



Cost-Benefit analysis of the Florida Cannabis Act (2018)
Legalizing of marijuana in Florida

Tolunay Aydas
tolunay.be@hotmail.com
University of Economics, Prague
BSc student Business Economics

Paul Hu
contact@paulhu.eu
University of Economics, Prague
Bsc student Business Economics

Professor Ing. P.Sieber, Ph.D.

1. Abstract

This paper attempts to calculate the net social benefit value of legalizing marijuana to the state of Florida. The cause of this analysis is the recent amendment push called the Florida Cannabis Act (2018) that aims the legalization of marijuana for recreational use. Only a few countries have decriminalized the use of the drug around the world. Currently Florida only accepts the use of marijuana for medical purposes.

The conversion from a black-market to a fully functional regulated market is a huge step with a lot of benefits and costs to society. This analysis compares how the status quo will change if the amendment is passed as state law. Economic benefits or costs include the increase of revenue by taxation, reducing in costs of the justice system and the likelihood of vehicle accidents.

This analysis concludes that the implementation of the Florida Cannabis Act (2018) will result in a positive net present value of \$1.265.000.000 to the state of Florida over the course of five years with a social discount rate of 3.5 percent.

2. Introduction

The Florida Cannabis act is a constitutional amendment that aims to legalize marijuana for recreational use. The acts aim to shift the sales of black-market marijuana to a regulated form of sales. The amendment was approved on March 17, 2016, meaning that supporters need to submit 753,603 valid signatures by February 1, 2018. (Ballotpedia, 2017) Because of this recent push and the consensus of the American people the legalizing marijuana is a good idea (Scott, 2017), we attempt to estimate and calculate the impact of this initiative on the State of Florida and its residents.

This act introduces a few new alternatives (Regulate Florida, 2017), but for the sake of this CBA, we focus on the following

1. Under this amendment, marijuana would be regulated similarly to alcohol
With this act, marijuana is regulated for limited use and growing by persons of twenty-one years of age or older. Users are prohibited to sell the plants they grow;
2. Driving under Influence
This act states that it would remain illegal for anyone to drive while impaired or under the influence of marijuana;
3. Retail marijuana sales
Under this act, retail sales of marijuana are legalized.

According to the World Drug Report, 183 million people around the world use the soft-drug marijuana. This is almost 4% of the world's population. The statistic shows that over 49 million people in the US have admitted to using the drug. Among these 49 million people, 1.2 million were registered as users for medical purposes. (Medical Marijuana Inc., 2017) An estimated 22.2 Americans aged 12 or older were current users of marijuana in 2015. The percentage of people aged 12 or older who were current marijuana users in 2015 was similar to the percentage in 2014, but it was higher than the percentages from 2002 to 2013. This increase among people aged 12 or older reflects the increase in marijuana use by adults aged 26 or older. For the age group between 18 to 25, these increases in use were only noticeable to a lesser extent. (Bose, et al., 2016)

The use and possession of marijuana remain illegal although some countries and states have made the soft drugs legal in some scenarios; such as regulating it in coffee shops in the Netherlands (Drugs, 2007) and the use of marijuana for medical reasons in the United States. (Room, Fischer, Hall,

Lenton, & Reuter, 2008) These scenarios, also known as decriminalization, has its boundaries. They do not legalize possession or supply of the drug. In recent years, there is a consensus to fully legalize the possession and supply of marijuana. This amendment regulates the sales, supply, and distribution similar in the matter that alcohol is regulated in the United States.

This paper attempts to calculate the net social benefit of legalizing marijuana in the state of Florida using data sourced from different researchers. We use these data to guide our paper for our analysis.

3. Defining the social groups

For this CBA, the social groups are defined as a resident of the state Florida. To be classified as a resident of Florida under this CBA, a citizen must be a resident of the state of Florida. A resident is defined as followed:

“A resident of the state of Florida is someone who has a permanent home in the state of Florida, holds a valid identity document or resident permit and has the right to vote.”

In the case, the definition of a resident of Florida is chosen from a statewide perspective. This means that people born from the state of Florida, who are living across the board, are not participants in this analysis, because they are not affected by the changes. To reduce the social groups with extreme preferences, citizens have to be at least 18 years old and/or not a convicted criminal. Citizens need the right to vote to influence politics. The final beneficiary would be the state of Florida. This means that the net social benefit or costs are accrued to the government.

