UNIVERSITY OF LJUBLJANA
SCHOOL OF ECONOMICS AND BUSINESS

MASTER'S THESIS

SOURCES OF VALUE IN THE CANNABIS INDUSTRY: THE CASE OF CANADIAN PUBLIC COMPANIES

Ljubljana, December 2019 MARK MALIS

AUTHORSHIP STATEMENT

The undersigned Mark Malis, a student at the University of Ljubljana, School of Economics and Business, (hereafter: SEB LU), author of this master's thesis with the title THE SOURCES OF VALUE IN THE CANNABIS INDUSTRY: THE CASE OF CANADIAN PUBLIC COMPANIES, prepared under supervision of Professor Aljoša Valentinčič, PhD,

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INTRODUCTION

Prohibition of cannabis in North America lasted for almost a century. The world is rapidly changing and adapting to new policies, countries look up to each other and trying to figure out, where they can benefit the most. Countries around the world have been accepting cannabis more and more especially for its medical purposes. Canada has legalised medical cannabis for patients with HIV/AIDS in 2001. In 2013, Canada legalised medical cannabis for patients with other illnesses as well (Selsky, 2019). In October of 2018, Canada has become the first G-7 country to legalise cannabis for recreational use and only the second country in the world, after Uruguay, to do so (Department of Justice Canada, 2018).

Many countries have adopted cannabis for medical purposes and there has been an increasing emphasis on the studies done on how to treat different diseases with the cannabis. Countries have figured out that cannabis can help many people but if regulated properly, it can also protect children from getting it illegally, decrease black market and other illegal activities and in addition, helps boost economy with increasing tax revenues to the government, creating many new job positions, opening the economy with increased exports, etc. Public companies that are producing cannabis products have become very popular in Canada. These are licensed producers with experienced team members such as doctors, pharmacists, professors, physicians, even former bankers, which are trying hard to offer top quality and safe products to their patients and recreational users (Bowman, 2017).

The focus of this Master's thesis is to explain, which factors and sources are affecting the value of the cannabis industry, such as the regulation, market (supply and demand), banking reforms, economic implications, impact on all stakeholders, future market drivers, collaborations (M&A), etc. From the finance and investment perspective, I assess the value of the 10 well-known public Canadian cannabis companies with different valuation models and financial techniques to show, whether the cannabis stocks are in general overvalued or undervalued. There are many catalysts and enormous potential for the cannabis industry however, there are also ongoing concerns by analysts and other financial experts that cannabis sector might be in a bubble due to companies trading at very high multiples with almost no earnings and negative cash flows. There are also increasing numbers of articles publishing that cannabis stocks might be extremely overvalued and that investors need to be aware of the risk they're taking (Brumley, 2019).

I explain some terms with regards to the cannabis industry and I also touch the theme about theoretical side of the cannabis, to better understand its components (cannabinoids) and their usage. Furthermore, I explain what the Canadian legalisation of recreational use of cannabis means for the other countries, especially for the Europe and USA, where for the latter, cannabis remains illegal under the federal law. I emphasize how quickly the industry is evolving and how well the cannabis is accepted.

1 FACTORS AFFECTING THE VALUE OF THE INDUSTRY

Terms marijuana and cannabis are of the same meaning, there is no difference. Marijuana comes from the dried flowering tops, leaves, stems, and seeds of the Cannabis sativa or Indica plant. Some people smoke marijuana in hand-rolled cigarettes called joints, in pipes or sometimes water pipes (bongs), or in blunts (marijuana rolled in cigar wraps). Nowadays, new methods of using cannabis emerged, such as vaping and edibles (cannabis infused in into foods). People have been using it for centuries, mainly for its fibers, seeds, for medical treatment and recreationally. There are around 120 substances, also known as cannabinoids, found in marijuana, of which the cannabidiol (CBD) and delta-9-tetrahydrocannabinol (THC) are the best known and most used. Where CBD is a non-psychoactive substance, the THC is a psychoactive substance, that impacts specific brain receptors and is used to treat variety of medical conditions. Marijuana is globally the most commonly used drug (Davis, 2018).

Effects of using marijuana depends on what type of a person you are. When people use or consume cannabis, they might experience different effects, such as: changes in perception, due to a slight hallucinogenic effect that can create a distorted illusion of time and space, mood changes, which can cause euphoria, feelings of energy, or a state of relaxation, increased heartbeat, decreased blood pressure, decreased concentration and memory, faster breathing, increased appetite, decrease in nausea, and reduced psychomotor coordination. THC can be found in user's urine for several weeks, depending on the variety of factors, such as metabolism of the individual, percentage of fat the individual has, consumption of water and C-vitamin, sweating, and few other factors (Davis, 2018).

Cannabis prohibition lasted almost 100 years and it began, when cannabis was added to the Confidential Restricted List in 1923 under the Narcotics Drug Act Amendment Bill. More specifically, the government introduced the Act to Prohibit the Improper Use of Opium and other Drugs and one of those 'other drugs' was also marijuana. The 1960s present the period of popularisation of cannabis, mainly due to the movement of 'Hippies'. Number of cases, where people were charged with possession of marijuana, rose from 20 cases in 1962 to more than 12,000 cases 1972. From this year on, criminal charges for Canadians became a growing problem. This led to the formation of the Le Dain Commission, which 3 years later, recommended decriminalisation for the possession of cannabis. In July 2001, Canada announced a government-run medical marijuana program, meant for people with chronical illnesses. On April 13, 2017, the Cannabis Act (Bill C-45) is presented to the Parliament, which would legalise the cannabis for the recreational use. It was passed in November the same year by the House of Commons and later in June 2018 by the Senate as well. On 21 June 2018, the Cannabis Act received the Royal Assent by the Gov. Gen. Julie Payette, which was the third and final step for the Bill of becoming Law. On October 17, 2018, the Cannabis Act came into force (CBC KIDS NEWS, 2018).

The Canadian Cannabis Act (C-45), which came into force on 17th October 2018, is a legal framework for controlling the production, distribution, sale, and possession of cannabis in

Canada. The purpose of cannabis act is to protect young people by restricting their access to cannabis, protect them from temptation of using cannabis, to deter illegal activities with regards to cannabis, to reduce the burden on the criminal justice system, to provide access to a quality and controlled supply of cannabis, and to improve and enhance public awareness of the health risks of using cannabis (Health Canada, 2018).

Federal minimum age to legally use cannabis was set at 18, however, each province had option to determine their own, same or higher, minimum age. Alberta and Quebec decided to set the legal age at 18 and other provinces decided to set it at 19 (Butler, 2018).

If you meet this age requirement, you can possess up to 30 grams of legal cannabis, dried or equivalent in non-dried form in public. You are allowed to share up to 30 grams of legal cannabis with other people who meet the age criteria. You can buy dried or fresh cannabis and cannabis oil from a provincially licensed retailer and in some provinces, you are able to purchase cannabis online from the licensed producers. You are also allowed to grow up to 4 cannabis plants per residence for personal use. You can also make cannabis products (foods and drinks) at home, which must not be concentrated products made of organic solvents. For the license producers, under the cannabis act, licenses are required for cultivating and processing cannabis, sale of cannabis for medical purposes and for analytical testing as well as for the research and studies done on cannabis. There are also permits that are required for the purpose of exporting and/or importing cannabis for scientific and medical purposes and for the industrial hemp. Licensed producers are facing many other requirements such as personnel and physical requirements, plain packaging for the products, strict requirements for using logos, colours and branding, labelling on cannabis products with different health warnings, symbols and specific information. Cannabis for medical purposes is continued regulated through Access to Cannabis for Medical Purposes Regulations (ACMPR) (Cannabis Act, 2018).

As of April 2019, there were 177 federally licensed cultivators, processors and sellers who are allowed selling cannabis to provincially authorized wholesalers and retailers who sell to the general public. The producers are also permitted to sell cannabis products for medical purposes directly to individuals, who are authorized by a health care professional. Each province and territory are putting in place its own regulated retail rules, some restricting sales to government operated establishments and others allowing the private sector to enter this new retail market. The Act enables purchases from authorized retailers, either online or in bricks-and-mortar stores, and personal cultivation of up to four plants, which depends on the province or territory. Federally licensed cannabis producers pay an excise duty to the Canada Revenue Agency, when their products are delivered to provincially authorized distributors and retailers. Many economic activities are related to cannabis. Households purchase the products for consumption. Cannabis businesses hire and pay employees, purchase intermediate inputs such as electricity and accommodation services, grow, process and distribute products, invest in plant, equipment and the accumulation of inventories and earn gross operating surpluses or mixed incomes. Governments collect the taxes on products sold. Governments regulate the products and, in some provinces, sell them. They also

provide related health, law enforcement, and information services. The national economic accounts allow users to view this economic activity from three perspectives, those of income, expenditure and production. Cannabis-related economic activities are taken into national GDP data. Cannabis-related economic activity is defined here as household spending on cannabis either legally or illegally, plus the change in inventories of cannabis producers plus legal and illegal exports minus imports of cannabis. Cannabis output contributed 0.39% to the total gross domestic product (at market prices) in 4th quarter of 2018 in Canada. The all-in average market price paid for legal cannabis flowers was C$9.70 in Q4 of 2018, whereas the price for illegal cannabis flower was C$6.51, which was anonymously self-reported. Based on Statistics Canada, cannabis inventories of producers and retailers increased by $461 million at current prices. Households purchased C$307 million worth of legal cannabis, whereas C$1.2 billion was spent on illegal cannabis, therefore, approximately 79% of cannabis was bought illegally, which is a decrease from 90% from 3rd quarter. It is the positive move, but the percentage of cannabis bought illegally is way too high (Statistics Canada, 2019a).

On behalf of The Cannabis Council of Canada and Abacus data, the survey conducted in September 2018 on what percentage of Canadians supported or accepted legalisation of cannabis showed that 70% of Canadians supported or accepted (were ok with it) the legalisation of cannabis, which is the highest percentage in the history of the country (Anderson & Coletto, 2018). Similarly, in the USA, marijuana support is at all-time highs and approximately 66% of Americans approve legalisation and support marijuana (Lopez, 2018).

1.1 Regulation

Cannabis in Canada is being regulated through 3 levels of government; federal government, provinces, and municipals. The federal government's main focus is to set requirements for producers who grow and manufacture cannabis products, to set the rules and standards for the entire industry that apply to different types of cannabis products available for sale, packaging, and labelling requirements for products, standardized serving sizes as well as potency, list of certain ingredients that are not allowed to be used, good practices and tracking requirements of cannabis from seed to sale to keep it out of the illegal market restrictions on promotional activities. The second group of government are Provinces, which are responsible for developing, implementing, maintaining and regulating systems to control the distribution and sale of cannabis. They are allowed to determine their own safety measures like increasing the minimum age in their province, lowering the personal possession limit in their jurisdiction, applying additional rules for growing cannabis at home, determine where adults are allowed consume cannabis (public locations, vehicles, how far from schools, etc.). Municipal level is the third level of government regulation and rules are determined based on regulatory frameworks set by the provinces. Based on an analysis by the Federation of Canadian Municipalities (FCM), municipalities are likely to be most active in the areas of zoning, business licensing, building code, municipal workplace safety and

enforcement of regulations around public consumption and impaired driving (Lee-Andersen, 2018).

1.2 Demand for Cannabis Products and Consumption Behaviour

Before Legalisation came into the effect, Deloitte published 2018 Cannabis Report with the title "*A society in transition, an industry ready to bloom"*, where they did an extensive research about demand for cannabis consumption. They found out that cannabis consumers at the time before legalisation, who said they'll transition all of their purchases to legal market, are more likely to be men with at least a university or graduate school education and an annual income over $50,000. On the other side, cannabis consumers before legalisation, who did not intend to buy any cannabis on the legal market are more likely to be aged 55 or older and have a high school education or less. They estimated that around 63% of cannabis products are going to be sold through legal channels (Deloitte, 2018).

National cannabis survey for the fourth quarter 2018, done by Statistics Canada suggests, that about 15% (4.6 million) of Canadian population aged 15 and older were registered of using cannabis in the months from mid-November to mid-December 2018 but overall, 19% of Canadians think they will use cannabis in the next 3 months. Among the 15% of Canadians reporting current use, 7% reported using cannabis for non-medical reasons, 4% said they use it for medical reasons only (with or without medical documentation) and another 4% reported using for both medical and non-medical reasons (mixed use). They found that consumers are deciding where to purchase cannabis, mainly based on three factors; quality and safety of the products (76%), lowest price (38%) and accessibility (33%). Observations also showed that medical cannabis users are using cannabis on a daily basis, however, their preferable method of consumption is intake in the form of oils and gel capsules rather than in the form of smoking. This is very important information for the producers as well, because margins on oils and gel capsules are much higher than on the dried cannabis, according to financial statements of all public cannabis companies that reported sales of these products (oils and/or gel capsules). Approximately 26% of recreational users got cannabis from legally authorized retailers or online licensed producers, compared to 86% of medical users with documentation, 47% of medical users without documentation, and 44% of mixed users (Statistics Canada, 2019b).

Now let's examine the newly released cannabis survey for the second quarter 2019, also by the Statistics Canada, where they focused mostly on trend differences between males and females. From mid-May to mid-June 2019, approximately 4.9 million or 16% of Canadians aged 15 and older were registered of using cannabis in the previous three months. Cannabis consumption in the second quarter of 2019 was slightly changed from the same quarter in 2018, prior to legalization. However, the number of Canadians aged 65 and older reporting cannabis use increased from 3% to 5% over this period, whereas cannabis use among consumers aged 15-64 years, was stable (between 10% to 25%, depending on the age group). Males (21%) were more likely to have used cannabis in the first half of 2019 as females (12%). This is true for every age group except seniors aged 65 and older.

Furthermore, males (8%) were twice as likely to report daily or multiple use per week as females (4%). Approximately 20% of males aged 15 and older reported consuming cannabis in the first half of 2019. Approximately 52% of these males reported using cannabis specifically for non-medical reasons, while about 30% reported using for both medical and non-medical reasons, and around 20% reported for the medical reasons (with/without medical documentation). Approximately 77% of Canadians, who reported using cannabis during the first half of 2019, consumed dried cannabis, while 26% consumed edibles. Canadians also reported using other types of products, such as liquid concentrates (20%), cannabis oil cartridges or vape pens (19%), and hashish (16%). Smoking is still the most frequent method of consuming cannabis, with approximately 68% of males and 62% of female consumers choosing this method in the first half of 2019. Around 14% of females and 5% of males have consumed cannabis through other methods, such as the application of products on the skin or under the tongue. Approximately 8% of consumers obtained cannabis by growing their own or grown by their friends. Approximately 33% of all Canadians reported having tried cannabis in the past but are not current users. Approximately 76% of consumers, who purchased cannabis in the first 6 months of 2019, pointed out quality and safety as an important factor when buying cannabis., whereas round 42% of consumers pointed out price as the most important factor. Approximately 33% stressed that accessibility (opening hours), location (proximity), and availability (preferred potency or strain) are the most important factors for them (Statistics Canada, 2019c).

Deloitte (2018) researched the topic on what actually drives the consumption and 66% of respondents to the survey said that they use cannabis because it helps them to relax and sleep. Cannabis is major disruptor in this area, which helps many people with these very common problems. According to Celyne Bastien, a communication officer of Canadian Sleep Society, around 40% of Canadians have some sort of sleep disorder with insomnia being the most frequent (Bastien, 2018). It's not just Canadians of course, the entire world population has these same problems. 62% said they use it to reduce stress and anxiety, 58% to have fun with friends, 48% to improve mood, 41% as an alternative to alcohol, 34% to make activities more interesting, 29% for specific medical reasons, 26% to increase creativity and expressiveness, 25% to heighten senses, 19% to improve sex life, and 18% to help connecting them with others. Because no such extended research has been done after legalisation of cannabis, we can determine 3 groups of consumers based on Deloitte's research; pre-legalisation current users, post-legalisation current users and post-legalisation likely users. For the first group, 20% said that they use cannabis daily, 33% 1-6-times per week, 24% once/twice per month, and 23% less than once per month. For the second group, the data suggest that 20% of them will still use cannabis daily, 35% 1-6-times per week, 27% once/twice per month, and 18% less than once per month. For the last group, forecast is that 4% will use it daily, 14% 1-6-times per week, 19% once/twice per month and 63% less than once per month. Canadians will consume more, and the average amount consumed during a single occasion is expected to rise 11%, from 0.82g to 0.91g by the anticipated popularity of edible products, which will come on the market in the October or November of 2019. Very important information for the cannabis companies is which purchase channels would

consumers choose and what are their purchase preferences. Survey by Deloitte (2018) suggests that approximately 47% of legal cannabis will be purchased in physical stores (licensed private retail stores or government retail stores), one third of cannabis users will buy cannabis products online, either on the licensed producer/manufacturer website, licensed producer/manufacturer mobile app, licensed private retail mobile app, government-operated website or licensed private retail website. Approximately 18% will grow cannabis at home. Physical stores seem to be the favourite purchase channel, because people wish having an experience, while buying cannabis products, to educate themselves about different strains[1]and how to use oils or gel capsules for instance. According to survey respondents, the most important 'must-have' for any physical store is to have knowledgeable employees, who can advise them on different products. The second most important thing for survey respondents is that the store is located in a safe area. Other important features are clear marked prices for all products, that retailer can be trusted with personal data, friendly opening hours, etc. According to survey by Deloitte (2018), price and variety of products will be the two key purchase drivers. 65% of probable and 75% of current consumers said they'll be looking at products offered at reasonable price. Approximately 60% of current consumers and 49% of probable consumers consider the range of available products (e.g., edibles, pre-rolls, oils) to be an important purchasing criterion (Deloitte, 2018).

1.3 Transition from Illegal to Legal Channels

As stated before, although the percentage is decreasing, approximately 79% of cannabis in Canada is still bought illegally. According to Deloitte's research, there are few important reasons why consumers would shift from illegal to legal market. Approximately 55% of consumers said they would purchase cannabis on legal market if there were better-quality products, 54% a range of price points for every budget, 47% if there were products that offer a range of potency, 44% if there were products that target specific effects on the body, 41% wish for products that are safe to use, 26% would love to use non-combustible products like gel capsules (they are increasingly available), 16% said that familiar brand would be the reason to change to legal channels, 1 % said if there were vaping products, and 6% revealed other reasons (Deloitte, 2018).

If we take a look at the situation in the United States, we can argue that high taxes and complex regulations have led to a boost of the black market. Californian authorities have seized around $30 million in illicit marijuana products in the year and a half since retail sales of pot became legal. Despite legalising the sale and possession of marijuana for recreational use, there are thousands of unlicensed retailers and dispensaries in the Golden State. An analysis from BDS Analytics, estimates were that 78% of all marijuana sold in California in 2018 was purchased on illegal markets, as was nearly 90% of the weed sold last year in Massachusetts. More than half of marijuana sales in Oregon and Washington were illegal

[1] Types and sorts of cannabis flowers

last year. The main reason is the price. Black market prices are much cheaper than those on the legal market (Hansen, 2019).

In addition to the last paragraph, problems in California erupted when state imposed a 15% excise tax on all cannabis sales in addition to local taxes that, when added up, can put more than a 45% mark-up on legal cannabis products. Moreover, there's a problem of the areas of the state where there are no dispensaries. As of last April, less than 1 in 3 cities in California (144 out of 482) allowed any kind of cannabis sales within their borders, which means that people who want to use cannabis, especially for medical reasons, have to look for products on the black market. Massachusetts is dealing with similar issues of high taxes and few legal outlets. The black market is also a problem for the growing cannabis industry. The total potential estimated demand for cannabis in the United States, including black market demand, is as high as $55 billion. But the legal industry can only boom and develop if more existing cannabis users choose the legal channel and new cannabis users join the market. The reasons that the black market thrives are high prices and not enough legal dispensaries, which means that there is a high risk that existing users will be sticking with their illegal sources and new users will be displeased by high prices. The prices need to come down in order for the consumers to shift from the illegal to the legal cannabis market (Murphy, 2019a).

