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Federal Proposals to Tax Marijuana: An Economic Analysis

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Summary

The combination of state policy and general public opinion favoring the legalizing of marijuana has led some in Congress to advocate for legalization and taxation of marijuana at the federal level. The Marijuana Tax Equity Act of 2013 (H.R. 501) would impose a federal excise tax of 50% on the producer and importer price of marijuana. The National Commission on Federal Marijuana Policy Act of 2013 (H.R. 1635) proposes establishing a National Commission on Federal Marijuana Policy that would review the potential revenue generated by taxing marijuana, among other things.

This report focuses solely on issues surrounding a potential federal marijuana tax. First, it provides a brief overview of marijuana production. Second, it presents possible justifications for taxes and, in some cases, estimates the level of tax suggested by that rationale. Third, it analyzes possible marijuana tax designs. The report also discusses various tax administration and enforcement issues, such as labeling and tracking.

Economic theory suggests the efficient level of taxation is equal to marijuana's external cost to society. Studies conducted in the United Kingdom (UK) and Canada suggest that the costs of individual marijuana consumption to society are between 12% and 28% of the costs of an individual alcohol user, and total social costs are even lower after accounting for the smaller number of marijuana users in society. Based on an economic estimate of \$30 billion of net external costs for alcohol, the result is an external cost of \$0.5 billion to \$1.6 billion annually for marijuana. These calculations imply that an upper limit to the economically efficient tax rate could be \$0.30 per marijuana cigarette (containing an average of one half of a gram of marijuana) or \$16.80 per ounce. An increased number of users in a legal market would raise total costs, but not necessarily costs per unit.

Some could also view excise taxes as a means to curtail demand, particularly as the price of marijuana can be expected to drop from current retail prices of up \$200-\$300 per ounce to prices closer to the cost of production at \$5-\$18 per ounce, if broadly legalized. The demand for marijuana is estimated to be relatively price inelastic, meaning that consumer demand is relatively insensitive to price changes. Although previous studies of marijuana demand largely examine consumers willing to engage in illegal activities, it appears that higher tax rates would have a minor effect on reducing demand. With this said, tax policy, coupled with adequate law enforcement, could be an effective tool to limit marijuana consumption among youth, as empirical studies indicate that their demand is more sensitive to price than non-youth.

Excise taxes on marijuana could also be levied primarily to raise revenue, as has been historically the case with tobacco and alcohol. As an illustration, assuming a total market size of \$40 billion, a federal tax of \$50 per ounce is estimated to raise about \$6.8 billion annually, after accounting for behavioral effects associated with price decreases following legalization.

The choices in administrative design could affect consumer behavior, production methods, evasion rates, or the tax base of a federal marijuana excise tax. Some of the more significant choices include whether to exempt medicinal uses or homegrown marijuana from tax.

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Introduction

The cultivation, distribution, and possession of marijuana are prohibited for any reason other than to engage in federally approved research under the federal Controlled Substances Act of 1970 (CSA; P.L. 91-513). Yet, 23 states, the District of Columbia, and Guam have passed legislation or initiatives legalizing qualified sale, possession, manufacture, and distribution of medical marijuana, and 17 states and the District of Columbia have decriminalized the possession of marijuana.¹ In addition, in November 2012, Colorado and Washington became the first states to legalize, regulate, and tax small amounts of marijuana for non-medicinal use (so-called recreational) by individuals 21 and older. Commercial sales of recreational marijuana became legal in the state of Colorado beginning on January 1, 2014—the first jurisdiction in the world to do so. Washington’s commercial marijuana market opened on July 7, 2014. On November 4, 2014, Alaska and Oregon became the third and fourth states to approve ballot initiatives to legalize, regulate, and tax marijuana for recreational purposes.² That same day, the District of Columbia approved further measures to legalize the cultivation, possession, and exchange (but not the commercial sales) of marijuana.³

In addition to state and local movements to decriminalize or legalize the production, sales, or use of marijuana, there has been a general shift in popular sentiment toward marijuana policy. According to polls conducted by Rasmussen, the Pew Research Center, and Gallup, a majority of Americans favor legalizing marijuana.⁴

The combination of state policies and general sentiment has led to heightened debate over the merits of marijuana legalization at the federal level. For example, in the 113th Congress, bills have

¹ For a list of jurisdictions that have legalized medical marijuana, see National Conference on State Legislatures, “State Medical Marijuana Laws,” at <http://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx>. For a list of jurisdictions that have decriminalized marijuana possession for personal consumption, see National Organization for the Reform of Marijuana Laws (NORML), “States that Have Decriminalized,” at <http://norml.org/aboutmarijuana/item/states-that-have-decriminalized>.

² For a summary of the marijuana-related ballot initiatives approved on November 4, 2014, see Paul Armentano, “State, Local Marijuana Legalization Measures Win Big On Election Day,” November 5, 2014, at <http://blog.norml.org/2014/11/05/state-local-marijuana-legalization-measures-win-big-on-election-day/>.

