

Recreational Marijuana in Wisconsin: A Benefit-Cost Analysis

Prepared for
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TABLE OF CONTENTS

Executive Summary	iii
Acknowledgments	iv
Introduction	1
Background	1
Description of Task	4
Current Wisconsin Policy	4
Alternatives	5
Alternative 1: Decriminalization only	5
Alternative 2: Recreational Legalization	6
Costs and Benefits	7
Impacts for Alternative 1: Decriminalization	11
<i>Benefits</i>	12
Avoided Criminal Justice Costs	12
<i>Costs</i>	12
Increase in Emergency Room (ER) Visits	12
Impacts for Alternative 2: Legalization	13
<i>Benefits</i>	13
Consumer Surplus	13
Benefits from Marijuana Tax Revenue	13
Licensing Fees and Administrative Costs	13
Avoided Criminal Justice Costs	14
<i>Costs</i>	14
Tax Revenue	14
Increased Risk of Crashes	14
Social Cost of Licensing Fees	14
Rise in Emergency Room (ER) Visits	15
Non-monetized Impacts	15
Analysis & Results	17
Limitations	21

Recommendation	23
Appendix A: Marijuana as a Schedule I Substance	24
Appendix B: Marijuana Laws and Penalties in Wisconsin	25
Appendix C: Draft Bill to Standardize Penalties for Possession of Marijuana	28
Appendix D: Determining Marijuana Tax Rate for Wisconsin	33
Appendix E: Past Year Marijuana Use Among People Aged 12 or Older: 2002-2019	34
Appendix F: Marijuana Tax Rates in Other States	36
Appendix G: Licensing and Renewal Fees in Different States	38
Appendix H: Cost from Increased Crash Rate after Legalization	40
Appendix I: Avoided Marijuana-Related Criminal Justice Costs in Wisconsin	41
Appendix J: ER Visits in Decriminalization	47
Appendix K: Demand Schedule for Marijuana in Wisconsin	49
Appendix L: Administrative Costs and Collections of Licensing Fees	56
Appendix M: Marijuana and Risk of Crashes	59
Appendix N: Impact of Recreational Legalization on Opioid Use	61
Appendix O: Impact of Marijuana Policy on Non-Drug Related Crime	65
Appendix P: Monte Carlo Simulation	67
References	78

Executive Summary

At the request of Representative Shae Sortwell, our team performed a cost-benefit analysis of marijuana decriminalization and marijuana legalization in Wisconsin. We estimate the social and economic costs and benefits of these two policy alternatives over a five-year time horizon. We also perform a sensitivity analysis using a Monte Carlo simulation to assess the robustness of our estimates. Our first policy alternative decriminalizes small amounts of Marijuana in Wisconsin. Our second alternative legalizes marijuana and sets up a regulatory structure for its manufacture and sale. Over five years, we find that decriminalization of small amounts of marijuana yields positive net benefits with a net present value of \$91 million. We also find that marijuana legalization yields net benefits with a net present value of approximately \$1 billion. Accordingly, we recommend that the State of Wisconsin adopt legislation to legalize marijuana and set up a regulatory structure for its manufacture and sale.

Marijuana legalization provides larger net benefits because a number of benefit categories were only applicable with a legal market for marijuana, particularly consumer surplus. We monetize five benefit categories, including consumer surplus, fiscal impact of tax revenue, licensing and registration fees, and avoided criminal justice costs. Although avoided opioid use through reduction in prescriptions for pain management is a potential long-term benefit of legalization, we were unable to monetize for inclusion in our estimate of net benefits. Our monetized cost categories include administrative costs, increased risk of crashes, rise in Emergency Room (ER) visits, and fiscal impact of tax revenue. Of note, we consider tax revenue a transfer and account for this by listing it as both a cost and benefit. We include a fiscal impact for the state as a part of our report.

In addition to our central recommendation, we recommend that the state launch and sustain a targeted public health and safety awareness campaign and evaluate the implementation and performance of the program after two years. We further recommend that state agencies responsible for implementing and administering the proposed marijuana legalization draw upon the best practices from other states that have successfully implemented legalization.

Acknowledgments

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Introduction

An increasing number of states are legalizing the use of marijuana for either recreational or medical purposes. As of today, thirty-one states and the District of Columbia have enacted laws that have decriminalized possession of small amounts of marijuana. Among these thirty-one states, eighteen states and the District of Columbia have legalized marijuana possession for adults over the age of 21. Despite growing support for decriminalization of the possession and sale of small amounts of marijuana, it is still prohibited under federal law. Additionally, multiple bills related to the decriminalization or legalization of marijuana in Wisconsin have been introduced in the state legislature, but have not gained much traction. We present the following cost-benefit analysis comparing the estimated costs and benefits of both marijuana decriminalization and legalization separately to help stakeholders assess the potential social impacts of these two changes to marijuana laws in the state.

This report provides issue background, a description of the two proposed alternatives, the cost and benefit categories for the two policy alternatives, and a description of the methodology we used to complete the analysis. A final discussion and recommendation section summarizes the net present value of marijuana decriminalization and legalization in Wisconsin and provides a number of recommendations for consideration by state policymakers.

Background

Marijuana was classified as a Schedule I substance under the Controlled Substances Act passed by Congress in 1970 (91 U.S.C. § 513). Drugs classified as Schedule I, which also include LSD, heroin, ecstasy, and peyote, are defined as not having any acceptable medical use and high susceptibility to abuse. Their possession or sale carries significant criminal and civil

penalties. Because it is still listed as a Schedule I substance federally, marijuana possession and distribution are federal crimes, even in states that have legalized and decriminalized marijuana ([Appendix A](#)).

Generally speaking, the federal government has not attempted to supersede state marijuana laws since 2013, when the Department of Justice issued the Cole Memo. It stated that the Justice Department would not enforce the federal prohibition of the possession and distribution of marijuana in states that legalized it. The Cole Memo was rescinded during the Trump administration, but it is not clear if its rescinding resulted in any change in actual marijuana prosecutions by the Department of Justice. Current Attorney General Merrick Garland has not reinstated the memo, or a similar version of it, but has testified to Congress that the Justice Department would continue the approach spelled out in the Cole Memo. Congress, since 2014, has included amendments to Justice Department appropriations bills prohibiting the use of any funds that would impede administration of a state's medical marijuana laws.

There have been efforts to decriminalize marijuana at the federal level to remove these conflicting laws, including the Cannabis Administration and Opportunity Act introduced by Senator Chuck Schumer of New York. Besides reconciling contradicting state and federal laws regarding marijuana, decriminalizing marijuana at the federal level would open the door for financial institutions to provide services to the marijuana industry. Under current federal law, most marijuana businesses are unable to utilize the services of banks or credit unions because these financial institutions face stiff penalties if they accept funds tied to marijuana. Despite the growing number of states with legalized marijuana, efforts to decriminalize at the federal level have not yet been successful.

Wisconsin allows cannabinoid (CBD) to be used for medical purposes, but has prohibited the possession or distribution of marijuana for medical or recreational purposes. In August 2021, Representative David Bowen introduced a bill that would legalize cannabis, allowing residents to possess up to two ounces of marijuana and grow up to six plants for personal use, eliminate tax requirements for medical use for those with a diagnosis by a physician, and help absolve individuals charged with past marijuana offenses. In November of 2021, Representative Shae Sortwell and several other lawmakers from both parties introduced legislation to decriminalize possession of small amounts of marijuana, which would treat it instead like a minor traffic offense, and would remove the penalty enhancement for repeat offenses for possession of small amounts of marijuana.

A 2019 survey by Marquette University found that 59 percent of Wisconsin residents support legalization of recreational marijuana and 89 percent support the legalization of medical marijuana. Some municipalities and counties, including Milwaukee County, Madison, and Eau Claire have approved local changes to the enforcement of the state law prohibiting marijuana, such as removing fines for possessing small amounts of marijuana. Although Governor Tony Evers's most recent budget proposal originally included a provision to legalize cannabis, it was later removed by the Wisconsin legislature.

Wisconsin is sometimes referred to as an "island" that is surrounded by neighbors who have liberalized marijuana policy. Minnesota decriminalized marijuana in 1976 and approved a medical marijuana program in 2014. Michigan voters approved a medical marijuana program in 2008 and more recently voted to legalize marijuana in 2018. Illinois approved a medical marijuana program in 2013, decriminalized marijuana in 2016, and became the eleventh state to legalize recreational marijuana in 2020 with the Illinois Cannabis Regulation and Tax Act. These

neighboring states may become sources for illegal possession of marijuana by Wisconsin residents.

Description of Task

In this report, we analyze the costs and benefits of implementing 1) marijuana decriminalization and 2) marijuana legalization. We consulted a wide array of studies and academic literature to support our analysis to predict the costs and benefits of legalization and decriminalization in Wisconsin. We predict the net present value to Wisconsin over the first five years of implementing both marijuana legalization and marijuana decriminalization.

Current Wisconsin Policy

Possessing, trading, delivering, and cultivating marijuana in Wisconsin is illegal, while only medical usage of CBD is legal. Under the state's penalties, the first offense of possessing marijuana is a misdemeanor with a fine of up to \$1000 and imprisonment up to 6 months ([Appendix B](#)). The second and subsequent offense is considered a felony with a fine of up to \$10,000 and imprisonment up to 3.5 years. Both selling and cultivating marijuana are felonies, whether it is the first offense or not, leading to a fine of up to \$25,000 and imprisonment up to 15 years, depending on the amounts sold or cultivated. According to reports from the Department of Justice, annual arrests related to marijuana are around 16,000 to 17,000 in Wisconsin. Enforcing one of the strictest laws on marijuana places burdens on police and the judiciary. However, Wisconsin is surrounded by two states that have legalized marijuana. Thus the state cannot fully block Wisconsin residents from access to marijuana.

Despite calls for legalization, marijuana is still considered to be a Schedule I drug under the Controlled Substances Act and thus remains illegal under Federal law. Differences between

state and federal law causes confusion about enforcement of marijuana-related cases. In practice, states have flexibility in prosecuting simple offenses and they may or may not choose to enforce federal law.

Alternatives

We evaluate two alternatives for statewide marijuana policy: (1) decriminalization only and (2) recreational legalization. As of November of 2021, eighteen states, including Illinois and Michigan, and the District of Columbia have legalized small amounts of recreational marijuana. With the exception of Nebraska and North Carolina, most states that have only decriminalized marijuana also have a medical marijuana program in place. This makes comparisons of Wisconsin to these states difficult, because Wisconsin does not have a medical marijuana program.

Alternative 1: Decriminalization only

Under this alternative, the possession, consumption, sale, and cultivation of marijuana in Wisconsin remains illegal, but penalties for possession would be reduced along with penalty enhancers for repeat convictions. This alternative is modeled on recently proposed legislation by Representative Sylvia Ortiz-Velez of Milwaukee and Representative Shae Sortwell, which aims to standardize marijuana penalties across Wisconsin ([Appendix C](#)). The current \$1,000 maximum fine for a first offense of marijuana possession would be reduced to a \$100 civic forfeiture for quantities under one-half ounce.

This law would preempt local governments to create a state standard, which would reduce penalties in cities like Green Bay, but increase penalties in cities like Madison and Milwaukee. Currently, Green Bay levies a fine of \$500 for first-time public possession offense,

which is the highest in the state. Madison and Milwaukee levy fines at the much lower rates of \$100 and \$50, respectively.

Additionally, prior marijuana possession convictions involving one ounce or less would not be counted when considering whether a subsequent conviction is a repeat offense and thus eligible for penalty enhancers under current law.

Alternative 2: Recreational Legalization

Under this alternative, the consumption of marijuana and possession of no more than two ounces of marijuana would be allowed under state law, and an administrative structure would be set up to regulate the manufacture and delivery of marijuana. Sales would be subject to the state sales tax and an excise tax levied at the point of sale. Some states only enact an excise tax on retailers, but others impose taxes on manufacturers, or at other points between the cultivation of the marijuana and its sale. For our analysis, we are interested in an effective tax rate, which takes all the taxes combined together to help us estimate consumer demand and state tax revenue. Our effective tax rate is 20 percent, which includes Wisconsin's 5 percent sales tax and an excise tax rate of 15 percent. This rate was selected after considering the effective tax rates adopted by Michigan and other states that have legalized marijuana ([Appendix D](#)).

States that legalize marijuana either have a medical marijuana program set up, or set one up as a component of the regulatory structure in legalization. Features include a registry of patients who are often exempt from a portion of either the sales or excise taxes on the point of sale. Michigan exempts medical marijuana from the state's 10 percent marijuana excise tax, but still levies the state's 6 percent sales tax. We propose a similar design in Wisconsin. Medical marijuana would be exempt from the 15 percent marijuana excise tax, but the state's 5 percent sales tax would still be applied.

Costs and Benefits

Table 1: Cost Benefit Impact Categories

	Alternative 1: Decriminalization	Alternative 2: Legalization
<i>Benefits</i>		
Consumer Surplus	-	X
Tax Revenue	-	X
Licensing Fees	-	X
Avoided Criminal Justice Costs	X	X
<i>Costs</i>		
Tax Revenue	-	X
Administrative Costs	-	X
Licensing Fees	-	X
Increase in Emergency Room utilization	X	X
Increased Car Crashes	-	X

Table 1 lists the nine cost and benefit categories under consideration for each alternative. We estimate benefits accruing from consumer surplus, fiscal impact of tax revenue, licensing and registration fees, avoided criminal justice costs, and avoided opioid use through reduction in prescriptions for pain management. We assess costs associated with legalizing or decriminalizing recreational marijuana across multiple categories, including administrative costs, increased risk of crashes, and rise in Emergency Room (ER) visits.

We assess impacts across a five-year follow-up period, following hypothetical implementation. Findings from several studies report an increase in marijuana use after recreational legalization (SAMHA, 2019; [Appendix E](#)). Post-recreational legalization in Illinois, the marijuana sales surpassed \$1 billion by October 2021, surpassing the \$669 million in sales

recorded in 2020. We adopt a five-year time horizon to take account of the increase in consumption over time.

Consumer Surplus

Consumer surplus is a measure of the value the consumers gain from legal marijuana consumption, which reflects the difference between the price that they are willing to pay for a good or service and the actual market price (Barbier, 2013). As Wisconsin does not have a legal market, we use information from other states to predict a demand schedule that allows estimates of consumer surplus.

Tax Revenue

Revenue generated from taxing marijuana sales is a fiscal impact to the state. Marijuana can be taxed based on price, weight, or potency. As of April 2021, legal marijuana purchases are taxed in eleven of the eighteen states who passed recreational marijuana legislation. Several states levy more than one of these types of taxes, at multiple levels, and some jurisdictions levy their general sales taxes along with excise taxes ([Appendix F](#)). Illinois collected approximately \$175 million in revenue in its first year of implementing legalized recreational marijuana. According to Governor Tony Evers, regulating and taxing marijuana would generate more than \$164 million in annual revenue starting in 2022. However, many experts believe that it might take longer than the projected timeline for the system to be established and return these projected revenues. While tax revenue is a fiscal benefit, this impact is a transfer from consumers to the state, thus we include it as a benefit and a cost.

License and Registration Fees

Marijuana application and licensing fees vary across the states where it is legal for adult use. The fee can be determined by statute or regulation based on a cap or guidance within statutes. Application fees range from \$100 for small growers in Massachusetts to \$6000 for applicants in Michigan, while licensing fees range from \$9 per plan for small, outdoor growers in Maine to as high as \$850,000 for large medical cannabis growers that also service adult-use consumers in Illinois ([Appendix G](#)).]. Governor Ever's most recent marijuana legalization proposal called for the Wisconsin Department of Revenue and Department of Agriculture, Trade and Consumer Protection to oversee the licensing and permitting of marijuana producers, processors, distributors, and retailers.

Similar to tax revenue, license fees are paid by members of the population with standing, which makes them a transfer. To account for the social cost of licensing and registration fees, we include it as both a cost and a benefit.

Avoided Criminal Justice Costs

According to 2018 statistics published by Drug Policy Alliance (DPA), drug offenses are the leading cause of arrests nationally, and 663,000 are marijuana-related offenses. The National Juvenile Justice reports that the average cost of each arrest is around \$1000 and up to \$5000 on the higher end. This suggests that the total annual costs of marijuana-related arrests in the United States can be anywhere between \$600 million and \$3 billion.

In Wisconsin, marijuana-related arrests reached a new low in 2019, according to data published by the Wisconsin Department of Justice (DoJ). In a study conducted by the Badger Institute, the authors demonstrate that the number of marijuana-related arrests in the state are already low and suggest that the criminal justice savings from decriminalization would be small.

For example, cities like Madison already decriminalized marijuana to a certain extent, and many marijuana-related cases will not be prosecuted. In Milwaukee, a person possessing twenty-five grams or less is fined \$50 but not charged with a crime. Some other cities like Eau Claire have decriminalized marijuana possession (Grace, 2019). In our analysis, we find that the cost savings, although relatively small, are significant.

Administrative Costs

States that legalize marijuana incur administrative costs related to implementation and maintenance of the necessary regulatory structure for the legal marijuana market, which includes the oversight of marijuana dispensaries and production facilities and the inspection of marijuana products. Annual administrative costs range from \$25 million in Oregon, \$9.7 million in Massachusetts, and \$3.2 million in Nevada. In Wisconsin, the Department of Health Services, the Department of Agriculture, Trade and Consumer Protections, and the Department of Revenue are agencies likely to need additional resources to implement marijuana legalization.

Increase in Emergency Room utilization

According to a report in the *Annals of Internal Medicine*, marijuana-related ER visits went up three-fold in Colorado following legalization. A similar impact was observed in Illinois, where doctors identified a spike in ER visits a week after legalization of recreational marijuana. For this reason, the increase in emergency room utilization from acute marijuana intoxication is a cost to consider.

Increase in Car Crashes

According to a study by the Insurance Institute for Highway Safety (IIHS) and Highway Loss Data Institute (HLDI), crash rates increased with the legalization of recreational marijuana

use and retail sales in California, Colorado, Nevada, Oregon, and Washington. Another 2018 IIHS study of police-reported crashes found that legalization was associated with a 5 percent higher crash rate relative to neighboring states that have controlling marijuana legislation ([Appendix H](#)). In Wisconsin, fatal car crashes have increased in recent years. Between 2019 and 2020, fatal crashes increased 7.8 percent across the state, with some municipalities, such as Milwaukee, reporting up to a 50 percent increase in fatal crashes despite reduction in overall crashes (Cushman, 2021). Alcohol-related crashes remain the leading cause of fatal accidents in Wisconsin (WIDOT, n.d.). For this reason, it is important to assess the impact of policy alternatives on crashes, with this being an important public safety issue in the state. As our evidence suggests increases in total car crashes following legalization, we assess this impact as a cost.

Impacts for Alternative 1: Decriminalization

Decriminalization would only allow possession of a small amount of marijuana, resulting in civil infractions rather than misdemeanor or felony arrests. Because marijuana is still prohibited under state law, there would be no legal market. Under this alternative, consumer surplus, tax revenue, license fees, and administrative costs do not apply. Additionally, it does not appear that car crash rates increase due to decriminalization (Cook et al., 2020). The impacts under consideration for this alternative are the avoided criminal justice costs and rise in emergency room visits. The following sections outline how each impact is predicted and monetized.