1.4 Creation of Jobs

Marijuana industry is adding a lot of value also in the job market. Marijuana related job positions have been increasing very rapidly and according to Alison McMahon, founder and CEO of Cannabis At Work, a recruitment and training site, marijuana industry in Canada can potentially create around 125,000 jobs in the 2019 (Owram, 2018).

In United States, marijuana is currently the fastest growing industry in the job market and in 2018 alone, it has added 64,389 full-time legal cannabis jobs, that is a total of 211,000 so far. From 2017-2020, the projected growth is 110%, which would make the marijuana job market the fastest growing market in United States (Heeb, 2019).

The highest concentrations of jobs are in states where cannabis is legal for both medical and recreational use and the most prevalent cities are Colorado and Washington. Professional and technical workers, such as accountants, lab workers, marketers and tax experts, represent more than half of the new workforce. Their median annual salary was $58,511, almost 11% higher than the overall U.S. median (Murphy, 2019b).

1.5 Medical Marijuana

Individuals who have a medical need and also have authorization of their health care practitioner, can access medical cannabis via 3 ways: they can register with licensed producer to get access to quality and controlled cannabis, they can register with Health Canada to grow and produce a limited amount of cannabis for their needs, or they can designate someone else to grow it for them. The possession limit must be less than a 30-day

supply or 150 grams of dried marijuana or the equivalent amount if in another form (Health Canada, 2016).

At the end of March 2019, there were 354,538 medical client registrations with federally licensed sellers, 30,883 individuals were registered with Health Canada for personal and designated cultivation of cannabis for their own medical purposes, 5,162 kilograms of dried cannabis and 14,730 litres of cannabis oil for medical purposes were sold between January 1 and March 31, 2019, and 340 kilograms of dried cannabis and 195 litres of cannabis oil were exported for medical or scientific purposes between January 1 and March 31, 2019 (Health Canada, 2019d).

Medical marijuana can be tax-deductible to some extent in contrast to the marijuana for recreational use, which cannot be. Canada is collecting around 100 million Canadian dollars in taxes. People who are using cannabis for medical purposes and have evidence of the physician or practitioner that they indeed have prescription, are allowed to deduct a limited amount from the taxes, if they are buying cannabis from a licensed producer. Beneficiaries must sum up the total expenses for the medical cannabis and then decide whether to subtract $2,268 or 3% of their net income (Hopper, 2019).

1.6 Industrial Hemp

Industrial hemp is one of the fastest growing global industries. The crop, related to marijuana, is an excellent introduction commodity to a better general understanding of the cannabis industry. Industrial hemp has usually high amounts of CBD and low amounts of THC and hemp has great potential for significant nutritional and medicinal purposes. Hemp is one of the only plants that contain Omega 3, 6 and 9 – which are essential fatty acids. It is promoted as a super food and the world is starting to notice the benefits of the hemp plant. New opportunities are presenting themselves as countries and states begin to lift regulations for growing hemp (Hollander, 2018).

According to Grand View Research, global hemp industry was worth $3.9 billion in 2017 and is expected to grow at CAGR of 14% and it will reach $10.6 billion by 2025. The demand is growing rapidly for hemp-based food products including cooking oil, dairy alternatives, flour, and salad dressings is expected to drive market growth. In addition, rising demand for bakery products such as bread and cookies is expected to drive the market as well. Also, the demand for CBD-infused beverages is growing strongly (FinancialNewsMedia.com, 2019).

Hemp-infused beverages have been available in the United Kingdom since February 2018. Although cannabis remains illegal everywhere in the country, CBD is not and therefore, beverage companies in the country have been releasing hemp-infused water and beer ever since. The region's first CBD oil-infused spring water came on the United Kingdom's supermarket shelves in February and one month later, the country's first hemp-infused beer became available on the market as well. According to the U.K. publication Metro, there were at least two bars serving CBD-infused beer in March 2018. In November of 2017, the Australian government passed a new set of laws that allowed residents to consume and grow

hemp. In February 2018, the hemp farmers harvested their first legal crop of edible hemp. New Zealand harvested their hemp in late 2018. In 1984, the legal THC limit was 0.5% in Europe. Three years later, they lowered it to 0.3%. They decreased it again in 1999 to 0.2%. Fast forward to today, and the European Industrial Hemp Association (EIHA) is demanding the European Parliament, European Commission and Members of State to revert THC restrictions to the limits of the 1980s. If Europe wants to stay competitive in the international hemp market, their government will have to consider what the EIHA is proposing (Hollander, 2018).

China grows nearly half the world's legal hemp. The 2018 sales were around $1.2 billion, and most of the revenue was generated from the textile fibre made from the plant's stalk. Now global demand for its seeds, leaves and flowers is surging. Packed with healthy fatty acids, seeds go into snacks and oil. Leaves and flowers contain CBD that reduces anxiety and inflammation. It is being added as a supplement to food, drinks and cosmetics across the world (The Economist, 2019).

Hemp is grown in 30 nations in US. In the United States, production is controlled under drug enforcement laws. To produce industrial hemp in the United States the grower must obtain a permit from the Drug Enforcement Agency (DEA). Estimates from Vote Hemp show that the total retail value of hemp products in the U.S. in 2017 was $820 million. This includes food and body products, clothing, auto parts, building materials, and other products (AgMRC, 2019).

United States legalised hemp in December 2018 and the industry has been booming ever since. Some analysts estimate that the hemp industry could reach $13 billion by 2026. As I mentioned before, hemp is a very good material for the production of sustainable clothing and one of the best-known brands in this segment, Levi Strauss & Co., decided to seize this opportunity. In March 2019, they started making jeans and jacket made from a 69% cotton and 31% hemp blend that feels like pure cotton. Levi wanted to make a statement and do something better for the environment because the hemp process uses drastically less water and chemicals than cotton. Company's head of global product innovation, Paul Dillinger, said that the company is continuing to work on improving the quality of its cottonised-hemp and the short-term goal for most apparel is to be nearly from half of a cotton-blend, as well as fully hemp for certain products. Dillinger expects a 100% cottonised-hemp garment in the next 5 years. Dillinger forecasts that when the company is able to make 100% cottonized-hemp clothing, they will take out more than 2/3 of the total water impact to the garment, which is saving a lot (Feloni, 2019).

1.7 Future Market Drivers

There are many factors, which will probably play a vital role in the future growth of the cannabis industry. Because we assume that financial markets are efficient, the markets are already, to some extent, discounting these future market driving factors to the present value.

1.7.1 Trends in Edibles and Beverages

Edible is a food product that contains cannabinoids. Foods and beverages made from just CBD, are known as hemp foods. When talking about edibles, the most common types are definitely baked goods, such as brownies, cookies, cakes, and other sweet deserts, which are known for its good taste and usually really long-lasting effects, due to the fact, that they are soluble in fats and therefore stay longer in the body. Edible products as well as beverages that contain THC[2] and/or CBD[3], are not going to be allowed for sale in Canada at least until October of 2019. In some states in USA, edibles have been on the market for a couple of years and consumers love them. Edibles' share of the total cannabis market has already grown from 5.4% in 2011 to the current 12% in United States. According to ArcView Market Research and BDS Analytics, consumers in Canada and United States will spend approximately $4.1 billion on edibles by 2022. With the edible market's potential in Canada, the industry is attracting big multinational companies and few marijuana producers have already some sort of partnerships with them. The biggest Canadian marijuana producer Canopy Growth got investment from the Constellation Brands in exchange for 54% stake, Hexo Corp got into Joint Venture with Molson Coors to develop cannabis-infused beverages, Tilray Inc. got partnerships with Novartis and Anheuser-Busch InBev, Cronos Group got investment from Altria Group, which acquired a 45% stake in the company (Green Entrepreneur, 2018).

The interest from the Canadians to purchase and try edible products is pretty high. According to Deloitte's survey, the majority of people would like to try cannabis-infused baked goods, such as cookies, brownies, biscuits. There is also very high interest of trying the cannabis-based chocolate, candies, honey, and ice cream. Furthermore, people also want to try cannabis-infused beverages. Deloitte's research suggests that edibles could represent 18% of the overall cannabis-related products intake by consumers. Companies are expected to have significantly high margins on edible products, because there is a lot of value added to the end product for a fraction of the costs (Deloitte, 2018).

There are 5 major risks that can potentially impact the growth of this special segment: regulations, competition, taxes, consumer concerns, and shelf life. Regulators in Canada are becoming increasingly worried about the dosage, packaging, and labelling of edible and beverage products as well as possible health issues regarding the use of nanotechnology of mixing CBD and/or THC into the products. Huge companies with worldwide known brands are entering the space and could gain and take the lion share from the cannabis companies away. There will probably be a complex taxation on edibles and beverages, which could decrease the demand for legal products and potentially shift it to the black market. There are also many consumer concerns about the dosage amount, taste and also about toxins, due to the completely different absorption of the cannabinoids. When edibles or beverages are

[2] Tetrahydrocannabinol (THC) is one of at least the cannabinoids identified in cannabis. THC is the principal psychoactive constituent of cannabis.

[3] Cannabidiol (CBD) is a natural cannabinoid discovered in 1940. It is one of the identified cannabinoids in cannabis plants, accounting for up to 40% of the plant's extract.

ingested, the cannabinoids are then soluble in fats instead of the water, which means that they are stored in the body longer and effects are stronger than in the case of smoking cannabis, for instance. The last risk is the shelf life, namely, the products could stay on the shelves for just a few weeks or months and if the demand will not be greater than the supply, many products could go to waste (Desjardins, 2019).

1.7.2 Supply and Demand

Two of the most important fundamental market drivers are supply and demand. Most were worried that there was already an oversupply, based on Health Canada's data, which showed that in February the total sales of dried cannabis as well as oils, were decreasing. However, since March the demand has picked up. It seems like there were some sorts of problems with distribution channels, because inventories of dried cannabis and especially those of cannabis oil, have been increasing rapidly every month, whereas sales of both types of cannabis have been pretty much flat and then they dropped in February. It is a positive sign that demand is slightly picking up and we still need to wait for all the physical stores to be opened and for the edibles to come on the market in October this year and perhaps the demand will be boosted by these two factors even more. As mentioned, one reason (besides low demand) can also be that there are some sorts of distribution issues and that the cannabis cannot come to the shelves fast enough. Sales are also lower than anticipated due to packaging, processing and quality assurance constraints and export volume is not growing. Currently, it is a bit worrying situation if you compare total inventories to total sales. In the Figure 1 below, we can see that total sales of dried cannabis have been increasing since March, however, total inventories (finished and unfinished) have increased substantially more. For a comparison, sales increased from 6,683 to 9,976 kilograms (49.3%) from February to June, whereas the total inventories (finished and unfinished) increased from 143,814 to 312,251 kilograms (117.1%) for the same period, which represents 31.3-times total sales for the month of June. In Figure 2 below, we can see that total sales of cannabis oil have also been increasing since March, however, like in the case of dried cannabis, inventories increased even more. Sales of cannabis oil increased from 7,270 to 9,614 litres (32.2%) from February to June, whereas the total inventories (finished and unfinished) increased from 96,378 to 141,181 litres (46.5%) for the same period, which represents 14.7-times total sales. According to Figure 3 below, sales of medical marijuana (dried cannabis) have been decreasing every month, with an exception of April, where the sales spiked, but continued the down trend in May and June. Sales of dried marijuana for the recreational use on the other hand, have been increasing each month with the exception of February, where they slightly decreased. Moreover, finished inventories was mostly held by the distributors and/or retailers. In June, total finished inventories (held by federal licence holders and distributors/retailers) were 48,918 kilograms, whereas the total sales (medical and non-medical) were 9,976 kilograms, representing 4.90-times sales. In Figure 4 are shown sales and finished inventories of cannabis oil. Sales of oil for medical purposes have been fluctuating whereas sales of oil for non-medical purposes have been increasing since the drop in February. June was the first month, where the sales of oil for non-medical use were higher than those for medical use,

suggesting that the oil has become a popular type of usage by the recreational users. In June, total finished inventories of oil (held by federal licence holders and distributors/retailers) were 98,123 litres, whereas the total sales (medical and non-medical) were 9,614 litres, representing 10.21-times finished inventories of oil to total sales (Health Canada, 2019a).

Figure 1: Total Inventories and Sales of Dried Cannabis (Kilograms)

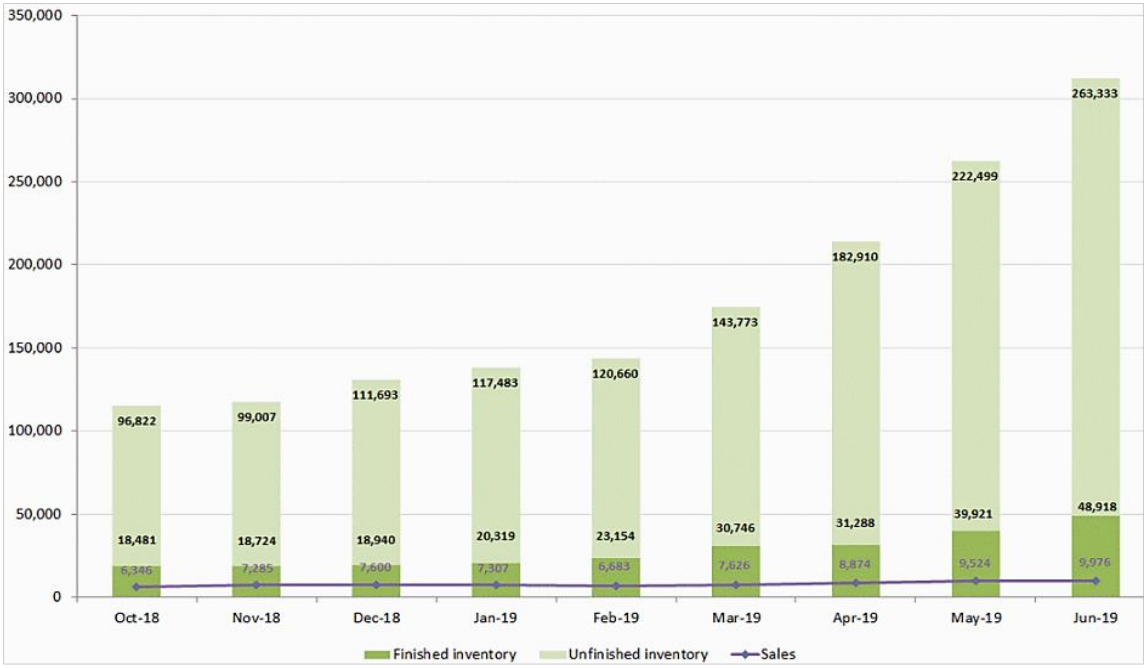

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Figure 2: Total Inventories and Sales of Cannabis Oil (Litres)

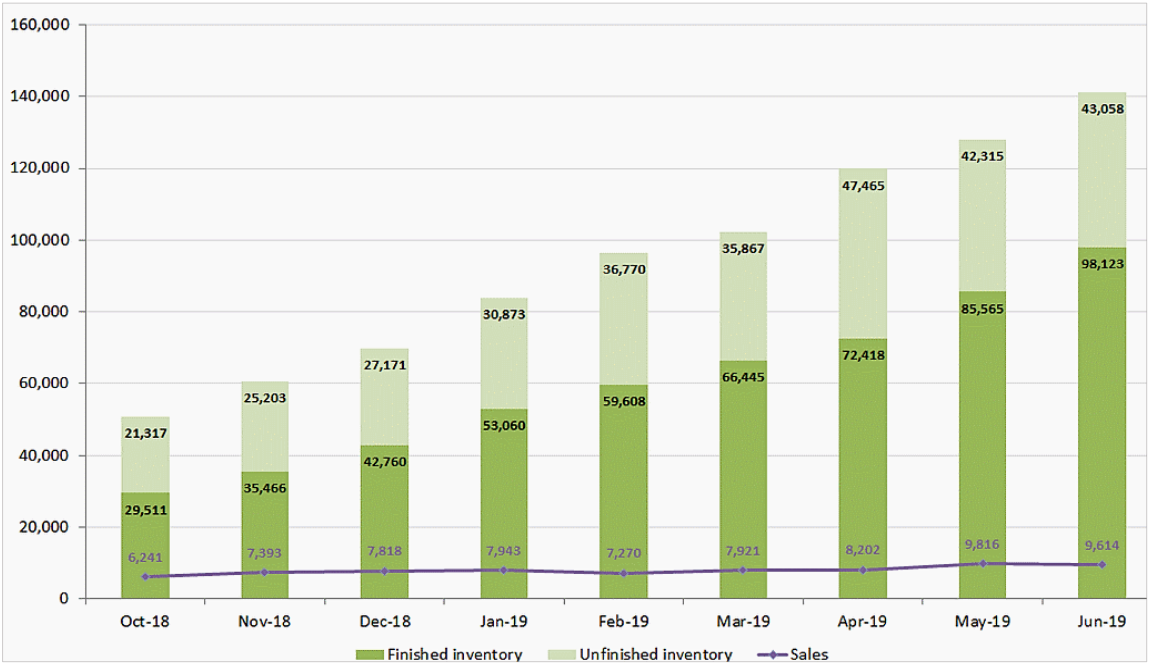

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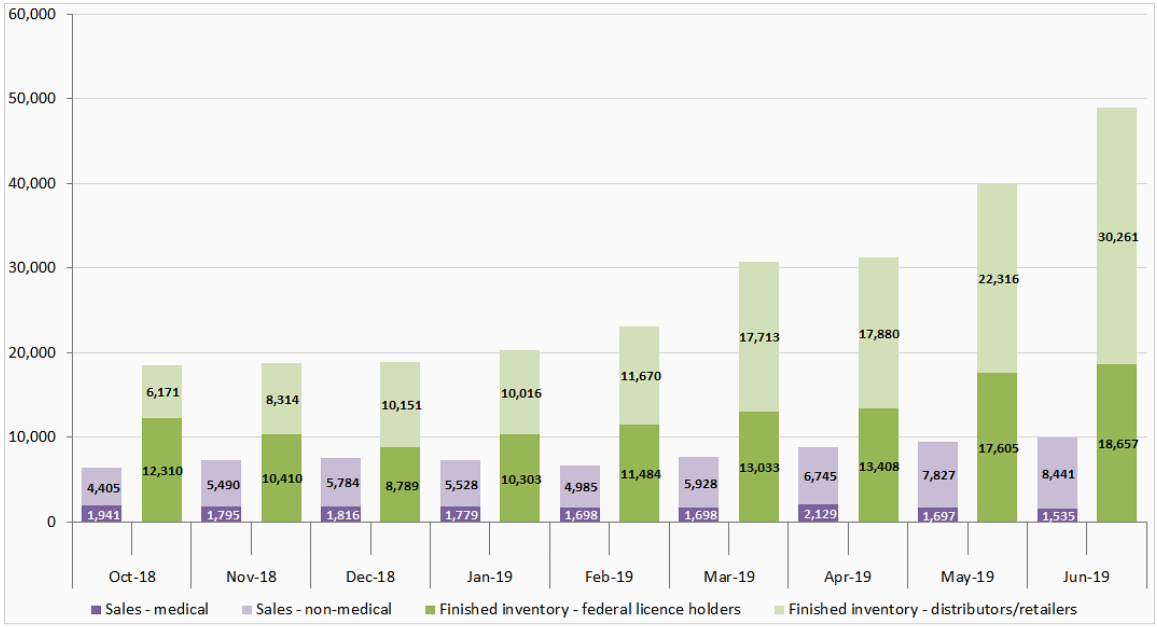
Figure 3: Finished Inventories and Sales of Dried Cannabis (Kilograms)



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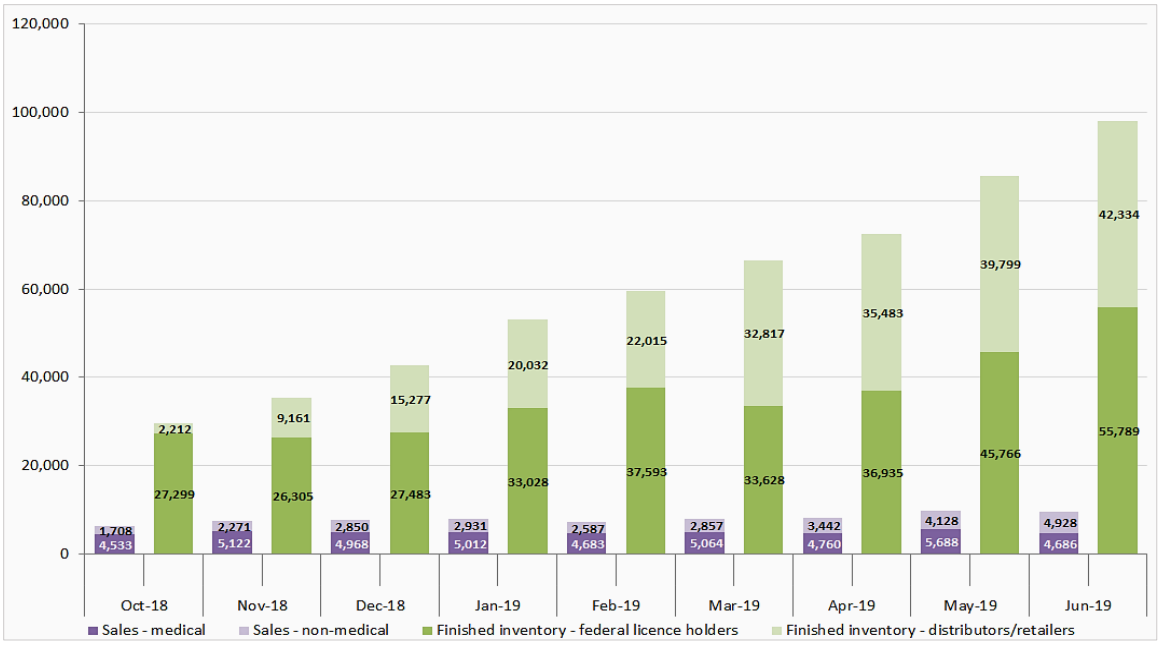
Deloitte team also suggests that the key to success is going to be the top-quality execution of retail fundamentals by marijuana companies. Constant engaging with customers, giving them great experience, good retail analytics and effective security and product integrity will be the most important features to ensure cannabis companies succeed and furthermore, cannabis retailers need to deliver safe and great experience to attract consumers from illegal to legal market (Deloitte, 2018).