4. Status Quo versus Project

The policies in this CBA can be divided into two groups, namely the current policy in Florida, where the use and possession of marijuana are illegal (status quo), and a modeled highly regulated-legalized policy which is comparable with the Dutch Model. This modeled highly regulated-legalized policy is based on the public health approach of Nadelmann (Government of the Netherlands, 2017) and further expanded by others. (Public Prosecution Service of Canada, 2014)

To combat social displacement, coffee shops around the border can't sell drugs to foreign neighbor countries to prevent "drugs" tourism. In the alternative, we adopt this countermeasure. In addition, the policy can be extended with extra rules set for its own city. For example, the city of Rotterdam has imposed a rule that there can't be a coffee shop in a 200 meters radius of a school, those coffee shops who were in the radius had to close. The details of the status quo and the highly regulated-legalized model can be found in table 1.

| Status quo | Legalized market |
|--|---|
| Marijuana is illegal | Positive consumer license |
| Formal cannabis caution for adults: | Minimum age of 21 years |
| Selling and possession of up to 20 grams of marijuana is currently a misdemeanor | Possession of up to 20 grams of marijuana is legal for own recreational use |
| Buy marijuana from black market | Only residents of Florida can buy marijuana at regulated market |
| No tax revenue from sales of marijuana | Tax revenues from sales of marijuana |
| Driving under the influence is illegal | Driving under the influence remains illegal. |

Table 1: Status quo versus legalized market

5. Social discount rate

We calculate the social discount rate on the basis of the average 5 years GDP growth of the United States. This means that the social discount rate is the same as the average economic growth of the country. The average growth was 3.5%, thus are social discount rate is the same. (Taborda, 2017) We also choose this percentage because a new project or policy must return at least 3.5% on an annual basis in terms of cash flow or efficiency. Also, T.Golzar’s journal stated that the SDR for her research was 3.5%. (Golzar, 2015)

6. Market analysis

6.1 Current market

Although consuming marijuana for medical purposes has been legal for many years in Florida, illegal marijuana trade still exists in the black market. Not all users of marijuana can or choose to obtain a medical license. Currently, there are only a few new legal markets in the United States, which makes it difficult in obtaining accurate information about the supply and demand in the market. The state of Florida has estimated the potential users of marijuana. This chapter describes the market analysis in the current market in Florida.

6.1.1 Current demand

The state of Florida has estimated 440.500 potential users of marijuana in 2017. (Florida Legislature, Office of Economic and Demographic Research, 2017) The United Nations Office on Drugs and Crime has researched the individuals consume in days per year. Because it is unclear how many grams they use per day, we chose to use the average of the data from United Nations and the Office of Financial Management. (United Nations Office on Drugs and Crime, 2006) (OFM, 2012) This results in an average of 1-gram marijuana per day used. Using these data, we estimated the current marijuana consumption in Florida to be approximately 44.000.000 grams per year.

| Columns | | | | | | | |
|--|--------------------------------|----------|-----------------|-----------------------------------|--------------------------------|----------------------------------|------------|
| a | b | c | d | e | f | g | |
| Percent of respondents | Days of cannabis used per year | | | Number of Florida marijuana users | Average usage per gram per day | Grams of marijuana used per year | |
| | Low (L) | High (H) | Average (L+H)/2 | | | | |
| 18% | 1 | 3 | | 2 | 79.290 | 1 | 158.580 |
| 14% | 4 | 11 | | 7,5 | 61.670 | 1 | 462.525 |
| 5% | 12 | 12 | | 12 | 22.025 | 1 | 264.300 |
| 3% | 13 | 23 | | 18 | 13.215 | 1 | 237.870 |
| 5% | 24 | 24 | | 24 | 22.025 | 1 | 528.600 |
| 8% | 25 | 51 | | 38 | 35.240 | 1 | 1.339.120 |
| 5% | 52 | 52 | | 52 | 22.025 | 1 | 1.145.300 |
| 6% | 53 | 103 | | 78 | 26.430 | 1 | 2.061.540 |
| 4% | 104 | 105 | | 104,5 | 17.620 | 1 | 1.841.290 |
| 3% | 106 | 155 | | 130,5 | 13.215 | 1 | 1.724.558 |
| 5% | 156 | 157 | | 156,5 | 22.025 | 1 | 3.446.913 |
| 6% | 158 | 259 | | 208,5 | 26.430 | 1 | 5.510.655 |
| 5% | 260 | 260 | | 260 | 22.025 | 1 | 5.726.500 |
| 6% | 261 | 359 | | 310 | 26.430 | 1 | 8.193.300 |
| 7% | 360 | 365 | | 362,5 | 30.835 | 1 | 11.177.688 |
| Approximate average of range in grams | | | | | | 44.000.000 | |
| Average annual gram per user | | | | | | 100 | |

