD market in Canada, we used the national input-output (I/O) model from Statistics Canada²⁷. The I/O divides the Canadian economy into a matrix of industries and commodities. As outlined in Statistics Canada's Guide to using the I/O Model²⁸, the "*model has the greatest potential of all major economic models for capturing the flows of goods and services between industries and consumers at relatively detailed levels*".

The I/O models are used to define the linkages between different economic sectors, and between buyers and producers of different goods and services. These linkages are described through the purchases of intermediate inputs and final demand spending. This inter-connected spending creates a multiplicative effect, where spending in one industry creates demand for intermediate inputs from other industries. As a result, the total impact on the level of economic activity will be higher than the original spending amount.

One application of I/O models is calculating the economic impacts associated with different types of economic changes or shocks. Because the model describes how supply chains work, we can "shock" the I/O model and observe how the impact feeds through the economy. Through the I/O model, we can trace how the increase in demand for the CBD translates into Gross Domestic Product (GDP), Labour income, employment, Government revenues (Taxes revenues), and Gross output.

The economic impact estimates are broken down into: (i) direct; (ii) indirect; and, (iii) induced impacts. A definition of each type of impact is provided below:

- i. **Direct impacts** are those economic impacts generated by the industry under consideration and can be observed through an analysis of that industry's employee base, payroll, taxes paid, and the difference between the value of sales and purchased inputs.
- ii. **Indirect impacts** are those economic impacts generated by other industries in the supply chain. For example, suppliers of good and services to the industry under consideration will see their activities rise because of the increase in demand for their products and services.
- iii. **Induced impacts** are the direct and indirect impacts that result from the subsequent increase in demand for goods and services in the economy as the individuals working for all the affected industries will spend their earnings on all goods and services. It is important to note that induced impacts should be interpreted with some caution as they are affected by households' behaviour and responses to changing economic conditions. For example, when an

²⁷ <https://www150.statcan.gc.ca/n1/en/catalogue/36230001>

²⁸ <http://publications.gc.ca/site/eng/9.869296/publication.html>

economy experiences high unemployment, households saving rates tend to increase, which would reduce their spending and the induced impact on the economy. Therefore, it is crucial to be mindful that induced economic impacts may not always materialize to the extent shown.

The Canadian I/O model used in this study is the most recent national version produced by Statistics Canada and is calibrated to Canada's economy in 2016²⁹.

Statistics Canada's I/O model uses the North American Industry Classification System ("NAICS") to categorize industries in Canada. Since there is little CBD activity outside the licensed dispensaries the market is not included in the Canadian I/O model. The closest category to the CBD industry in the I/O model is the pharmaceutical and medicinal products industry. We shocked this industry using our estimate of the market size in 2019 presented in Section 3.

Estimates of economic impacts

Figure 5 presents the impacts on three key economic indicators: Output; real GDP at basic prices; and, labour income.

Output represents gross output. That is, the total value of the goods and service produced as a result of the impact of the CBD market on the economy. Gross output is a summation of the revenues received by each industry in the supply chain. It is important to note that intermediate purchases from other industries are not netted out in measuring of gross output. As a result, the impact on gross output is higher than the impact on GDP. We estimate that the CBD industry will increase gross output by \$2.78 billion in 2019. Of this amount, 49 percent is generated through a direct impact, 28 per cent is the indirect impact and the rest comes from the induced impact.

Real GDP at basic prices³⁰ represents the value added generated by the CBD industry. That is, gross output net of all the intermediate inputs. We estimate that real GDP will rise by a total of \$1.59 billion in 2019.

²⁹ The Supply and Use Product Classification (SUPC), 2016.

³⁰ The GDP at basic prices equals GDP at market prices, minus taxes and subsidies on products. It is the "natural" or "real" valuation of the production.