Figure 4: Finished Inventories and Sales of Cannabis Oil (Litres)



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1.7.3 Favourable Reimbursement Environment, Government Support, and Economic Implications

One area that Europe is quite progressive in, is the national health insurance's coverage of medicinal marijuana medicines and prescriptions. Currently in Europe, Germany, Italy, and Denmark all offer full medical aid coverage for patients using cannabis-based medicines. In Asia, only Israel has this type of medical aid coverage. With this type of help from the government, medical patients are getting easier access to the cannabis-based medicine and for this same reason, medical patients are increasing. This is one of the most important market drivers with regards to medical cannabis. The more countries that provide and choose to reimburse some of the expenses for medical cannabis to the patients, the quicker the entire market will evolve. This is huge difference to both the US and Canada, where the national health schemes do not cover the costs. This problem has led to some of the major licensed producers subsidising the tax components of the medicines to assist their patient base, which lowers the corporate profits (Bernberg, 2018).

After a long prohibition, some countries are considering legalising the cannabis in order to take advantage of the recent increase in consumption. As I stated before, cannabis is the most used illicit drug in the world and some Governments worldwide, have taken action by regulating the cultivation and consumption of cannabis, such as Uruguay, United States, and Canada. The next in line is probably Europe, where the regulation of cannabis for medical use has already been discussed in the European Parliament and some Member States have a whole new debate on the economic benefits that legalising cannabis might bring. The world's first cannabis exchange-traded fund in Canada made 50% return from the beginning of 2019 until April. A few months after Canada legalised cannabis, the Horizons Marijuana Life Sciences Index fund has grown to €1.15 billion ($1.3 billion), therefore becoming the 18th largest Canadian ETF. This information is very appealing to other countries in the EU and they might start discussing again the regulation of cannabis. For instance, if we look at Spain, the Drug Policy Unit of the Faculty of Psychology of the Autonomous University of Barcelona (UAB) has calculated the revenue, the government would get if legalising the cannabis in Spain. According to UAB analysis, the Spanish Public Treasury would receive €3.3 billion ($3.71 billion) per year in taxes and social security contributions. The study also suggested that there would be around 101,000 new job positions in order to produce the amount of cannabis, which would meet the forecasted demand. Cannabis remains the most prevalent illegal drug not only worldwide but also in Europe. According to the European Monitoring Centre for Drugs and Drug Addiction (EMCDD), 17.2 million young people or 14.1% have used cannabis in 2017. The highest consumption rates in EU are in the following countries: France (21.5%), Italy (20.7%), the Czech Republic (19.4%), and Spain (17.1%). Europe is the next continent, who I believe, will be focusing on regulating the cannabis in the next few years, mainly to decrease the illegal drugs coming from the black market and to benefit from the tax revenues (Valdivia, 2019).

All eyes are focusing on Germany. It has the highest population in Europe, with roughly 84 million people, which means that if it decides to legalise marijuana, it will become the largest

cannabis market in Europe. Medical cannabis has been legal for two years now and most of it is imported from Macedonia, Netherlands, and some from Canada. According to industry-affiliated research institute Prohibition Partners, the market for medicinal cannabis in Germany could reach roughly €7.7 billion ($8.6 billion) by 2028, and for the whole of Europe around €58 billion ($64.8 billion). 2018 estimates suggest, there are currently between 30,000-70,000 medical cannabis patients in Germany. Cannabis supply in Germany is very scarce and prices are extremely high with comparison to prices in United States or Canada. For 1 gram of medical cannabis, one must pay up to €26 ($29), which is in comparison to Canadian prices ridiculously high. Germany could have become a crucial location for the cannabis business but the delays had only helped nations such as Portugal, Greece and Macedonia push their domestic cultivation (Martin, 2019).

France is the second most important EU country, which could potentially legalise cannabis in the near future. It has around 67 million people and have the highest consumption rate in the Europe of 21.5%, so it represents an important potential market. The French Council of Economic Analysis (CAE) estimated that based on annual consumption of 500 to 700 tonnes per year, taxes on legal cannabis could bring up to €2.8 billion ($3.12 billion) to the state and create up to 80,000 jobs, however, country's president currently does not have any intentions to legalise cannabis for recreational use (AFP, 2019).

1.7.4 Banking Bill

One of the most important drivers in this industry is getting the access to capital. Legally authorized cannabis businesses in United States are forced to operate with cash only, which sometimes makes them targets for violent criminals. The Secure And Fair Enforcement (SAFE) banking act is addressing this issue by creating a safe business place that allows banks and credit unions to provide services to these businesses. SAFE Banking Bill was first introduced on 7th March and was later approved by the congressional committee on 28th March 2019 and has advanced to the full body. Under the approved bill, federal banking regulators would not be able to punish financial institutions just because they work with marijuana businesses that are legal under state or local laws, or those of an Indian tribe (H.R. 1595 — 116th Congress: Secure And Fair Enforcement Banking Act of 2019, 2019)

Currently, while a growing number of banks are opening accounts for cannabis businesses as more state policies change, many remain reluctant to do so out of fear of violating federal money laundering or drug laws. As a result, many marijuana growers, processors, and sellers are forced to operate on a cash-only basis, which can make them targets for robberies. The SAFE Banking Act extends safe harbour protections to the Fed. The bill additionally provides protections for ancillary businesses, including insurers, real estate firms, accountants and other professional services that may otherwise run faultily of federal anti-money laundering laws. When this bill is finally approved, it will give further validation to the cannabis industry but not only because of the easier access to cash and its storage in the bank accounts, but also due to the fact that banks will be highly involved in the industry,

which is a clear sign of cannabis approval, and perception of many people will shift to the positive (Angell, 2019).

The Secure And Fair Enforcement banking act was passed by the Democratic-controlled House of Representatives by a 321-103 vote on September 25th, 2019. It will now head to the Senate for the final vote (McDermott & McDermott, 2019).

1.7.5 Therapeutic Effects of Cannabis and Cannabinoids

Therapeutic effects of cannabis and cannabinoids are going to be major disruptor for the entire medical industry. This is probably the main reason why valuations are so high for some companies and that so many scientists support marijuana. Everybody wants to find the next big cure for any major diseases. Many researches have been done across the world, but due to regulatory challenges, the trials were limited, and the full potential for the researches was impeded. Once laws become looser, researches will be done much easier.

In Table 1, you can see the study reported in BMJ in 2019, where the focus was on how different cannabis-based products such as Epidiolex, Sativex, and Dronabinol, were affecting people with different medical conditions, such as chronic pain, multiple sclerosis, treatment resistant epilepsy, nausea, and vomiting due to chemotherapy. They were testing different products that contain either just CBD, THX, or combination of both. Authors of the research expressed the wish that they would have liked to test more people in order to give a further validation to the end results. The largest sample and frequency of tests was done for the people suffering from chronic pain and/or multiples sclerosis. There were 9 studies done with 1,734 participants, where they tested how was Sativex (THC+CBD) affecting people with chronic pain, where they compared the effect to the placebo. The study found that people experienced 30% less pain than before taking the Sativex and they confirmed that it is more effective than placebo, at a 95% confidence level. There were 5 studies done with 1,244 participants, where they tested how was Sativex (THC+CBD) affecting people with multiple sclerosis and they found that Sativex was not more effective than placebo at treating the multiple sclerosis. There were 2 studies done with 291 participants, where they tested how was Epidiolex (CBD) affecting people with treatment resistant epilepsy and the results were astonishing. They found that people were experiencing 50% reduction in seizure frequency and they determined, that Epidiolex is more effective than placebo, at a 95% confidence level. There were 3 studies done with 102 participants, where they tested how was Dronabinol (THC) affecting people with nausea and vomiting syndromes due to chemotherapy and they found, that there was a complete response in nausea and vomiting. They determined, that Dronabinol is more effective than placebo, at a confidence level of 95% (Freeman, Hindocha, Green, & Bloomfield, 2019).

Table 1: Effects of cannabis based products and cannabinoids on different diseases

Indication	Number of studies (participants)	Primary products tested	Comparator	Outcome	Summary estimate (95% confidence interval)	GRADE certainty rating
Chronic pain[23]	9 (1734)	Sativex (THC+CBD)	Placebo	30% reduction in pain	Odds ratio: 1.46 (1.16 to 1.84). More effective than placebo	⊕⊕⊕◯ Moderate
Multiple sclerosis[11]	5 (1244)	Sativex (THC+CBD)	Placebo	Ashworth spasticity scale	Weighted mean difference: −0.12 (−0.24 to 0.01). Not more effective than placebo	⊕⊕⊕◯ Moderate
Treatment resistant epilepsy[24]	2 (291)	Epidiolex (CBD)	Placebo	50% reduction in seizure frequency	Relative risk: 1.74 (1.24 to 2.43). More effective than placebo	⊕⊕◯◯ Low
Nausea and vomiting due to chemotherapy[11]	3 (102)	Dronabinol (THC)	Placebo	Complete response in nausea and vomiting	Odds ratio: 3.82 (1.55 to 9.42). More effective than placebo	⊕⊕◯◯ Low

Source: Freeman, Hindocha, Green & Bloomfield, 2019

A study with the title *The Association between Cannabis Product Characteristics and Symptom Relief* (Stith, Vigil, Brockelman, Keeling, & Brendan, 2019), published in Scientific Reports Journal, found that THC and CBD contents were the most important factors for the symptom relief for a wide assortment of health conditions. The study was done based on the largest database of real-time measurements of the effects of cannabis in the United States, collected with an app, which was developed by the co-authors. On average, responders experienced significant improvements across the 27 health symptom categories measured. Dried flower was associated with greater symptom relief than the use of other types of products such as CBD and/or THC infused concentrates, edibles, tinctures, and topicals. The study did not find variation in symptom relief with use of pipes, joints, or vaporisers. Only THC potency levels showed independent associations with symptom relief and experiences of both positive and negative side effects, with higher levels resulting in larger effects. Interestingly, the study did not find an independent link between CBD levels and any of the symptom effects measured in the study across nearly 20,000 user sessions. The study's aim was to discover how fundamental characteristics of currently available and frequently used cannabis products affect different health symptom intensity levels. The average patient, across the roughly 20,000 measured user sessions and 27 measured symptom categories ranging from depression to seizure activity, showed an immediate symptom improvement of 3.5 points on a scale of 0-10. Dried flower was the most commonly used product and was associated with greater symptom improvement than other types of products (Stith, Vigil, Brockelman, Keeling, & Brendan, 2019).

Another cannabis and cannabinoid research with the tile *Therapeutic Effects of Prolonged Cannabidiol Treatment on Psychological Symptoms and Cognitive Function in Regular Cannabis Users: A Pragmatic Open-Label Clinical Trial*, found astonishing effects of prolonged usage of CBD on the human mind and body. This is the first study to research the effects of a lengthened course of daily use of CBD to cannabis users in the community. 10 weeks of 200 mg oral CBD daily was well tolerated, with no side effects during or after completion. In this trial, the cannabis users continued their typical lifestyle of cannabis use

during the trial without any restriction. The results showed that dramatical reductions in depressive and psychotic symptoms were observed, along with improvements in cognition, from baseline to the end of the treatment. The findings suggest that CBD treatment might produce benefits to mental health and cognitive function that are likely CBD treatment specific. Moreover, these beneficial outcomes were observed in the context even of ongoing cannabis use (Solowij, et al., 2018).

1.7.6 Global Growth of the Cannabis Industry

There are many different sources for the estimation of the global cannabis industry value. The predictions are varying quite a bit and are forecasted for different span of years. For instance, researchers at ArcView Market Research estimate that the industry will reach $16.9 billion in 2019, rising to $31.3 billion in 2022 at a 26.7% compound annual growth rate (Green, 2019). Analysts at Grand View Research estimate that the global cannabis industry will reach $146 billion by 2025 at an annual compound growth rate of 34.6% (Grand View Research, 2018a). Researchers at Barclays estimate that the legal global cannabis industry will reach $272 billion by 2028 (Bernberg, 2019). Independent investment bank, capital advisory, and research firm Seaport Global, estimates that the global cannabis industry will reach $630 billion in due time mainly because of a retail dispensary model built around recreational use, consumer packaged goods, and pharma products offered for therapeutic use in traditional channels. Ultimately, they see the greatest potential for cannabis as a value-added ingredient (Brochstein, 2019).

The most optimistic prediction of them all comes from the Todd Harrison, CIO and co-founder at CB1 Capital and a columnist for Investopedia. Harrison is suggesting that when cannabis 2.0 arrives, people will eat it, drink it, wear it, rub it on, stick it in, and take bubble baths in it. In his own words, there are four drivers of this industry:

1. Time vs. Policy

The endocannabinoid system was discovered in the early 1990s, that is why not many doctors have studied it. It has an important role for vertebrates in that it helps to regulate neurotransmissions to promote physiological balance. Because cannabis research is not studied enough due to legal restrictions, most people do not understand the similarities between the compounds in the plant and those within people and pets. Some of the cannabinoids found in cannabis are identical in action to the endocannabinoids that our bodies naturally produce. Many scientists are convinced that because over the last 100 years we began ingesting processed food and unhealthy fats instead of organic food, the condition of our endocannabinoid system has changed, which led to many unknown medical conditions. In the summer of 2018, FDA approved Epidiolex® from GW Pharmaceuticals, which demonstrated medical efficacy for plant-based cannabinoids via full-spectrum CBD for certain childhood epileptic diseases. Their successful brain cancer trials and the enormous therapeutic benefits of minor cannabinoids continue to emerge despite the current barriers to research. Harris continued that western medicine will require clinical proof across

numerous factors before accepting the fact that cannabinoid wellness has effective agility. This will probably take some time, but Harrison believes that the stock market, as a forward-looking discounting mechanism, will begin to price-in this new reality before the medicine comes on the broader market.

2. Price vs. Institutional Demand

CB1 Capital estimates that revenues for US cannabis operators will exceed $5 billion in 2019 and for the most part, US operators cannot access the banking system the same way companies operating in Canada can. This issue is trying to be resolved with the Banking Bill, which I mentioned before. When this happens, Wall Street will initiate coverage and institutions will accumulate equity exposure in US operators, with demand that will likely exceed current retail holders. US companies will also have access to debt financing as an alternative to dilution of equity, which should help improve their balance sheets, and up-lists to US exchanges will provide exposure to more investors and more liquidity in companies' stocks. Private equity will continue to play an important role for the emerging industry but CB1 Capital believes that institutions will purchase most of their cannabis investments through publicly traded securities, which will allow for industry-standard reporting and regulation, as well as the ability to diversify and scale global exposure.

3. Perception

Financial market moves are usually defined by three phases; denial, migration, and panic. Banking reform should guide the migration, which could last several years, before the non-believers turn to late-stage buyers for FOMO or fear of missing out (panic). The cannabis market will divide into several categories; consumer packaged goods (beverages and nutraceuticals), industrial use-cases (plastic composites and hempcrete), and efficacy-driven solutions also known as biotech. That evolution will shift the mindset and beliefs of many about what to think of cannabis in a broader perspective. CB1 Capital expects to see a lot more M&As and would be surprised if big pharma does not do a takeover or at least acquire some stake in any licensed producers.

4. Liquidity

CB1 Capital believes that global cannabis is currently estimated to be a $300 billion annual cash crop and if that were the total addressable market, it would be a solid opportunity. CB1 Capital sees cannabis and hemp as ingredients for wide range of end-products, such as pet supplements, cosmetics, clothes, medicine and more and they predict a trillion dollars of global market capitalization in ten years. They believe that most companies will not make it (will go out of business) however, companies that execute well will experience successes beyond what most people can possibly imagine. Todd Harrison ended his speech with an advice to investors in this industry, he said: "As with any investment, discipline and rigor are required and diversification is advised across industry verticals and geographic regions to help offset stock-specific risk. But, if you still view cannabis as a gateway drug, it's time to wake-up because generational opportunities abound for anyone willing to pay attention" (Harrison, 2019).

1.7.7 Countries Increasingly Legalising the Use of Medical Marijuana

In introduction, I wrote about the legalisation of medical cannabis usage in Canada so let's look at the situation around the world. More countries that legalise at least the usage of cannabis for medical purposes, the more value it adds to the overall market. If certain countries do not have enough cannabis production, they can import cannabis from Canadian or US companies, which automatically adds more value for them. Furthermore, each additional country that legalises either medical marijuana or the marijuana for the recreational use, adds further validation that the perception across the world about the marijuana is changing to the more positive side. In addition, countries can learn from each other along the process of regulating cannabis and improve the system with the elimination of any unnecessary hurdles. In table 2, you can see the marijuana status in some of the countries around the world.

Especially important market is Europe, which could potentially become the biggest cannabis market in the world. With many diverse countries and cultures and with the population of around 743 million, Europe is double the size of the combined US and Canadian markets (Worldometers, 2019).