Benefits

a. Avoided Criminal Justice Costs

We use data from the Wisconsin Department of Justice (DoJ) to find trends in both marijuana possession and sale-related arrests. Possession arrests have significantly decreased over the years while sales arrests have been relatively constant. In order to estimate avoided criminal justice costs, we: 1) predict marijuana possession trends resulting in arrests, trials, and jail sentences over the next five years; 2) estimate the cost of an arrest, cost per trial, the cost for jail time. From this, we predict the discounted avoided costs across five years will be **\$96 million** for decriminalization ([Appendix I](#)).

Costs

a. Increase in Emergency Room (ER) Visits

To predict the cost due to the rise in emergency room utilization, we estimate the rate of increase due to decriminalization, the cost per case for marijuana toxicity related visit, and the population of Wisconsin. Using data based on changes observed in Colorado, we estimate the average annual cost of emergency room visits to be approximately \$1 million dollars, after accounting for uncertainty in the rate of increase. The total discounted costs across the five-year time span is **\$5 million** ([Appendix J](#)).

Impacts for Alternative 2: Legalization

Benefits

a. Consumer Surplus

To estimate consumer surplus, we first model a demand schedule for Wisconsin. We estimated the following modeling parameters for Wisconsin: 1) Population; 2) Growth in consumption; 3) Initial price per gram of flower; 4) Annual quantity sold each year following hypothetical implementation (flower in grams); and 5) Price elasticity of demand. Because of uncertainty in our parameters, we use Monte Carlo simulations to estimate the consumer surplus benefit. Based on these estimates we predict discounted net consumer surplus benefit of **\$1 billion** over five years for the legalization alternative ([Appendix K](#)).

b. Benefits from Marijuana Tax Revenue

The total discounted benefits accruing from generated tax revenue is estimated to be about **\$267 million** over five years for the legalization alternative.

c. Licensing Fees and Administrative Costs

The parameters used to estimate licensing fees are the Wisconsin population and the mean per capita revenue across fully implemented legal states ([Appendix L](#)). The annual benefit from licensing fees is estimated to be \$9 million per year, on average, with a five-year total discounted benefit of **\$41 million**.

To determine administrative costs, we use the estimated per capita cost of regulating this policy and the Wisconsin population. With these parameters, we see a five-year discounted cost of **\$64 million dollars**.

d. Avoided Criminal Justice Costs

Similar to the decriminalization alternative, we predict and monetize trends in arrests over the next five years for possession multiplied. We additionally factor in avoided costs from intent to sell arrests, trials, and convictions resulting in jail sentences. From this, we predict an average avoided costs, discounted across five years, of **\$116 million** for the legalization alternative ([Appendix I](#)).

Costs

a. Tax Revenue

As tax revenue to the state is a transfer from consumers, we must also include tax revenue as a social cost paid by marijuana consumers. The cost estimate is the same as the benefit category, **\$267 million**.

b. Increased Risk of Crashes

[Appendix M](#) provides a rationale for the costs due to increased risk of crashes. To estimate this impact, we used the total cost of car crashes and the predicted rate of increase in crashes following legalization to get an annual cost. After discounting, our estimate of the cost for fatal traffic accidents totals **\$47 million** over five years.

c. Social Cost of Licensing Fees

While revenue from licensing fees may be a fiscal benefit to Wisconsin, this impact is a transfer from consumers to the state. As this is a transfer, there is a social cost associated with charging licensing fees to the cannabis industry. This cost offsets the five-year benefit of **\$41 million**.

d. Rise in Emergency Room (ER) Visits

Using data based on changes observed in Colorado, we estimate the average annual increased cost of emergency room visits to be \$4 million for the legalization alternative, with the total discounted cost of **\$18 million** over five-years.

Non-monetized Impacts

In addition to the costs and benefits estimated above, we identified but declined to monetize four other potential impacts that were discussed in the literature: labor market impacts, changes in educational outcomes, environmental impacts, and changes in crime rates post legalization. We did monetize costs and benefits related to changes in opioid use, but declined to include them in our main analysis. We expand upon this below and in [Appendix N](#).

Either the reduction or elimination of penalties related to marijuana possession would have an impact on the labor market, but to what extent is uncertain. One study found individuals in states that decriminalized marijuana had higher weekly earnings, but no significant impact on the probability of employment. Additional literature suggests that black adults, particularly men, benefit the most from decriminalization. Other research has pointed to more uncertain, if not negative, labor market consequences as a result of marijuana consumption.

In 2020, according to a report by Leafly and Whitney Economics, more than 77,000 jobs were added in the legal cannabis industry. The industry witnessed a 32 percent growth in job market from its 2019 numbers, at a time when there was a slowdown in broader economic growth. Wisconsin is one of the few states that does not have a job market for the legal marijuana industry.

Much research has looked into the negative impact marijuana use at young ages can have on cognitive development, including altering brain structure and function. There is little debate

on this negative impact and its logical extension to negative impacts on educational outcomes. However, what is less clear is to what extent, if any, marijuana legalization or decriminalization leads to an increase in youth consumption of marijuana. One study found that after medical marijuana legalization in 14 states, only one state had a statistically significant increase in youth marijuana use and two states showed statistically significant decreases. While medical marijuana legalization differs from legalization and decriminalization, other studies have shown either little impact or even a decline in youth consumption after legalization.

Increase in the scale of marijuana cultivation, following an increase in consumption, results in environmental costs. It has been found that marijuana cultivation is linked to a high carbon footprint and the location for cultivation also plays a major role. Growing marijuana indoors consumes a lot of energy with associated carbon emissions. Another study found that the energy required to produce one kilogram of dried cannabis flower produces around 2 to 5 tonnes of carbon dioxide, but outdoor cultivation can shrink this carbon footprint. We do not have sufficient information to monetize this impact.

The impact that decriminalization or legalization has on non-marijuana crime is uncertain ([Appendix O](#)). Research in Colorado and Washington found no statistically significant long-term effects of marijuana legalization on non-marijuana violent or property crime rates. Another study found property crime rates went down in neighborhoods where dispensaries were located in Denver. Adding uncertainty to this is the continued federal prohibition of marijuana, which forces most of those in the marijuana businesses to avoid financial institutions, and consumers who must use cash, which potentially increases crime risk.

Due to the size of the impact, the great uncertainty in some of the cost estimates, and the mixed findings regarding the effects of marijuana legislation on opioid use, we include this as a

non-monetized impact. Our predictions found net costs in the billions of dollars for a small increase in opioid overdoses and net benefits in billions of dollars for reduced opioid use. Because of the sheer magnitude of these estimates, along with the uncertainty associated with them, we only note them here and expand upon the estimates in [Appendix N](#). We nonetheless believe that the non-monetized impact on opioid use could be positive.

Analysis & Results

To take account of the uncertainty in many of the parameters used to monetize impacts, we conducted Monte Carlo sensitivity analysis by specifying distributions for each uncertain parameter and generating random draws over 10,000 trials. The primary method of determining net present value is the mean across all trials. However, we also present the 90 percent ranges and the frequency of simulations that report a positive net present value. A mid-year social discount rate of 3.5 percent is applied across the five year estimation.

Decriminalization

Table 2 shows the mean values across all simulations for each impact category in millions of dollars. Consumer surplus and tax revenue are dependent on a legal market, thus these benefit categories are \$0 for this alternative. As decriminalization is not associated with an increase in traffic fatalities, this impact is also \$0 for this alternative. The monetized benefit category driving this alternative is criminal justice savings, with a total \$96 million saved across five years. The highest cost impact is emergency room visits with an average cost of \$5 million over five years. After 10,000 trials, the average net benefit for this alternative is \$91 million dollars, with the distribution in Figure 1 yielding positive net present values 100 percent of the time.

Table 2: Predicted Benefits, Costs, and Present Value (millions of dollars)

	Alternative 1: Decriminalization	Alternative 2: Legalization
Benefits		
Consumer Surplus	—	1016 (293, 1785)
Tax Revenue	—	267 (78, 466)
Criminal Justice Savings	96 (54, 138)	116 (73,159)
Licensing Fees	—	41 (20, 62)
Costs		
Administrative Costs	—	64 (23, 107)
Tax Revenue	—	267 (78, 466)
Licensing Fees	—	41 (20, 62)
ER Visits	5 (1, 9)	18 (4, 32)
Traffic Fatalities	—	47 (-1784, 1897)
Totals		
Benefits	96 (54, 138)	1440 (530, 2410)
Costs	5 (1, 9)	437 (-1403, 2294)
Net Present Value	91 (49, 133)	1003 (-974, 2975)
Net Present Value of Revenue	96 (54, 138)	359 (164, 568)

This table presents the mean (90 percent interval) for each impact across 10,000 Monte Carlo trials.

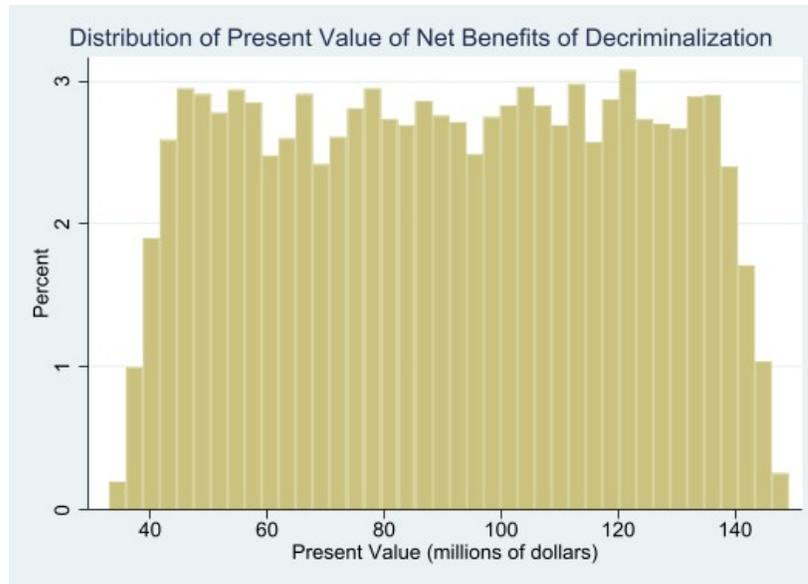
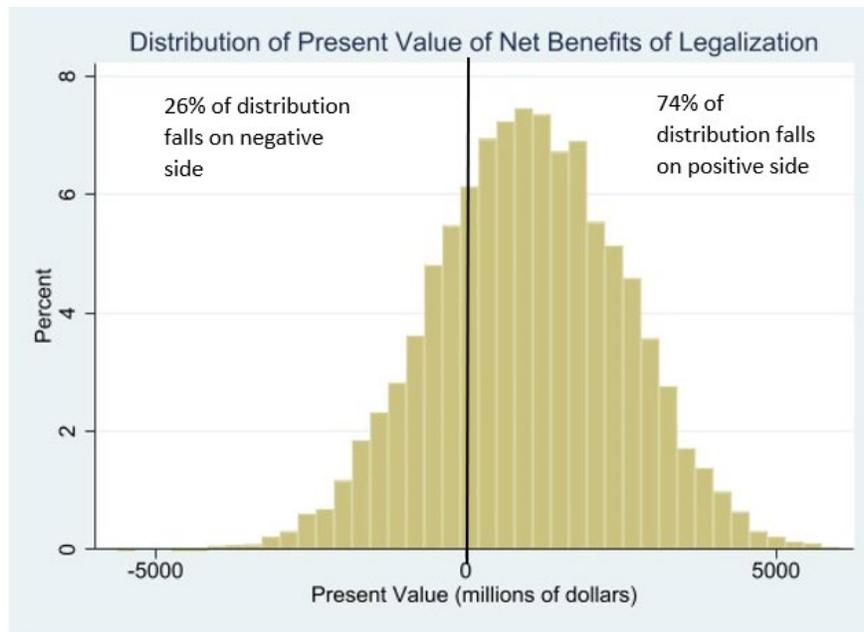


Figure 1: Distribution of Present Value of Net Benefits for Decriminalization

Legalization

Table 2 summarizes the mean present value across all simulations for each impact category in millions of dollars. Consumer surplus, followed by criminal justice savings, yield the largest benefits, excluding tax revenue which is a transfer. Administrative costs are the highest cost category of this alternative. With this, the total of all benefit categories across five years averages \$1.4 billion and the average total cost averages \$437 million. We find an average present value of net benefit to be \$1 billion (-\$974, \$2975). Looking at the distribution of net benefits in Figure 2 across all trials, 74 percent yield present value of net benefits.

Figure 2: Distribution of Present Value of Net Benefits for Legalization



A fiscal perspective, we only consider impact categories that have a direct impact on the State budget. Table 3 represents the fiscal impact analysis, which shows a total benefit of \$424 million and a total cost of \$64 million across five years. The net present value of fiscal impact analysis is \$359 million (\$231 million, \$628 million). Figure 3 shows that the fiscal analysis yields positive present values across 100% of all Monte Carlos trials.

Figure 3: Distribution of Present Value of Net Benefits for Fiscal Impacts

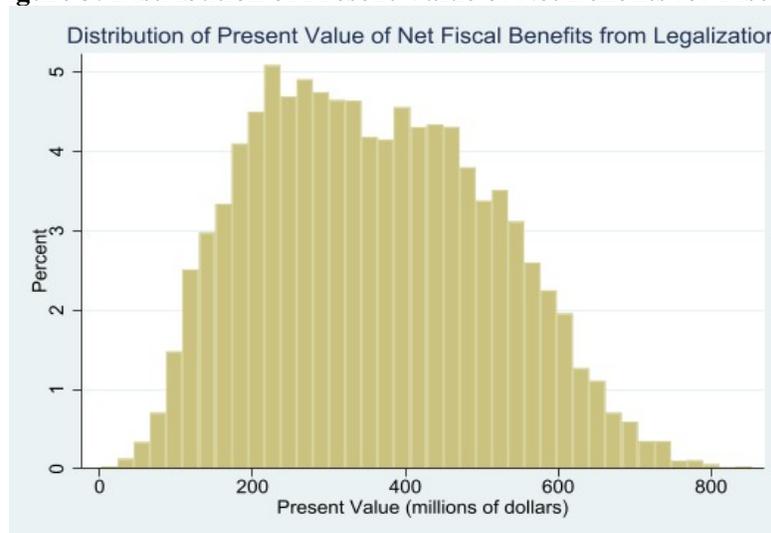


Table 3: State Fiscal Impact (millions of dollars)

	Alternative 1: Decriminalization	Alternative 2: Legalization
Revenue		
Tax Revenue	—	267 (78, 466)
Criminal Justice Savings	96 (54, 138)	116 (73,159)
Licensing Fees	—	41 (20, 62)
Expenditures		
Administrative Costs	—	64 (23, 107)
Totals		
Revenue	—	424 (231, 628)
Expenditures	—	64 (23, 107)
Present Value of Net Revenue	96 (54, 138)	359 (164, 568)

State fiscal impact represents the present value of net benefits for tax revenue, licensing fees, and administrative costs.

Limitations

One of the major constraints we faced in our analysis was the availability of relevant information. Many impacts have little associated research to facilitate monetization. Data were very limited on trends for decriminalization, as most states that decriminalized marijuana in recent years did so alongside the legalization of medical or recreational marijuana. We had to estimate decriminalization impacts assuming a direct proportional relationship between use and the impact under consideration. It would be better to have trends specific to decriminalized

states, rather than using the ratio between estimated users for each alternative as a conversion rate.

We intended to present an expungement alternative, but due to the challenges in estimating the labor market impacts of a conviction, we were unable to calculate the net benefit of this alternative. Therefore, the net benefit of the decriminalization alternative is likely underestimated.

The consumer surplus prediction assumed that 100 percent of sales were from flowers. Individuals can also purchase infusions, oils, and plants. These are often priced and taxed at a higher rate, which means the consumer surplus calculations likely underestimate consumer benefits observed in real-world implementation. A more accurate cost-benefit analysis would account for sales and demand by product type.

In real world implementation, the legal market would not operate independently. Tax burden is shifted to retail consumers in order to maximize industry profits. Higher tax rates can potentially result in higher retail costs. The cost, elasticity of demand, and tax rates may shape how much consumers continue to participate in illicit markets. A major limitation of this analysis is our inability to explore how tax rate and price variability influence shadow market demand to determine what tax design would maximize benefits.

A percentage of the increase in emergency room hospitalizations would be paid for with the state Medicaid system. We did not account for this additional cost in our state fiscal impact. This would result in less overall net fiscal benefits for the state of Wisconsin, but not enough to change our prediction that both alternatives result in a net fiscal benefit to the state. This omission does not change overall net costs and benefits as every predicted increase in emergency room hospitalization, paid for via Medicaid or not, are accounted for in our analysis.

Recommendation

Our analysis of the costs and benefits associated with marijuana decriminalization resulted in a mean net benefit of \$91 million over five years as compared to the \$1 billion mean net benefit of marijuana legalization. If we consider fiscal impacts alone, both alternatives still yield net benefits, but the legalization alternative would net \$359 million in revenue to the state of Wisconsin, while decriminalization would net \$96 million. To maximize net benefits, we recommend that policy makers adopt marijuana legalization. However, either alternative would result in net benefits for Wisconsin residents and taxpayers.

Appendix A: Marijuana as a Schedule I Substance

Marijuana is a dry, shredded green/brown mix of flowers, stems, seeds, and leaves from the Cannabis Sativa plant. According to the Controlled Substances Act, Marijuana is a Schedule I substance. Although some states allow marijuana to be used for medical purposes, the Food and Drug Administration (FDA) has not approved marketing applications for any marijuana product for any clinical indication and concluded that it has no federally approved medical use for treatment in the country. Marijuana is a complex plant with over 400 chemical entities - with 60 of them being cannabinoid compounds. These compounds are found to produce euphoria, enhancement of sensory perception, difficulties in concentration and impairment of memory among other known effects.

Marijuana Strain Components	Known Characteristics
<i>Cannabis indica</i>	calming, sedating, and better for night-time use
<i>Cannabis sativa</i>	energizing, uplifting, and better for daytime use
Tetrahydrocannabinol (THC)	induces the psychoactive effects of marijuana
Cannabidiol (CBD)	lacks psychoactivity

Table A1: Marijuana Strain Components and Characteristics (Eric. et.al, 2018)

There are multiple strains of marijuana and they can also be designed to contain varying ratios of THC, CBD, and other components. THC is found to induce a psychoactive effect while CBD lacks psychoactivity.