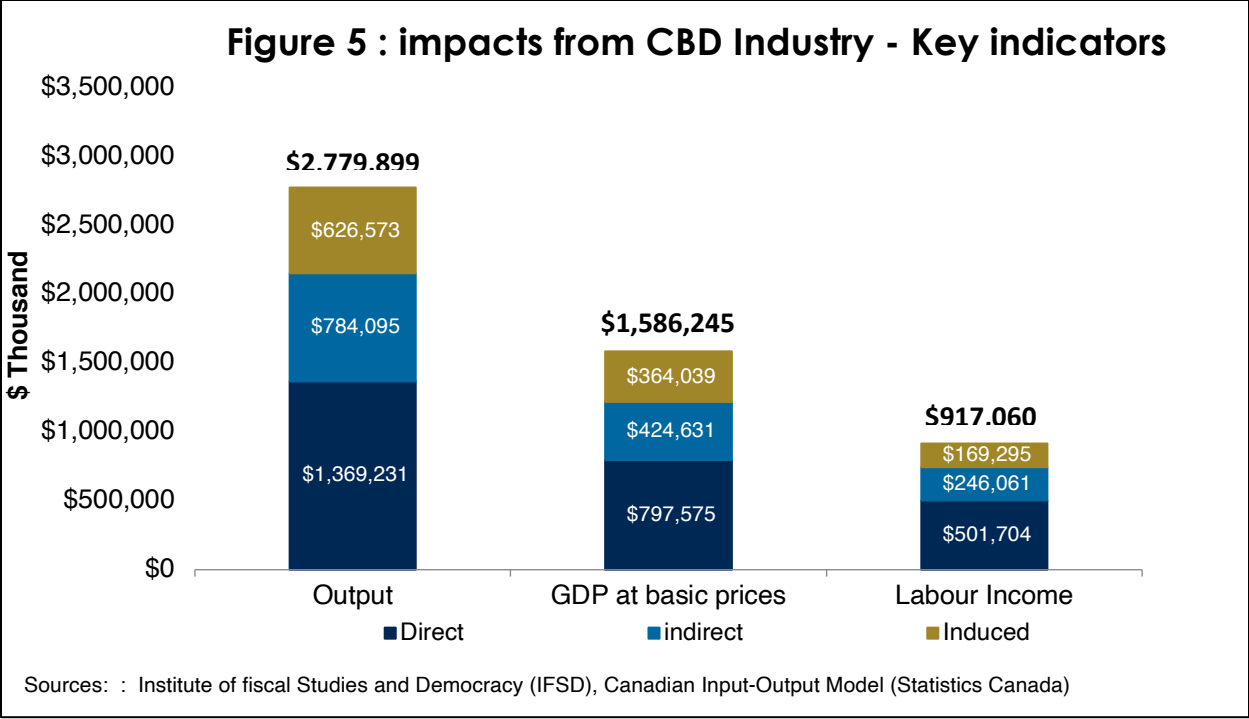
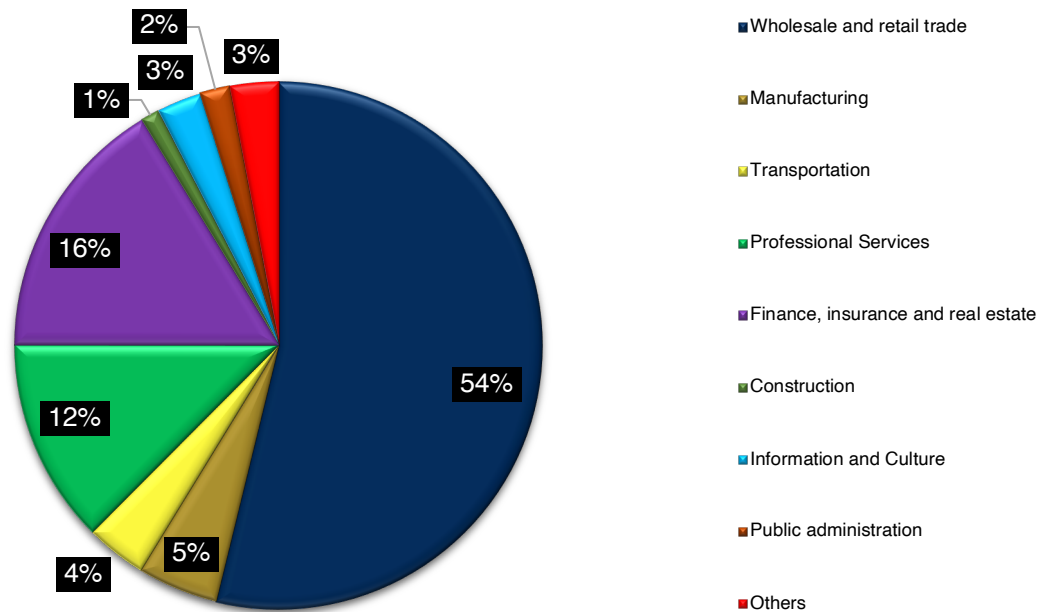