Figure 1: Estimates for marijuana consumption in grams in Florida per annual
 Columns a,b,c: (United Nations Office on Drugs and Crime, 2006)
 Columns d,g: authors calculations
 Column e: authors calculations based on 440.500 marijuana users in Florida
 Column f: (United Nations Office on Drugs and Crime, 2006) (OFM, 2012)

6.1.2 Current supply

According to OFM, the current price of medical marijuana is \$12 per gram. (OFM, 2012) We can see that this price is mostly consistent with the black-market price of \$8-\$12, which depends on the quality and amount purchased. (Price of Weed, 2017) Since the black-market price varies, we assume that the black-market price is at or below the medical marijuana price.

Because marijuana is an illegal good, the contribution margin per gram marijuana is high. This means that the costs of producing marijuana are much lower than the selling price. Currently, the producers are taking risks by participating the illegal market, which makes producers want to pass on the final price. According to OFM, producers will sell their product to retailers for approximately \$5. (OFM, 2012) We assume that \$5 are the marginal costs of production (MCP) per gram marijuana in the legal market. We also assume that the MCP is constant and that the supply curve is linear.

6.1.3 Elasticity

To estimate the demand elasticity, we reviewed several journals. We felt that Taliya I. Golzar's journal estimated the most representative price elasticity for the current market. Thus, we used a demand elasticity of -0.52, which means that for each percentage of increased price, the demand will decrease by 0.52%. (Golzar, 2015)

6.1.4 Summary current market

The data above indicates the following consumer surplus, costs of risks and the resulting deadweight loss.

| <i>Consumer surplus</i> | <i>Cost of risk</i> | <i>Deadweightloss</i> |
|-------------------------|---------------------|-----------------------|
| 264.000.000 | 308.000.000 | 47.000.000 |

Currently, there are 44.000.000 grams of marijuana demanded by a price of \$12 per gram. According to the demand elasticity of -0.52, we can calculate the willingness to pay when 1 gram is supplied. For every 1% of a higher price, there are 0.52% less demanded by consumers. This results in a maximum price of \$24.¹ However, the market price is currently \$12. This results in a consumer surplus of \$264.000.000.²

We assumed the costs of risks as the producer surplus. This the amount that producers get paid by taking risks by participating the illegal market. The marginal costs of production (MCP) are \$5. However, they can sell their product for \$12 when the market equilibrium is 44.000.000 grams of marijuana. This results in costs of risk of \$308.000.000.³

The deadweight loss is a result of a distortion in the market; it means that there exists some inefficiency. In figure 2 we can see that the deadweight loss is the difference between the market price and the MCP, multiplied by the extra demanded grams of marijuana when the price would be \$5. To calculate these demanded grams, we approached the demand elasticity again. The demand for marijuana with a price of \$5 per gram would be 57.346.667 grams.⁴ The extra demanded marijuana with a lower price of \$7 is 13.346.667 grams. This results in a deadweight loss of \$47.000.000.⁵

¹ $\$44 \text{ million} / (\$44 \text{ million} * 0,52) = 192\% \text{ decrease. } \$12 * \text{ increase of } 192\% = \24