Table 2: Marijuana status in some countries around the world

COUNTRY	MARIJUANA STATUS
Argentina	Use of cannabis oil and other cannabis derivatives for medicinal purposes has been legal nationally since 21 September 2017 (Vignolo Córica, 2017)
Australia	Medical cannabis has been legal in Australia since February 2016. Under the federal scheme, patients with a valid prescription can possess and use medicinal cannabis products manufactured from cannabis legally cultivated in Australia (Thomsen, 2016).
Austria	On 9 July 2008, the Austrian Parliament approved cannabis cultivation for scientific and medical uses. Cannabis cultivation is controlled by the Austrian Agency for Health and Food Safety (AFP, 2008). On January 1st, 2016, the decriminalization for possession of small amount for personal use came into effect (Berger, 2015).
Belgium	Cannabis in Belgium is decriminalized since 2013. In June 2015, country legalised certain uses of medical cannabis, which only include Sativex oral spray for multiple sclerosis (Furniere, 2015).
Bermuda	In November 2016, the Supreme Court of Bermuda ruled in favour of allowing the medical use of cannabis (Bell, 2016).
Brazil	In November of 2018, a key Senate committee approved a bill to allow the use and cultivation of marijuana for medical purposes (Jaeger, 2018).
Chile	Private personal use and recreational cultivation decriminalized. Chile legalised the cultivation of medical cannabis in 2014. Sale of medical cannabis is allowed through prescription at pharmacies (Maclver, 2017).
Croatia	In October 2015, Croatia became the first Balkan country to allow the use of marijuana for some diseases. Herbal products made from cannabis can be used as additional medicine for treating tumours, AIDS, multiple sclerosis and child epilepsy (Milekic, 2015).
Cyprus	In January 2017, the country legalised medical use of cannabis use for cancer treatment. Cannabis is not allowed for production therefore it must be imported from other countries (Tharoor, 2017).
Denmark	Three types of cannabis derivatives for medical use (Sativex, Marinol and Nabilone), which require prescription, are approved by the Danish Medicines Agency. On 1 January 2018, the act on the medicinal cannabis pilot programme entered into force and it is mainly for cancer patients, or to alleviate muscle stiffness in multiple sclerosis patient (The Danish Medicines Agency, 2018).

(table continues)

Table 2: Marijuana status in some countries around the world (continued)

Estonia	In 2005, the country legalised medical cannabis through a Ministry of Social Affairs regulation. Estonia does not have a medical marijuana program, but government permits medical cannabis use on a per-patient basis. The only allowed cannabis-based drug is Marinol (Marijuana Doctors & Dr. Rosado, Joseph, 2018).
France	In 2013, a new French law permitting cannabis derivatives to be used in the making of medicinal products came into effect. Patient are allowed to use only Sativex oral spray (Törnkvist, 2013).
Germany	In March 2017, cannabis for medical purposes was legalised. People with serious illnesses such as multiple sclerosis and cancer, are able to access cannabis. The new law also allows doctors with a license to prescribe cannabis to patients suffering from epilepsy, chronic nausea and migraines (Seedsman, 2017).
Greece	In June 2017, Greece legalised medical cannabis and in 2018, Greek Parliament approved a law authorizing the cultivation and production of medical cannabis in the country (TVXS, 2017).
Israel	Medical marijuana has been legal since the early 1990s for cancer patients and those with pain-related illnesses such as Parkinson's, multiple sclerosis, and PTSD. (E. Bohn, 2012).
Italy	In January 2013, medical cannabis became legal and the state-approved cannabis was prescribed for several conditions, in particular for chronic pain relief to patients with cancer and multiple sclerosis. Patients have been permitted to obtain a legal supply of medical cannabis from licenced, state-run pharmacies however, the only cannabis available has been that imported from the Netherlands, and its cost was extremely high at up to €38 per gram (Sensi, 2015).
Luxembourg	In June 2018, country legalised medical cannabis for patients suffering from diseases such as cancer, multiple sclerosis or neurodegenerative diseases (Pritchard, 2018).
Malta	Medical marijuana use in Malta was signed into law by President Marie-Louise Coleiro Preca on March 9, 2018 (Lamers, 2018a).
Mexico	In June 2017, President Nieto signed a bill into law to allow the products, for medical purposes, containing less than 1% THC to legally buy, sell, import and export (Osborne, 2017).
Netherlands	Office of Medicinal Cannabis (OMC) started acting as a National Agency on 1 January 2001. The OMC is an organization of the Dutch Government, responsible to produce cannabis for medical and scientific purposes. Medicinal grade cannabis became available in Dutch pharmacies in September 2003, but only by prescription. Few products with CBD and almost no THC are available for patients (NCSM, n.d.).
New Zealand	Medical cannabis was legalised in December 2018. Patients can use any sort of cannabis-based drug or plant itself (Ainge Roy, 2018).
Peru	In October 2017, Peru's Congress passed a bill to legalise medical marijuana of allowing cannabis oil to be produced, imported and commercialized (Aquino & Baum, 2017).
Puerto Rico	Usage of marijuana for medical purposes was legalised in 2015 however, it is still illegal for recreational purposes. Medical use of marijuana is permitted, but smoking the substance is not legal (Sifferlin, 2015).
Poland	The country legalised medical cannabis in June 2017, the products that are allowed to use are raw cannabis, tinctures, resin, and other extracts (Hiltz, 2017).
Portugal	In July 2018, legislation was signed into law to allow the medical use of cannabis in Portugal and its dispensation at pharmacies (Lamers, 2018b)
Slovenia	In 2014, the country legalised cannabis usage for medical purposes. Patients with certain diseases can get cannabis derived products with the prescription by the doctor (T.H., 2014).
South Korea	In November 2018, country legalised cannabis for medical purposes as the treatment option for patients with epilepsy and other rare diseases. The access is limited to Sativex, Marinol and Epidiolex (Jung-a, 2018).
Switzerland	Since 2011, Swiss physicians can obtain a special permit for their patients with the allowance to prescribe medical cannabis for 12 months. Only two pharmacies in the country are permitted to dispense cannabis tinctures and cannabis oil concentrates (Medcan, n.d.).
Turkey	In late 2016, the country made a historic move to legalise medical marijuana. Sublingual cannabinoid medications (such as Sativex) are allowed for use with a doctor's prescription (Marijuana Doctors & Dr. Rosado, Joseph, 2019).
Uruguay	Recreational cannabis was legalised in December 2013, making Uruguay the first country in the world to legalise it. In August 2014, Uruguay legalised growing up to six plants at home, as well as the formation of growing clubs, a state-controlled marijuana dispensary regime, and the creation of a Cannabis regulatory institute (Castaldi, Kerry, Lewis, & O'Brien, 2017).
United Kingdom	Medical use of cannabis was legalised on 1 November 2018. A license is available from the home office to import prescribed medicinal cannabis however, as of mid-February 2019, basically no-one has been able to access medical cannabis (Schraer, 2019).
United States of America	The use of medical cannabis is not legalised nationwide although, most states have legalised it. Currently, 33 states and the District of Columbia (DC), have legalised the use of medical marijuana (ProCon, 2019).

Source: Own work based on individual references provided in the table

2 PORTER'S FIVE FORCES FOR CANADIAN CANNABIS MARKET

Threat of New Entrants

Today, there are 220 licensed cannabis producers in Canada as of August, but not all of them have the license for processing and sale, some of them have only the license for cultivation. This presents a medium level of obstacle for new potential producers with regards to the number of existing licensed producers however, it represents high level of obstacle if we take into the account the duration of the licensing process to be approved by the health Canada, which can take many months. All combined, there is a medium-high level of difficulty for new producers to get the license and enter the legal market (Health Canada, 2019b).

The process of setting up a greenhouse to grow plants is likely not very difficult to replicate although the process itself can take several months or even years. Having all the right equipment and be compliant with the Health Canada standards is quite expensive. Capital requirements are substantial for every producer at the beginning of its process. If the company is public, it needs to raise enough capital at the IPO (initial public offering). If it needs further capital, it can raise it either by issuing new stocks (dilution) or get a loan from a bank. As you will see later on, in the DCF section, raising capital through issuance of new equity is much more expensive than raising it by debt. Among 10 companies, that I chose, the average cost of capital is 18.6%, whereas the average cost of debt before taxes is approximately 5.5%. Because interest payable on debt are tax-deductible, average cost of debt after tax stands at 4.75% (assuming marginal effective tax rate is 13.7%). Due to these facts, companies prefer to use debt to raise capital, furthermore, the debt raises increased dramatically in 2019 (up until end of March). The value of debt raises totalled $764.9 million in 2019 compared with $474.8 million last year, which is a 61% increase. Level of difficulty for the capital requirements is low-medium for potential new entrants (Marijuana Business Daily, 2019).

Economies of scale are difficult to achieve due to small licensed growing areas at the beginning. Health Canada is usually issuing licenses for parts of the total potential growing areas due to many strict requirements the companies must meet. Due to relatively small licensed growing areas, new companies are having difficult time to achieve economies of scale and are generally making large losses at the beginning due to higher costs. The new producers might not be able to reach the desired cost target and match the exiting producers' production costs. Level of difficulty to achieve economies of scale in the first few years is high (Health Canada, 2019c).

We can say that there are many strains and each strain contain different THC and CBD levels and important is also how is each cannabis plant grown, how much light it gets, water and nutrition from the earth, etc. Product differentiation in this industry is vital and in order to

achieve that, producers need to have top quality plants, equipment, and a lot of experience. The first two are easy to get but having experienced team is very difficult to come by. Company must have very innovative team and offer variety of products that range from dried flowers to oils and gel capsules, liquids for vaping, etc. Level of difficulty to achieve product differentiation is medium.

Bargaining Power of Buyers

Buyers pressure the producers to reduce the prices and improve the quality of the products and services. As written before, there are currently 220 licensed producers, who are selling either directly or indirectly cannabis products to end buyers. As I stated, spending on legal cannabis was 21% and spending on illegal cannabis was 79% of total spending. This means that the majority of buyers still buy cannabis on black market, therefore the buyers have no switching costs whether they choose different legal producers, or they choose to buy cannabis on the illegal market (high criminal risk and charges involved). Of course, they are breaking the law by doing so, however, this is the current situation and we shall not ignore it. The demand for legal cannabis is slightly increasing month-to-month, whereas supply is growing rapidly. Canadian are also allowed to grow their own cannabis at home (up to 4 plants) in some provinces, which means that buyers are able to use multiple sources to get cannabis products and furthermore, they can put pressure on the prices because they have strong bargaining power. Bargaining power of buyers is very strong (Ross, 2019).

Bargaining Power of Suppliers

The situation for the bargaining power of suppliers is converse of that in the case of buyers' bargaining power. It might not seem that 220 licensed producers are enough to supply Canadian market, but a lot of them have the capacity to produce cannabis, which is enough to supply Canada for several years. For instance, from what we saw in Figure 1 the total dried cannabis sold, ranging from October to June, was 71,221 kilograms and Canopy Growth alone, which is the largest cannabis producer in Canada, has the capacity to produce 500,000 kilograms per year. The supply outstrips the demand by much and in addition, licensed producers must compete with the prices and quality of the products from the illegal market. Buyers have no switching costs, they do not rely heavily on sales from particular supplier, there is increasing number of suppliers. To conclude, bargaining power of suppliers is low (Williams, 2018).

Threat of Substitute Products

Many say that cannabis is a substitute for opioids, but many recovery professionals are sceptical about this statement. Recreational use of cannabis is meant for relaxation and calmness and there is no other legally sold substitute for that same purpose. On the other side, when speaking about medical use of cannabis, there are 'potential' substitutes like opioids or other drugs, which are harmful, and cannabis-based products that are synthetically derived from the plant such as Sativex or Marinol. Some can argue that cigarettes are substitutes for cannabis, but they contain absolutely none of the psychoactive ingredients

such as cannabis does. There are not many substitutes to cannabis and the threat of substitute products is very low (Carlini, 2018).

Rivalry Amongst Competitors

We really cannot say for now that the rivalry looks intense, because this high growth industry is still in development stages. The rivalry will probably be in the form of consumer education or overnight (fast) delivery from the producer to the retailer. At some point there will be many licensed producers and prices will probably decrease so we might expect a price war within the industry. The quality of products and services will be another factor, which will determine producers' differentiation and therefore increase the rivalry among them. Cannabis producers are trying to differentiate themselves already and want to be represented as a trusted and well-established companies also in order to get as many deals with provincial governments as possible. They are also developing their own brands of products to attract new customers. The crucial factor for the producers will be the ability to grow at low cost, for them to be able to offer attractive and competitive prices on the market. Currently, we can say that there is some rivalry amongst competitors, but the level is low-medium, however, we can expect much higher rivalry in the next few years, when the market gets saturated and supply really outstrips demand (Goldsman, 2017).

3 VALUING CANNABIS COMPANIES WITH VARIOUS FINANCIAL MODELS

Cannabis industry is currently the fastest growing industry and valuations are usually difficult to calculate or predict, meaning, the margin of error is usually big. Canadian companies are expanding and gaining market share in Canada, but they are also making connections and supply agreements across the globe. Analysts are mainly focusing on two metrics; EV/S and EV/EBITDA, which I use in my models, but I add also different models in order to compare companies within the industry and also to compare the valuations with other fast-growing industries. According to analysts, currently the sales matter the most since companies are fighting to gain as much market share as possible and therefore, the bigger the sales, the bigger their market share. Due to prohibited permission of reproduction, I am not allowed to attach figure or specific material, but I can provide a source in which you can see the example of Canopy Growth coverage by GMP Securities, where they emphasize enterprise value, revenue growth, and EBITDA. I checked, if that is the case for other companies covered by other analysts as well, and I guarantee that it is (Macdonell, 2019).

Another way to value companies is with the DCF models, which are very popular financial models to use. I believe that results from DCF analyses are more important than results from the relative valuation, because the focus is on the actual cash and not on accounting techniques that can be easier to manipulate. Usually when doing due diligence for a company, you need to look deep and also beyond financial data and dig up other information, such as: whether the company has an experienced management team, are there strong operational procedures and internal controls in place, what is company's competitive

advantage over the competitors, does it have a large customer base, what is its share structure, is it generating enough cash to cover any debt, and so on. These same points apply to the cannabis companies as well and anyone wanting to invest in them, should be looking into above-mentioned information as well.

3.1 Relative Valuation

Relative valuation is often used as a valuation method to assess the value of an asset or stock and compare it to other assets or stocks. In some circumstances, relative valuation is preferable method to use. An example is the use of relative valuation in an infant industry such as the cannabis industry, where current and near-term future operating cash flows are usually negative and DCF approach is more difficult to use due to unpredictability and potential inaccuracy. The main two ratios I use in this master's thesis are EV/SALES and EV/EBITDA. EV stands for enterprise value and it is a measure of a company's entire value. It includes ownership interest and asset claims from debt as well as equity of a company. Enterprise value is actually the value of the company that you need to pay if you want to acquire it (premium or discount are not included). Enterprise value is calculated as the market capitalization, plus debt, minus cash and cash equivalents. Enterprise value is better to use than just market capitalization as the enterprise value considers also company's debt and cash and furthermore, any change in capital structure will not affect the amount of enterprise value. It is often used in mergers and acquisitions (CPI, n.d.).

EBITDA stands for earnings before interest, taxes, depreciation, and amortization. It is often used to evaluate how good is the performance of company's operations. It is similar to operating profit (EBIT), but it excludes certain non-operating expenses and non-cash expenses. The purpose of these deductions is to separate factors that business owners have influence over, such as debt financing and capital structure, methods used for depreciation, and to some extent also taxes. To calculate EBITDA, we need to start with the net income and add taxes, interest expenses and depreciation and amortization. EBITDA focuses on the operating decisions of a business and the business' profitability from the aspect of the core operations, before any impact of capital structure, leverage and non-cash items like depreciation. Another reason to use EBITDA, especially in the cannabis industry, is because majority of companies are making losses and ratios such as P/E or EV/EBIT, would not make any sense (CPI, n.d.).

Because of all these reasons, EV/SALES and EV/EBITDA are better to use than some other standard ratios such as P/S (price to sales), P/E (price to earnings) or even P/B (price to book value). Most of analysts, that cover cannabis companies, also prefer to use EV/SALES and EV/EBITDA as the key 2 metrics in determining the value of the cannabis stocks, as I mentioned before. It is logical to use these two metrics as the priority for cannabis companies is to grow their market share and increase revenue as much as possible, the EBITDA is then the second most important metric that follows the revenue. However, revenues are not

increasing as fast as many predicted, mainly due to falling prices of cannabis (presented in figure 5) and modest increase in demand, which we saw from figures 1 and 2.

In addition to the revenues not growing fast enough, increasing spending and huge compensations by the management of almost all cannabis companies have caused EBITDA to be way lower than most analysts predicted. For example, according to Bloomberg's report of the highest paid CEOs in 2018, Brendan Kennedy, CEO of Tilray Inc., was the second highest paid CEO with a total compensation package of $256 million after Tesla's CEO Elon Musk, who was the most paid, with a package of $513 million. Third was the CEO of Walt Disney, Bob Iger, with a package of $146 million and fourth was Tim Cook, CEO of Apple, with the package of $141 million. Companies like Apple and Walt Disney are well-established and very profitable companies and one can really argue against the compensation that Brendan Kennedy received. He runs a company, which is a couple of years old and makes losses. Such high compensations at such early stages of a company are destructing the value of the company (Jones, 2019).

In Table 3 below, I chose 10 of the best-known (my opinion), the most traded, and well-capitalized (there are couple of companies with greater market caps than last two companies on my list) cannabis companies based in Canada. The data were taken from Thomson Reuters and are updated to the quarter reported by each individual company up to 31st May and so are the analysts' estimates, most of them are updated up until May 31st as well. 'E' stands for estimates and those are fiscal years. We can see that the mean EV/SALES multiple for the fiscal year 2019 is 27.42-times, and for the fiscal year 2020, it is 10.22-times. The mean EV/EBITDA multiple for the fiscal year 2019 is 53.37-times (all except 3 companies have negative EBITDA), and for fiscal year 2020 is 48.50-times. We need to note that numbers of Canopy Growth for the sales and EBITDA in 2019 are actual, because the company has already reported the full fiscal year of 2019. Another note is that all numbers for Tilray are in U.S. dollars, which has no effect on the multiples, of course. Although this is a very small sample size, we can use the EV/S and EV/EBITDA mean values and compare them to other comparable industries, such as tobacco, drugs (pharmaceutical), drugs (biotechnology), healthcare products, and alcoholic beverages industry. In Table 4, you can see EV/SALES and EV/EBITDA multiples for previously above-mentioned industries. Data was taken from Aswath Damodaran (2019a) for the fiscal year 2019 and because I could not find any estimates for the entire industries for the fiscal year 2020, I assumed the same multiples as in 2019. We can ignore 53.37x EV/EBITDA multiple for 2019 for the cannabis industry because as mentioned before, only 3 out of 10 companies will supposedly have positive EBITDA. If we focus on 2020 estimates alone, we can see that the average EV/SALES multiple for the cannabis industry is not extremely higher than the average multiples for the rest of the industries, however, EV/EBITDA is extremely high in comparison to others.