Appendix B: Marijuana Laws and Penalties in Wisconsin

Offense	Penalty	Incarceration	Maximum Fine
POSSESSION			
Any Amount (first offense)	Misdemeanor	6 months	\$1000
Any amount (subsequent offense)	Felony	3.5 years	\$10,000
SALE OR DELIVERY			
200 g or less	Felony	3.5 years	\$10,000
200 - 1000 g	Felony	6 years	\$10,000
1000 - 2500 g	Felony	10 years	\$25,000
2500 - 10,000 g	Felony	12.5 years	\$25,000
More than 10,000 g	Felony	15 years	\$50,000
<i>Includes possession with intent to distribute</i>			
<i>Subsequent offense is subject to additional penalties</i>			
CULTIVATION			
4 plants or fewer	Felony	3.5 years	\$ 10,000
4 - 20 plants	Felony	6 years	\$ 10,000
20 - 50 plants	Felony	10 years	\$ 25,000
50 - 200 plants	Felony	12.5 years	\$ 25,000
More than 200 plants	Felony	15 years	\$ 50,000
<i>Subsequent offense is subject to additional penalties</i>			
HASH AND CONCENTRATES			
Penalties for hashish and marijuana are generally treated equally under the law. Please see the details below.			

PARAPHERNALIA			
Use or possession with intent to use	Misdemeanor	30 days	\$500
Sale or distribution	Misdemeanor	90 days	\$ 1,000
Selling to a minor	Misdemeanor	9 months	\$10,000
CIVIL ASSET FORFEITURE			
All controlled substances and items used to distribute, including vehicles, are subject to forfeiture.			
MISCELLANEOUS			
Driving privileges may be suspended for 6 months - 5 years.			

Table B1: Marijuana Laws and Penalties in Wisconsin

Local Decriminalization Ordinances in Wisconsin

A number of cities across Wisconsin have passed ordinances making minor marijuana possession a civil violation as opposed to a criminal offense, as it is under Wisconsin state statute.

City	Maximum Fine	Amount	Year Passed	Population
Appleton	\$200	25 grams or less	1965	74,370
Eau Claire	\$100 - \$500	25 grams or less	2002	68,339
Green Bay	\$1 - \$500	28 grams or less	2018	105,139
Kenosha	\$10 - \$750	28 grams or less	2015	99,631
La Crosse	\$1	25 grams or less	2020	52,109
Madison	\$0 - \$1	28 grams or less	2020	258,054
Marshfield	\$100 - \$500	N/A	2010	18,467
Milwaukee	\$1	28 grams or less	2021	595,047
Monona	\$0 - private \$200 - public	25 grams or less	2017	8,179

Oshkosh	\$75	25 grams or less	2018	66,579
Racine	\$75	25 grams or less	1990	77,571
Stevens Point	\$100	5 grams or less	2015	26,423
Superior	\$100 - \$500	25 grams or less	2018	26,475
Waukesha	\$1000	N/A	2007	72,363
Wausau	\$50 - \$500	N/A	N/A	39,106

Table B2: Local Decriminalization Ordinances in Wisconsin

The diagram below shows current marijuana laws in the country:

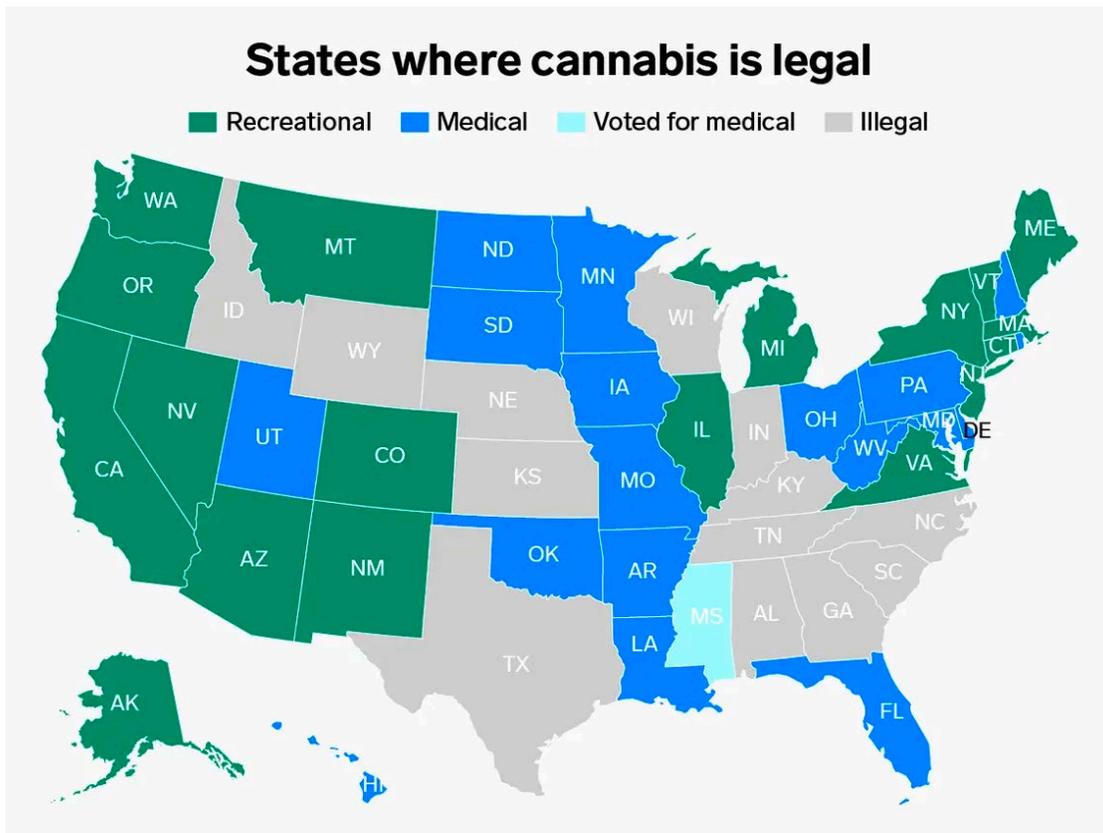


Figure B1: Marijuana Laws in US

Source: <https://www.businessinsider.com/legal-marijuana-states-2018-1>

Appendix C: Draft Bill to Standardize Penalties for Possession of Marijuana

PRELIMINARY DRAFT - NOT READY FOR INTRODUCTION

Analysis by the Legislative Reference Bureau

Current law prohibits a person from possessing or attempting to possess marijuana. A person who violates the prohibition is guilty of a misdemeanor crime and may be fined not more than \$1,000 or imprisoned for not more than six months, or both, for a first conviction and is guilty of a Class I felony and may be fined not more than \$10,000 or imprisoned for not more than three years and six months, or both, for a repeat conviction. Under current law, a repeat conviction includes any previous conviction for a state or federal misdemeanor or felony relating to a controlled substance.

This bill reduces to a \$100 civil forfeiture the penalty for possessing or attempting to possess 14 grams or less of marijuana. The bill also eliminates counting, for the purposes of determining if a conviction is a repeat conviction, a criminal offense of marijuana possession involving 28 grams or less. Current law also increases the penalties for possession of other controlled substances due to a prior conviction for a state or federal misdemeanor or felony relating to a controlled substance. The bill eliminates counting, as a prior conviction, a conviction for marijuana possession involving 28 grams or less.

Current law allows a local government to enact an ordinance prohibiting the possession of marijuana and to impose a forfeiture for a violation of the ordinance. The bill preempts a local government from imposing a forfeiture amount for the possession of 14 grams or less of marijuana that is less than the \$100 forfeiture amount imposed by the state or that is more than \$250. Under the bill, the court may impose, instead of the forfeiture amount, no less than 16 hours nor more than 40 hours of community service for violating an ordinance prohibiting the possession of 14 grams or less of marijuana. The bill does not change the current law that allows local governments discretion in the forfeiture amount imposed for possession of more than 14 grams of marijuana.

The bill also specifies that a citation issued for possession of marijuana must contain provisions for a deposit in lieu of a court appearance. The court may consider the deposit as a plea of no contest and enter a judgment without the person appearing in court.

The bill allows law enforcement officers discretion in how they complete processing or “booking” of a person for a violation of state law or a local ordinance prohibiting possession or attempted possession of marijuana, including whether to take the person to jail, complete a booking photo, or fingerprint the person. Under the bill, however, a law enforcement officer must still obtain certain personal information from the person sufficient for identification, including at least the person's name and current address.

Current law prohibits a person from using or possessing drug paraphernalia with the intent to produce, distribute, or use a controlled substance. The bill eliminates the prohibition on possessing or using drug paraphernalia that relates to marijuana consumption.

Because this bill creates a new crime or revises a penalty for an existing crime, the Joint Review Committee on Criminal Penalties may be requested to prepare a report.

For further information see the state and local fiscal estimate, which will be printed as an appendix to this bill.

The people of the state of Wisconsin, represented in senate and assembly, do enact as follows:

SECTION 1. 59.54 (25) (a) (intro.) of the statutes is amended to read:

59.54 (25) (a) (intro.) The board may enact and enforce an ordinance to prohibit the possession of marijuana, as defined in s. 961.01 (14), subject to the exceptions in s. 961.41 (3g) (intro.), and. The board may provide a forfeiture for a violation of the ordinance; ~~except that if.~~ If the board provides a forfeiture, the amount for the possession of not more than 14 grams of marijuana may not be less than the maximum amount of the forfeiture in s. 961.41 (3g) (e) 1. nor more than \$250. If the defendant appears in court, the court may impose for each violation not less than 16 nor more than 40 hours of community service in lieu of the forfeiture. If a complaint is issued regarding an allegation of possession of more than 25 28 grams of marijuana, or possession of any amount of marijuana following a conviction in this state for possession of marijuana, the subject of the complaint may not be prosecuted under this subsection for the same action that is the subject of the complaint unless all of the following occur:

SECTION 2. 66.0107 (1) (bm) of the statutes is amended to read:

66.0107 (1) (bm) Enact and enforce an ordinance to prohibit the possession of marijuana, as defined in s. 961.01 (14), subject to the exceptions in s. 961.41 (3g) (intro.) and provide a forfeiture for a violation of the ordinance; ~~except that if.~~ If the board or council provides a forfeiture, the amount for the possession of not more than 14 grams of marijuana may not be less than the maximum amount of the forfeiture in s. 961.41 (3g) (e) 1. nor more than \$250. If the defendant appears in court, the court may impose for each violation not less than 16 nor more than 40 hours of community service in lieu of the forfeiture. If a complaint is issued regarding an allegation of possession of more than 25 28 grams of marijuana, or possession of any amount of marijuana following a conviction in this state for possession of marijuana, the subject of the complaint may not be prosecuted under this paragraph for the same action that is the subject of the complaint unless the charges are dismissed or the district attorney declines to prosecute the case.

SECTION 3. 66.0108 of the statutes is created to read:

66.0108 Discretion in processing certain marijuana violations. (1) In this section, “law enforcement officer” has the meaning given in s. 165.85 (2) (c). (2) In processing a person for possession or attempted possession of not more than 14 grams of marijuana, as defined in s. 961.01 (14), in violation of s. 961.41 (3g) (e) 1. or for violation of an ordinance prohibiting the possession of marijuana under s. 59.54 (25) or 66.0107 (1) (bm), a law enforcement officer may exercise discretion regarding what, if any, standard procedures to complete, including determining whether or not to take the person to jail, complete fingerprinting, or have a formal police photograph taken. Notwithstanding the use of discretion otherwise permitted under this section, a law enforcement officer shall obtain sufficient personal information for identification, including at least the person's name and current address.

SECTION 4. 778.25 (1) (a) 2m. of the statutes is created to read:

778.25 (1) (a) 2m. Under s. 961.41 (3g) (e) 1. or a local ordinance under s. 59.54(25) (a) or 66.0107 (1) (bm).

SECTION 5. 961.41 (3g) (c) of the statutes is amended to read:

961.41 (3g) (c) *Cocaine and cocaine base.* If a person possesses or attempts to possess cocaine or cocaine base, or a controlled substance analog of cocaine or cocaine base, the person shall be fined not more than \$5,000 and may be imprisoned for not more than one year in the county jail upon a first conviction and is guilty of a Class I felony for a 2nd or subsequent offense. For purposes of this paragraph, an offense is considered a 2nd or subsequent offense if, prior to the offender's conviction of the offense, the offender has at any time been convicted of any felony or misdemeanor under this chapter, except for a misdemeanor under par. (e) 2., or under any statute of the United States or of any state relating to controlled substances, controlled substance analogs, narcotic drugs, marijuana, or depressant, stimulant, or hallucinogenic drugs, except that, if the statute relates to marijuana possession, only felonies or misdemeanors involving more than 28 grams may be counted.

SECTION 6. 961.41 (3g) (d) of the statutes is amended to read:

961.41 (3g) (d) *Certain hallucinogenic and stimulant drugs.* If a person possesses or attempts to possess lysergic acid diethylamide, phencyclidine, amphetamine, 3, 4-methylenedioxymethamphetamine, methcathinone, cathinone, N-benzylpiperazine, a substance specified in s. 961.14 (4) (a) to (h), (m) to (q), (sm), (u) to (xb), or (7) (L), psilocin, or psilocybin, or a controlled substance analog of lysergic acid diethylamide, phencyclidine, amphetamine, 3, 4-methylenedioxymethamphetamine, methcathinone, cathinone, N-benzylpiperazine, a substance specified in s. 961.14 (4) (a) to (h), (m) to (q), (sm), (u) to (xb), or (7) (L), psilocin, or psilocybin, the person may be fined not more than \$5,000 or imprisoned for not more than one year in the county jail or both upon a first conviction and is guilty of a Class I felony for a 2nd or subsequent offense. For purposes of this paragraph, an offense is considered a 2nd or subsequent offense if, prior to the offender's conviction of the offense, the offender has at any time been convicted of any felony or misdemeanor under this chapter, except for a misdemeanor under par. (e) 2., or under any statute of the United States or of any state relating to controlled substances, controlled substance analogs, narcotic drugs, marijuana, or depressant, stimulant, or hallucinogenic drugs, except that, if the statute relates to marijuana possession, only felonies or misdemeanors involving more than 28 grams may be counted.

SECTION 7. 961.41 (3g) (e) of the statutes is renumbered 961.41 (3g) (e) 1. and amended to read:

961.41 (3g) (e) 1. If a person possesses or attempts to possess not more than 14 grams of tetrahydrocannabinols included under s. 961.14 (4) (t), or a controlled substance analog of tetrahydrocannabinols, the person may be subject to a forfeiture of not more than \$100.

2. If a person possesses or attempts to possess more than 14 grams but not more than 28 grams of tetrahydrocannabinols included under s. 961.14 (4) (t), or a controlled substance analog of

tetrahydrocannabinols, the person may be fined not more than \$1,000 or imprisoned for not more than 6 months or both.

3. If a person possesses or attempts to possess more than 28 grams of tetrahydrocannabinols included under s. 961.14 (4) (t), or a controlled substance analog of tetrahydrocannabinols, the person may be fined not more than \$1,000 or imprisoned for not more than 6 months or both upon a first conviction and is guilty of a Class I felony for a 2nd or subsequent offense. For purposes of this paragraph-subdivision, an offense is considered a 2nd or subsequent offense if, prior to the offender's conviction of the offense, the offender has at any time been convicted of any of the following:

a. A felony or misdemeanor under this chapter ~~or~~, except that, if the felony or misdemeanor relates to marijuana possession, only felonies or misdemeanors involving more than 28 grams may be counted.

b. A felony or misdemeanor under any statute of the United States or of any state relating to controlled substances, controlled substance analogs, narcotic drugs, marijuana, or depressant, stimulant, or hallucinogenic drugs, except that, if the felony or misdemeanor relates to marijuana possession, only felonies or misdemeanors involving more than 28 grams may be counted.

SECTION 8. 961.41 (3g) (em) of the statutes is amended to read:

961.41 (3g) (em) *Synthetic cannabinoids.* If a person possesses or attempts to possess a controlled substance specified in s. 961.14 (4) (tb), or a controlled substance analog of a controlled substance specified in s. 961.14 (4) (tb), the person may be fined not more than \$1,000 or imprisoned for not more than 6 months or both upon a first conviction and is guilty of a Class I felony for a 2nd or subsequent offense. For purposes of this paragraph, an offense is considered a 2nd or subsequent offense if, prior to the offender's conviction of the offense, the offender has at any time been convicted of any felony or misdemeanor under this chapter, except for a misdemeanor under par. (e) 2., or under any statute of the United States or of any state relating to controlled substances, controlled substance analogs, narcotic drugs, marijuana, or depressant, stimulant, or hallucinogenic drugs, except that, if the statute relates to marijuana possession, only felonies or misdemeanors involving more than 28 grams may be counted.

SECTION 9. 961.47 (1) of the statutes is amended to read:

961.47 (1) Whenever any person who has not previously been convicted of any offense under this chapter, or of any offense under any statute of the United States or of any state or of any county ordinance relating to controlled substances or controlled substance analogs, narcotic drugs, marijuana or stimulant, depressant or hallucinogenic drugs, pleads guilty to or is found guilty of possession or attempted possession of a controlled substance or controlled substance analog under s. 961.41(3g) (b), the court, without entering a judgment of guilt and with the consent of the accused, may defer further proceedings and place him or her on probation upon terms and conditions. For purposes of this subsection, a conviction does not count as a previous conviction if it was for an offense under s. 961.41 (3g) (e) 1. or 2. or, if the conviction was for marijuana possession, if the conviction involved not more than 28 grams. Upon violation of a term or condition, the court may enter an adjudication of guilt and proceed as otherwise provided. Upon fulfillment of the terms and conditions, the court shall discharge the person and dismiss the proceedings against him or her. Discharge and dismissal under this section shall be without adjudication of guilt and is not a conviction for purposes of disqualifications or disabilities

imposed by law upon conviction of a crime, including the additional penalties imposed for 2nd or subsequent convictions under s. 961.48. There may be only one discharge and dismissal under this section with respect to any person.

SECTION 10. 961.48 (3) of the statutes is amended to read:

961.48 (3) For purposes of this section, a felony offense under this chapter is considered a 2nd or subsequent offense if, prior to the offender's conviction of the offense, the offender has at any time been convicted of any felony or misdemeanor offenses under this chapter, except for a misdemeanor under s. 961.41 (3g) (e) 2., or under any statute of the United States or of any state relating to controlled substances or controlled substance analogs, narcotic drugs, marijuana or depressant, stimulant or hallucinogenic drugs, except that, if the statute relates to marijuana possession, only felonies or misdemeanors involving more than 28 grams may be counted.

SECTION 11. 961.571 (1) (a) (intro.), 1., 2., 3., 4., 5., 6., 8., 9. and 10. of the statutes are renumbered 961.571 (1) (ag) (intro.), 1., 2., 3., 4., 5., 6., 7., 8. and 9.

SECTION 12. 961.571 (1) (a) 7. of the statutes is repealed.

SECTION 13. 961.571 (1) (a) 11. (intro.) of the statutes is renumbered 961.571(1) (ag) 11. (intro.) and amended to read:

961.571 (1) (ag) 11. (intro.) Objects used, designed for use or primarily intended for use in ingesting, inhaling or otherwise introducing ~~marijuana~~, cocaine, hashish, or hashish oil into the human body, such as:

SECTION 14. 961.571 (1) (a) 11. a., b., c., d., f., g., h., i., j. and m. of the statutes are renumbered 961.571 (1) (ag) 11. a., b., c., d., e., f., g., h., i. and j.

SECTION 15. 961.571 (1) (a) 11. e., k. and L. of the statutes are repealed.