² $(\$24 - \$12) * 44.000.000 \text{ grams} / 2 = \$264.000.000$

³ $(\$12 - \$5) * 44.000.000 \text{ grams} = \$308.000.000$

⁴ When MCP = Black market demand

⁵ $(\$12 - \$5) * 13.346.667 \text{ extra demanded} / 2 = \$47.000.000$

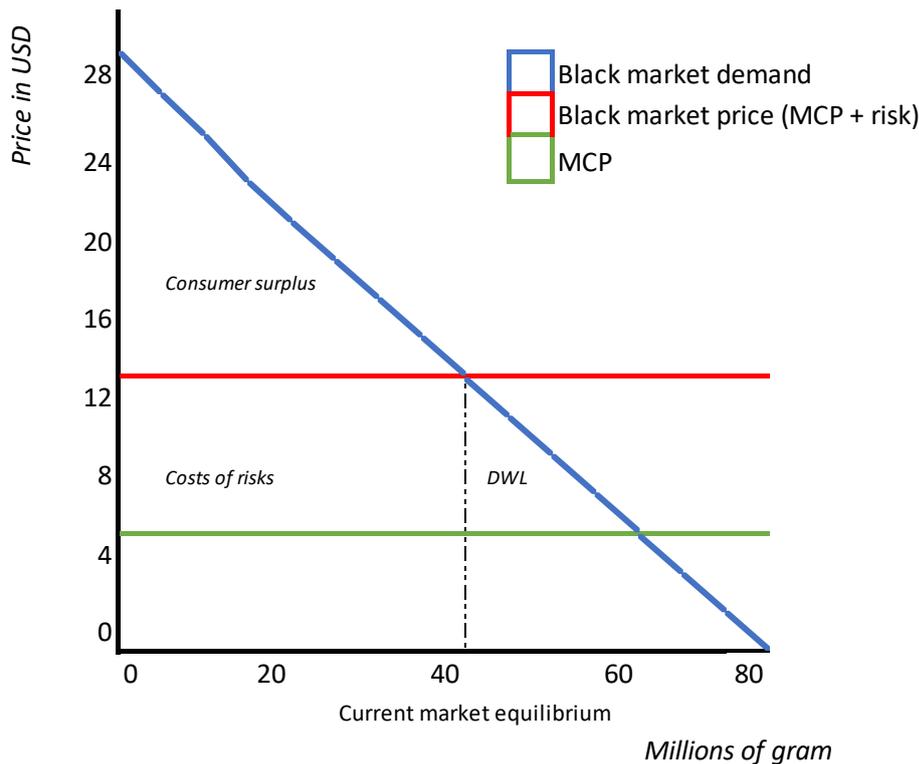


Figure 2: Market for marijuana before legalization

6.2 Impact of legalization on markets

The act strives to regulate marijuana similar to alcohol, meaning the drug will be subject to taxation. To eliminate the sales of black-market drugs, estimate that the equilibrium price will remain the same as it is now. The cost of risk in the current market will transfer to the producers in the form of producer surplus.

This will generate a new source of income for legal producers while eliminating the black market. Also, the government will benefit from this producer surplus in the form of tax revenues. We will further discuss the taxation impact in chapter 9. We consider the transfer of the cost of risk from the black-markets producers to legal producers as a complete benefit transfer.

Although researchers suggest that the legalization of marijuana doesn't increase consumption by new users, it does increase the probability of adolescent initiation use of the drug by 5 to 6 percent. (National Bureau of Economic Research, 2014) This can be attributed that marijuana is more accessible when it comes legalized. To compensate the additional new one-time users of the drug, we have increased the highest number of percentage of increased probability with 1 percent, increasing the total increase in consumption to 7 percent.

6.2.1 New demand calculation

With these numbers discussed before, we estimated that the new quantity demanded would be 47.080.000 grams, a 7 percent increase at a post-tax price of \$12.

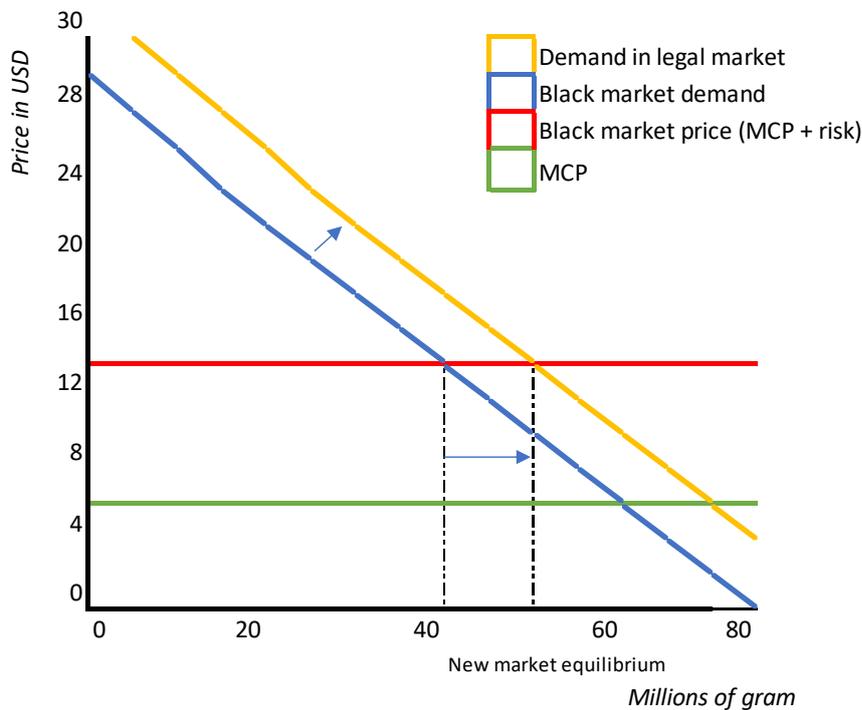


Figure 3: Market for marijuana after legalization

In the new market, the deadweight loss has increased by 7%. This is due to the increase in demand while retaining the same equilibrium price. Also, because the legal market is subject to taxation, the state has additional costs and fees to fund the taxation. We don't include these costs because of they have a small impact on our calculations.