Table 3: Multiples Among Cannabis Companies (in millions Canadian dollars)

(In millions C$)		Enterprise	SALES			EBITDA			EV/SALES		EV/EBITDA	
Company name	Market Cap	Value	2018	E2019	E2020	2018	E2019	E2020	E2019	E2020	E2019	E2020
Canopy Growth	18,767.82	15,198.84	77.95	*226.34	680.29	-61.80	*-257.00	-36.14	67.15	22.34	neg	neg
Aurora Cannabis	10,414.81	10,518.74	55.20	687.08	834.72	-75.77	-130.21	160.00	15.31	12.60	neg	65.74
Cronos Group	6,420.25	4,004.25	15.70	52.45	166.26	-15.60	-4.40	54.50	76.34	24.08	neg	73.47
Tilray**	4,329.26	4,435.72	43.13	175.97	359.61	-54.09	-46.00	24.50	25.21	12.33	neg	181.05
Aphria	2,241.33	2,183.97	36.92	213.40	708.11	0.56	-45.60	127.95	10.23	3.08	neg	17.07
HEXO Corp	2,227.32	2,087.47	4.93	59.66	290.00	-16.31	-29.50	73.50	34.99	7.20	neg	28.40
OrganiGram Holdings	1,532.04	1,493.76	12.43	94.00	195.00	41.17	54.51	72.50	15.89	7.66	27.40	20.60
CannTrust Holdings	1,002.68	975.53	45.65	82.00	155.00	-7.18	9.20	46.40	11.90	6.29	106.04	21.02
Village Farms	815.76	853.95	150.00	211.50	306.68	0.35	32.02	66.52	4.04	2.78	26.67	12.84
Supreme Cannabis	475.92	476.40	8.85	36.13	124.00	-5.77	-5.30	29.22	13.19	3.84	neg	16.30
MEAN	4,822.72	4,222.86	45.08	183.85	381.97	-19.44	-42.23	61.90	27.42	10.22	53.37	48.50
*Actual numbers												
**In U.S. dollars												
Note: In some cases, enterprise value is less than market capitalization due to cash position being larger than total debt												

Source: Own work based on data from Thomson Reuters

Some might argue that we need to forecast further into the future or to adjust these multiples to the growth rate. We cannot use individual estimates for each company for the growth of EBITDA in the cannabis industry because it would be very inaccurate, but we can adjust these multiples to the projected CAGR (compound annual growth rate) of each industry over the next few years. Many research groups, such as Mordor Intelligence, Technavio, Grand View Research and more, are forecasting different CAGRs for the same industries and therefore, I took the average number. CAGR between 3% and 4% until 2024 is predicted for the alcoholic beverage industry, therefore I took the 3.5% (Technavio, 2016). CAGR for drugs (biotechnology) industry is expected to be around 7.4% until 2025 (Grand View Research, 2017). Drugs (pharmaceutical) industry is projected to reach USD 9.79 billion by 2025 from USD 6.97 billion in 2019, at a CAGR of 5.8% (Research and Markets, 2019). Healthcare products industry is anticipated to grow at a CAGR of 8.7% until 2025 (Adroit Market Research, 2019). Tobacco industry is expected to grow at a CAGR of 2.8% until 2021 (Grand View Research, 2018b).

We saw that projections for the growth of the cannabis industry are varying a lot. I think that the most realistic projection is from the ArcView Market Research that predicts a CAGR of 26.7%. I rounded it down to 26%. We can see from the Table 5, if the actual growth of the cannabis industry will be as predicted, the valuations can be justified in comparison to other industries. In fact, the average EV/EBITDA multiple of the cannabis industry, adjusted to projected CAGR, is the second lowest among all industries. We know that industry is not growing as fast as anticipated and in the scenario where the growth is much less than predicted, for instance 15%, EV/EBITDA multiple would be 3.23-times for the cannabis industry, which would be far more difficult to justify.

Table 4: EV/SALES and EV/EBITDA multiples across industries

INDUSTRY:	# OF FIRMS	EV/SALES		EV/EBITDA	
		E2019	E2020	E2019	E2020
Beverages (Alcoholic)	31	3.87	3.87	13.58	13.58
Cannabis	**10**	**27.42**	**10.22**	**53.37**	**48.50**
Drugs (Biotechnology)	481	6.46	6.46	11.99	11.99
Drugs (Pharmaceutical)	237	4.79	4.79	13.46	13.46
Healthcare Products	248	5.00	5.00	19.33	19.33
Tobacco	17	4.32	4.32	10.08	10.08

Source: Own work based on data from Damodaran (2019a) and Thomson Reuters

Table 5: Estimated EV/EBITDA 2020 multiples across industries adjusted to CAGR

INDUSTRY:	# OF FIRMS	CAGR (%)	EV/EBITDA E2020	EV/EBITDA E2020 adjusted to CAGR
Beverages (Alcoholic)	31	3.50	13.58	3.88
Cannabis	**10**	**26.00**	**48.50**	**1.87**
Drugs (Biotechnology)	481	7.40	11.99	1.62
Drugs (Pharmaceutical)	237	5.80	13.46	2.32
Healthcare Products	248	8.70	19.33	2.22
Tobacco	17	2.80	10.08	3.60

Source: Own work based on data from Damodaran (2019a) and Thomson Reuters

For the third option we can use price-to-book (PB) ratio, which is also a good tool to value companies but is in my opinion, less important than EV/S and EV/EBITDA, for all the reasons I mentioned earlier. Book value actually means the shareholder's equity of the company, it is sometime referred as the net asset value of a company calculated as total assets minus intangible assets (patents, goodwill) and liabilities. PB ratio also tells you how much you're paying over or under the company's net assets. It is calculated as market price per share divided by book value per share or it can also be calculated as market capitalization divided by shareholder's equity (Hayes, 2019).

In Table 6, I calculated the average PB ratio for the cannabis industry and data for other industries were taken from Aswath Damodaran (2019b). As shown, cannabis industry has the 2nd lowest PB ratio among all comparable industries, which is indication that it either trades at a discount to other industries or that something fundamentally is wrong with the companies in the cannabis industry. Noting is also the very high PB ratio for the tobacco companies, the reason can be that many of them have perhaps a lot of debt and other liabilities and shareholder's equity is therefore in most cases very scarce. I need to emphasize that cannabis companies have made many M&As and therefore, many of them have large goodwill as well as intangible assets. Their average book-to-tangible assets ratio is much larger than normal PB ratio. For instance, the lowest PB ratio among ten cannabis companies has Aphria Inc., which is 1.35, however, their book-to-tangible assets ratio is 3.9, almost 3-

times larger than the normal PB ratio. I do not have data on book-to-tangible assets ratios for other industries and thus I am not able to compare them based on this specifically adjusted ratio.

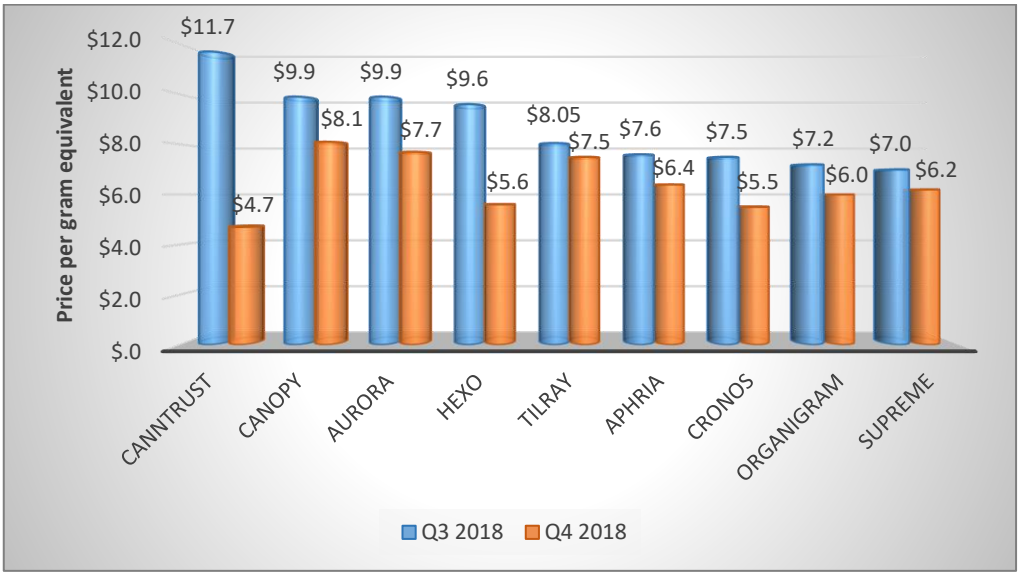
Table 6: PB ratios across comparable industries

INDUSTRY:	# OF FIRMS	PB
Beverages (Alcoholic)	31	2.48
Cannabis	**10**	**3.67**
Drugs (Biotechnology)	481	6.24
Drugs (Pharmaceutical	237	4.85
Healthcare Products	248	4.36
Tobacco	17	28.74

Source: Own work based on data from Damodaran (2019b)

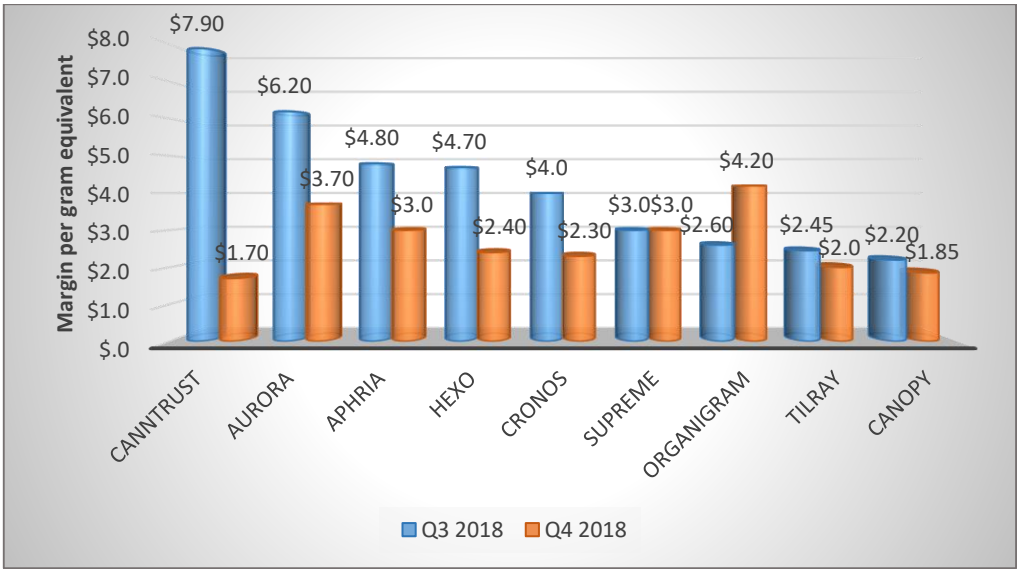
There are many concerns regarding valuations of the cannabis companies mainly due to demand being flat with each month but there are also few other problems as well. The selling price per gram has fallen in Q4 2018 dramatically in comparison to the previous quarter, and every cannabis company has experienced the fall, as you can see in Figure 5 below (prices in Canadian dollars). The most logical reason is that the demand cannot cope with the supply, although many are reporting that there is a supply shortage, this simply cannot be the case. One reason can also be, that prices on the black market have decreased even more and the demand has shifted again to the illegal channels. The largest drop in price per gram experienced the company CannTrust, which has sold less oils and gel gaps than anticipated and thus, price per gram decreased significantly and so did the gross margin, which can be seen in the next figure. Due to falling prices, the revenues were lower than expected but the costs remained the same and therefore almost all cannabis companies experienced a decline in gross margins, as shown in the Figure 6 (prices in Canadian dollars). Another major concern, especially for investors, is the comparison between the year when companies break-even and the cash that is left. Almost every company does not have enough cash and will break-even in multiple years, which means that they will need to raise additional cash to support the growth and cover the losses. That usually means raising capital through bank loans or raising it through share issuance, the latter means of course a dilution for the investors. We still need to wait for the end of year results, which we will know around February of 2020, for the average price per gram sold as well as average gross margins and perhaps other margins such as profit margins or at least EBITDA margins (Willis, 2019).

Figure 5: Selling Price Per Gram Equivalent



Source: Own work based on data from SEDAR and Thomson Reuters

Figure 6: Gross Margin Per Gram Equivalent



Source: Own work based on data from SEDAR and Thomson Reuters

Another concern is about the accounting loopholes these companies are using. Under International Financial Reporting Standards (IFRS) there is a standard named **IAS 41 Agriculture** that allows cannabis companies to measure agriculture produce (at point of harvest) as well as biological assets, at fair value less costs to sell. Companies can also include changes in fair value of biological assets in the profit or loss, they can also measure biological assets, attached to a land, separately. These accounting standards can drastically change companies' balance sheets, income statements, and cash flow statements, which would otherwise, under the Generally Accepted Accounting Principles (GAAP), not be possible (IFRS, n.d.).

Cannabis companies are reporting biological assets (cannabis plants) under the current assets. In figure 7 is an example of reporting the biological assets in the balance sheet by Canopy Growth and as evident below, there was a 12-month increase of about $62.63 million in biological assets, which consequently means that the current assets grew by the same number.

Figure 7: Biological assets reporting in the balance sheet (Canopy Growth)

CANOPY GROWTH CORPORATION
CONSOLIDATED STATEMENTS OF FINANCIAL POSITION

(Expressed in CDN $000's)	Notes		March 31, 2019		March 31, 2018
Assets					
Current assets					
Cash and cash equivalents	5	$	2,480,830	$	322,560
Marketable securities	6		2,034,133		-
Amounts receivable	7		106,974		21,425
Biological assets	8		78,975		16,348
Inventory	9		262,105		101,607
Prepaid expenses and other current assets	10		107,123		19,837
			5,070,140		481,777
Investments in equity method investees	11		112,385		63,106
Other financial assets	12		363,427		163,463
Property, plant and equipment	13		1,096,340		303,682
Intangible assets	14		519,556		101,526
Goodwill	14		1,544,055		314,923
Other long-term assets			25,902		8,340
		$	8,731,805	$	1,436,817

Source: SEDAR

Measuring asset values during their growth stage represents a major challenge. Cannabis companies are facing with large variations of number of cannabis growth cycles and grow rooms, yield rates per plant, costs per gram, cost to compete, and market selling prices and hence, the fair value of biological assets and the related adjustments often have a significant effect on net income determined in accordance with International Financial Reporting Standards. There is not an active market for partially grown cannabis plants and thus, the biological asset value of growing plants prior to harvest is often determined using a cash flow model to determine the fair value minus cost to sell under IFRS. Fair value measurement models often take into consideration anticipated yields of dried flower, stage of growth, market price of finished products, selling costs and costs per gram, cost to compete, and wastage (BDO Canada, 2019).

Biological assets have impact on the income and cash flow statements as well. In figure 8 is an example of how Canopy Growth reports changes in biological assets in the income statement. As evident, for the quarter ended 31st March 2019, the company reported gross margin before changes of biological assets of $50.92 million. The gross margin, after effects of biological assets, was increased to $88.93 million, a change of $38.01 million. Those effects are also shown under operating cash flow in the cash flow statement and they are increasing it in the same way they increase gross margin. In some cases, the reported gross margin can be even higher than the actual revenue due to effects of unrealized gain on changes in fair value of biological assets (Smallcap Power, 2019).

Figure 8: Biological assets reporting in the income statement (Canopy Growth)

CANOPY GROWTH CORPORATION CONSOLIDATED STATEMENTS OF OPERATIONS FOR THE YEARS ENDED MARCH 31, 2019 AND 2018 (Expressed in CDN $000's except share amounts)	Notes	March 31, 2019	March 31, 2018 (Restated - see note 3(c))
Revenue	21	$ 253,431	$ 77,948
Excise taxes	21	27,090	-
Net revenue	21	226,341	77,948
Inventory production costs expensed to cost of sales		175,425	40,213
Gross margin before the undernoted		50,916	37,735
Fair value changes in biological assets included in inventory sold and other inventory charges	9	129,536	67,861
Unrealized gain on changes in fair value of biological assets	8	(167,550)	(96,721)
Gross margin		88,930	66,595

Source: SEDAR

3.2 Discounted Cash Flow Approach (DCF)

Discounted cash flow (DCF) is a valuation method used to estimate the value of an investment, based on its future cash flows. DCF analysis tries to determine the value of a company today, based on projections of its cash flows in the future. DCF analysis finds the present value of expected future cash flows using a discount rate. A present value estimate is then used to evaluate a potential investment. If the value calculated through DCF is higher than the current cost of the investment, the opportunity should be considered due to the company being potentially undervalued. If the value calculated with DCF model is more than the market value, the opposite occurs. There are two approaches of calculating DCF models, the first is free cash flow to firm or the unlevered approach, which calculates the entire value of the firm and uses weighted average cost of capital (WACC) as a discount rate and which I use in my models. I believe that the free cash flow to firm approach presents a better overall image of the company, from the investor's side, as well as from the lender's point of view. The second is free cash flow to equity or levered approach, which calculates the equity value of the firm and uses capital asset pricing model (CAPM) as a discount rate. Weighted average cost of capital is calculated as shown below (1).

$$WACC = (E/V \times Re) + (D/V \times Rd \times (1-Tc)) \quad (1)$$

Where is: E = market value of total equity (market capitalization); V = total market value of the company's financing; D = market value of total debt (I took most recent book value of debt); Re = cost of equity; Rd = cost of debt; Tc = tax rate (Chen, 2019).

Capital asset pricing model is calculated as shown in formula (2) below.

$$CAPM = Rf + (Rm - Rf) * \beta \quad (2)$$

Where is: Rf = risk-free rate; Rm = market's expected rate of return; β = beta of the company. Market value of equity simply means company's market capitalization, which is share price

multiplied by the outstanding shares. I took for each company the book value of the total debt, which means current portion of long-term debt plus long-term debt and any long-term lease and financial obligations (Chen, 2019).

Beta is a measure of the volatility, or systematic risk, of an individual stock in comparison to the unsystematic risk of the entire market (in my case the benchmark is S&P 500 index). If the beta of a company is less than 1, it is perceived as a less risky investment, whereas the beta of more than 1 is perceived as a riskier investment. The cost of equity (CAPM) as well as WACC, should be higher for riskier investments and lower for safer investments. Cannabis stocks are perceived to be riskier investments and therefore they have in general higher betas as you can see in my models, where the average beta among 10 cannabis companies is 3.06 and thus, the discount rates are also higher (Kenton, 2019).

I compare the results of the DCF model with the market share price on May 31st and determine whether the company is overvalued or undervalued. I show the procedure and interpretation of results on the example of Canopy Growth, which is the biggest publicly traded cannabis company. DCF analyses, as well as CAPM and WACC calculations for the other 9 companies, can be found in appendixes. I decided to use the data from Aswath Damodaran (2019a) for the risk-free rate and equity risk premium (market's expected rate minus risk-free rate). The data are updated up to June 2019.

I ignored the fact that there is a currency risk, if the currency of an investor is not U.S. dollar, however, we need to take into consideration that the U.S. stock exchanges (NYSE, NASDAQ) are the largest and one of the best performing exchanges in the world, in addition, all 10 companies that I chose are trading on different U.S. stock exchanges. Beta of each company was taken from the data by Thomson Reuters (Shukla, 2019).

Interest rate on a three-month U.S. Treasury bill is often used as the risk-free rate for U.S.-based investors, however, Damodaran (2019a) uses U.S. 10-year government bond yield for the risk-free rate and because the cash flows in my models are projected for the 10 years, the risk-free rate of a 10-year government bond fits perfectly (Chen, 2019).

As seen from the table 7, I chose 2.14% for the risk-free rate, for the market expected rate 7.52% (return of S&P 500 index reduced by inflation) and thus the ERP (equity risk premium) is 5.38%. I took beta for each company from the Thomson Reuters data. After I calculated the CAPM for each company, I moved forward on calculating the WACC. I took all the remaining data, needed to calculate WACC, from SEDAR and Thomson Reuters (Damodaran, 2019a).

Currently, the basic rate of Part I tax rate in Canada is 38% and the net tax rate (after all deductions) is 15%, and for Canadian-controlled private corporations claiming the small business deduction, the net tax rate is 9%. There are also provincial or territorial tax rates that differ from province to province (Canada Revenue Agency, 2019b). Analysts might use different metrics to compare taxation levels across countries or industries. The statutory corporate income tax rate provides a high-level measure of income taxes payable by a profitable corporation but, this method does not include differences in the definition of

taxable income, the availability of tax incentives, and other taxes that corporations might have to pay (sales taxes, capital taxes, etc). Because of those issues, marginal effective tax rate (METR) is a good way to estimate tax rate of a specific industry. The METR is an estimate of the level of taxation on a new business investment, and considers federal, provincial, and territorial statutory corporate income tax rates, in addition to other features of the corporate tax system. These other features include investment tax credits and key deductions, such as capital cost allowances. The METR also considers other taxes paid by corporations, such as capital taxes and unrecoverable sales taxes paid on capital purchases. How much exactly will be the effective tax rate for each company (when they start to make a profit) is difficult to predict, therefore, I chose 15% for Village Farms (Effective tax rate is known) and for the others, I decided to look for Canadian marginal effective tax rate. Although marginal effective tax rate for the agriculture sector is 8.1%, we cannot say with certainty that cannabis industry belongs in that sector, it rather belongs in many different sectors, such as healthcare, consumer-packaged goods, retail trade, wholesale trade, and more. That is the reason I used the average Canadian marginal effective tax rate for all sectors, which stands at 13.7% as of 2019 (Department of Finance Canada, 2019).