SECTION 16. 961.571 (1) (ac) of the statutes is created to read: 961.571 (1) (ac) Notwithstanding s. 961.01 (4), “controlled substance” does not include tetrahydrocannabinols or marijuana.

Appendix D: Determining Marijuana Tax Rate for Wisconsin

For our analysis, we are interested in the effective tax rate, which takes all the taxes combined together to help us estimate Wisconsin consumer demand and tax revenue. States that have legalized marijuana tended to have higher tax rates than states that legalized in recent years. We decided on an effective tax rate of 20 percent in Wisconsin, which includes the state's 5 percent sales tax and an excise tax rate of 15 percent. We select this rate after considering neighboring Michigan and other states that have recently passed marijuana legalization (see [Appendix F](#) for state tax notes). Michigan has a 6 percent sales tax and 10 percent excise tax rate on marijuana. Many other states' effective tax rates fall between 15 percent and 25 percent. Illinois is more difficult to assess because the excise tax rate depends on the THC levels of the cannabis sold, but its effective tax rate is much higher on average than most other states.

Appendix E: Past Year Marijuana Use Among People Aged 12 or Older: 2002-2019

In a report by Substance Abuse and Mental Health Administration (2020), the percentage who were past-year marijuana users increased from 11 percent in 2002 to 17.5 percent among those twelve years and older.

Figure E1: Marijuana Use Among People Aged 12 or Older

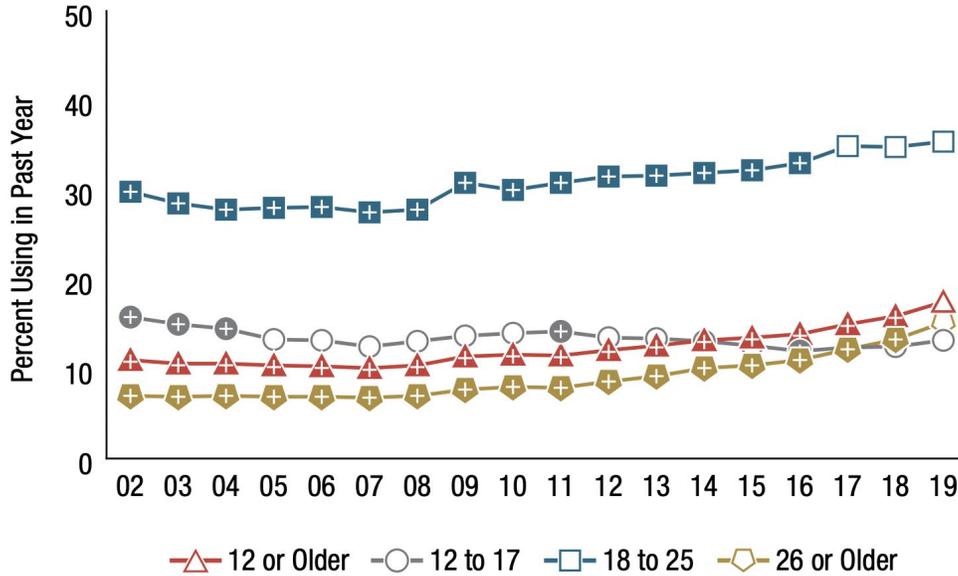


Figure 12 Table. Past Year Marijuana Use among People Aged 12 or Older: 2002-2019

Age	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
≥12	11.0 ⁺	10.6 ⁺	10.6 ⁺	10.4 ⁺	10.3 ⁺	10.1 ⁺	10.4 ⁺	11.4 ⁺	11.6 ⁺	11.5 ⁺	12.1 ⁺	12.6 ⁺	13.2 ⁺	13.5 ⁺	13.9 ⁺	15.0 ⁺	15.9 ⁺	17.5
12-17	15.8 ⁺	15.0 ⁺	14.5 ⁺	13.3	13.2	12.5	13.1	13.7	14.0	14.2 ⁺	13.5	13.4	13.1	12.6	12.0 ⁺	12.4	12.5	13.2
18-25	29.8 ⁺	28.5 ⁺	27.8 ⁺	28.0 ⁺	28.1 ⁺	27.5 ⁺	27.8 ⁺	30.8 ⁺	30.0 ⁺	30.8 ⁺	31.5 ⁺	31.6 ⁺	31.9 ⁺	32.2 ⁺	33.0 ⁺	34.9	34.8	35.4
≥26	7.0 ⁺	6.9 ⁺	7.0 ⁺	6.9 ⁺	6.9 ⁺	6.8 ⁺	7.0 ⁺	7.7 ⁺	8.0 ⁺	7.9 ⁺	8.6 ⁺	9.2 ⁺	10.1 ⁺	10.4 ⁺	11.0 ⁺	12.2 ⁺	13.3 ⁺	15.2

⁺ Difference between this estimate and the 2019 estimate is statistically significant at the .05 level.

Source: Substance Abuse and Mental Health Administration. (2020, September). *Key Substance Use and Mental Health Indicators in the United States: Results from the 2019 National Survey on Drug Use and Health*. Substance Abuse and Mental Health Administration. Retrieved December 2, 2021, from <https://www.samhsa.gov/data/sites/default/files/reports/rpt29393/2019NSDUHFFR1PDFWHTML/2019NSDUHFR1PDFW090120.pdf>

According to another cross-sectional study analyzing the racial and ethnic differences in marijuana use following legalization in states with medical cannabis laws, revealed that living in a state after enactment of recreational cannabis laws was associated with increases in the odds of cannabis use within the past year and past month among Hispanic and non-Hispanic White individuals (as well as individuals identifying as Native American, Pacific Islander, Asian, or more than 1 race) compared with the period before the passage of recreational use laws (Martin, 2021). This means, marijuana legalization is generally associated with increased use of cannabis and not associated with frequent use or use disorder among consumers, including among members of demographic subgroups most affected by criminalization.

Appendix F: Marijuana Tax Rates in Other States

State	Tax Rate
Alaska	\$50/oz. Mature flowers; \$25/oz. Immature flowers; \$15/oz. Trim, \$1 per clone
Arizona	16% excise tax (retail price)
California	15% excise tax (levied on wholesale at average market rate); \$9.65/oz. Flowers & \$2.87 oz. leaves cultivation tax; \$1.35/oz fresh cannabis plant
Colorado	15% excise tax (levied on wholesale at average market rate); 15% excise tax (retail price)
Illinois	7% excise tax (levied on wholesale at average market rate); 10% tax on cannabis flower or products with less than 35% THC; 20% tax on products infused with cannabis, such as edible products; 25% tax on any product with a THC concentration higher than 35%
Maine	10% excise tax of value at the wholesale level; \$94/lb. Trim; \$1.5 per immature plant or seedling; \$0.3 per seed
Massachusetts	10.75% excise tax (retail price)
Michigan	10% excise tax (retail price)
Montana (a)	20% excise tax (retail price)
Nevada	15% excise tax (fair market value at wholesale); 10% excise tax (retail price)
New Jersey (a,b)	Up to \$10 per ounce, if the average retail price of an ounce of usable cannabis was \$350 or more;

	<p>Up to \$30 per ounce if the average retail price of an ounce of usable cannabis was less than \$350 but at least \$250;</p> <p>Up to \$40 per ounce, if the average retail price of an ounce of usable cannabis was less than \$250 but at least \$200;</p> <p>Up to \$60 per ounce, if the average retail price of an ounce of usable cannabis was less than \$200</p>
New York (a,c)	<p>\$0.005 per milligram of THC in flower</p> <p>\$0.008 per milligram of THC in concentrates</p> <p>\$0.03 per milligram of THC in edibles</p> <p>9% excise tax (retail price)</p>
Oregon	17% excise tax (retail price)
South Dakota (a)	15% excise tax (retail price)
Vermont (a)	14% excise tax (retail price)
Washington	37% excise tax (retail price)

Table F1: Marijuana Tax Rates in Other States

- (a) As of March 2021, the retail sale of recreational marijuana has not yet started
- (b) Rates were determined as of February 22, 2021
- (c) Rates were determined as of March 30, 2021

Note: District of Columbia voters approved legalization and purchase of marijuana in 2014 but federal law prohibits any action to implement it. In 2018, the New Hampshire legislature voted to legalize the possession and growing of marijuana, but sales are not permitted. Alabama, Georgia, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Nebraska, North Carolina, South Carolina, Oklahoma, Rhode Island, and Tennessee impose a controlled substance tax on the purchase of illegal products. Several states impose local taxes as well as general sales taxes on marijuana products. Those are not included here.

Sources: <https://taxfoundation.org/state-recreational-marijuana-taxes-2021/>

Appendix G: Licensing and Renewal Fees in Different States

State	Application Fee	Retail License	Cultivation License	Product Manufacturer License	Lab License	Other License
Colorado	Initial - Store Cultivator, manufacturer - \$5000 Initial - lab, transporter, hospitality - \$1000 Annual Renewal - \$3000	Initial - \$2000 Annual Renewal - \$1500	Initial - \$1500 Renewal - based on plant numbers 1-500 plants: \$1500 501-1500 plants: \$2,300 1501-3000 plants: \$3,500 Each additional 3000: \$800	Initial - \$1500 Renewal - \$1500	Initial - \$1500 Renewal - \$1500	Transportation - \$4,400 Hospitality - \$1000 (initial) and \$750 (renewal) Research and Development - \$1500
Illinois	\$5000 unless revised by rules Reduced by half for certain social and equity applicants	\$60,000 may be waived for certain social equity applicants	Cultivation Centers - \$100,000 annually Craft growers: \$40,000 annually May be waived for certain social equity applicants	Renewal: \$20,000 annually May be waived for certain social equity applicants		Transporter - \$10,000 May be waived for certain social equity applicants
Michigan	\$6000	Initial - \$25,000 Renewal	Initial - \$4000, \$8000, or \$40,000	Initial - \$40,000 Annual	Initial - \$25,000 Annual	Transporter - same as stores Onsite -

		depends on gross sales - \$20,000, \$25,000, or \$30,000	Annual Renewal - \$3000-\$50,000 depending on gross weight transferred	Renewal - \$30,000, \$40,000, or \$50,000 depending on gross weight transferred	Renewal - \$20,000, \$25,000, or \$30,000 Depending on tests conducted	\$1000 annually Events - \$1000
Washington	\$250 Testing Labs- \$2,747	\$1,381	\$1,381	\$1,381	Years 1-3: \$6,192/year plus per diem and travel for audit* Year 4: Likely \$1667 * Plus \$150 per hour for additional required follow-up	Transportation - \$1000 Research - \$1300 Medical endorsement : No fee

Table G1: Licensing and Renewal Fees in Different States

Source: <https://www.mpp.org/issues/legalization/breakdown-application-licensing-renewal-fees-adult-use-states/>

Appendix H: Cost from Increased Crash Rate after Legalization

In this appendix, we predict and monetize increased crash rates from marijuana legalization. The Wisconsin Department of Transportation (n.d.) estimates that the economic loss from car crashes was approximately \$2.49 billion in 2015. Adjusting for inflation at a rate of \$1.09 for every 2015 dollar, our cost estimate is \$2.85 billion. According to Farmer et al. (2021), after marijuana legalization, crashes will increase 5.9 percent (0.35 percent, 11.85 percent) on average. We use the lower and upper bounds of the 95 percent confidence interval to generate a random normal distribution for sensitivity analysis. From this, we project the total increased cost from crashes in Wisconsin after marijuana legalization will be the total economic loss from crashes times the rate of increase. The annual estimated cost from increased crashes after marijuana legalization is \$10 million. The total cost discounted across five years is **\$47 million**.

Appendix I: Avoided Marijuana-Related Criminal Justice Costs in Wisconsin

In this appendix we discuss avoiding marijuana-related criminal justice costs in Wisconsin. Despite legalization and decriminalization of marijuana in at least half the states across the country, police officers still make more arrests for marijuana offenses than for any other drug under federal law. In 2018, according to region-wise marijuana crime published by the Federal Bureau of Investigation (FBI), marijuana-related offenses accounted for about 15 percent of all drug arrests in the West, around 53 percent in Northeast, 50 percent in Midwest, and 49 percent in the South. Even with marijuana being a leading cause of arrests in the United States, marijuana arrests have declined in the last decade and are at their lowest level in at least 20 years (Gramlich, 2020). This is especially true in states that have decriminalized and legalized marijuana. Data published by the Colorado Division of Criminal Justice reveals that the total number of marijuana arrests decreased by 68 percent between 2012 and 2019 from 13,225 to 4,290.

Drug abuse violations		United States total	Northeast	Midwest	South	West
Total¹		100.0	100.0	100.0	100.0	100.0
Sale/Manufacturing:	Total	13.6	15.9	12.8	15.9	9.4
	Heroin or cocaine and their derivatives	4.4	8.6	3.0	4.2	3.1
	Marijuana	3.3	3.9	4.3	3.9	1.5
	Synthetic or manufactured drugs	1.8	1.2	0.8	3.5	0.4
	Other dangerous nonnarcotic drugs	4.0	2.2	4.7	4.3	4.4
Possession:	Total	86.4	84.1	87.2	84.1	90.6
	Heroin or cocaine and their derivatives	20.2	19.0	12.7	13.5	34.5
	Marijuana	36.8	48.9	45.8	44.8	13.4
	Synthetic or manufactured drugs	4.3	3.5	4.6	5.9	2.6
	Other dangerous nonnarcotic drugs	25.0	12.8	24.1	19.8	40.1

¹ Because of rounding, the percentages may not add to 100.0.

Table II: Drug Abuse Violations - 2018 data published by FBI

Costs associated with marijuana charges can occur at the point of arrest, through the court system, and facility costs among cases resulting in sentencing. According to Grace (2019) in a policy brief conducted by Badger Institute, only 0.23 percent of all marijuana convictions resulted in prison sentences. This is roughly 21 cases where marijuana was the most serious offense, with only 3 of those being first time offenders, and therefore eligible for exclusion under our alternatives. While these cases still result in costs to Wisconsin, by and large, the majority of cases resulting in incarceration send those convicted to jail rather than prison. Our estimates omit costs related to prison sentencing because it is relevant to so few cases.

To begin this analysis, we first assess current trends in possession and intent to distribute arrests and convictions resulting in sentencing. Figure II(a) and II(b) shows that arrests related to possession and intent to distribute are declining in the last five years. In order to accurately assess the impact of avoided arrests, we account for this downward trend. Table 10 shows the number of arrests associated with this figure.

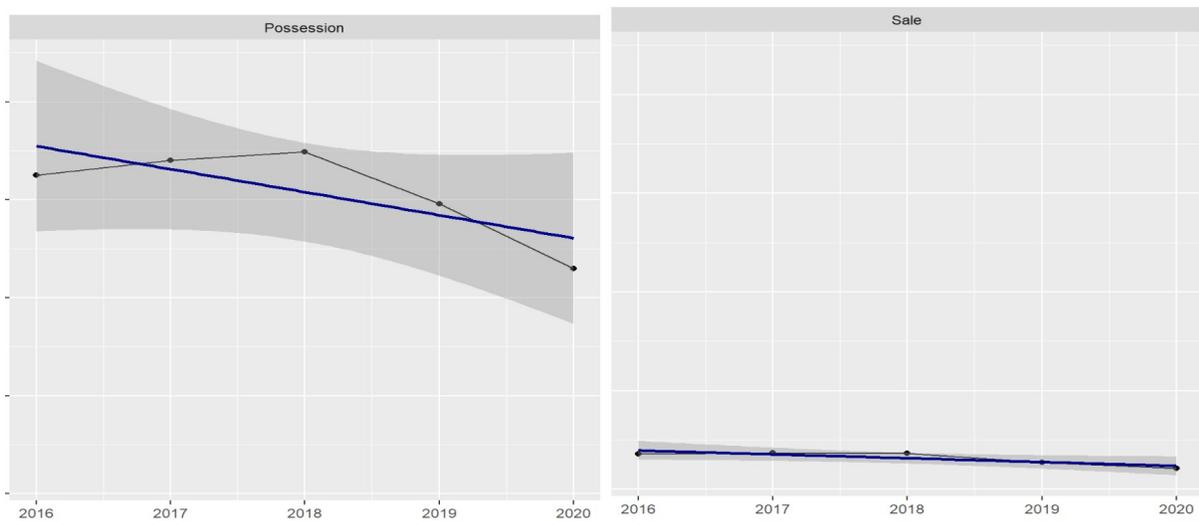


Figure II: Marijuana Possession and Sale Arrests from 2016 to 2020

(a) Figure II-a (left) shows the arrest for possession of marijuana in Wisconsin.

(b) Figure II-b (right) shows arrest trends for intent to distribute marijuana in Wisconsin

Table I2: Number of marijuana-related arrests in Wisconsin

Year	Possession	Intent to Distribute
2016	16250	1798
2017	17018	1863
2018	17444	1829
2019	14786	1353
2020	11488	1077

Source: Wisconsin Department of Justice. *Wisconsin Department of Justice*. UCR Arrest Data. Retrieved December 8, 2021 from <https://www.doj.state.wi.us/dles/bja/ucr-arrest-data>

Number of arrests, trials, and convictions

Using the results of the regression represented in Figure J2, we predict future arrests for five years following hypothetical implementation beginning in 2022, which is shown in Figure J2. According to Grace (2019), only 15 percent of possession arrests result in a jail sentence, while 23-26 percent of intent to distribute arrests result in jail. Additionally, we estimate that 34 percent of arrests will go to court trials (Brown et. al., 2018). We account for uncertainty in this trial rate using Monte Carlos sensitivity approach.

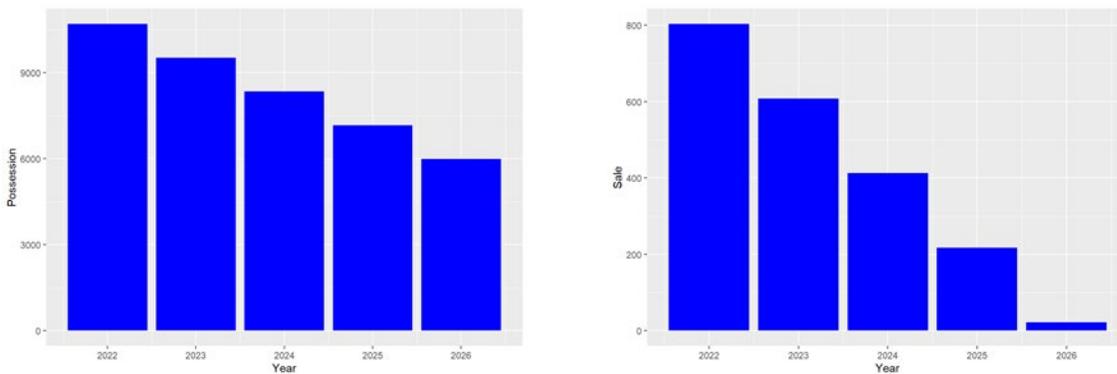


Figure I2: Predicted possession and intent to distribute arrests for the next five years

Jail Terms

Typical sentencing for marijuana is a maximum of six months for possession, but carries a term of twelve months for distribution of under 30 grams. It is important to note that under

state law, sale of marijuana would be a prison sentence. However, as previously stated, these cases tend to result in jail sentencing rather than prison, thus we use the same prison term limits but apply costs associated with jail sentencing. We use a minimum sentencing of 2 months and a maximum sentencing of 6 months for possession. We extend the maximum to forty-two months for intent to distribute arrests. These ranges are used for the Monte Carlos sensitivity analysis.