Figure 6 separates the impact on GDP by key industries. As expected, the largest impact is on the wholesale and retail trade industries as the expansion of the CBD market would be through direct sale to consumers. The second and third largest impacts are on the finance, insurance, and real estate industry, and the professional, scientific, and technical services industry as the CBD industry is expected to generate more demand for banking, leasing, legal, and accounting services.

It is important to note that one should expect to see a significant impact on the agricultural sector given that the main source of CBD would be industrial hemp production. Our estimates do not show this impact because the input-output model does not yet include CBD. We used pharmaceutical and medicinal sector as a proxy, which does not have a strong link to the agricultural sector.

Figure 6: GDP impacts, by industry



Sources: : Institute of fiscal Studies and Democracy (IFSD), Canadian Input-Output Model (Statistics Canada)

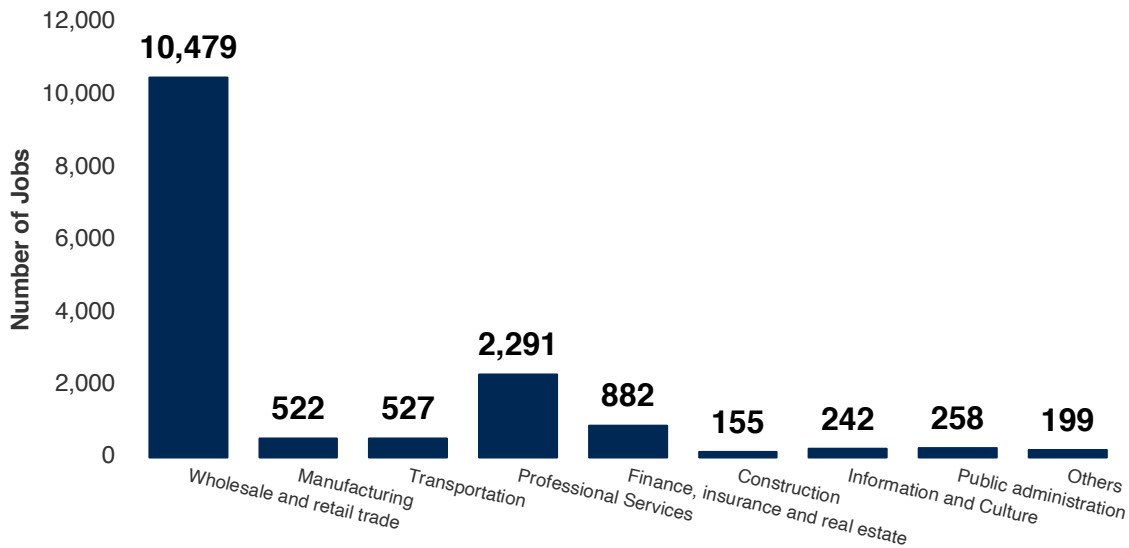
Labour Income represents the income generated in the production of goods and services accruing to labour. Labour income is comprised of two components— wages and salaries and supplementary labour income.