There is an excise duty framework for cannabis in Canada. Under this framework, a federal excise duty is payable by a licensed cannabis producer when the cannabis products they package are delivered to a purchaser (a provincially authorized distributor and/or retailer or final customer). An excise stamp must appear on all cannabis products that have been legally produced and are available for purchase. The Canada Revenue Agency is responsible for licensing cultivators, producers and packagers of cannabis products, and collecting federal duties and taxes. Consumers, who are purchasing cannabis products are obliged for paying the applicable Goods and Services Tax (GST) or Harmonized Sales Tax (HST), depending on the province or territory where the product is purchased. Tax rates can be either 5%, 13% or 15%. Most companies are therefore reporting gross revenue as well as net revenue, where the latter is a result of deducting excise duties from the gross revenue. Due to that, I was able to simply forecast net revenues alone and did not have to subtract any excise duties in my DCF models (Canada Revenue Agency, 2019a).

Selecting a long-term growth rate for a company can be very difficult. According to Damodaran (2002), a company's long-term growth rate should be determined based on different subjective factors, such as the quality of management, the strength of a firm's marketing, its capacity to form partnerships with other firms, the management's strategic vision, and especially reinvestment, which includes acquisitions, research and development, and investments in marketing and distribution. These factors allow you to determine where the growth is coming from (Damodaran, 2002). We've seen many mergers and acquisitions in the cannabis industry, and I anticipate that M&A will increase in the future. When determining long-term growth rate for each company, I took into consideration all of the above-mentioned subjective factors that Damodaran suggests, but mainly, I focused on the quality of the management and its vision/strategy, strength of the firm's marketing and quality of the products (reviews by customers), and on the market share each company

gained as well as on the future market share it could potentially gain. Based on the growth forecasts for the cannabis industry that the cannabis industry will grow in the future more than the majority of other industries, in addition to all the above-mentioned factors, I chose perpetuity (long-term) growth rates between 2.30% and 2.50% (depending on each company's potential), which are higher than Canada's forecasted long-term GDP growth rate of 1.7% (Alexander, 2019). My selected long-term growth rates are also higher than Canada's projected inflation rate between 2019-2024, where the average inflation rate, during the projected period, stands at 2.06% (Plecher, 2019). To conclude, my determined long-term growth rates for the selected cannabis companies were based on projected growth rates for the cannabis industry as well as Canada's inflation and GDP growth rates projections, subjective factors mentioned above, and based on companies' historic financial information and their management-prepared projections.

I calculated WACC for each individual company. I think that perception of the companies in this industry will change in the near future and due to looser banking regulations regarding doing business with the cannabis companies, real revenues, real earnings, positive cash flows, and by establishing a credible and successful business model, these companies will no longer be treated as speculative investments, which means that betas of the companies will decrease (lower risk/lower volatility), which consequently decreases CAPM and ultimately the WACC. Based on my belief that in the future, we cannot expect the same annual returns as today and that we will see lower volatility/risk (lower beta) in these stocks, I adjusted WACC in a way that would satisfy my expected returns, based on the risk I would be taking. I was being conservative and lowered beta for selected cannabis companies by approximately 0.5 between fiscal years 2023 and 2024 up until fiscal year 2027, and then again decreased it by 0.5 in the fiscal year 2027, which lowered WACC by approximately 2-2.5% for each decrease in beta. Forecasts of all the factors in the DCF model are based on analysts' forecasts and companies' guidance until a particular year, afterwards I forecasted them with a more or less steady growth rate, which differs for each company. Data of analysts' forecasts were taken directly from my broker's platform and data were provided by Thomson Reuters. There are different numbers of coverages for each company and fiscal years. Analysts that cover cannabis companies come from different Canadian banks and financial institutions. The most common coverages come from analysts of Canadian Imperial Bank of Commerce, Bank of Montreal, GMP Securities, Jefferies, Cowen, Beacon Securities, Canaccord Genuity and more. Most of them are focusing on EV/SALES and EV/EBITDA multiples for few years ahead but few of them also provide forecasts for the separate components of the DCF model, such as capital expenditures, sales, operating profit, D&A, etc. They did not use growth projection models for EBITDA or net profit such as retention rate multiplied by return on new investment, mainly because almost all of cannabis companies have either negative earnings or are just barely profitable and thus have a 100% retention rate (in case of profitability) in order to fund their own expansion or exploit profitable investment opportunities. Moreover, my observations suggest that analysts are mainly focusing on how much market share can a company gain and then predict EBITDA and net profit margins based on the company's projections of cash cost per gram and other

costs. To come to the free cash flow for each year, I summed up net operating profit after tax (NOPAT), depreciation and amortization, and change in net working capital (taken from cash flow statement), and subtracted capital expenditures (CAPEX). Afterwards, I discounted free cash flow for each year with WACC determined for each year. I summed up all estimated discounted cash flows and added present value of the terminal value (discounted value of cash flows beyond the projected period) to come to the enterprise value of the company. From the enterprise value, I subtracted net debt (total debt minus cash and cash equivalents), to come to the equity value of the company. The final step was to divide the equity value with the number of shares outstanding, to get the equity value per share. All numbers are in millions of Canadian dollars, except per share numbers and beta of the company.

Particularly for the Canopy Growth, I took analysts' forecasts for revenues and operating margins (provided by Thomson Reuters) up until fiscal year 2023, afterwards I forecasted them myself. As mentioned, for the tax rate I chose average marginal effective tax rate for all Canadian sectors for the current year of 2019. As with the revenues and operating margins, D&A was similarly done, where I took analysts' forecasts up until fiscal year 2023 and then forecasted them myself, based on the D&A percentage of the revenues. All changes in net working capital were forecasted by myself, I was closely studying the historical patterns and trying to predict the future pattern, however, net working capital is the factor in the DCF model, where forecasting errors are usually the largest. Capital expenditures were done in the same way as revenues, operating margins, and D&A, where I took analysts' forecasts up until fiscal year 2023 and then forecasted them myself, based on the CAPEX percentage of the revenue. The only factor that I needed to calculate in the WACC model was cost of debt. I calculated it from the company's financial report. Canopy Growth has debt in the form of convertible senior notes at 4.25% interest, in amount of C$835.7 million, and Term loan facility advanced in the form of prime rate operating loan, bearing interest rate of prime plus 1.0% (Canopy Growth Corporation, 2019). Prime rate in Canada is 3.95% for the 2019 and therefore, interest rate comes at 4.95% for the second type of debt. I calculated the total cost of debt based on proportions and it came at a total of 4.32% before taxes (Bank of Canada, 2019).

We can see in table 8, that the equity value for Canopy Growth is almost C$4.3 billion but it has 344 million outstanding shares and thus, the model is showing the equity value per share of C$12.45, whereas the stock closed at C$54.48 on May 31st, indicating that the stock is extremely overvalued and that it has a downside risk to the equity value per share of about 77%, meaning theoretically, the share price can go down 77% from the stock price of C$54.48. In fact, the results from the DCF analyses suggest, that Canopy Growth is the most overvalued company among all 10 companies.

Table 7: CAPM and WACC Calculations for Canopy Growth (market capitalization and debt are in millions of Canadian dollars)

Rf (%)	2.14
ERP (%)	5.38
Beta	4.10
Debt	945.90
Cost of debt (%)	4.32
Market cap.	18767.82
Tax rate (%)	13.70
CAPM (%)	24.20
WACC (%)	23.22

Source: Own work based on data from SEDAR, Thomson Reuters, and Damodaran (2019a)

Table 8: DCF Analysis for Canopy Growth (in millions of Canadian dollars, except per share data)

Fiscal year ends 31st March	ACTUAL			ESTIMATES									
CANOPY GROWTH	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029
REVENUE	39.90	77.95	226.34	680.29	1265.14	2087.58	2818.23	3663.70	4579.63	5724.54	6869.44	8243.33	9479.83
OPERATING INCOME	-15.28	-101.46	-505.68	-491.61	-173.90	162.32	563.65	915.93	1373.89	1717.36	2060.83	2308.13	2654.35
OPERATING MARGIN (%)	-38.30	-130.16	-223.42	-72.26	-13.75	7.78	20.00	25.00	30.00	30.00	30.00	30.00	30.00
TAXES	-2.70	1.59	12.32	0.00	0.00	22.24	77.22	125.48	188.22	235.28	282.33	316.21	363.65
TAX RATE (%)	/	/	/	/	/	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70
NOPAT	-12.58	-103.05	-518.00	-491.61	-173.90	140.08	486.43	790.44	1185.67	1482.08	1778.50	1991.92	2290.71
D&A	6.06	20.49	46.92	141.06	285.69	445.68	607.49	799.74	988.18	1239.60	1489.77	1648.67	1895.97
D&A (% of revenue)	15.2	26.28	20.73	20.74	22.58	21.35	21.56	21.83	21.58	21.65	21.69	20.00	20.00
Δ Receivable	-4.33	-15.61	-85.55	-238.10	-253.03	-417.52	-563.65	-732.74	-915.93	-1144.91	-1373.89	-1648.67	-1895.97
Δ Inventory	-23.83	-55.63	-160.50	-442.19	-632.57	-939.41	-1268.20	-732.74	-915.93	-1144.91	-1373.89	-1648.67	-1895.97
Δ Oth Assets & Prepaid Expenses	-3.25	-15.55	-87.29	-170.07	-189.77	-313.14	-422.73	-549.56	-686.94	-858.68	-1030.42	-1236.50	-1421.97
Δ Payable & Accrued Liabilities	9.28	74.19	136.96	340.15	632.57	1043.79	1409.12	1831.85	2289.81	2862.27	3434.72	4121.67	4739.92
Change in NWC	-22.12	-12.60	-196.37	-510.22	-442.80	-626.27	-845.47	-183.19	-228.98	-286.23	-343.47	-412.17	-473.99
CAPEX	29.39	176.04	644.46	374.16	569.31	835.03	986.38	1099.11	1373.89	1431.13	1717.36	1648.67	1895.97
CAPEX (% of revenue)	73.66	225.83	284.73	55.00	45.00	40.00	35.00	30.00	30.00	25.00	25.00	20.00	20.00
FREE CASH FLOW	-58.03	-271.20	-1311.91	-1234.92	-900.32	-875.55	-737.94	307.89	570.98	1004.32	1207.44	1579.75	1816.71
DCF	-58.03	-271.20	-1311.91	-1040.21	-615.47	-485.76	-332.28	122.82	188.25	273.66	309.78	340.61	329.17
WACC (%)				23.22	23.22	23.22	23.22	21.00	21.00	21.00	19.00	19.00	19.00

PERPETUITY GROWTH (%)	2.50
TOTAL DCF	-909.42
PV. TERMINAL VALUE	1628.69
ENTERPRISE VALUE	719.27
NET DEBT	-3568.96
EQUITY VALUE	4288.24
SHARES OUTSTANDING	344.49
EQUITY VALUE/SHARE ($)	12.45
Market Price (May 31st, $)	54.48

Source: Own work based on data from SEDAR and Thomson Reuters

Because discounted cash flow model is extremely sensitive to even slightest changes (especially changes in discount rates), I made two sensitivity analysis tables. We can see from the table 9, what the equity value per share would be, if either WACC, perpetuity growth, or both, were different than anticipated. From the table 9, the best-case scenario would be, if the perpetuity growth was 3.25% (instead of 2.50%) and WACC was 17% (instead of 23.22%), the equity value per share would be $21.51. The company would therefore grow at faster pace than forecasted and it would also have lower cost of capital. The worst-case scenario on the other hand would be, if the perpetuity growth was 1.75% and WACC was 29%, the equity value per share would be $9.15. The company would therefore grow at slower pace than forecasted and it would also have higher cost of capital. So, we have a price per share span of $12.36 between the low and the high estimate. I decided to make another sensitivity analysis with the changing variables WACC and tax rate, mainly because we do not know with certainty, what the actual tax rates will be. You can see the similar outcome in table 10, where the best-case scenario would be, if the tax rate was 11% (instead of 13.7%) and WACC was 17% (instead of 23.22%), the equity value per share would be $21.60. The worst-case scenario would be, if the tax rate was 17% and WACC was 29%, the equity value per share would be $8.90. We can also see that the equity value per share is more sensitive to the changes in tax rates rather than perpetuity growth rates. The price span between the low and the high estimate is in this case $12.70.

Table 9: Sensitivity analysis for Canopy Growth (WACC, Perpetuity growth, in $)

		PERPETUITY GROWTH (%)						
		1.75	2.00	2.25	2.50	2.75	3.00	3.25
WACC (%)	17.00	20.15	20.36	20.57	20.79	21.02	21.26	21.51
	19.00	16.74	16.88	17.02	17.17	17.32	17.48	17.64
	21.00	14.26	14.36	14.46	14.56	14.66	14.76	14.87
	23.22	12.25	12.31	12.38	12.45	12.52	12.59	12.66
	25.00	11.03	11.08	11.13	11.18	11.23	11.28	11.33
	27.00	9.97	10.00	10.04	10.07	10.11	10.15	10.19
	29.00	9.15	9.17	9.20	9.23	9.26	9.28	9.31

Source: Own work based on data from Thomson Reuters, SEDAR, and Damodaran (2019a)

Table 10: Sensitivity analysis for Canopy Growth (WACC, Tax rate, in $)

		TAX RATE (%)						
		11.00	12.00	13.00	13.70	15.00	16.00	17.00
WACC (%)	17.00	21.60	21.30	21.00	20.79	20.40	20.10	19.80
	19.00	17.82	17.58	17.34	17.17	16.86	16.62	16.38
	21.00	15.09	14.89	14.69	14.56	14.30	14.10	13.91
	23.22	12.88	12.72	12.56	12.45	12.24	12.08	11.92
	25.00	11.55	11.41	11.27	11.18	11.00	10.86	10.72
	27.00	10.39	10.27	10.16	10.07	9.92	9.81	9.69
	29.00	9.50	9.40	9.30	9.23	9.10	9.00	8.90

Source: Own work based on data from Thomson Reuters, SEDAR, and Damodaran (2019a)

You can find extensive analyses and calculations for the other 9 stocks in appendixes. In table 11, we can see the results for the selected cannabis companies. Out of 10 stocks, 8 are extremely overvalued (up to 338%), 1 (Aphria Inc.) is overvalued by approximately 70%, and Village Farms is the only stock being undervalued, but we need to emphasize that the company has been growing organic vegetables for almost three decades and have now shifted part of its operations into growing cannabis and hemp and thus, most of the revenue comes from the vegetable business for now. The downside risk to get to the equity value per share for Canopy Growth was 77.15%, whereas the upside potential for the Village Farms was 17.78%. Companies (9 of them) are on average overvalued by 202.84%, while the average downside risk to the equity value per share among 9 overvalued stocks is 64.83%.

Table 11: Valuation comparison among selected cannabis companies

COMPANY	Market price as of May 31st ($)	Equity value/share with DCF model ($)	Overvaluation (%)	Downside risk to the equity value/share (%)
CanopyGrowth	54.48	12.45	337.59	-77.15
CannTrust Holdings	7.10	1.97	260.41	-72.25
Tilray Inc.*	38.01	11.12	241.82	-70.74
Hexo Corp.	8.67	2.70	221.11	-68.86
Aurora Cannabis	10.27	3.37	204.75	-67.19
OrganiGram Holding	9.81	3.68	166.58	-62.49
Cronos Group	19.10	7.30	161.64	-61.78
Supreme Cannabis	1.62	0.62	161.29	-61.73
Aphria Inc.	8.93	5.24	70.42	-41.32
Village Farms	**16.48**	**19.41**	-15.10	**17.78**
*Prices in U.S. dollars				

Source: Own work based on data from Thomson Reuters, SEDAR, and Damodaran (2019a)

We can agree that cannabis stocks are in general very overvalued, when we focus solely on the discounted cash flow approach. One of the most notable problems is that these cannabis companies are not even running at their full capacity and yet, they're already experiencing problems with huge inventories due to demand not being as strong as anticipated. In some cases, and as shown in the models, the worth of inventory is larger than the total revenue for the fiscal year 2018. When companies get the remaining licenses for other growing spaces, they will produce even more product and if the demand does not pick up fast, there will be major oversupply of cannabis on the market and prices will decrease, therefore, companies will suffer from decreasing revenues and profits. Due to rapid expansions, the cash burn is substantial, and it is shown mostly by enormous capital expenditures. In case of Hexo Corp, capital expenditures in fiscal year 2018 were by 827% larger than the revenue.

It is expected that capital expenditures will decrease substantially in the upcoming years and depreciation and amortization will increase as companies are not going to grow as rapidly as they are now. Operating margins are expected to slightly pick up, mainly due to increasing sales of oils and gel capsules and moreover, come October, sales of THC-infused edibles and beverages are going to be legal in Canada and companies are expecting higher price points and margins on these products (Williams, 2019).

CONCLUSION

There are numerous factors that are determining the value of the cannabis industry in Canada and there are many pros and cons about the legalisation. We saw that the industry is currently the fastest growing overall but demand in Canada has been increasing with much slower pace than anticipated and consumers are demanding and expecting lower prices, more variety of products, better quality products, and better services from the companies. Oversupply has begun and companies need to figure out what to do in order to avoid any future price wars and even worse, losing their customers to the black market. The problem is that around 79% of cannabis in Canada was bought on black market in 2018. However, the pros outstrip the cons as we have seen many positive outcomes since the legalisation. New jobs have been created, the government has collected taxes from the sales, cannabis sales have been boosting national GDP, children are safer and the prevention from accessing cannabis is better, from the medical perspective there are many people who does not need to suffer anymore or take dangerous opioids as cannabis helps them to treat different diseases. For the industry to grow further on, companies are betting on higher margins on selling consumer-packaged goods (beverages, edible products, and nutraceuticals), industrial use-cases (plastic composites and hempcrete), and efficacy-driven solutions also known as biotech. The Banking Bill in USA will also help Canadian companies that operate in USA to access more cash and to evolve faster. The more countries legalise cannabis worldwide, the more opportunities there will be for the Canadian companies because of having the first-mover advantage. The more reimbursements (for medical patients) and government support there will be, the more acceptable the entire industry will get, and the growth will come afterwards. When the perception about the cannabis shifts, the industry will thrive and grow easier than any time before.

From the investment perspective, I found that the cannabis companies are in general overvalued. With the relative valuation method, I have shown that cannabis companies are trading at much higher multiples than companies in comparable industries such as the beverage, tobacco, drugs, and health care industries. The only way to somehow justify their valuations is to adjust multiples to the projected growth rate over the next few years, however, I showed that if the projected growth rate is less than anticipated, valuations will be more difficult to justify. With the DCF analyses, I found that out of ten well-known and most traded stocks, only one stock is undervalued, and others are either very or extremely overvalued (up to 338%). My conclusion is that the industry itself has tremendous opportunities in the future, especially in the medical segment, regulation of cannabis is a good thing and it boost the economy, however, from the investment perspective, most of the stocks are extremely overvalued and are not representing good risk to return opportunity and I would be very cautious when investing in these companies, for now. We need to wait and see how the industry will evolve in a few years and whether the valuations of these companies will come down to earth so that the stocks could represent a good investment opportunity.

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APPENDIXES

Appendix 1: POVZETEK

Ta magistrska naloga je po naravi bolj opisovalna kakor raziskovalna. Glavni vprašanji, ki sem si ju zastavil, sta:

1) kakšni oziroma kateri so viri vrednosti v panogi marihuane,

2) ali so podjetja v tej panogi na splošno precenjena ali podcenjena z investicijskega vidika.