Arrest Costs

Fredericks et. al. (2010) estimates the cost per arrest is \$439. After accounting for inflation, we use \$559.50 per arrest as our estimate.

Court Costs

According to Fredricks et. al. (2010), the cost per court case is \$167 for drug offenses. After accounting for inflation, we will use \$212.85 as our cost per trial.

Jail Costs per diem

Estimating the Department of Corrections cost for convicted marijuana cases is difficult because rates differ at the county level. However, the state reimbursement rate to counties is \$60 per day (Grace, 2019). This serves as our shadow price for an arrest.

Estimation of benefit from avoided arrests, trials, and convictions

For legalization, we combine the number of arrests for both possession and intent to distribute. For decriminalization, we use possession charges only. Using the parameters specified in Table J3, we estimate the cost of an avoided arrest by multiplying our predicted annual cases by cost per arrest. To predict the costs associated with avoiding court cases, we multiply the

number of arrests by the percent predicted to go to trial and the cost per case. Similarly, we multiply conviction rates, the number of arrests, term duration, and cost per day to predict avoided department of correction costs. Thus, the total benefit is the sum of avoided costs from arrest, trials, and convictions.

Table I3: Variables and Parameters

Parameter	Variable
Number of Possession Arrests	AP
Number of Intent to Distribute Arrests	AS
Trial rate	TR
Conviction Rate - Possession	CRP
Conviction Rate - Intent to Distribute	CRS
Possession Jail Term	term_p
Intent to Distribute Jail Term	term_s
Cost per Arrest	MCPA
Cost per Court Trial	MCPT
State Daily Reimbursement per Inmate	MCPP

Decriminalization:

$$\text{Avoided Arrest Costs} = [\text{AP}] \times \text{MCPA}$$

$$\text{Avoided Court Costs} = [\text{AP}] \times [\text{TR}] \times \text{MCPT}$$

$$\text{Avoided Correction Costs} = ([\text{AP}] \times [\text{CRP}] \times [\text{term}_p]) \times \text{MCPP}$$

$$\text{Avoided Criminal Justice Costs} = [\text{Avoided Arrest Costs}] + [\text{Avoided Court Costs}] + [\text{Avoided Correction Costs}]$$

Legalization:

$$\text{Avoided Arrest Costs} = [\text{AS} + \text{AP}] \times \text{MCPA}$$

$$\text{Avoided Court Costs} = [\text{AS} + \text{AP}] \times [\text{TR}] \times \text{MCPT}$$

$$\text{Avoided Correction Costs} = (([\text{AS}] \times [\text{CRS}] \times [\text{term}_s]) + ([\text{AP}] \times [\text{CRP}] \times [\text{term}_p])) \times \text{MCPP}$$

$$\text{Avoided Criminal Justice Costs} = [\text{Avoided Arrest Costs}] + [\text{Avoided Court Costs}] + [\text{Avoided Correction Costs}]$$

Table I4: Decriminalization and Legalization Estimates for Criminal Justice Savings (in millions)

	Decriminalization	Legalization
Year 1	\$26	\$34
Year 2	\$22	\$28
Year 3	\$19	\$23
Year 4	\$16	\$18
Year 5	\$13	\$13
Total	\$97	\$116

In a five-year term, the criminal justice savings averages \$97 million (90 percent Interval: \$54, \$139) for decriminalization and \$116 million (90 percent Interval: \$73, \$159) for legalization.

Appendix J: ER Visits in Decriminalization

In this appendix, we outline how to calculate the cost of increased emergency room visits related to marijuana use.

Estimating number of visits per capita

An important part of predicting increase in emergency room visits related to marijuana use is having baseline emergency room visit information for Wisconsin. However, we were unsuccessful in finding numbers to use as estimates. A cost benefit analysis conducted for Connecticut reported that Colorado saw an approximately 959 new emergency room cases per million residents each year after legalization. Using this rate does not require us to establish a baseline, we multiply this by the Wisconsin population to get the estimated change in emergency room visits.

Under the decriminalization alternative, we estimate that decriminalization will result in an increase in use of about 0.4 percent per year based on data published in a study published in the National Library of Medicine (Carliner et. al., 2017). Based on our consumer surplus estimates, we note an increase of 1.4 percent per year in use under legalization alternatives. Based on this, we expect the increase in the prevalence of marijuana use to be 71 percent less for decriminalization, compared to legalization. We use 270 new cases per million more than the status quo as the estimate for decriminalization and multiply by the Wisconsin population to estimate the number of new cases. We account for uncertainty in the rate for sensitivity analyses.

71 percent reduction = [929 new cases per million] - [Rate for Decriminalization] / [929 new cases per million]

[Rate for Decriminalization] = 270 new cases per million

Cost of Emergency Room Visit

From the same cost-benefit analysis, we use the reported median cost of a marijuana related emergency room visit in 2016 as \$1,270. To account for inflation, we multiply this value by \$1.08. The cost estimate we use is \$1,371.60.

Final Estimates of Costs Associated with Increased Emergency Room Utilization

To get our final cost estimate, we multiply the number of new cases estimated annually for each alternative by the cost per case.

Decriminalization:

Under decriminalization, we get an average annual cost of \$1 million dollars due to increased emergency room utilization across 10,000 Monte Carlos trials. After accounting for mid-year discounting, we predict the five-year total cost to be \$5 million (90 percent Interval: \$1 million, \$9 million).

Legalization:

Under legalization, we see an average cost of \$4 million dollars annually across all trials. The resulting five year predicted cost is \$18 million dollars (90 percent Interval: \$4 million, \$32 million).

Appendix K: Demand Schedule for Marijuana in Wisconsin

This appendix shows how the demand schedule and consumer surplus was calculated using data from other states. To begin, we compiled the following data for each state in Table L1: 1) average price per ounce 2) population 3) annual revenue. We use these to predict parameters for Wisconsin. In order to estimate consumer surplus, we use the initial population of Wisconsin, the estimated percentage of cannabis users at full market implementation, an estimate of price per gram, an estimate of quantity sold per year, and the price elasticity of demand. States were included if sales began by January 1st, 2020. The calculation of each parameter for the demand schedule is as follows:

Table K1: Data from legal states used to create parameter estimates for consumer surplus

	Date of Legalization	Start of Sales	Price Per Ounce	Population	Annual Revenue
WA	12/2012	07/2014	\$233	7,705,281	\$469,200,000
CO	12/2012	01/2014	\$242	5,773,714	\$307,278,327
AK	02/2015	12/2016	\$298	733,391	\$24,540,009
OR	07/2015	10/2015	\$211	4,237,256	\$133,150,349
CA	11/2016	01/2018	\$257	39,538,223	\$474,100,000
MA	15-Dec-16	11/2018	\$341	7,029,917	\$51,680,000
NV	1-Jan-17	07/2017	\$270	3,104,614	\$105,180,947
MI	6-Dec-18	12/2019	\$290	10,077,331	\$9,692,684
IL	1-Jan-20	01/2020	\$354	12,800,000	\$34,700,000

Initial Population: For this analysis, we are using the 2020 Wisconsin population of 5,893,718 from the US Census Bureau.

Percent of users in Wisconsin: Data from the National Survey on Drug Use and Health (NSDUH) from 2003 to 2018 shows how prevalence of marijuana use changes each year following legalization of recreational use. As demonstrated in the figure below, marijuana use steadily increases post legalization. As we anticipate an increase in users over time, we make adjustments to account for growth in consumption over five years.

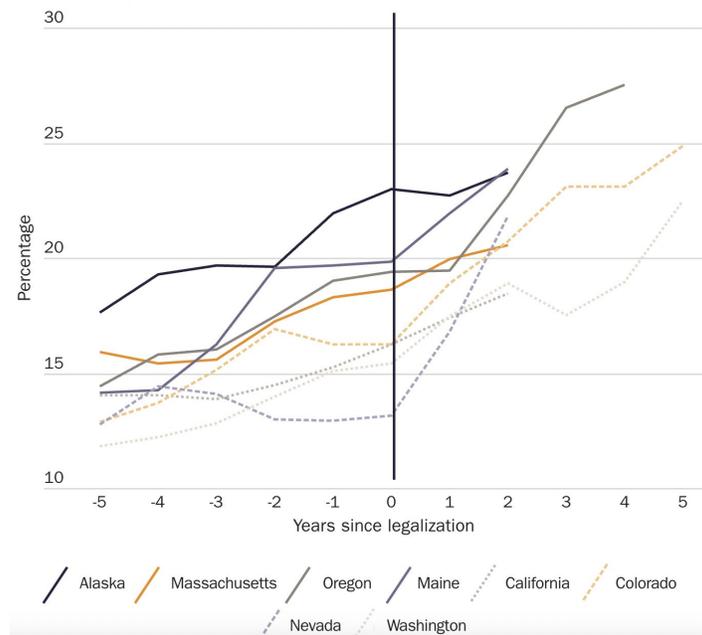


Figure K1: Marijuana Consumption rate across eight states

Source: “National Survey on Drug Use and Health (NSDUH),” Substance Abuse and Mental Health Services Administration, 2003–2018, <https://www.samhsa.gov/data/data-we-collect/nsduh-national-survey-drug-use-and-health>.

Price of Marijuana per gram flower

Using information from the American Addiction Centers, we compiled the average price per ounce for each state. This was converted to price per gram. We used the mean across all states to represent the point estimate for Wisconsin, with the minimum and maximum used for sensitivity analyses.

Quantity of flower sold per person per year (grams)

Obtaining the average quantity sold per person in each state was challenging. Due to the absence of data, we used the total tax revenue, average price per gram, and the population for each state to make our estimate. First, we divided the total tax revenue by the number of marijuana users to get the per person estimated tax contribution. With this information, we divided by price per gram to get the average quantity purchased per person for each state. Once we extrapolated this information, we calculated point estimates by taking the mean across all the states.

$$Q_{(\text{per person})} = ([\text{State Revenue}] / [\text{average price per gram}]) / [\text{State Population}]$$

$$Q_{\text{initial}} = \text{mean} (Q_{(\text{per person})})$$

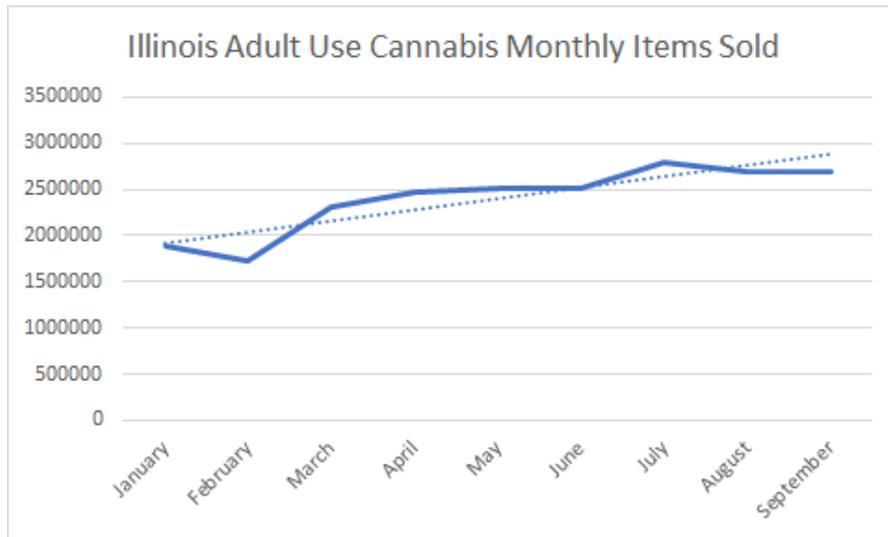
The initial quantity for year one is estimated by taking the mean quantity per person (per capita) and multiplying by the population in Wisconsin. The standard deviation is used to construct lower and upper bounds to account for variance across legalized states in the sensitivity analyses.

Month	Items sold	In-state resident sales	Out-of-state resident sales	Sales total
January	1,898,064	\$63,745,077.18	\$25,068,795.60	\$88,813,872.78
February	1,724,610	\$57,907,195.55	\$22,834,446.29	\$80,741,641.84
March	2,317,315	\$75,744,092.53	\$33,405,263.45	\$109,149,355.98
April	2,463,056	\$79,909,284.92	\$35,052,383.30	\$114,961,668.22
May	2,512,093	\$79,559,545.00	\$36,820,803.01	\$116,380,348.01
June	2,513,676	\$79,190,074.69	\$36,384,666.58	\$115,574,741.27
July	2,802,124	\$85,426,028.21	\$42,368,192.28	\$127,794,220.50
August	2,702,230	\$81,275,830.72	\$40,657,711.51	\$121,933,542.23
September	2,702,260	\$81,686,864.69	\$40,030,844.82	\$121,717,709.51

Table K2: Illinois adult use cannabis monthly sales figures (2021) Source: <https://www.marijuanamoment.net/illinois-has-sold-more-than-1-billion-in-marijuana-so-far-this-year-state-officially-announces/>

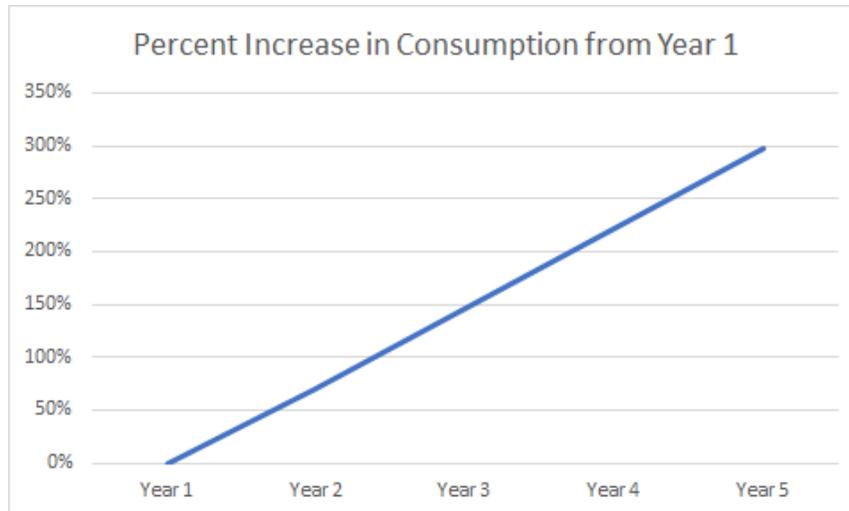
Based on sale trends in Illinois, as demonstrated in Table K2, we fit the sales over first nine months over linear regression to generate predicted values for the end of years one through five.

Figure K2: Illinois Adult Use Cannabis Monthly Sales



As the amounts in K2 are in units of grams, but rather number of items sold, we used the predicted values to calculate percent increase in sales each year as a proxy for consumption growth. From this, we predict the quantity to increase in the following trends from first year predictions.

Figure K3: Predicted growth in consumption from Year 1



Estimates for years two through five are adjusted to reflect this trend. The example equation below shows how we adjust for growth in consumption.

$$[\text{Quantity in Year 2}] = [\text{Q initial}] * [\text{Year 2 Percent Increase}] + [\text{Q initial}]$$

Table K3: Average Quantity and Increase in Sales

	Average Quantity (grams)	Percent Increase in Sales (from Year 1)
Year 1	2208518	–
Year 2	3016380	70.7
Year 3	3913644	146.3
Year 4	4485398	221.8
Year 5	5734559	297.4

Price Elasticity

Davis et. al. (2016) and Golzar, T.I. (2015) use consumer transaction data to calculate elasticity, these estimates were used for this report. The minimum elasticity is -0.54 as reported in Golzar, T.I., 2015 (Golzar, 2015), while the maximum is the highest elasticity reported in Davis et. al. (2016). Therefore, the point estimate is the mid-point between these at -0.665.

Table K4: Uncertain parameters for consumer surplus calculation

	Variable	Point Estimate	Minimum	Maximum
Initial population	Pop_initial	5,893,718	N/A	N/A
Increase in Consumption	Delta_Q	184%	N/A	N/A
Price per gram	P_initial	9.904762	8.1826	11.6268
Initial Quantity	Q_perperson	2.95	0.45	5.45
Price Elasticity	E _D	-0.665	-0.54	-0.79

Calculation of Demand Schedule

In order to calculate the demand schedule, estimate slope using quantity, elasticity and initial price.

$$\text{slope} = E_d \times Q_{\text{year1}} / \text{Price}$$

Once we have slope, we can use the estimated annual quantity to predict the intercept, in order to get the linear equation for supply.

$$[Q_d] = [Q_{\text{intercept}}] - \text{slope}(P)$$

Once the intercept is determined, we can set the linear equation equal to zero, plug in slope, intercept, and initial quantity to calculate a choke price. Consumer surplus, is therefore, the area of the triangle above the supply, between the intersection of the first-year demand and price. This is repeated for the other years.

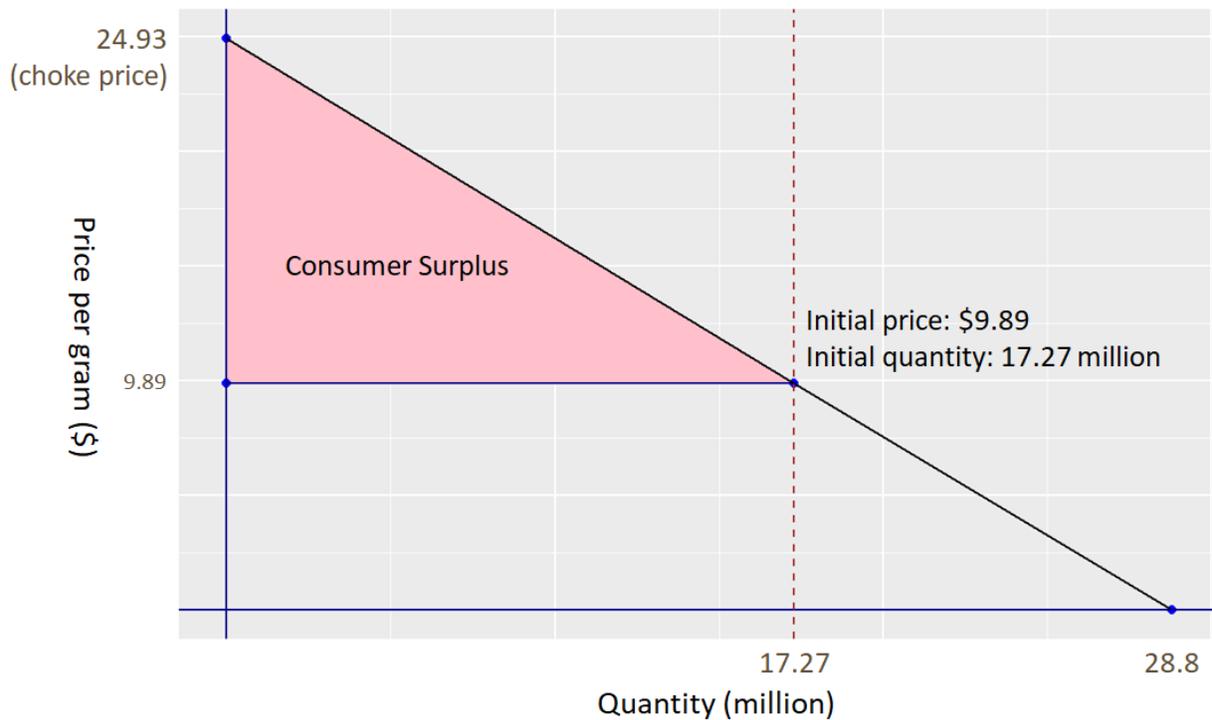
$$[\text{Consumer surplus}] = (\text{Choke Price} - \text{Initial Price}) \times (Q_{\text{year1}}) \times \frac{1}{2}$$

This is done across 10,000 simulations to account for uncertainty in the parameters. The resulting predicted consumer surplus benefit is in the table below:

Table K5: Discounted Consumer Surplus Benefit

	Consumer Surplus (in Millions)
Year 1	\$127
Year 2	\$166
Year 3	\$205
Year 4	\$242
Year 5	\$274
Total	\$1016

Figure K4: Calculating Consumer Surplus



This figure presents the method for calculating consumer surplus, using Year 1 as an example. This calculation was repeated across five years.