6.2.2 Summary legal market

The data above suggest the following consumer surplus, legal producers and the resulting deadweight loss.

| Consumer surplus | Legal producers | Deadweightloss |
|------------------|-----------------|----------------|
| 447.260.000 | 329.560.000 | 50.000.000 |

6.3 Summary

The following table gives an overview of the changes of the status quo and the alternative when the marijuana is legalized, and the black market is eliminated. The increases in consumer, producers and a part of the increased tax revenues are net benefits.

| | Consumer Surplus | Risk | Legal producers | Deadweightloss |
|-------------------------|--------------------|---------------------|--------------------|------------------|
| Status Quo | 264.000.000 | 308.000.000 | | 47.000.000 |
| Legal market | 447.260.000 | | 329.560.000 | 50.000.000 |
| NSB | 183.260.000 | -308.000.000 | 329.560.000 | 3.000.000 |
| Total net change | 207.820.000 | | | |

Table 2: Summary market analysis status quo versus legalized market

7. Law enforcement

In status quo possession and supply of marijuana is prohibited in Florida. Selling and possession of up to 20 grams of marijuana is currently a misdemeanor in Florida, with convictions a fine of maximal \$1.000. Possession and selling of more than 20 grams is considered as a felony. The conviction for this is an incarceration from 5 to 15 years, with a fine up to \$200.000. (The National Organization for the Reform of Marijuana, 2017)

In 2015, Taliya Golzar graduated with Distinction in Economics. She researched the economic consequences of legalizing marijuana in Florida. She focused on budgetary implications of marijuana legalization in the state of Florida. Her study concludes the annual savings and the increase in tax revenue that would have come from legalization. Therefore, in this CBA we count the annual savings as net benefits. (Golzar, 2015)

T. Golzar divides the cost savings associated with expenditure on marijuana prohibition into 3 groups. First of all, legalization marijuana will lead a less needed police budget. In the status quo, the police budget is rated at \$300 million. In calculating the cost savings to police resources, her study has estimated the portion of arrests that are standing alone, which means that only directly marijuana-related arrest will be used. Given this breakdown, 6,4% of all arrests made are the duo of marijuana possession and 0,5% of all arrests are due to marijuana distribution. These costs will be forgone in the legalization, which is a saving of \$6.21 million.

Secondly, she divides the cost savings into judicial costs. She concludes that 9.8% of all felony condemnations in Florida's courts are marijuana related. These condemnations were due to trafficking and possessing the drug. Based on these calculations, \$13 million of judicial costs will be saved in a legalized market.

The last costs which will be saved in a legalized market are the enforcement costs. Because variations in the penal systems in the United States, the specifics are considered to the penal system of Florida. 1% of all prisoners are offended due to marijuana offenses. (Miron & Waldock, 2010) With this in mind, we can estimate that \$6.3 million of the \$630 million are enforcements costs caused by marijuana offenses. In the legalized market these costs will be fully saved.

| | <i>Police budget (arrests)</i> | <i>Judicial budget (Convictions)</i> | <i>Corrections budget (courtfillings)</i> |
|----------------------------|------------------------------------|--|---|
| Status Quo | 300 | 443 | 2.100 |
| Legal market | 293,8 | 430 | 2.093,7 |
| Cost savings | 6,2 | 13,0 | 6,3 |
| Total costs savings | 25,5 | | |

Table 3: Annual costs savings associated with no longer enforcing marijuana misdemeanor laws, in million dollars, in 2015 (Golzar, 2015)

8. Health costs

To evaluate the health impact of legalizing marijuana, we reviewed the medical literature. Research shows that the impacts can be divided into two major categories, namely the respiratory illnesses and emergency room visits.

Researchers have evaluated the impact of marijuana on a wide range of health problems, such as different forms of cancer, psychosis, reduced cognitive function, heart attack, depression, bronchitis, emphysema, anxiety and dependence and birth defects. These journal articles found in many cases no increased risk of health problems due to marijuana use. (Berthiller, et al., 2009) (Polen, Sidney, Tekawa, Sadler, & Friedman, 1993) (Hall & Degenhardt, 2009) (Sidney, Beck, Tekawa, Jr., & C. P., 1997) (Hall & Babor, 2000) Thus, there is no conclusive evidence of such risk. With this in mind, we excluded many of these health risks in our CBA. However, we are not completely ignoring these risks; if some health issues are related to marijuana use, they may result in the additional emergency room visit.