Osredotočil sem se na Kanado, saj je prva država izmed članic G-7, ki je oktobra 2018 legalizirala uporabo marihuane za rekreativne namene. Ugotovil sem, da je mnogo faktorjev, ki vplivajo na to, kako se je razvila ta industrija do sedaj, in mnogo faktorjev, ki bodo vplivali na razvoj v prihodnosti. Tako kot pri vsaki stvari, so z legalizacijo prišle prednosti in slabosti, prvih pa je občutno več.

Panoga marihuane je trenutno tako v Kanadi kot tudi v Združenih Državah Amerike najhitreje rastoča panoga. V Kanadi se je začel pojavljati problem s strani povpraševanja, kajti slednje raste prepočasi, veliko počasneje kot je bilo predvideno. Potrošniki si želijo nižje cene, raznolike in kvalitetnejše produkte ter boljše storitve s strani ponudnikov. Pojavljati se je začela prekomerna ponudba na trgu in podjetja (ponudniki) morajo najti rešitev čim prej, da se bodo lahko izognila morebitnim prihodnjim cenovnim vojnam, ali še slabše, izgubi kupcev, ki bodo morda poiskali cenejše in boljše izdelke na črnem (ilegalnem) trgu. V Kanadi je problem, da je v letu 2018 kar 79% celotnega nakupa marihuane bilo opravljenega na črnem trgu. Kot sem omenil, pa je legalizacija prinesla več prednosti kakor slabosti. Ustvarilo se je mnogo novih službenih pozicij, vlada je pobrala veliko davkov od prodaje marihuane, sama prodaja marihuane je vključena v državni BDP in ga tako povečuje, otroci so varnejši pred dosegom marihuane, z zdravstvenega vidika pa ogromno ljudi več ne trpi in ne jemlje zdravju škodljivih zdravil, saj jim marihuana pomaga zdraviti njihove zdravstvene težave. Da bo panoga vzdrževala hitro rast, podjetja stavijo na višje prihodnje marže s prodajo potrošniškega pakiranega blaga (pijače, užitni izdelki, hranila), industrijskih kompozitov (plastični kompoziti in bio materiali iz konoplje) in s prodajo rešitev, ki temeljijo na učinkovitosti, kot je biotehnologija. Bančni predlog (Banking Bill) v ZDA, ki temelji na tem, da bodo podjetja lažje zbrala denar za razvoj in ekspanzijo kot tudi shranila denar na bančnih računih, bo zagotovo omogočil kanadskim podjetjem, ki delujejo v ZDA, da se bodo lažje in hitreje razvila. Pomembno je poudariti, da bo s tem, ko bo več držav legaliziralo marihuano, tudi večja verjetnost za boljšo percepcijo ljudi in sprejem celotne panoge, prav tako pa je to pomembno za kanadska podjetja, saj imajo prednost prvega ponudnika pred ostalimi. Če nadaljujem, je prav tako pomembno tudi dejstvo, da več kot bo podpore s strani vlad in povračil za paciente, ki uporabljajo marihuano v zdravstvene namene, večja bo verjetnost za prihodnji razvoj. Ko se bo percepcija ljudi spremenila, bo ta panoga doživela razvoj, ki ga bo lažje doseči kot kadarkoli prej.

Z investicijskega vidika sem ugotovil, da je večina javnih podjetij v marihuana panogi precenjenih. Z relativno analizo in vrednostnimi večkratniki (finančna tehnika ocenjevanja

vrednosti podjetja) sem prikazal, da se kanadska podjetja v panogi marihuane trgujejo na veliko višjih vrednostnih večkratnikih kakor podjetja drugih panog, kot so alkoholna, tobačna, zdravstvena in farmacijska. Edini način, s katerim bi lahko utemeljil vrednosti teh podjetij, je ta, da bi prilagodil vrednostne večkratnike glede na pričakovano rast te panoge. Vendar bo, če rast ne bo takšna, kot je pričakovana in bo dejansko manjša, veliko težje utemeljiti te visoke vrednosti, po katerih se podjetja v panogi marihuane trgujejo. Z analizo diskontiranih denarnih tokov sem ugotovil, da je izmed deset najbolj poznanih in trgovanih podjetij samo eno podjetje podcenjeno in vsa ostala močno ali ekstremno precenjena.

Moje zaključne misli so, da panoga marihuane predstavlja ogromno priložnost za prihodnost, še posebej z vidika medicinskih aplikacij. Regulacija konoplje je dobra stvar, saj zmanjšuje ilegalno prodajo marihuane na črnem trgu, varuje otroke pred dostopom do marihuane, pospešuje ekonomijo in omogoča nova delovna mesta. Vendar je z investicijskega vidika večina podjetij oziroma delnic zelo ali ekstremno precenjenih in ne predstavlja dobre naložbene priložnosti, še posebej z vidika tveganja. Osebno bi bil zelo previden pri investiranju v ta podjetja. Malo še moramo počakati, da vidimo, kako se bo celotna industrija razvila v nekaj letih, kakšni bodo novi produkti in nove storitve, koliko držav bo še sprejelo odločitev za legalizacijo in regulacijo marihuane in morda se potem pokaže kakšna priložnost za investiranje.

Appendix 2: DCF, CAPM, and WACC for Aurora Cannabis

Table 1: DCF Analysis for Aurora Cannabis (in millions of Canadian dollars, except per share data)

Fiscal year ends 30th June	ACTUAL		ESTIMATES										
AURORA CANNABIS	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029
REVENUE	18.07	55.20	268.03	687.08	1166.74	2270.65	3065.38	3984.99	4981.24	6226.55	7471.86	8966.23	10759.48
OPERATING INCOME	-11.19	-95.77	-312.68	-73.28	88.58	454.13	735.69	1115.80	1494.37	1867.96	2017.40	2241.56	2474.68
OPERATING MARGIN (%)	-61.93	-173.50	-116.66	-10.67	7.59	20.00	24.00	28.00	30.00	30.00	27.00	25.00	23.00
TAXES	-4.30	8.10	12.32	0.00	12.14	62.22	100.79	152.86	204.73	255.91	276.38	307.09	339.03
TAX RATE (%)	/	/	/	/	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70
NOPAT	-6.89	-103.87	-325.00	-73.28	76.44	391.91	634.90	962.93	1289.64	1612.05	1741.02	1934.46	2135.65
D&A	1.09	12.26	82.20	206.12	350.02	681.20	919.61	1195.50	1494.37	1556.64	1867.96	1793.25	1990.50
D&A (% of revenue)	6.03	22.21	30.67	30.00	30.00	30.00	30.00	30.00	30.00	25.00	25.00	20.00	18.50
Δ Receivable	-2.23	-12.78	-73.91	-206.12	-291.69	-567.66	-643.73	-597.75	-747.19	-871.72	-971.34	-1165.61	-2151.90
Δ Inventory	-5.39	-21.89	-53.11	-151.16	-256.68	-499.54	-674.38	-557.90	-697.37	-871.72	-224.16	-179.32	-753.16
Δ Oth Assets & Prepaid Expenses	-2.39	-4.47	-11.61	-34.35	-58.34	-113.53	-153.27	-199.25	-249.06	-311.33	-373.59	-358.65	-215.19
Δ Payable & Accrued Liabilities	7.07	38.70	47.25	137.42	245.02	499.54	643.73	797.00	996.25	1245.31	1344.93	1613.92	1936.71
Change in NWC	-2.93	-0.44	-91.38	-254.22	-361.69	-681.20	-827.65	-557.90	-697.37	-809.45	-224.16	-89.66	-1183.54
CAPEX	25.72	136.94	644.46	377.89	525.03	908.26	1072.88	1195.50	1494.37	1556.64	1867.96	1793.25	1936.71
CAPEX (% of revenue)	142.34	248.08	240.44	55.00	45.00	40.00	35.00	30.00	30.00	25.00	25.00	20.00	18.00
FREE CASH FLOW	-34.45	-228.99	-978.64	-499.27	-460.26	-516.35	-346.02	405.03	592.27	802.60	1516.86	1844.80	1005.90
DCF			-978.64	-429.57	-340.72	-328.88	-204.87	210.36	269.83	320.75	612.64	665.25	323.87
WACC (%)			16.23	16.23	16.23	16.23	14.00	14.00	14.00	14.00	12.00	12.00	12.00

PERPETUITY GROWTH (%)	2.50
TOTAL DCF	1098.66
PV. TERMINAL VALUE	2418.68
ENTERPRISE VALUE	3517.34
NET DEBT	103.93
EQUITY VALUE	3413.41
SHARES OUTSTANDING	1014.10
EQUITY VALUE/SHARE ($)	3.37
Market Price (May 31st, $)	10.27

Source: Own work based on data from SEDAR and Thomson Reuters

Table 2: Calculations of CAPM and WACC for Aurora Cannabis (market capitalization and debt are in millions of Canadian dollars)

Rf (%)	2.14
ERP (%)	5.38
Beta	2.75
Debt	639.10
Cost of debt (%)	5.40
Market cap.	10414.81
Tax rate (%)	13.7
CAPM (%)	16.94
WACC (%)	16.23

Source: Own work based on data from SEDAR, Thomson Reuters, and Damodaran (2019a)

Appendix 3: DCF, CAPM, and WACC for Tilray

Table 3: DCF Analysis for Tilray (in millions of U.S. dollars, except per share data)

Fiscal year ends 31st December	ACTUAL		ESTIMATES										
TILRAY	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029
REVENUE	20.54	43.13	175.97	359.61	556.07	793.96	1032.15	1341.79	1677.24	2096.55	2515.86	3019.03	3622.84
OPERATING INCOME	-7.50	-57.65	-73.23	-11.41	69.53	222.31	330.29	429.37	536.72	628.97	704.44	784.95	869.48
OPERATING MARGIN (%)	-36.51	-133.67	-41.62	-3.17	12.50	28.00	32.00	32.00	32.00	20.00	28.00	26.00	24.00
TAXES	0.00	-4.45	12.32	0.00	9.53	30.46	45.25	58.82	73.53	86.17	96.51	107.54	119.12
TAX RATE (%)	/	/	/	/	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70
NOPAT	-7.50	-53.20	-85.55	-11.41	60.00	191.85	285.04	370.55	463.19	542.80	607.93	677.41	750.36
D&A	1.85	3.56	11.79	28.72	47.27	75.43	103.21	140.89	184.50	236.91	291.84	359.26	434.74
D&A (% of revenue)	9.01	8.25	6.70	7.99	8.50	9.50	10.00	10.50	11.00	11.30	11.60	11.90	12.00
Δ Receivable	-1.69	-15.38	-15.20	-32.36	-55.61	-79.40	-103.21	-134.18	-167.72	-209.66	-251.59	-301.90	-362.28
Δ Inventory	-3.32	-8.79	-45.00	-79.11	-122.34	-174.67	-154.82	-174.43	-218.04	-209.66	-276.74	-332.09	-434.74
Δ Oth Assets & Prepaid Expenses	-0.48	-2.46	-3.74	-8.63	-13.35	-19.06	-24.77	-32.20	-40.25	-50.32	-60.38	-30.19	-36.23
Δ Payable & Accrued Liabilities	5.71	17.79	43.99	89.90	139.02	198.49	258.04	268.36	335.45	419.31	452.85	362.28	398.51
Change in NWC	0.22	-8.83	-19.95	-30.21	-52.27	-74.63	-24.77	-72.46	-90.57	-50.32	-135.86	-301.90	-434.74
CAPEX	11.44	54.46	40.00	89.90	139.02	198.49	206.43	268.36	335.45	314.48	377.38	452.85	470.97
CAPEX (% of revenue)	55.7	126.27	22.73	25.00	25.00	25.00	20.00	20.00	20.00	15.00	15.00	15.00	13.00
FREE CASH FLOW	-16.87	-112.93	-133.71	-102.80	-84.02	-5.84	157.05	170.62	221.66	414.91	386.54	281.92	279.39
DCF			-124.92	-83.83	-59.80	-3.63	92.44	89.27	103.09	171.52	165.43	109.19	97.93
WACC (%)			14.57	14.57	14.57	14.57	12.50	12.50	12.50	12.50	10.50	10.50	10.50

PERPETUITY GROWTH (%)	2.30
TOTAL DCF	556.68
PV. TERMINAL VALUE	816.66
ENTERPRISE VALUE	1373.34
NET DEBT	106.50
EQUITY VALUE	1266.84
SHARES OUTSTANDING	113.90
EQUITY VALUE/SHARE ($)	11.12
Market Price (May 31st, $)	38.01

Source: Own work based on data from SEDAR and Thomson Reuters

Table 4: Calculations of CAPM and WACC for Tilray (market capitalization and debt are in millions of U.S. dollars)

Rf (%)	2.14
ERP (%)	5.38
Beta	2.50
Debt	431.89
Cost of debt (%)	5.00
Market cap.	4329.26
Tax rate (%)	13.70
CAPM (%)	15.59
WACC (%)	14.57

Source: Own work based on data from SEDAR, Thomson Reuters, and Damodaran (2019a)

Appendix 4: DCF, CAPM, and WACC for Cronos Group

Table 5: DCF Analysis for Cronos Group (in millions of Canadian dollars, except per share data)

Fiscal year ends 31st December	ACTUAL		ESTIMATES										
CRONOS GROUP	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029
REVENUE	4.08	15.70	52.45	166.26	364.94	502.30	652.99	803.18	987.91	1185.49	1422.59	1678.65	1980.81
OPERATING INCOME	2.79	-18.11	-33.03	1.86	62.90	140.64	189.37	232.92	286.49	331.94	398.32	436.45	515.01
OPERATING MARGIN (%)	68.38	-115.35	-62.97	1.12	17.24	28.00	29.00	29.00	29.00	28.00	28.00	26.00	26.00
TAXES	0.30	-4.45	12.32	0.25	8.62	19.27	25.94	31.91	39.25	45.48	54.57	59.79	70.56
TAX RATE (%)	10.75	/	/	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70
NOPAT	2.49	-13.66	-45.35	1.61	54.28	121.38	163.42	201.01	247.24	286.46	343.75	376.66	444.45
D&A	1.00	2.51	9.18	36.58	102.18	160.74	208.96	200.79	246.98	296.37	327.20	386.09	366.45
D&A (% of revenue)	24.51	15.99	17.50	22.00	28.00	32.00	32.00	25.00	25.00	25.00	23.00	23.00	18.50
Δ Receivable	-1.03	-3.12	-11.54	-36.58	-80.29	-110.51	-117.54	-144.57	-177.82	-213.39	-256.07	-251.80	-277.31
Δ Inventory	-8.44	-8.52	-23.00	-49.88	-102.18	-110.51	-143.66	-176.70	-217.34	-118.55	-156.48	-184.65	-237.70
Δ Oth Assets & Prepaid Expenses	-0.29	-3.09	-3.74	-3.99	-7.30	-10.05	-13.06	-16.06	-19.76	-23.71	-28.45	-16.79	-19.81
Δ Payable & Accrued Liabilities	6.70	7.65	34.00	41.57	91.24	125.58	163.25	160.64	197.58	237.10	256.07	201.44	217.89
Change in NWC	-3.06	-7.08	-4.28	-48.88	-98.53	-105.48	-111.01	-176.70	-217.34	-118.55	-184.94	-251.80	-316.93
CAPEX	42.70	114.77	78.15	91.44	182.47	226.04	261.20	240.95	296.37	355.65	355.65	335.73	376.35
CAPEX (% of revenue)	1046.57	731.02	149.00	55.00	50.00	45.00	40.00	30.00	30.00	30.00	25.00	20.00	19.00
FREE CASH FLOW	-42.27	-133.00	-118.60	-102.14	-124.54	-49.41	0.18	-15.85	-19.49	108.64	130.37	175.22	117.62
DCF			-109.08	-79.46	-81.95	-27.50	0.09	-7.01	-7.43	35.69	42.80	50.46	29.72
WACC (%)			18.22	18.22	18.22	18.22	16.00	16.00	16.00	16.00	14.00	14.00	14.00

PERPETUITY GROWTH (%)	2.30
TOTAL DCF	-153.66
PV. TERMINAL VALUE	190.94
ENTERPRISE VALUE	37.27
NET DEBT	-2415.90
EQUITY VALUE	2453.17
SHARES OUTSTANDING	336.14
EQUITY VALUE/SHARE ($)	7.30
Market Price (May 31st, $)	19.10

Source: Own work based on data from SEDAR and Thomson Reuters

Table 6: Calculations of CAPM and WACC for Cronos Group (market capitalization and debt are in millions of Canadian dollars)

Rf (%)	2.14
ERP (%)	5.38
Beta	2.99
Debt	2.38
Cost of debt (%)	5.00
Market cap.	6420.25
Tax rate (%)	13.70
CAPM (%)	18.23
WACC (%)	18.22

Source: Own work based on data from SEDAR, Thomson Reuters, and Damodaran (2019a)

Appendix 5: DCF, CAPM, and WACC for Aphria

Table 7: DCF Analysis for Aphria (in millions of Canadian dollars, except per share data)

Fiscal year ends 31st May	ACTUAL			ESTIMATES									
APHRIA	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029
REVENUE	20.44	36.92	237.11	708.11	963.70	1156.44	1387.73	1665.27	1998.33	2298.08	2642.79	2959.92	3315.11
OPERATING INCOME	-1.39	21.45	-145.12	10.90	67.83	196.59	402.44	482.93	579.52	666.44	766.41	769.58	861.93
OPERATING MARGIN (%)	-6.80	58.1	61.2	1.54	7.04	17.00	29.00	29.00	29.00	29.00	29.00	26.00	26.00
TAXES	0.13	6.41	0.00	1.49	9.29	26.93	55.13	66.16	79.39	91.30	105.00	105.43	118.08
TAX RATE (%)	3.00	17.88	/	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70
NOPAT	-1.52	15.04	-145.12	9.41	58.54	169.66	347.31	416.77	500.12	575.14	661.41	664.15	743.85
D&A	1.94	6.68	22.94	127.46	173.47	208.16	249.79	299.75	399.67	459.62	528.56	591.98	596.72
D&A (% of revenue)	9.49	18.09	9.67	18.00	18.00	18.00	18.00	18.00	20.00	20.00	20.00	20.00	18.00
Δ Receivable	0.95	-2.56	-22.10	-127.46	-173.47	-208.16	-249.79	-299.75	-359.70	-413.65	-369.99	-355.19	-364.66
Δ Inventory	-1.80	-25.95	-69.38	-155.78	-212.01	-231.29	-277.55	-333.05	-399.67	-298.75	-290.71	-295.99	-331.51
Δ Oth Assets & Prepaid Expenses	-2.34	-40.79	-9.07	-16.99	-19.27	-23.13	-27.75	-33.31	-39.97	-45.96	-52.86	-29.60	-33.15
Δ Payable & Accrued Liabilities	4.60	25.65	74.30	212.43	289.11	346.93	346.93	333.05	399.67	459.62	475.70	384.79	430.96
Change in NWC	1.41	-43.65	-26.25	-87.81	-115.64	-115.64	-208.16	-333.05	-399.67	-298.75	-237.85	-295.99	-298.36
CAPEX	67.72	216.70	200.75	318.65	337.30	404.75	416.32	416.32	499.58	574.52	581.41	651.18	596.72
CAPEX (% of revenue)	331.31	586.94	84.67	45.00	35.00	35.00	30.00	25.00	25.00	25.00	22.00	22.00	18.00
FREE CASH FLOW	-65.89	-238.63	-349.18	-269.59	-220.94	-142.58	-27.38	-32.86	0.54	161.49	370.70	308.96	445.49
DCF			-349.18	-234.30	-166.89	-93.60	-16.79	-17.83	0.26	68.64	160.86	120.78	156.89
WACC (%)				15.06	15.06	15.06	13.00	13.00	13.00	13.00	11.00	11.00	11.00