Appendix L: Administrative Costs and Collections of Licensing Fees

This appendix discusses the rationale for estimating administrative costs and revenue from collection of licensing fees. Both of these estimates have a similar approach and stem from the same data source, and are combined into a single appendix. Obtaining detailed information on these impacts was a challenge. From a high level, administrative costs refer to the cost to the state of regulation accompanying legalizing cannabis. This includes startup costs for setting up a regulatory office within the State Department of Health, as well as on-going costs for staffing. Without more details on the specific administrative infrastructure set up in each state, number of positions, and salaries, the best data we could obtain is the real world per capita costs reported for fiscal year 2019 (Marijuana Policy Project, n.d.).

Similarly, we were not able to find the breakdown of the total revenue for licensing fees in each state, so we converted the reported revenue from fiscal year 2019 to a per capita estimate. The policy design for licensing fees varies by state, but refers to revenue from licensing related to dispensary business, cultivation, transportation, and laboratory testing. The fees to obtain and

maintain business licenses for these various aspects of the cannabis industry varies by the amount of product or revenue the business will handle, but can be upwards of \$120,000 per year for retail business and upwards of \$75,000 a year for cultivation (Marijuana Policy Project, n.d.). The potential for fiscal impact can be potentially high, depending on the policy design that the state selects as we are unable to obtain details about the number of licenses for each business category across other legal states, as well as frequency distribution for the wide array of licensing fees, we use per capita estimates to predict potential revenue for Wisconsin.

To calculate the impact from these categories, we obtained the mean per capita estimates across all the legal states. Table L1 shows the reported administrative costs and licensing fees across all of the legal states. The mean and standard deviations were used for the uniform distribution to account for uncertainty in the Monte Carlo simulation. We multiplied the per capita estimates by the Wisconsin population to estimate the administrative costs and the revenue from licensing fees. It is important to note that while licensing fees would be a fiscal benefit to the state, this is a transfer from consumers. When factoring in the social cost of legalization, we must also add licensing fees to the cost category, therefore this benefit nets out.

Table L1: Administrative Costs and Revenue from Licensing Fees in States with Recreational Legalization for Fiscal Year 2019

State	Administrative Costs (in Millions)	Administrative Costs per Capita	Revenue from Licensing Fees (in Millions)	Revenue from Licensing Fees per Capita
Washington	\$22.8	\$295,900.95	\$4.8	\$ 62,294.94
Colorado	\$25.7	\$445,274.08	\$ 11.8	\$ 205,656.52
Alaska	\$1.8	\$249,512.20	\$2.0	\$ 281,103.26
Oregon	\$25	\$590,004.47	\$13.1	\$ 309,162.34
California	\$33.5	\$ 84,836.89	\$28.3	\$ 71,530.78

Massachusetts	\$9.7	\$137,981.71	\$8.7	\$ 123,756.80
Nevada	\$3.2	\$103,072.39	\$5.2	\$ 167,897.10
Michigan	\$2.3	\$22,823.50	\$2.7	\$ 26,892.04
Illinois		\$ -	\$15.0	\$ 117,524.22

Source: Marijuana Policy Project (n.d.). *Financial impact of legalizing and regulating cannabis for adult use*. MPP. Retrieved November 1, 2021, from <https://www.mpp.org/issues/legalization/financial-information-on-states-with-adult-use-legalization/>

Final Estimate of Administrative Costs

We predict an average undiscounted annual administrative cost of \$14 million per year, with a total cost of \$65 million across five years (90 percent Interval: \$23 million, \$107 million), after accounting for mid-year discounting and sensitivity analysis.

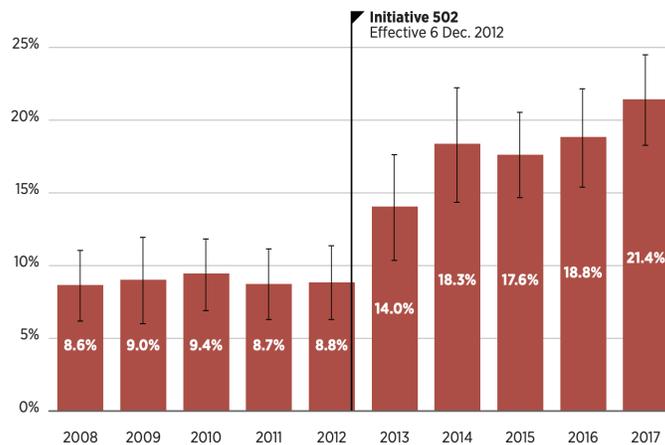
Final Estimate of Revenue from Licensing Fees

We estimate the annual benefit from licensing fees to be \$9 million per year, on average. After 10,000 Monte Carlos trials, we estimate the five-year total benefit to be \$41 million (90 percent Interval: \$20 million, \$62 million) after applying mid-year discounting.

Appendix M: Marijuana and Risk of Crashes

Marijuana contains delta-9-THC, a psychoactive cannabinoid that induces user intoxication. THC can be detected in the body long after ingestion although the psychoactive effects last only for a few hours. Several studies have attempted to find the correlation between marijuana consumption and DUID accidents. About 5 percent of the US population above the age of sixteen years reported driving under the influence of cannabis and 1 percent reported driving under the influence of illicit drugs other than marijuana. Analysis of systematic reviews, meta-analyses reveals that there is significantly increased risk of crashes after acute cannabis use. The results vary depending on the level of substance, application, and crash severity. In some studies, there is a significant correlation between high THC blood concentration and crash risk. Other studies do not support this relationship at lower THC concentrations. Hence, there is no clear number specifying the concentration threshold in these studies. Image M1 shows an increase in the percentage of drivers involved in car crashes and tested THC-positive.

Figure M1: Estimated Percentage of Drivers Involved in Fatal Crashes Who Were THC-Positive,

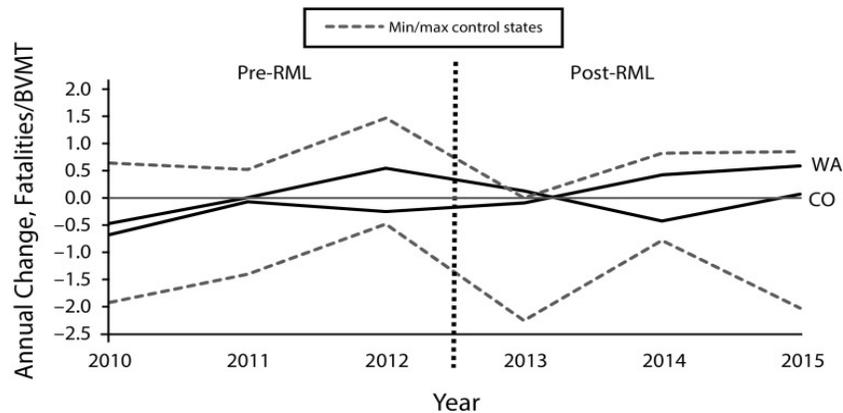


Washington State, 2008-2017. Vertical bars represent 95% Confidence Intervals. Source: Tefft, B. C. & Arnold, L. S. (2020). Cannabis Use Among Drivers in Fatal Crashes in Washington State Before and After Legalization (Research Brief). Washington, D.C.: AAA Foundation for Traffic Safety

Before legalizing marijuana, the year-over-year (YoY) changes observed in Washington and Colorado were similar to control states (Alabama, Indiana, Kentucky, Missouri, South

Carolina, Tennessee, Texas, and Wisconsin). Post legalization, fatalities in Washington and Colorado increased relative to corresponding decreases in the control states. The graph below shows YoY changes in motor vehicle crash fatality rates per billion vehicle miles traveled (BMVT) before and after recreational marijuana legalization (RML) in Washington, Colorado, and ten other states between the years 2010 and 2015.

Figure M2: Annual YoY in Motor Vehicle Crash Fatality Rates in Washington, Colorado, and Control States



Source: Tefft, B. C. & Arnold, L. S. (2020). Cannabis Use Among Drivers in Fatal Crashes in Washington State Before and After Legalization (Research Brief). Washington, D.C.: AAA Foundation for Traffic Safety

Data from the Colorado Department of Transportation (CDOT) reveals that about 69 percent of marijuana users have driven under the influence of marijuana at least once, and 27 percent admit to driving under the influence on a daily basis. Despite this, a similar trend in car accidents was observed in Colorado after it legalized weed consumption in the year 2012. On an average, there has been an increase. However, the Insurance Institute for Highway Safety (2018) reports the lack of straightforward connection between accidents and marijuana consumption. Studies evaluating whether marijuana itself leads to crashes have been inconsistent - data from emergency rooms in Denver, Colorado, Portland, Oregon, and Sacramento, California showed no significant increase in crash risk unless marijuana is consumed alongside alcohol.

Appendix N: Impact of Recreational Legalization on Opioid Use

This appendix describes our findings regarding the impact of marijuana laws on opioid use and our assessment of the potential net benefit. Review of the available literature shows conflicting findings regarding the change in opioid use after marijuana decriminalization or legalization. Some studies indicate opioid use results in an increase in fatal overdoses, while others conclude there is a decrease. In a literature review conducted by Wendelboe et. al. (2019), findings from ten peer-reviewed studies seem to indicate that opioid prescriptions decrease in states where marijuana use is primarily medicinal, while opioid fatalities appear to increase among cannabis users. Similarly, Shover et. al. (2019) examined opioid use trends from 1999 to 2017 and noted that after accounting for recreational legalization, the previously noted reduction in opioid use associated with medical marijuana laws reverses in effect. Though these results should be considered cautiously, as they are not very robust, we consider opioid use producing both costs and benefits in review of evidence that recreational use may have different impacts. In terms of costs, we assess the increase in fatal overdoses among cannabis users. To assess benefits, we consider the impact from reduction in prescription opiates for pain management.

Increase in Fatal Overdoses among Cannabis Users

To calculate opioid costs, we estimate the rate of increase in fatal overdoses, the current population of Wisconsin, and the cost per capita of an opioid overdose. According to the CDC (2021), Wisconsin's opioid related fatality cost is \$11.45 million per case in 2016. The annual rate of increase in cases is assumed to be 3.79 cases per 100,000, based on an analysis comparing overdose trends in states where marijuana is illegal versus legal (Wendelboe et. al., 2019). The details regarding this rate are outlined in Table N1. We multiplied this by the population of

Wisconsin to get an estimate for the number of lives lost due to opioid overdose. We then multiply this by the per case cost of a fatal overdose.

$$\text{Cost} = [\text{Wisconsin Population}] \times [\text{Rate of Increase}] \times [\text{Per Case Cost of Overdose}].$$

Table N1: State - Level Prevalence of Opioid Prescriptions and Fatal Overdoses in 2016

State	Year Medical	Year Recreational	Opioid Prescriptions per 100 Population	Opioid Death Rate (per 100,000 Population)
Alaska	1998	2014	58.9	12.5
Arizona	2010	NA	70.2	11.4
California	1996	2016	44.8	4.9
Colorado	2000	2012	59.8	9.5
Connecticut	2012	NA	55.9	24.5
Delaware	2011	NA	79.2	16.9
Hawaii	2000	NA	41.9	5.2
Illinois	2013	NA	56.8	15.3
Maine	1999	2016	66.9	25.2
Maryland	2003	NA	58.7	30
Massachusetts	2012	2016	47.1	29.7
Michigan	2008	NA	84.9	18.5
Minnesota	2014	NA	46.9	7.4
Montana	2004	NA	69.8	4.2
Nevada	2000	2016	80.7	13.3
New Hampshire	2013	NA	64.3	35.8
New Jersey	2009	NA	52.6	16
New Mexico	2007	NA	65.1	17.5
New York	2014	NA	42.7	15.1
Oregon	1998	2014	76.3	7.6
Rhode Island	2007	NA	60.3	26.7
Vermont	2004	NA	58.6	18.4
Washington	1998	2012	64.9	30

This table from Wendelboe et. al. (2019) shows the prevalence of opioid use and fatal overdose by State and policy status. States with medical or recreational cannabis were compared to states with prohibition. The authors found a significant reduction in prescription opioids and an increase in fatal overdoses. The rate of increase in fatal overdoses from this analysis serves as the point estimate for the cost estimate.

Reduction in prescription opiates

To calculate the reduction in opioid prescriptions, we determine the Wisconsin baseline and estimate the potential number of avoided misuse and fatal overdoses as a result of reduced prescribing. According to NIDA (2020), Wisconsin providers prescribe opioids at a rate of 45.8 prescriptions per 100 persons, which gives us a reasonable baseline estimate based on the current population of the state. Chihuri and Li (2019) estimate a 7 percent reduction in prescription opioids in states where medical marijuana is legal. We use this as our point estimate for this analysis. We can now predict the number of avoided opioid prescriptions using the following equation:

$$[\text{Avoided Prescriptions}] = [\text{Baseline Prescriptions}] \times [0.07]$$

We assume that up to 34 percent of patients prescribed opiates will develop overuse disorder (Klimas et. al., 2019). Based on Wisconsin data on current overuse and fatal overdose cases, we estimate a case fatality rate of 2.5 percent (CDC, 2021). The CDC also estimates the cost per case to be around \$221,000. With these numbers we can predict the avoided overuse cases and avoided overdoses, and multiply this by the cost per case of overuse and the cost per case of an overdose to get the total benefit.

$$[\text{Avoided Overuse Cases}] = [\text{Avoided Prescriptions}] \times [\text{Incidence Rate of Overuse Disorder}]$$

$$[\text{Avoided Overdoses}] = [\text{Avoided Overuse Cases}] \times [\text{Case Fatality Rate}]$$

$$[\text{Opioid Benefit}] = [\text{Avoided Overuse Cases} \times \text{Cost per Case}] + [\text{Avoided Overdoses} \times \text{Cost per Overdose}]$$

Estimation of Net Effect on Opioid Use Costs

The total annual benefit from reduced prescriptions is on average, \$18 billion dollars, across 10,000 Monte Carlos trials. The total annual cost from increased fatal overdoses among

recreational marijuana users is \$1 billion. The five-year total benefits and costs, accounting for mid-year discounting, is \$81 billion and \$6 billion, respectively.

To get the net present value of the impact of legalizing marijuana on opioid use, we take the difference between the net benefit and costs across five years. The present value of net benefits for opioid impacts yields an average of \$75 million (90 percent Interval: \$14 billion, \$137 billion) in cost savings after accounting for uncertainty and mid-year discount. This impact yields a positive present value of net benefits 98.4 percent of the time.

From this analysis, we see the potential benefit from reduction in opioid use cases is large. Due to the size of the impact, the great uncertainty in some of the cost estimates, and the mixed findings regarding the effects of marijuana legislation on opioid use, we excluded these analyses from the main analysis. The sheer size of this effect would drive findings towards very large net benefit in high billions across nearly 100 percent of trials. Due to the significance of the opioid epidemic in Wisconsin, it is important to present these analyses with the caveat about the uncertainties. We nonetheless believe that the non-monetized impact on opioid use could be positive.

Table N2: Parameters for Modeling Net Opioid Benefit

Parameter	Point Estimate	Distribution
Cost Estimate: Increase in Fatal Overdoses due to Cannabis Use		
Wisconsin Population	5893718	N/A
Rate of Increase per Capita	3.79/100,000	Uniform
Cost Per Overdose (Millions of Dollars)	11.45 million	N/A
Benefit: Reduction in Prescription Opiates		
Wisconsin Baseline Prescribing per Capita	45.8/100	N/A
Percent Reduction in Prescribing	7	N/A
Incidence of Overuse (percent)	16.5 (Min: 1, Max: 34)	Uniform
Case Fatality Rate	2.5%	N/A
Cost Per Overdose (Millions of Dollars)	11.45	N/A
Cost Per Overuse (Millions of Dollars)	0.221	N/A

Appendix O: Impact of Marijuana Policy on Non-Drug Related Crime

This appendix discusses impacts of marijuana policy on non-drug related crimes. In a time-series analysis conducted by Lu et. al. (2018) of the effect of marijuana on crime in Colorado and Washington state, the researchers found that there was an immediate increase in crime rate soon after legalization but in the long term, these effects have been stabilized. They exercise a word of caution about establishing correlation and causation between legalization and crime rate: “the short-term increases might appear to suggest that marijuana increased crime, but we have to be careful about this interpretation as the increases do not reflect permanent shifts and could be artificially induced by the small number of time units between legalization and sale”.

Furthermore, Huber III et. al. (2016) examined the relationship between the legalization of medical marijuana, depenalization of possession, and the incidence of non-drug crime from 1972 to 2012. The results of this study show a 4-12% reduction in robberies, larcenies, and burglaries due to the legalization of medical marijuana, while decriminalization has small effects and may increase crime rates. The researchers also examined crimes unrelated to the cannabis market and noted null results, showing support for significant reduction in crime due to medical marijuana legislation, which they attribute to supply-side effects of medicinal use.

While evidence across the literature may suggest null effects to significant reductions in crime, federal banking regulations may pose potential risks of property crime in the vicinity of dispensaries. Due to federal prohibition of marijuana, many banks will not serve the cannabis industry, even when clear law and favorable regulatory structures are in place. (Hill, 2021). The Department of Treasury provided guidance to allow banks to serve the industry, but they are still required to file suspicious activity reports and comply with a heavy set of regulations due to federal policy, even in states that passed legalization (Klein, 2018). This poses a problem with

businesses having to handle large sums of cash and find their own mechanisms for secure storage, risking potential of robbery and property crimes.

Though the cash flow and banking issue may potentially increase risk of property crime near or at dispensaries, the findings are mixed. A study by Hunt et. al. suggests there is no relationship between dispensary allowances and property crimes, though they note that pre-existing trends show a decline. They conclude that the findings support recent studies that dispensaries help reduce crime by reducing vacant buildings and putting more security in these areas. Another study conducted by Dong & Tyndall (2018) examined the concern that dispensaries may contribute to local crime. While they did find that the presence of a dispensary has no impact on average local crime rates overall, when they factored in socioeconomic status of the surrounding neighborhood, they noted an increase in property crime adjacent to new dispensaries. While the findings are mixed, it is important to consider the potential impact of federal prohibition and access to banking institutions on risk of robberies.