To evaluate the cost related to health care we only used the new users to the market in contrast to the grams of marijuana consumed. Since we are only interested in the health costs related to increased marijuana use, we excluded the current black market and medical marijuana users.

8.1 Emergency room visits

To measure the extra health care costs after legalization, we focused on the extra emergency room visits attributable to marijuana use. For this, we used the ER visits attributable to marijuana use nationwide, the growth in marijuana users and the average costs of an ER visit.

The Substance Abuse and Mental Health Services Administration determined that there are 123 ER visits per 100.000 in the United States, which are directly attributable to marijuana use. (Substance Abuse and Mental Health Services Administration (SAMHSA), 2011) However, this number may be not accurate due to over-reporting, because an individual may get identified as marijuana user when he admits the reason of visit to the ER. This may lead to unreliable information. Despite this, we determined to be conservative and use this number as a guideline to compute the extra ER costs attributable to marijuana use.

As earlier described, in status quo there are 123 ER visits for every 100.000 people in the United States. We assumed that the ER visits also will increase by 7%, like the extra users of marijuana in a legalized market which is already mentioned in chapter 6.2. This results in 132 visits per 100.000 people in the legalized market. According to Medical Expenditure Panel Survey, the average costs per ER visit in the United States was \$1.461 in 2012. (US Department of Health & Human Services., 2010) This results in costs of ER visits per 100.000 people for status quo and after legalization \$179.703 and \$192.828, respectively. Taking into account the total residents of Florida of 20.610.000, this leads to total costs of ER visits attributable to marijuana in status quo and legalized market of \$37.036.788 and \$39.629.363, respectively. This means that legalizing marijuana in Florida will cause \$2.600.000 of extra costs for marijuana-related ER visits.

| | <i>Status quo</i> | <i>Legalization</i> |
|--|----------------------|----------------------|
| ER visits per 100.000 | 123 | 132 |
| Costs per ER visit | \$ 1.461 | \$ 1.461 |
| Costs visits per 100.000 | \$ 179.703 | \$ 192.282 |
| Residents Florida | 20.610.000 | 20.610.000 |
| Total costs ER visits marijuana | \$ 37.036.788 | \$ 39.629.363 |
| Extra costs after legalization | 2.600.000 | |

Table 4: Annual extra ER visits costs associated with marijuana after legalization

8.2 Respiratory Illness and Lung Cancer

The medical literature is mixed when it comes to associating marijuana use with respiratory illness. While Polen's study in 1993 concludes a direct relation with consuming marijuana and increased risk of respiratory illnesses (Polen, Sidney, Tekawa, Sadler, & Friedman, 1993), Mehra was unable to find evidence that using marijuana is associated with an increased risk of lung cancer. (Mehra, Moore, Crothers, Tetrault, & Fiellin, 2006) According to Hashibe's study of over 2.200 subjects, there was no evidence found or increased risk of cancer from marijuana use. (Hashibe, et al., 2006) Although we have not found any evidence of increased risk of lung cancer from marijuana, we decided not to exclude the potential impact totally. Therefore, we chose to follow the worst-case-scenario, with computing the consequences with simplified calculations.

To evaluate the extra associated costs with additional lung cancer attributable to marijuana users, we used the increased marijuana users after legalization. According to Polen's study, the increased probability of respiratory illness associated with marijuana consumption is 0.0068%. Cipriano's study determines \$1.200.000 of costs for active lung cancer treatment for 10 years. (Cipriano, et al., 2011) These 3 variables multiplied with each other results in \$25.161.360 of increased costs for the next 10 years. This is approximately \$2.520.000 of additional costs per year for lung cancer treatments attributable to increased marijuana use in a legalized market.

| Probability of marijuana user getting lung cancer in costs | |
|---|---------------------|
| <i>New marijuana users</i> | 30.835 |
| <i>Increased probability of respiratory illness associated with marijuana consumption according to Polen et al.</i> | 0,068% |
| <i>Active lung cancer treatment cost for 10 years</i> | \$ 1.200.000 |
| <i>10 year costs associated with with additional lung cancer cases</i> | \$ 25.161.360 |
| Costs associated with additional lung cancer cases per year | \$ 2.520.000 |

Table 5: Annual extra costs associated with additional lung cancer cases attributable to increased marijuana use after legalization