PERPETUITY GROWTH (%)	2.50
TOTAL DCF	-21.99
PV. TERMINAL VALUE	1280.43
ENTERPRISE VALUE	1258.45
NET DEBT	-57.36
EQUITY VALUE	1315.81
SHARES OUTSTANDING	250.99
EQUITY VALUE/SHARE ($)	5.24
Market Price (May 31st, $)	8.93

Source: Own work based on data from SEDAR and Thomson Reuters

Table 8: Calculations of CAPM and WACC for Aphria (market capitalization and debt are in millions of Canadian dollars)

Rf (%)	2.14
ERP (%)	5.38
Beta	2.47
Debt	77.38
Cost of debt (%)	5.06
Market cap.	2241.33
Tax rate (%)	13.70
CAPM (%)	15.43
WACC (%)	15.06

Source: Own work based on data from SEDAR, Thomson Reuters, and Damodaran (2019a)

Appendix 6: DCF, CAPM, and WACC for Hexo Corp

Table 9: DCF Analysis for Hexo Corp (in millions of Canadian dollars, except per share data)

Fiscal year ends 31st July	ACTUAL		ESTIMATES										
HEXO CORP	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029
REVENUE	4.10	4.93	59.66	290.00	504.00	704.00	858.88	1047.83	1236.44	1434.27	1663.76	1863.41	2087.02
OPERATING INCOME	-2.43	-17.97	-42.00	24.01	66.95	171.00	249.08	303.87	358.57	401.60	465.85	484.49	542.62
OPERATING MARGIN (%)	-59.27	-364.50	-70.40	8.28	13.28	24.29	29.00	29.00	29.00	28.00	28.00	26.00	26.00
TAXES	0.00	0.00	0.00	3.29	9.17	23.43	34.12	41.63	49.12	55.02	63.82	66.37	74.34
TAX RATE (%)	/	/	/	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70
NOPAT	-2.43	-17.97	-42.00	20.72	57.78	147.57	214.95	262.24	309.44	346.58	402.03	418.11	468.29
D&A	0.59	1.67	4.30	46.40	80.64	126.72	154.60	188.61	222.56	258.17	299.48	260.88	292.18
D&A (% of revenue)	14.39	33.87	7.21	16.00	16.00	18.00	18.00	18.00	18.00	18.00	18.00	14.00	14.00
Δ Receivable	0.69	-0.29	-13.13	-55.10	-75.60	-105.60	-128.83	-157.18	-185.47	-215.14	-249.56	-223.61	-250.44
Δ Inventory	-4.54	-7.65	-43.00	-95.70	-141.12	-176.00	-188.95	-188.61	-222.56	-186.46	-216.29	-204.98	-208.70
Δ Oth Assets & Prepaid Expenses	-0.16	-4.00	-26.00	-8.70	-15.12	-21.12	-25.77	-31.44	-37.09	-57.37	-66.55	-74.54	-62.61
Δ Payable & Accrued Liabilities	0.37	7.32	35.01	101.50	176.40	246.40	214.72	230.52	272.02	315.54	299.48	335.41	292.18
Change in NWC	-3.64	-4.62	-47.12	-58.00	-55.44	-56.32	-128.83	-146.70	-173.10	-143.43	-232.93	-167.71	-229.57
CAPEX	3.11	45.72	120.00	76.00	87.00	147.84	180.36	188.61	222.56	258.17	299.48	260.88	292.18
CAPEX (% of revenue)	75.85	927.38	201.14	26.21	21.00	21.00	21.00	18.00	18.00	18.00	18.00	14.00	14.00
FREE CASH FLOW	-8.59	-66.64	-204.82	-66.88	-4.02	70.13	60.35	115.54	136.34	203.15	169.10	250.40	238.71
DCF			-198.28	-53.16	-2.63	37.59	28.74	46.05	45.47	56.69	45.33	57.12	46.34
WACC (%)			21.79	21.79	21.79	21.79	19.50	19.50	19.50	19.50	17.50	17.50	17.50

PERPETUITY GROWTH (%)	2.50
TOTAL DCF	307.53
PV. TERMINAL VALUE	246.26
ENTERPRISE VALUE	553.80
NET DEBT	-139.85
EQUITY VALUE	693.65
SHARES OUTSTANDING	256.90
EQUITY VALUE/SHARE ($)	2.70
Market Price (May 31st, $)	8.67

Source: Own work based on data from SEDAR and Thomson Reuters

Table 10: Calculations of CAPM and WACC for Hexo Corp (market capitalization and debt are in millions of Canadian dollars)

Rf (%)	2.14
ERP (%)	5.38
Beta	3.70
Debt	33.75
Cost of debt (%)	5.60
Market cap.	2227.32
Tax rate (%)	13.70
CAPM (%)	22.05
WACC (%)	21.79

Source: Own work based on data from SEDAR, Thomson Reuters, and Damodaran (2019a)

Appendix 7: DCF, CAPM, and WACC for OrganiGram Holdings

Table 11: DCF Analysis for OrganiGram Holdings (in millions of Canadian dollars, except per share data)

Fiscal year ends 31st August	ACTUAL		ESTIMATES										
ORGANIGRAM HOLDINGS	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029
REVENUE	5.39	12.43	94.00	195.00	272.00	326.40	391.68	470.02	564.02	654.26	752.40	865.26	986.40
OPERATING INCOME	-11.10	36.42	59.50	46.10	75.00	97.92	117.50	141.00	169.21	183.19	210.67	233.62	266.33
OPERATING MARGIN (%)	-205.94	293.00	63.30	23.64	27.57	30.00	30.00	30.00	30.00	28.00	28.00	27.00	27.00
TAXES	0.00	5.65	8.15	6.32	10.28	13.42	16.10	19.32	23.18	25.10	28.86	32.01	36.49
TAX RATE (%)	/	20.34	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70
NOPAT	-11.10	30.77	51.35	39.78	64.73	84.50	101.41	121.69	146.02	158.10	181.81	201.61	229.84
D&A	1.56	3.53	10.90	25.35	38.08	45.70	54.84	65.80	78.96	91.60	105.34	112.48	128.23
D&A (% of revenue)	28.94	28.40	11.60	13.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	13.00	13.00
Δ Receivable	1.07	-0.30	-17.60	-35.10	-48.96	-58.75	-70.50	-84.60	-84.60	-98.14	-97.81	-112.48	-128.23
Δ Inventory	-1.47	-59.42	-51.80	-64.35	-76.16	-81.60	-86.17	-103.40	-90.24	-85.05	-73.00	-65.00	-52.00
Δ Oth Assets & Prepaid Expenses	1.29	-3.36	-6.90	-7.61	-8.16	-9.79	-11.75	-14.10	-16.92	-13.09	-15.05	-8.65	-9.86
Δ Payable & Accrued Liabilities	4.14	4.50	17.10	39.00	54.40	65.28	97.92	103.40	124.08	111.22	135.43	155.75	167.69
Change in NWC	5.03	-58.58	-59.20	-68.06	-78.88	-84.86	-70.50	-98.70	-67.68	-85.05	-50.43	-30.39	-22.41
CAPEX	34.33	56.44	102.26	43.00	51.00	52.22	62.67	75.20	90.24	104.68	120.38	112.48	128.23
CAPEX (% of revenue)	636.92	454.06	108.79	22.05	18.75	16.00	16.00	16.00	16.00	16.00	16.00	13.00	13.00
FREE CASH FLOW	-38.84	-80.72	-99.21	-45.92	-27.08	-6.89	23.07	13.58	67.06	59.96	116.33	171.23	207.43
DCF			-95.27	-37.41	-18.72	-4.04	12.51	6.38	27.26	21.10	40.94	53.09	56.67
WACC (%)			17.86	17.86	17.86	17.86	15.50	15.50	15.50	15.50	13.50	13.50	13.50

PERPETUITY GROWTH (%)	2.50
TOTAL DCF	157.79
PV. TERMINAL VALUE	378.12
ENTERPRISE VALUE	535.91
NET DEBT	-38.28
EQUITY VALUE	574.20
SHARES OUTSTANDING	156.17
EQUITY VALUE/SHARE ($)	3.68
Market Price (May 31st, $)	9.81

Source: Own work based on data from SEDAR and Thomson Reuters

Table 12: Calculations of CAPM and WACC for OrganiGram Holdings (market capitalization and debt are in millions of Canadian dollars)

Rf (%)	2.14
ERP (%)	5.38
Beta	3.00
Debt	49.47
Cost of debt (%)	5.70
Market cap.	1532.04
Tax rate (%)	13.70
CAPM (%)	18.28
WACC (%)	17.86

Source: Own work based on data from SEDAR, Thomson Reuters, and Damodaran (2019a)

Appendix 8: DCF, CAPM, and WACC for CannTrust Holdings

Table 13: Extensive DCF Analysis for CannTrust Holdings (in millions of Canadian dollars, except per share data)

Fiscal year ends 31st December	ACTUAL		ESTIMATES										
CANNTRUST HOLDINGS	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029
REVENUE	20.70	45.65	82.00	155.00	232.50	290.63	348.75	418.50	502.20	582.55	669.93	770.43	878.28
OPERATING INCOME	8.86	-10.19	19.00	32.20	62.30	90.09	108.11	121.37	145.64	163.11	187.58	208.01	237.14
OPERATING MARGIN (%)	42.8	-22.32	23.17	20.77	26.80	31.00	31.00	29.00	29.00	28.00	28.00	27.00	27.00
TAXES	0.00	1.43	2.60	4.41	8.54	12.34	14.81	16.63	19.95	22.35	25.70	28.50	32.49
TAX RATE (%)	/	/	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70
NOPAT	8.86	-11.62	16.40	27.79	53.76	77.75	93.30	104.74	125.69	140.77	161.88	179.52	204.65
D&A	2.22	4.08	5.20	17.05	27.90	40.69	48.83	58.59	70.31	81.56	93.79	107.86	114.18
D&A (% of revenue)	10.72	8.94	6.34	11.00	12.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	13.00
Δ Receivable	-0.02	-5.99	-10.80	-27.90	-41.85	-52.31	-55.80	-66.96	-75.33	-87.38	-87.09	-100.16	-114.18
Δ Inventory	-14.81	-25.09	-31.40	-51.15	-65.10	-72.66	-76.73	-92.07	-80.35	-75.73	-87.09	-84.75	-87.83
Δ Oth Assets & Prepaid Expenses	-0.39	-22.00	-11.35	-6.98	-10.46	-13.08	-15.69	-12.56	-15.07	-11.65	-13.40	-7.70	-8.78
Δ Payable & Accrued Liabilities	4.01	6.23	9.30	27.90	41.85	52.31	87.19	92.07	110.48	99.03	120.59	115.56	122.96
Change in NWC	-11.21	-46.85	-44.25	-58.13	-75.56	-85.73	-61.03	-79.52	-60.26	-75.73	-66.99	-77.04	-87.83
CAPEX	23.99	33.02	50.51	39.28	38.00	43.59	52.31	62.78	70.31	81.56	93.79	107.86	114.18
CAPEX (% of revenue)	115.89	72.33	61.60	25.34	16.34	15.00	15.00	15.00	14.00	14.00	14.00	14.00	13.00
FREE CASH FLOW	-24.12	-87.41	-73.16	-52.57	-31.90	-10.89	28.78	21.04	65.42	65.04	94.89	102.47	116.82
DCF			-67.25	-40.83	-20.94	-6.04	14.76	9.30	24.93	21.37	31.15	29.51	29.51
WACC (%)			18.34	18.34	18.34	18.34	16.00	16.00	16.00	16.00	14.00	14.00	14.00

PERPETUITY GROWTH (%)	2.50
TOTAL DCF	59.73
PV. TERMINAL VALUE	190.96
ENTERPRISE VALUE	250.69
NET DEBT	-27.13
EQUITY VALUE	277.82
SHARES OUTSTANDING	141.22
EQUITY VALUE/SHARE ($)	1.97
Market Price (May 31st, $)	7.10

Source: Own work based on data from SEDAR and Thomson Reuters

Table 14: Calculations of CAPM and WACC for CannTrust Holdings (market capitalization and debt are in millions of Canadian dollars)

Rf (%)	2.14
ERP (%)	5.38
Beta	3.05
Debt	15.60
Cost of debt (%)	5.80
Market cap.	1002.68
Tax rate (%)	13.70
CAPM (%)	18.55
WACC (%)	18.34

Source: Own work based on data from SEDAR, Thomson Reuters, and Damodaran (2019a)

Appendix 9: DCF, CAPM, and WACC for Village Farms

Table 15: DCF Analysis for Village Farms (in millions of Canadian dollars, except per share data)

Fiscal year ends 31st December	ACTUAL		ESTIMATES										
VILLAGE FARMS	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029
REVENUE	158.41	150.00	211.50	306.68	429.35	566.74	708.42	850.10	1020.12	1224.15	1420.01	1647.21	1877.82
OPERATING INCOME	-1.18	-6.68	12.90	62.90	99.20	141.68	198.36	246.53	295.84	342.76	397.60	444.75	507.01
OPERATING MARGIN (%)	-0.74	-4.45	6.10	20.51	23.10	25.00	28.00	29.00	29.00	28.00	28.00	27.00	27.00
TAXES	0.14	-2.48	1.94	9.44	14.88	21.25	29.75	36.98	44.38	51.41	59.64	66.71	76.05
TAX RATE (%)	/	/	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
NOPAT	-1.32	-4.20	10.97	53.47	84.32	120.43	168.60	209.55	251.46	291.35	337.96	378.04	430.96
D&A	7.59	7.03	7.94	11.65	17.17	22.67	28.34	34.00	40.80	48.97	49.70	57.65	65.72
D&A (% of revenue)	4.79	4.69	3.75	3.80	4.00	4.00	4.00	4.00	4.00	4.00	3.50	3.50	3.50
Δ Receivable	-1.07	-0.03	-7.90	-15.33	-21.47	-28.34	-35.42	-38.25	-45.91	-55.09	-42.60	-49.42	-56.33
Δ Inventory	-1.16	-5.00	-10.20	-18.40	-34.35	-45.34	-56.67	-68.01	-45.00	-39.00	-44.00	-35.00	-43.00
Δ Oth Assets & Prepaid Expenses	0.12	-11.20	-9.00	-10.73	-15.03	-19.84	-24.79	-25.50	-30.60	-24.48	-28.40	-16.47	-18.78
Δ Payable & Accrued Liabilities	0.44	1.37	2.06	6.13	12.88	17.00	21.25	25.50	30.60	42.85	49.70	57.65	65.72
Change in NWC	-1.67	-14.86	-25.04	-38.33	-57.96	-76.51	-95.64	-106.26	-90.91	-75.72	-65.30	-43.24	-52.39
CAPEX	1.70	3.09	4.30	5.00	38.00	25.50	31.88	34.00	40.80	48.97	49.70	57.65	65.72
CAPEX (% of revenue)	1.07	2.06	2.03	4.50	4.50	4.50	4.50	4.00	4.00	4.00	3.50	3.50	3.50
FREE CASH FLOW	2.90	-15.12	-10.44	21.78	5.53	41.09	69.43	103.29	160.55	215.62	272.66	334.80	378.57
DCF			-9.55	16.69	3.55	22.07	34.25	43.55	57.86	66.42	83.12	88.75	87.26
WACC (%)			19.43	19.43	19.43	19.43	17.00	17.00	17.00	17.00	15.00	15.00	15.00

PERPETUITY GROWTH (%)	2.50
TOTAL DCF	470.53
PV. TERMINAL VALUE	528.32
ENTERPRISE VALUE	998.85
NET DEBT	38.19
EQUITY VALUE	960.66
SHARES OUTSTANDING	49.50
EQUITY VALUE/SHARE ($)	19.41
Market Price (May 31st, $)	16.48

Source: Own work based on data from SEDAR and Thomson Reuters

Table 16: Calculations of CAPM and WACC for Village Farms (market capitalization and debt are in millions of Canadian dollars)

Rf (%)	2.14
ERP (%)	5.38
Beta	3.35
Debt	44.38
Cost of debt (%)	7.00
Market cap.	815.76
Tax rate (%)	15.00
CAPM (%)	20.16
WACC (%)	19.43

Source: Own work based on data from SEDAR, Thomson Reuters, and Damodaran (2019a)

Appendix 10: DCF, CAPM, and WACC for Supreme Cannabis

Table 17: DCF Analysis for Supreme Cannabis (in millions of Canadian dollars, except per share data)

Fiscal year ends 30th June	ACTUAL		ESTIMATES										
SUPREME CANNABIS	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029
REVENUE	0.00	8.85	40.97	124.00	157.00	200.96	251.20	301.44	361.73	430.46	495.02	569.28	648.98
OPERATING INCOME	-18.33	-6.94	-18.73	5.50	22.00	40.19	65.31	78.37	94.05	103.31	108.91	125.24	129.80
OPERATING MARGIN (%)	/	-78.42	-45.72	4.44	14.01	20.00	26.00	26.00	26.00	24.00	22.00	22.00	20.00
TAXES	-3.06	0.75	0.00	0.75	3.01	5.51	8.95	10.74	12.88	14.15	14.92	17.16	17.78
TAX RATE (%)	/	/	/	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70	13.70
NOPAT	-15.27	-7.69	-18.73	4.75	18.99	34.69	56.36	67.64	81.16	89.16	93.99	108.08	112.01
D&A	0.58	1.17	5.23	17.36	21.98	28.13	35.17	42.20	50.64	60.26	69.30	79.70	77.88
D&A (% of revenue)	/	13.22	12.77	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	12.00
Δ Receivable	-0.73	-7.41	-11.80	-14.88	-18.84	-24.12	-30.14	-36.17	-43.41	-51.65	-34.65	-39.85	-45.43
Δ Inventory	-0.46	-7.40	-5.10	-18.60	-23.55	-30.14	-27.63	-33.16	-39.79	-34.44	-39.60	-45.54	-38.94
Δ Oth Assets & Prepaid Expenses	0.13	-1.18	-2.60	-7.44	-9.42	-12.06	-12.56	-15.07	-18.09	-21.52	-14.85	-17.08	-19.47
Δ Payable & Accrued Liabilities	4.23	17.81	9.60	17.36	21.98	28.13	35.17	42.20	50.64	60.26	54.45	62.62	71.39
Change in NWC	3.17	1.82	-9.90	-23.56	-29.83	-38.18	-35.17	-42.20	-50.64	-47.35	-34.65	-39.85	-32.45
CAPEX	12.16	71.85	85.00	45.00	41.00	40.19	50.24	60.29	57.88	68.87	79.20	91.08	90.86
CAPEX (% of revenue)	/	811.86	207.47	36.29	26.11	20.00	20.00	20.00	16.00	16.00	16.00	16.00	14.00
FREE CASH FLOW	-23.68	-76.55	-108.40	-46.45	-29.86	-15.55	6.12	7.35	23.29	33.20	49.43	56.85	66.59
DCF			-107.16	-39.92	-22.30	-10.10	3.46	3.95	11.07	13.97	21.27	22.03	23.25
WACC (%)			15.04	15.04	15.04	15.04	15.04	13.00	13.00	13.00	11.00	11.00	11.00

PERPETUITY GROWTH (%)	2.50
TOTAL DCF	-6.32
PV. TERMINAL VALUE	189.94
ENTERPRISE VALUE	183.62
NET DEBT	0.48
EQUITY VALUE	183.14
SHARES OUTSTANDING	293.77
EQUITY VALUE/SHARE ($)	0.62
Market Price (May 31st, $)	1.62

Source: Own work based on data from SEDAR and Thomson Reuters

Table 18: Calculations of CAPM and WACC for Supreme Cannabis (market capitalization and debt are in millions of Canadian dollars)

Rf (%)	2.14
ERP (%)	5.38
Beta	2.69
Debt	75.50
Cost of debt (%)	6.00
Market cap.	475.92
Tax rate (%)	13.70
CAPM (%)	16.61
WACC (%)	15.04

Source: Own work based on data from SEDAR, Thomson Reuters, and Damodaran (2019a)