Another crime impact perspective examines the public safety benefit of legalization. Studies from the literature suggest there could be improvements in police effectiveness due to better resource allocation from time saved from reduced cannabis related arrests, as evident in a study by Makin et. al. (2019). Using time-series analysis of Uniform Crime Reports data from 2010 to 2015 in Washington State, the researchers found no negative effects of legalization on crime clearance rates. The evidence from the study suggests legalization has resulted in improvements in some clearance rates.

Appendix P: Monte Carlo Simulation

```

/*****
/*          MARIJUANA CBA - FALL 2021          */
*****/

/*****
/*      Many parameters used to calculate each impact have uncertainty. */
/*      To account for this, we will use monte carlos sensitivity */
/*      analyses in the estimation of each cost and benefit. From this */
/*      we will use mean, min, and max for each year as inputs for the */
/*      final monte carlos. */
*****/

/*set observations = 1,000 and pick any number for seed (see allows
replication of findings. Without the seed, each time the program is run,
different values will be produced)*/

set obs 10000
set seed 25

/*****
/*          STEP 1: CALCULATE BENEFITS          */
*****/
-----
/*      1. Consumer Surplus          */
/*      2. Tax Revenue          */
/*      3. Criminal Justice Savings          */
/*      4. Licensing Fees          */
/*      5. Opioid Benefit          */
*****/

/*****
(1) CALCULATE CONSUMER SURPLUS
--estimate initial quantity
--use this to get slope
--use slope and initial Q to estimate intercept
--set linear equation to 0, solve for P to get
choke price
--Use choke price, initial price, Quantity to
calculate consumer surplus.  $(1/2)*Q*(P_{choke}-P)$ 
*****/

//initial parameters with min/max values
gen pop_initial=5893718
gen prev_initial=0.164
gen delta_prev=0.014
gen P=9.904762
gen P_min=P-1.722081
gen P_max=P+1.722081
gen Qyear_perpersoninpop=2.95
gen E=-0.664
gen E_min=-0.54
gen E_max=-0.79

/*****
Quantity, Price, Elasticity, and prevalence have uncertainty
Use sensitivity methods to adjust for this
*****/

***QUESTION FOR WEIMER: are we using uniform distribution for all uncertainty
or should we use other distributions for some of these -- for example -- normal ***

/*Quantity year 1 - since estimate is the average grams sold per capita,
multiply by wisconsin population to get estimates*/

//replace uncertain parameters:
gen Pdiff=P_max-P_min

```

```

gen Ediff=E_max-E_min
gen saleincrease2=0.707224835*uniform()
gen saleincrease3=1.462718855*uniform()
gen saleincrease4=2.218212874*uniform()
gen saleincrease5=2.973706893*uniform()

replace prev_initial = 0.16 * runiform()
replace P=P_min + Pdiff*uniform()
replace E=E_min + Ediff * runiform()
replace Qyear_perpersoninpop=runiform((2.95-2.6),(2.95+2.6))

gen Qyear1=pop_initial*Qyear_perpersoninpop

//generate qauntity growth over five years
gen Qyear2=(Qyear1*saleincrease2)+Qyear1
gen Qyear3=(Qyear1*saleincrease3)+Qyear1
gen Qyear4=(Qyear1*saleincrease4)+Qyear1
gen Qyear5=(Qyear1*saleincrease5)+Qyear1

//Q= population * Quantity sold per person
generate Qinitial_y1=Qyear1
generate Qinitial_y2=Qyear2
generate Qinitial_y3=Qyear3
generate Qinitial_y4=Qyear4
generate Qinitial_y5=Qyear5

summarize Qyear1 Qyear2 Qyear3 Qyear4 Qyear5

//get slope -- slope = Elasticity * (Initial Quantity/Price)
generate slope1= E * (Qinitial_y1/P)
generate slope2= E * (Qinitial_y2/P)
generate slope3= E * (Qinitial_y3/P)
generate slope4= E * (Qinitial_y4/P)
generate slope5= E * (Qinitial_y5/P)

//get intercept -- Qint = Initial Q + (-slope/P)
//NOTE: remember slope is already negative
generate Qint1=Qinitial_y1 +(-slope1*P)
generate Qint2=Qinitial_y2 +(-slope2*P)
generate Qint3=Qinitial_y3 +(-slope3*P)
generate Qint4=Qinitial_y4 +(-slope4*P)
generate Qint5=Qinitial_y5 +(-slope5*P)

//Calculate choke price
generate P_choke1=Qint1/-slope1
generate P_choke2=Qint2/-slope2
generate P_choke3=Qint3/-slope3
generate P_choke4=Qint4/-slope4
generate P_choke5=Qint5/-slope5

//calculate consumer surplus
generate consumer_surplus_y1=(P_choke1-P)*(Qinitial_y1)*(1/2)
generate consumer_surplus_y2=(P_choke2-P)*(Qinitial_y2)*(1/2)
generate consumer_surplus_y3=(P_choke3-P)*(Qinitial_y3)*(1/2)
generate consumer_surplus_y4=(P_choke4-P)*(Qinitial_y4)*(1/2)
generate consumer_surplus_y5=(P_choke5-P)*(Qinitial_y5)*(1/2)

gen q1=Qyear1/1000000
gen qi1=Qint1/1000000

tabstat q1 P_choke1 P slope1 qi1, stat(mean)

/*****
(2) CALCULATE TAX REVENUE
--use consumer surplus quantity estimates
--multiple by tax rate and price
--point estimate, min, max for MC

```

```

*****/

//tax rate
gen tax_rate=0.20

//calculate tax revenue estimates
gen Revenue_y1=(Qinitial_y1*P)*tax_rate
gen Revenue_y2=(Qinitial_y2*P)*tax_rate
gen Revenue_y3=(Qinitial_y3*P)*tax_rate
gen Revenue_y4=(Qinitial_y4*P)*tax_rate
gen Revenue_y5=(Qinitial_y5*P)*tax_rate

//output stats
tabstat Revenue_y1, stat(mean)
tabstat Revenue_y2, stat(mean)
tabstat Revenue_y3, stat(mean)
tabstat Revenue_y4, stat(mean)
tabstat Revenue_y5, stat(mean)

/*****
(3) AVOIDED CRIMINAL JUSTICE COSTS
--need to calculate for possession and sale
--sale only relevant to legalization
--savings=initial arrest*marginal cost per arrest
*****/

//CRIMINAL JUSTICE SAVINGS
// (1) Avoided Arrest Costs
/// Population Arrested - Possession
gen avoided_arrest_possession_1 = 10694.8
gen avoided_arrest_possession_2 = 9519.2
gen avoided_arrest_possession_3 = 8343.6
gen avoided_arrest_possession_4 = 7168
gen avoided_arrest_possession_5 = 5992.4
/// Population Arrested - Sale
gen avoided_arrest_sale_1 = 803.2
gen avoided_arrest_sale_2 = 608
gen avoided_arrest_sale_3 = 412.8
gen avoided_arrest_sale_4 = 217.6
gen avoided_arrest_sale_5 = 22.4

gen marginal_cost_per_arrest = 559.6
gen MCPA = marginal_cost_per_arrest

//For legalization, we will save on both sales and possession charges
gen avoided_total_arrest_rec_1=(avoided_arrest_possession_1+avoided_arrest_sale_1)*MCPA
gen avoided_total_arrest_rec_2=(avoided_arrest_possession_2+avoided_arrest_sale_2)*MCPA
gen avoided_total_arrest_rec_3=(avoided_arrest_possession_3+avoided_arrest_sale_3)*MCPA
gen avoided_total_arrest_rec_4=(avoided_arrest_possession_4+avoided_arrest_sale_4)*MCPA
gen avoided_total_arrest_rec_5=(avoided_arrest_possession_5+avoided_arrest_sale_5)*MCPA

//For decriminalization, we will save only on possession charges
gen avoided_total_arrest_decrim_1=(avoided_arrest_possession_1)*MCPA
gen avoided_total_arrest_decrim_2=(avoided_arrest_possession_2)*MCPA
gen avoided_total_arrest_decrim_3=(avoided_arrest_possession_3)*MCPA
gen avoided_total_arrest_decrim_4=(avoided_arrest_possession_4)*MCPA
gen avoided_total_arrest_decrim_5=(avoided_arrest_possession_5)*MCPA

// (2) Avoided Jail Expenditures

/// Population Jailed - Possession
gen avoided_jail_possession_1 = 1604.22
gen avoided_jail_possession_2 = 1427.88
gen avoided_jail_possession_3 = 1251.54
gen avoided_jail_possession_4 = 1075.2
gen avoided_jail_possession_5 = 898.86
/// Population jailed - Sale
gen avoided_jail_sale_1 = 196.784

```

```

gen avoided_jail_sale_2 = 148.96
gen avoided_jail_sale_3 = 101.136
gen avoided_jail_sale_4 = 53.312
gen avoided_jail_sale_5 = 5.488
    /// Jail Term
gen term_possession = runiform(2,12)
gen term_sale = runiform(2,42)
gen monthly_cost_per_person = 1800
gen MCPP = monthly_cost_per_person

    /// Thus, the avoided cost from putting them into jail are for legalization:
gen avoided_total_jail_rec_1 = (avoided_jail_possession_1*term_possession + avoided_jail_sale_1*term_sale)*MCPP
gen avoided_total_jail_rec_2 = (avoided_jail_possession_2*term_possession + avoided_jail_sale_2*term_sale)*MCPP
gen avoided_total_jail_rec_3 = (avoided_jail_possession_3*term_possession + avoided_jail_sale_3*term_sale)*MCPP
gen avoided_total_jail_rec_4 = (avoided_jail_possession_4*term_possession + avoided_jail_sale_4*term_sale)*MCPP
gen avoided_total_jail_rec_5 = (avoided_jail_possession_5*term_possession + avoided_jail_sale_5*term_sale)*MCPP

    /// Thus, the avoided cost from putting them into jail are for decriminalization:
gen avoided_total_jail_decrim_1 = (avoided_jail_possession_1*term_possession)*MCPP
gen avoided_total_jail_decrim_2 = (avoided_jail_possession_2*term_possession)*MCPP
gen avoided_total_jail_decrim_3 = (avoided_jail_possession_3*term_possession)*MCPP
gen avoided_total_jail_decrim_4 = (avoided_jail_possession_4*term_possession)*MCPP
gen avoided_total_jail_decrim_5 = (avoided_jail_possession_5*term_possession)*MCPP

//(3) Avoided Court Costs
gen total_arrests1=avoided_arrest_possession_1+avoided_arrest_sale_1
gen total_arrests2=avoided_arrest_possession_2+avoided_arrest_sale_2
gen total_arrests3=avoided_arrest_possession_3+avoided_arrest_sale_3
gen total_arrests4=avoided_arrest_possession_4+avoided_arrest_sale_4
gen total_arrests5=avoided_arrest_possession_5+avoided_arrest_sale_5

    //number of cases that go to trial
gen trial_rate=0.34*uniform()
gen MCPT=212.85

//legalization
gen avoided_trial_rec1=total_arrests1*trial_rate*MCPT
gen avoided_trial_rec2=total_arrests2*trial_rate*MCPT
gen avoided_trial_rec3=total_arrests3*trial_rate*MCPT
gen avoided_trial_rec4=total_arrests4*trial_rate*MCPT
gen avoided_trial_rec5=total_arrests5*trial_rate*MCPT

//dcriminalization
gen avoided_trial_decrim1=avoided_arrest_possession_1*trial_rate*MCPT
gen avoided_trial_decrim2=avoided_arrest_possession_2*trial_rate*MCPT
gen avoided_trial_decrim3=avoided_arrest_possession_3*trial_rate*MCPT
gen avoided_trial_decrim4=avoided_arrest_possession_4*trial_rate*MCPT
gen avoided_trial_decrim5=avoided_arrest_possession_5*trial_rate*MCPT

//(4) TOTAL
//LEGALIZATION -- total rec savings accounting for both arrests and convictions resulting in jail time
gen total_avoided_rec_1 = avoided_total_arrest_rec_1+avoided_total_jail_rec_1+avoided_trial_rec1
gen total_avoided_rec_2 = avoided_total_arrest_rec_2+avoided_total_jail_rec_2+avoided_trial_rec2
gen total_avoided_rec_3 = avoided_total_arrest_rec_3+avoided_total_jail_rec_3+avoided_trial_rec3
gen total_avoided_rec_4 = avoided_total_arrest_rec_4+avoided_total_jail_rec_4+avoided_trial_rec4
gen total_avoided_rec_5 = avoided_total_arrest_rec_5+avoided_total_jail_rec_5+avoided_trial_rec5

//LEGALIZATION -- total decrim savings accounting for both arrests and convictions resulting in jail time
gen total_avoided_decrim_1 = avoided_total_arrest_decrim_1+avoided_total_jail_decrim_1+avoided_trial_decrim1
gen total_avoided_decrim_2 = avoided_total_arrest_decrim_2+avoided_total_jail_decrim_2+avoided_trial_decrim2
gen total_avoided_decrim_3 = avoided_total_arrest_decrim_3+avoided_total_jail_decrim_3+avoided_trial_decrim3
gen total_avoided_decrim_4 = avoided_total_arrest_decrim_4+avoided_total_jail_decrim_4+avoided_trial_decrim4
gen total_avoided_decrim_5 = avoided_total_arrest_decrim_5+avoided_total_jail_decrim_5+avoided_trial_decrim5

```

```

/*****
(4) LICENSE FEES
*****/

```

```

//average licensing fees per capita from legal states
gen fees_perperson=runiform((1.51-0.98),(1.51+0.98))

//calculate tax revenue estimates
gen annual_license_fees=pop_initial*fees_perperson

//output stats
tabstat annual_license_fees, stat(mean)

/*****
(5) OPIOID USE REDUCTION
*****/
//how much prescriptions occur in wisconsin
gen rx_per_person_in_pop=0.458

//how many are likely to become overuse cases
gen misuse_incidence_rate=0.010 + 0.33*uniform()

//percent reduction in prescriptions -- assume equivalent reduction in overuse cases
gen rx_reduction=0.07

//first generate number of predicted overuse cases annually
gen predicted_overuse=pop_initial*rx_per_person_in_pop*misuse_incidence_rate

//avoided misuse case is equal to 7% of predicted cases
gen avoided_overuse_indicents=predicted_overuse*rx_reduction

//cost per overuse case (adjusted for inflation)
gen cost_of_overuse=221219*1.06
//cost per fatal overdose
gen cost_opioid_overdose = 11450000*1.06

//avoided costs from cases = avoided cases x costs
gen avoided_costs_from_cases=avoided_overuse_indicents*cost_of_overuse

//avoided costs from overdoses
/* case incident rate of fatal overdose is 2.5%. So if we take 2.5% of
avoided cases as the number of avoided fatal overdoses*/
gen avoided_costs_from_overdose=(avoided_overuse_indicents*0.025)*cost_opioid_overdose

gen avoided_costs_opioids = avoided_costs_from_overdose + avoided_costs_from_cases

gen opioidbenefit=avoided_costs_opioids/1000000

tabstat opioidbenefit, stat(mean)

/*****
/*          STEP 2: CALCULATE COSTS          */
/*          -----          */
/*          1. Emergency room          */
/*          2. Opioid costs          */
/*          3. Traffic fatalities          */
/*          4. Administrative costs          */
*****/

/*****
(1) EMERGENCY ROOM VISITS
--ED visit rate decriminalization
--ED rate with legalization
--price per visit
*****/
gen ED_price=1371.60
gen ED_visit_rate_l=0.000959 * uniform()
gen ED_visit_rate_d=0.000270 * uniform()

```

```

//legalization
gen ED_costs_annual_l=pop_initial*ED_visit_rate_l*ED_price

//decriminalization
gen ED_costs_annual_d=pop_initial*ED_visit_rate_d*ED_price

tabstat ED_costs_annual_l ED_costs_annual_d, stat(mean)

/*****
(2) OPIOID COSTS
*****/
//cost of overdose same as benefit category
/*cost_opioid_overdose*/

gen opioid_increase_rate = (3.79/100000)* runiform()

// Wisconsin population: pop_initial

gen increase_opioid_death = pop_initial*opioid_increase_rate
gen opioid_cost_annual_legal= increase_opioid_death*cost_opioid_overdose

tabstat opioid_cost_annual_legal, stat(mean)

/*assuming demand increases proportionally with use, we can use the
ratio of change in prevalence to estimate difference in demand between
decrim and legalization*/

gen demand_ratio=0.004/0.014

gen increase_opioid_death_d= pop_initial*opioid_increase_rate*demand_ratio
gen opioid_cost_annual_decrim= increase_opioid_death_d*cost_opioid_overdose

/*****
(3) TRAFFIC FATALITIES
*****/

gen crash_costs = 2716280000 //2015 data with inflation adjusted already
gen increase_rate = rnormal(0.0035,0.1145)

gen crash_cost_increase = crash_costs* increase_rate

/// Decriminalization
*gen costs_crashes_decrim = crash_costs * increase_rate*(demand_ratio)

/// Legalization
gen costs_crashes_legal = crash_costs * increase_rate

gen crashes = costs_crashes_legal/1000000

tabstat crashes, stat(mean)

/*****
(4) ADMINISTRATIVE COSTS
*****/

//average administrative costs per capita maintenance
gen admin_costs_per_person=runiform((2.41-1.95),(2.41+1.95))

//costs based on WI population
gen annual_administrative_costs = (admin_costs_per_person)*pop_initial

gen admincost=annual_administrative_costs/1000000
tabstat admincost, stat(mean)

/*****

```

```

/*          STEP 3: ANNUAL NET BENEFITS          */
/*          -----          */
/*          Legalization          */
/*          --B1:consumer_surplus_y1 (to 5)          */
/*          --B2:total_avaoided_rec_from_criminal_justice_1 (to 5)          */
/*          --B3:Revenue_y1 (to 5)          */
/*          --B4:annual_license_fees          */
/*          --B5:opioid_reduction          */
/*          --C1:ED_costs_annual_d          */
/*          --C2:potential_increased_cost_annual          */
/*          --C3:cost_from_increased_crashes_legal          */
/*          --C4: annual_administrative_costs          */
/*          Decriminalization          */
/*          --B1:total_avaoided_decrim_from_criminal_justice_1 (to 5)          */
/*          --C1:ED_costs_annual_d          */
/*          --C2:cost_from_increased_crashes_decriminal          */
/*          --C3:potential_increased_cost_annual_decrim          */
/*****