9. Fiscal aspect

9.1 Fiscal benefits

If legalizing marijuana becomes a reality, we estimate that 350 retailers will open a new store for the consumption of marijuana in the first year. This number is based on looking at previously legalized states and estimations of consultants. (The State of Washington, 2017)

One of the key fiscal benefits of legalizing marijuana is the ability to tax the drug at each level of the supply chain. Therefore, the demand for marijuana is the only variable in the fiscal benefit. Because you must smoke the drug, producers and retailers are each subject to the 25 percent excise tax of the whole price giving it the same taxation percentage of other tobacco products. (Department of Business & Professional Regulation, 2017) This income can be used by the state as they desire. We calculated that the producer surplus is \$329.560.000 times the taxation percentage of 25% is a tax revenue of \$82.390.000. Another form of income is the permits and licensing fee from retailers and producers. If we compare to a state that has legalized the use of marijuana, there is usually a \$250 application fee and a \$1.000 issuance/renewal fee for each licensee.

To be safe, we assume that the average retailer is continuing his business for at least five years. Which is far less than the average mortality rate of 10 years for a company. (Daepf, Hamilton, West, & Bettencourt, 2015) Making this income from licensing and taxation fixed net income benefits.

9.2 Fiscal costs

The state has costs carrying-out regulating the marijuana market. These costs are accrued by the state of Florida and consist of licensure, regulation, quality control, tax collection and educating government officials. For the costs of tax collection, the average marginal excess burden of taxation is 0.25 dollars per \$1. (Conover, 2010)

From our calculation, the tax revenues are estimated at \$82.390.000 times the marginal excess burden of taxation gives us extra costs of \$20.597.500 per year.

To cope with the new situation, we include estimated costs for all 46.000 officers in Florida training for one day. (Brian A. Reaves, 2011) One day of training costs approximately \$100 per officer, giving us an additional \$4.600.000 costs. (Hershops, 2015)

10. Vehicle crashes

Because of the legalization of marijuana, it is plausible that the increase of marijuana consumption increases the number of users driving under influence of the drug and therefore, increasing the number of vehicle crashes. To calculate these costs, we have considered the following formula;

*Cost per crash per resident * % of crashes caused by drug use * increased chance of accidents by drug use * total new users.*

In this formula, we calculate the average total cost of a crash per resident of Florida and multiply it by the number of drug-related crashes. Because driving under the influence of a drug increases the probability of crashes, we add that to our calculation. The sum of these numbers is then multiplied by the estimated new marijuana users.

According to the National Highway Traffic Safety Administration, the total cost of motor vehicle crashes in the United States was estimated at \$836 Billion. These numbers were the sum of 6.296.000 crashes and include tangible costs, such as medical costs, lost in productivity; but also intangible costs like the decrease in Quality of life caused by these crashes (NHTSA, 2017) In the annual report of the Florida Highway Safety and Motor Vehicles department, the number of total crashes was 374.342. (Florida Highway Safety and Motor Vehicles department, 2015) To assess these numbers accordingly giving the influx of new marijuana users, we searched for the number of car crashes caused by drug-related cases.

Of the 374.342 crashes in Florida, 8910 of those were crashes related to illicit drug use. This is approximately 2.4%. It is difficult to estimate how many of these new marijuana users are going to drive under the influence of drugs, but for the simplification of the calculation, we are going to assume that the percentage of crashes caused by drug-related cases is the same for new users. The population of Florida was estimated at 20.24 million people in 2015.

These numbers translate to a cost of \$2.456 per Florida resident per crash. Research has indicated that driving while under the influence of marijuana increases the risk of having a crash by 2 to 3 times (Hall & Degenhardt, 2009) With these numbers, we estimated that the extra costs after the legalization of marijuana would be \$4.500.00.

| <i>Vehicle collisions</i> | |
|--|---------------------|
| Total costs of vehicle crashes in US | \$ 836.000.000.000 |
| Total crashes in US | 6.296.000 |
| Total crashes in Florida | 374.342 |
| Cost of 1 crash | \$ 132.782,72 |
| Cost of crashes total in Florida | 49.706.148.666 |
| Residents Florida now | 20.240.000 |
| Costs per resident | \$ 2.456 |
| Drug-related crashed per year now | 8.910 |
| <i>in %</i> | 2,38% |
| New marijuana users | 30.835 |
| Increased chance of crashes by using marijuana | 2,5 |
| Extra costs after legalization | \$ 4.500.000 |

Table 6: Annual extra costs associated with increased chance of crashes by using marijuana after legalization