It is estimated that the total Labour income that will be generated from the CBD industry is \$917 million. Of this, approximately \$501 million, or 55 percent, will be generated through direct impacts. The remaining \$416 million will be generated in the other industries in the supply chain and through induced impacts on the economy.

Higher GDP and labour income are associated with more jobs. The CBD industry is estimated to generate approximately 9,638 direct full-time equivalent positions (FTEs) plus an additional 5917 FTEs through indirect and induced impacts (Figure 7) for a total of 15,550 FTEs. Most of the indirect employment effects are in the professional services industry and finance, insurance and real estate industry in line with the GDP impact in those industries. Higher GDP and labor income should also result in higher income tax, sales tax and excise tax revenues.

Based on our forecast of the size of the CBD market over the next five years, we can project that by 2023 the CBD market will raise real GDP by \$2.1 billion and generate 20255 more FTE jobs.

Figure 7 : Employment impact by industry



Sources : : Institute of fiscal Studies and Democracy (IFSD), Canadian Input-Output Model (Statistics Canada)
 Notes : Others represent Agriculture, Extractive industry, Utilities, Other commercial services

Another way of looking at the economic impact of the CBD market is through estimates of industry multipliers. That is, how much GDP can be generated in the Canadian economy for every dollar of value added (GDP) in the CBD industry, and how many jobs can be created in the Canadian economy for every job created in the CBD industry. Column 1 of Table 6 shows the economic response to an increase in demand for cannabidiol products. A \$1 million increase in CBD demand would generate a total GDP impact of \$843,952 and supports 8300 jobs. The second column shows the multipliers, expressed as the total impact relative to the direct CBD industry impact. The GDP multiplier shows that for every \$100 in direct GDP generated by the CBD industry, an additional \$99 in GDP is created through its indirect and induced impacts. Similarly, every 100 jobs that the CBD industry creates support an additional 61 jobs (Full-time equivalent) across Canada.

Table 6: CBD Industry Multipliers

	Impact of \$1 million in demand	Total impact/Direct impact
Gross output	1.479	2.03
GDP at basic prices	0.844	1.99
Labour income	0.488	1.83
Employment (FTE)	8300	1.61

Source: Institute of Fiscal Studies and Democracy, Statistics Canada (Input-Output Model)

Section 5: Cautionary notes

A deregulated CBD market does not yet exist in Canada. Even in the U.S., despite the passage of the Farm Bill in 2018 that allowed the cultivation and production of CBD, the Federal Drug Administration has not allowed CBD products to enter the market as health products. As a result, the estimates of the market size in the U.S. are based on a hypothetical scenario where the FDA has regulated CBD products as natural health products.

Our estimate of the market size is based on the U.S. estimates and assumptions about the consumption per day and participation rate of Canadian consumers. This is not the ideal way of assessing the market size and the economic impact of a new industry. Any change in those assumptions would change the estimated market size. The lack of reliable Canadian data does not allow us to be more precise.

Given the increasing popularity of CBD products, it is important that researchers have access to reliable data both on potential health impacts of CBD and its consumption by product type and by age group over time. This would require collaboration between the industry, industry associations and Statistics Canada. Access to such data would allow researchers to use a more robust methodology to analyze the CBD market.

The economic impact is estimated using the Canadian Input-output model. The I/O model, while powerful in using the linkages between industries to estimate the impact of a shock, is a static model that reflects industry linkages at a point of time. It does not consider economies of scale, capacity constraints, technological change, externalities, price changes, or changes in consumer behaviour.

Moreover, the economic impact is estimated under the assumption that CBD users do not substitute expenditure on CBD for expenditure on other products and services. Any amount of substitution would reduce the economic impact of CBD.

The estimates presented here are sensitive to the assumptions we have made and therefore are only indicative.