```

//LEGALIZATION

```

gen legal_b1 = ((consumer_surplus_y1 + total_avaoided_rec_1 + Revenue_y1 + annual_license_fees) - Revenue_y1 - annual_license_fees - ED_costs_annual_1 - costs_crashes_legal - annual_administrative_costs)/1000000
gen legal_b2 = ((consumer_surplus_y2 + total_avaoided_rec_2 + Revenue_y2 + annual_license_fees) - Revenue_y2 - annual_license_fees - ED_costs_annual_1 - costs_crashes_legal - annual_administrative_costs)/1000000
gen legal_b3 = ((consumer_surplus_y3 + total_avaoided_rec_3 + Revenue_y3 + annual_license_fees) - Revenue_y3 - annual_license_fees - ED_costs_annual_1 - costs_crashes_legal - annual_administrative_costs)/1000000
gen legal_b4 = ((consumer_surplus_y4 + total_avaoided_rec_4 + Revenue_y4 + annual_license_fees) - Revenue_y4 - annual_license_fees - ED_costs_annual_1 - costs_crashes_legal - annual_administrative_costs)/1000000
gen legal_b5 = ((consumer_surplus_y5 + total_avaoided_rec_5 + Revenue_y5 + annual_license_fees) - Revenue_y5 - annual_license_fees - ED_costs_annual_1 - costs_crashes_legal - annual_administrative_costs)/1000000

```

```

gen legal_b1o = ((consumer_surplus_y1 + total_avaoided_rec_1 + Revenue_y1 + avoided_costs_opioids + annual_license_fees) - ED_costs_annual_1 - opioid_cost_annual_legal - costs_crashes_legal - annual_administrative_costs)/1000000
gen legal_b2o = ((consumer_surplus_y2 + total_avaoided_rec_2 + Revenue_y2 + avoided_costs_opioids + annual_license_fees) - ED_costs_annual_1 - opioid_cost_annual_legal - costs_crashes_legal - annual_administrative_costs)/1000000
gen legal_b3o = ((consumer_surplus_y3 + total_avaoided_rec_3 + Revenue_y3 + avoided_costs_opioids + annual_license_fees) - ED_costs_annual_1 - opioid_cost_annual_legal - costs_crashes_legal - annual_administrative_costs)/1000000
gen legal_b4o = ((consumer_surplus_y4 + total_avaoided_rec_4 + Revenue_y4 + avoided_costs_opioids + annual_license_fees) - ED_costs_annual_1 - opioid_cost_annual_legal - costs_crashes_legal - annual_administrative_costs)/1000000
gen legal_b5o = ((consumer_surplus_y5 + total_avaoided_rec_5 + Revenue_y5 + avoided_costs_opioids + annual_license_fees) - ED_costs_annual_1 - opioid_cost_annual_legal - costs_crashes_legal - annual_administrative_costs)/1000000

```

```

gen legal_nsb1 = ((total_avaoided_rec_1 + Revenue_y1 + annual_license_fees) - annual_administrative_costs)/1000000
gen legal_nsb2 = ((total_avaoided_rec_2 + Revenue_y2 + annual_license_fees) - annual_administrative_costs)/1000000
gen legal_nsb3 = ((total_avaoided_rec_3 + Revenue_y3 + annual_license_fees) - annual_administrative_costs)/1000000
gen legal_nsb4 = ((total_avaoided_rec_4 + Revenue_y4 + annual_license_fees) - annual_administrative_costs)/1000000
gen legal_nsb5 = ((total_avaoided_rec_5 + Revenue_y5 + annual_license_fees) - annual_administrative_costs)/1000000

```

//DECRIMINALIZATION

```

gen decrim_b1 = (total_avaoided_decrim_1 - ED_costs_annual_d)/1000000
gen decrim_b2 = (total_avaoided_decrim_2 - ED_costs_annual_d)/1000000
gen decrim_b3 = (total_avaoided_decrim_3 - ED_costs_annual_d)/1000000
gen decrim_b4 = (total_avaoided_decrim_4 - ED_costs_annual_d)/1000000
gen decrim_b5 = (total_avaoided_decrim_5 - ED_costs_annual_d)/1000000

```

```

/*****
/*          STEP 4: PRESENT VALUE OF ALTERNATIVES          */
/*          -----          */
/*          social discount = 3.5%          */
/*****

```

gen d=0.035

// Calculate present value of net benefits of legalization //

```

gen legal_PVNB = legal_b1/(1+d)^0.5 + legal_b2/(1+d)^1.5 + legal_b3/(1+d)^2.5 + legal_b4/(1+d)^3.5 + ///
legal_b5/(1+d)^4.5

```

```

// Calculate present value of net benefits of legalization //
gen legal_PVNBo = legal_b1o/(1+d)^0.5 + legal_b2o/(1+d)^1.5 + legal_b3o/(1+d)^2.5 + legal_b4o/(1+d)^3.5 + ///
legal_b5o/(1+d)^4.5

// Calculate present value of net benefits of decriminalization //
gen decrim_PVNB = decrim_b1/(1+d)^0.5 + decrim_b2/(1+d)^1.5 + decrim_b3/(1+d)^2.5 + decrim_b4/(1+d)^3.5 + ///
decrim_b5/(1+d)^4.5

//calculate total net state benefit
gen net_state_benefit= legal_nsb1/(1+d)^0.5 + legal_nsb2/(1+d)^1.5 + legal_nsb3/(1+d)^2.5 + legal_nsb4/(1+d)^3.5 + ///
legal_nsb5/(1+d)^4.5

// Summarize and plot results //
summarize legal_b1 legal_b2 legal_b3 legal_b4 legal_b5
/*summarize legal_b1o legal_b2o legal_b3o legal_b4o legal_b5o*/
summarize decrim_b1 decrim_b2 decrim_b3 decrim_b4 decrim_b5
summarize legal_PVNBo legal_PVNBo decrim_PVNB decrim_PVNB net_state_benefit, detail
hist legal_PVNBo, percent title("Distribution of Present Value of Net Benefits of Legalization")
hist decrim_PVNB, percent title("Distribution of Present Value of Net Benefits of Decriminalization")

//how often do we get positive NPV?
gen positiveNPV_legal=1 if legal_PVNBo>0
replace positiveNPV_legal=0 if legal_PVNBo<0

gen positiveNPV_decrim=1 if decrim_PVNB>0
replace positiveNPV_decrim=0 if decrim_PVNB<0

tabulate positiveNPV_legal
tabulate positiveNPV_decrim

gen positiveNPV_fiscal=1 if net_state_benefit>0
replace positiveNPV_fiscal=0 if net_state_benefit<0
hist net_state_benefit, percent title("Distribution of Present Value of Net Revenue")
tabulate positiveNPV_fiscal

/*****
/*          OUTPUT STATS          */
*****/

/*****
/*          LEGALIZATION          */
*****/

//CONSUMER SURPLUS
gen cs1=(consumer_surplus_y1/(1+d)^0.5)/1000000
gen cs2=(consumer_surplus_y2/(1+d)^1.5)/1000000
gen cs3=(consumer_surplus_y3/(1+d)^2.5)/1000000
gen cs4=(consumer_surplus_y4/(1+d)^3.5)/1000000
gen cs5=(consumer_surplus_y5/(1+d)^4.5)/1000000
gen cs_total=cs1+cs2+cs3+cs4+cs5

tabstat cs_total cs1 cs2 cs3 cs4 cs5, stat(mean)

//TAX REVENUE
gen r1=(Revenue_y1/(1+d)^0.5)/1000000
gen r2=(Revenue_y2/(1+d)^1.5)/1000000
gen r3=(Revenue_y3/(1+d)^2.5)/1000000
gen r4=(Revenue_y4/(1+d)^3.5)/1000000
gen r5=(Revenue_y5/(1+d)^4.5)/1000000
gen r_total=r1+r2+r3+r4+r5

tabstat r_total r1 r2 r3 r4 r5, stat(mean)

//LICENSING
gen lf1=(annual_license_fees/(1+d)^0.5)/1000000
gen lf2=(annual_license_fees/(1+d)^1.5)/1000000
gen lf3=(annual_license_fees/(1+d)^2.5)/1000000

```

```

gen lf4=(annual_license_fees/(1+d)^3.5)/1000000
gen lf5=(annual_license_fees/(1+d)^4.5)/1000000
gen lf_total=lf1+lf2+lf3+lf4+lf5

tabstat lf_total lf1 lf2 lf3 lf4 lf5, stat(mean)

//CRIMINAL JUSTICE SAVINGS: LEGALIZATION
gen cj1=(total_avoided_rec_1/(1+d)^0.5)/1000000
gen cj2=(total_avoided_rec_2/(1+d)^1.5)/1000000
gen cj3=(total_avoided_rec_3/(1+d)^2.5)/1000000
gen cj4=(total_avoided_rec_4/(1+d)^3.5)/1000000
gen cj5=(total_avoided_rec_5/(1+d)^4.5)/1000000
gen cj_total=cj1+cj2+cj3+cj4+cj5

//output stats
tabstat cj1 cj2 cj3 cj4 cj5 cj_total, stat(mean)

//OPIOID BENEFITS
gen ob_notdiscounted=avoided_costs_opioids/1000000000
gen ocb1=(avoided_costs_opioids/(1+d)^0.5)/1000000
gen ocb2=(avoided_costs_opioids/(1+d)^1.5)/1000000
gen ocb3=(avoided_costs_opioids/(1+d)^2.5)/1000000
gen ocb4=(avoided_costs_opioids/(1+d)^3.5)/1000000
gen ocb5=(avoided_costs_opioids/(1+d)^4.5)/1000000
gen ocb_total=ocb1+ocb2+ocb3+ocb4+ocb5

tabstat ob_notdiscounted ocb_total ocb1 ocb2 ocb3 ocb4 ocb5, stat(mean)

//ADMINISTRATIVE COSTS
gen ac1=(annual_administrative_costs/(1+d)^0.5)/10000000
gen ac2=(annual_administrative_costs/(1+d)^1.5)/10000000
gen ac3=(annual_administrative_costs/(1+d)^2.5)/10000000
gen ac4=(annual_administrative_costs/(1+d)^3.5)/10000000
gen ac5=(annual_administrative_costs/(1+d)^4.5)/10000000
gen ac_total=ac1+ac2+ac3+ac4+ac5

tabstat ac_total ac1 ac2 ac3 ac4 ac5, stat(mean)

//EMERGENCY ROOM
gen edl1=(ED_costs_annual_1/(1+d)^0.5)/1000000
gen edl2=(ED_costs_annual_1/(1+d)^1.5)/1000000
gen edl3=(ED_costs_annual_1/(1+d)^2.5)/1000000
gen edl4=(ED_costs_annual_1/(1+d)^3.5)/1000000
gen edl5=(ED_costs_annual_1/(1+d)^4.5)/1000000
gen edl_total=edl1+edl2+edl3+edl4+edl5

tabstat edl_total edl1 edl2 edl3 edl4 edl5, stat(mean)

//OPIOID COSTS
gen oc_notdiscounted=opioid_cost_annual_legal/1000000000
gen ocl1=(opioid_cost_annual_legal/(1+d)^0.5)/1000000
gen ocl2=(opioid_cost_annual_legal/(1+d)^1.5)/1000000
gen ocl3=(opioid_cost_annual_legal/(1+d)^2.5)/1000000
gen ocl4=(opioid_cost_annual_legal/(1+d)^3.5)/1000000
gen ocl5=(opioid_cost_annual_legal/(1+d)^4.5)/1000000
gen ocl_total=ocl1+ocl2+ocl3+ocl4+ocl5

tabstat oc_notdiscounted ocl_total ocl1 ocl2 ocl3 ocl4 ocl5 ocl_total, stat(mean)

//NET PRESENT VALUE OF OPIOID BENEFITS
gen total_opioid_benefit=ocb_total-ocl_total

summarize total_opioid_benefit, detail

* how often do we get positive NPV? /
gen positiveNPV_opioid=1 if total_opioid_benefit>0
replace positiveNPV_opioid=0 if total_opioid_benefit<0

```

tabulate positiveNPV_opioid

//INCREASE IN CRASHES

gen tfl1=(costs_crashes_legal/(1+d)^0.5)/1000000
gen tfl2=(costs_crashes_legal/(1+d)^1.5)/1000000
gen tfl3=(costs_crashes_legal/(1+d)^2.5)/1000000
gen tfl4=(costs_crashes_legal/(1+d)^3.5)/1000000
gen tfl5=(costs_crashes_legal/(1+d)^4.5)/1000000
gen tfl_total=tfl1+tfl2+tfl3+tfl4+tfl5

tabstat tfl_total tfl1 tfl2 tfl3 tfl4 tfl5, stat(mean)

summarize cs_total r_total lf_total cj_total ocb_total ac_total edl_total ocl_total tfl_total, detail

//TOTALS state fiscal impact

gen b1f=((total_avoided_rec_1 + Revenue_y1 + annual_license_fees)/(1+d)^0.5)/1000000
gen b2f=((total_avoided_rec_2 + Revenue_y2 + annual_license_fees)/(1+d)^1.5)/1000000
gen b3f=((total_avoided_rec_3 + Revenue_y3 + annual_license_fees)/(1+d)^2.5)/1000000
gen b4f=((total_avoided_rec_4 + Revenue_y4 + annual_license_fees)/(1+d)^3.5)/1000000
gen b5f=((total_avoided_rec_5 + Revenue_y5 + annual_license_fees)/(1+d)^4.5)/1000000
gen btotalf =b1f+b2f+b3f+b4f+b5f

summarize btotalf, detail

tabstat btotalf b1f b2f b3f b4f b5f, stat(mean)

//TOTALS without opioids

gen b1=((consumer_surplus_y1 + total_avoided_rec_1 + Revenue_y1 + annual_license_fees)/(1+d)^0.5)/1000000
gen b2=((consumer_surplus_y2 + total_avoided_rec_2 + Revenue_y2 + annual_license_fees)/(1+d)^1.5)/1000000
gen b3=((consumer_surplus_y3 + total_avoided_rec_3 + Revenue_y3 + annual_license_fees)/(1+d)^2.5)/1000000
gen b4=((consumer_surplus_y4 + total_avoided_rec_4 + Revenue_y4 + annual_license_fees)/(1+d)^3.5)/1000000
gen b5=((consumer_surplus_y5 + total_avoided_rec_5 + Revenue_y5 + annual_license_fees)/(1+d)^4.5)/1000000
gen btotall=b1+b2+b3+b4+b5

gen c1=((annual_administrative_costs + ED_costs_annual_1 + costs_crashes_legal + Revenue_y1 + annual_license_fees)/(1+d)^0.5)/1000000
gen c2=((annual_administrative_costs + ED_costs_annual_1 + costs_crashes_legal + Revenue_y2 + annual_license_fees)/(1+d)^1.5)/1000000
gen c3=((annual_administrative_costs + ED_costs_annual_1 + costs_crashes_legal + Revenue_y3 + annual_license_fees)/(1+d)^2.5)/1000000
gen c4=((annual_administrative_costs + ED_costs_annual_1 + costs_crashes_legal + Revenue_y4 + annual_license_fees)/(1+d)^3.5)/1000000
gen c5=((annual_administrative_costs + ED_costs_annual_1 + costs_crashes_legal + Revenue_y5 + annual_license_fees)/(1+d)^4.5)/1000000
gen ctotall=c1+c2+c3+c4+c5

tabstat btotall b1 b2 b3 b4 b5, stat(mean)

tabstat ctotall c1 c2 c3 c4 c5, stat(mean)

summarize btotall ctotall, detail

summarize cs_total r_total lf_total cj_total ocb_total ac_total edl_total ocl_total tfl_total, detail

/*
/* DECRIMINALIZATION */
/*

//CRIMINAL JUSTICE SAVINGS

gen cjd1=(total_avoided_decrim_1/(1+d)^0.5)/1000000
gen cjd2=(total_avoided_decrim_2/(1+d)^1.5)/1000000
gen cjd3=(total_avoided_decrim_3/(1+d)^2.5)/1000000
gen cjd4=(total_avoided_decrim_4/(1+d)^3.5)/1000000
gen cjd5=(total_avoided_decrim_5/(1+d)^4.5)/1000000
gen cjd_total=cjd1+cjd2+cjd3+cjd4+cjd5

tabstat cjd1 cjd2 cjd3 cjd4 cjd5 cjd_total, stat(mean)

```

//EMERGENCY ROOM
gen edd1=(ED_costs_annual_d/(1+d)^0.5)/1000000
gen edd2=(ED_costs_annual_d/(1+d)^1.5)/1000000
gen edd3=(ED_costs_annual_d/(1+d)^2.5)/1000000
gen edd4=(ED_costs_annual_d/(1+d)^3.5)/1000000
gen edd5=(ED_costs_annual_d/(1+d)^4.5)/1000000
gen edd_total=edd1+edd2+edd3+edd4+edd5

tabstat edd1 edd2 edd3 edd4 edd5 edd_total, stat(mean)

summarize cjd_total edd_total, detail

/*OPIOID COSTS
gen ocd1=(opioid_cost_annual_decrim/(1+d))/1000000
gen ocd2=(opioid_cost_annual_decrim/(1+d)^2)/1000000
gen ocd3=(opioid_cost_annual_decrim/(1+d)^3)/1000000
gen ocd4=(opioid_cost_annual_decrim/(1+d)^4)/1000000
gen ocd5=(opioid_cost_annual_decrim/(1+d)^5)/1000000
gen ocd_total=ocd1+ocd2+ocd3+ocd4+ocd5

tabstat ocd1 ocd2 ocd3 ocd4 ocd5 ocd_total, stat(mean) */

/*TRAFFIC FATALITIES
gen tfd1=(costs_crashes_decrim/(1+d))/1000000
gen tfd2=(costs_crashes_decrim/(1+d)^2)/1000000
gen tfd3=(costs_crashes_decrim/(1+d)^3)/1000000
gen tfd4=(costs_crashes_decrim/(1+d)^4)/1000000
gen tfd5=(costs_crashes_decrim/(1+d)^5)/1000000
gen tfd_total=tfd1+tfd2+tfd3+tfd4+tfd5

tabstat tfd1 tfd2 tfd3 tfd4 tfd5 tfd_total, stat(mean)*/

/*TOTALS
gen b1d = ((total_avoided_rec_1)/(1+d))/1000000
gen b2d = ((total_avoided_rec_2)/(1+d)^2)/1000000
gen b3d = ((total_avoided_rec_3)/(1+d)^3)/1000000
gen b4d = ((total_avoided_rec_4)/(1+d)^4)/1000000
gen b5d = ((total_avoided_rec_5)/(1+d)^5)/1000000
gen btotald=b1d+b2d+b3d+b4d+b5d

gen c1d= ((ED_costs_annual_d)*opioid_cost_annual_decrim*/(1+d)^0.5)/1000000
gen c2d= ((ED_costs_annual_d)*opioid_cost_annual_decrim*/(1+d)^1.5)/1000000
gen c3d= ((ED_costs_annual_d)*opioid_cost_annual_decrim*/(1+d)^2.5)/1000000
gen c4d= ((ED_costs_annual_d)*opioid_cost_annual_decrim*/(1+d)^3.5)/1000000
gen c5d= ((ED_costs_annual_d)*opioid_cost_annual_decrim*/(1+d)^4.5)/1000000
gen ctotald=c1d+c2d+c3d+c4d+c5d

tabstat b1d b2d b3d b4d b5d btotald, stat(mean)
tabstat c1d c2d c3d c4d c5d ctotald, stat(mean)*/

```

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