11. Net present value

With a social discount rate of 3.50%, we have discounted the annual benefits and costs for 5 years. This results in a positive Net Present Value of \$1.265.000.000, which can be seen in table 7. Thus, we are convinced that accepting this policy will add value to the society of Florida. This positive Net Present Value suggests that the costs savings can cover the increased costs of legalizing marijuana.

| Social Discount Rate (SDR) | | 3,50% | | | | | |
|---------------------------------------|----------------------------------|----------------|----------------|----------------|----------------|----------------|-------------------------|
| <i>Amounts in \$1.000</i> | | | | | | | |
| Benefits | <i>Undiscounted annual total</i> | <i>Year 1</i> | <i>Year 2</i> | <i>Year 3</i> | <i>Year 4</i> | <i>Year 5</i> | <i>Total of 5 years</i> |
| <i>Increase in consumer surplus</i> | 264.000 | 255.072 | 246.447 | 238.113 | 230.061 | 222.281 | 1.191.974 |
| <i>Increase in producer surplus</i> | 329.560 | 318.415 | 307.648 | 297.244 | 287.193 | 277.481 | 1.487.981 |
| <i>Reduced enforcement costs</i> | 25.510 | 24.647 | 23.814 | 23.009 | 22.230 | 21.479 | 115.179 |
| <i>Government revenues</i> | 82.390 | 79.604 | 76.912 | 74.311 | 71.798 | 69.370 | 371.995 |
| <i>Application & licences fee</i> | 368 | 355 | 343 | 331 | 320 | 309 | 1.659 |
| Total discounted benefits | 701.828 | 678.094 | 655.163 | 633.008 | 611.602 | 590.920 | 3.168.000 |

| <i>Amounts in \$1.000</i> | | | | | | | |
|--|----------------------------------|----------------|----------------|----------------|----------------|----------------|-------------------------|
| Costs | <i>Undiscounted annual total</i> | <i>Year 1</i> | <i>Year 2</i> | <i>Year 3</i> | <i>Year 4</i> | <i>Year 5</i> | <i>Total of 5 years</i> |
| <i>Vehicle crashes</i> | 4.500 | 4.348 | 4.201 | 4.059 | 3.921 | 3.789 | 20.318 |
| <i>Costs of risks</i> | 308.000 | 297.585 | 287.521 | 277.798 | 268.404 | 259.328 | 1.390.636 |
| <i>Costs of extra ER visits</i> | 2.600 | 2.512 | 2.427 | 2.345 | 2.266 | 2.189 | 11.739 |
| <i>Costs associated with additional lung cancer cases per year</i> | 2.520 | 2.435 | 2.352 | 2.273 | 2.196 | 2.122 | 11.378 |
| <i>Producer tax remittance</i> | 82.390 | 79.604 | 76.912 | 74.311 | 71.798 | 69.370 | 371.995 |
| <i>METB costs</i> | 20.598 | 19.901 | 19.228 | 18.578 | 17.950 | 17.343 | 92.999 |
| <i>One day of training costs</i> | 920 | 889 | 859 | 830 | 802 | 775 | 4.154 |
| Total discounted costs | 421.528 | 407.273 | 393.500 | 380.194 | 367.337 | 354.915 | 1.903.000 |

| | |
|--------------------------|--------------------|
| Net Present Value | \$1.265.000 |
|--------------------------|--------------------|

Table 7: Net Present Value of legalizing marijuana in Florida in \$1.000

12. Recommendation

Our analysis of the Florida Cannabis Act (2018) calculates that the legalization of the drug will provide a net present value of \$1.265.000.000 to society in the state of Florida. Two of the biggest contributors of these numbers is the increase of consumer surplus and the legal producer surplus of the drug in question.

What is important to understand in this analysis is that the legal market must compete with the black market to provide a net value for society. If the price drops at the black market by increased efficiency or the producers and retailers will use a lower cost of risk (WTA for sellers on black markets), people are more enticed to buy it at illegal places for a lower price. Possessing and consumption of the drug for the consumer remains legal. We want to remove barriers for legal suppliers and create barriers for illegal suppliers while keeping consumption in tone.

With these presets in mind, we would recommend the following:

- Continue to enforce the activities on illegal marijuana production and distribution
- Educate potential buyers at different location like schools, libraries, and universities about the danger of buying marijuana from an illegal source
- Set the same selling price at a legal retailer at the same price as the illegal one
- Make it easily available so consumers don't have to use a "black market dealer"

All these recommendations are based to stay competitive against the black market, keep the public safe of harmful use of the drug and educate society while reducing costs for the state and adding value to society.

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