³ Under the District of Columbia Home Rule Act of 1973 (P.L. 93-198), DC officials must transmit the legalization bill to Congress. Then, Congress has 60 legislative days to review certain changes to DC’s criminal code and 30 legislative days to review other legislative measures. See Council of the District of Columbia, “How a Bill Becomes a Law,” at <http://dccouncil.us/pages/how-a-bill-becomes-a-law>.

⁴ See “56% Favor Legalizing, Regulating Marijuana,” *Rasmussen Reports*, May 17, 2012, at http://www.rasmussenreports.com/public_content/lifestyle/general_lifestyle/may_2012/56_favor_legalizing_regulating_marijuana; Pew Research Center for the People and the Press, *Majority Now Supports Legalizing Marijuana*, April 4, 2013, at <http://www.people-press.org/2013/04/04/majority-now-supports-legalizing-marijuana/>; and Art Swift, *For First Time, Americans Favor Legalizing Marijuana*, Gallup, October 22, 2013, at <http://www.gallup.com/poll/165539/first-time-americans-favor-legalizing-marijuana.aspx>. According to the polls, disagreements exist along ideological lines though, with a majority of Democrats and Independents in favor of legalization but a majority of Republicans are against legalization. A majority of poll respondents, regardless of ideology, agree that government efforts to enforce marijuana laws cost more than they are worth. See Pew Research Center, *Partisans Disagree on Legalization of Marijuana, but Agree on Law Enforcement Policies*, April 30, 2013, at <http://www.pewresearch.org/daily-number/partisans-disagree-on-legalization-of-marijuana-but-agree-on-law-enforcement-policies/>. For analysis on select public opinion polls on marijuana, see E.J. Dionne, Jr. and William Galston, *The New Politics of Marijuana Legalization*, The Brookings Institution, May 2013, at <http://www.brookings.edu/research/interactives/2013/politics-of-marijuana-legalization>.

been introduced that would remove marijuana from the list of Schedule I drugs prohibited by the Controlled Substances Act and impose a federal excise tax on the production and importation of marijuana.⁵ Another bill proposes the establishment of a National Commission on Federal Marijuana Policy that would review the potential revenue generated by taxing marijuana, among other things.⁶ Overall, the debate concerning marijuana legalization is complex, as it spans across issues ranging from criminal justice to public health and safety. The revenue-raising potential of a marijuana tax could become a contributing factor in the desirability of legalizing marijuana.

This report focuses solely on one aspect of the economic debate over federal marijuana legalization: imposing an excise tax on legalized marijuana.⁷ First, it provides a brief overview of marijuana production. Second, it presents possible arguments for taxes and, in some cases, estimates the level of tax suggested by that rationale. Third, possible marijuana tax designs are analyzed.⁸

A Brief Overview of Marijuana Production

Marijuana is a preparation of the plant, *Cannabis sativa*, generally used as a recreational drug or medicine primarily for its psychoactive and physiological effects.⁹ The term *marijuana* refers to the dried leaves and flowers of the cannabis plant. The main psychoactive ingredient in marijuana is delta-9-tetrahydrocannabinol (THC). THC is the primary cannabinoid responsible for the “high” that users experience when consuming the drug. Still, THC is only one of many “cannabinoid” chemical compounds in marijuana that contribute to the effects of the psychoactive effects of marijuana (in terms of strength, onset, duration, etc.). Consumers could desire different strains of marijuana for the contents of other cannabinoids that do not produce a psychoactive effect. For example, marijuana strains high in cannabidiol (CBD) are often sought to provide relief from anxiety.¹⁰

Depending on its preparation, the potency, or relative concentration, of a particular product derived from marijuana can vary. The stalks and stems of a marijuana plant have almost no

⁵ These bills are, respectively, the Ending Federal Marijuana Prohibition Act of 2013 (H.R. 499) and the Marijuana Tax Equity Act of 2013 (H.R. 501). Specifically, H.R. 501 would impose a 50% tax on the price sold.

⁶ See the National Commission on Federal Marijuana Policy Act of 2013 (H.R. 1635).

⁷ The current federal tax treatment of marijuana (as a Schedule I drug) is detailed in **Appendix B**.

⁸ This report also assumes some familiarity with the general principles and analysis of excise taxes. For an introduction to excise tax issues, see CRS Report R43189, *Federal Excise Taxes: An Introduction and General Analysis*, by Sean Lowry. Also, it does not consider legal or regulatory issues, except as they relate to excise tax issues. For further information on these issues, see CRS Report R43034, *State Legalization of Recreational Marijuana: Selected Legal Issues*, by Todd Garvey and Brian T. Yeh; CRS Report R43435, *Marijuana: Medical and Retail—Selected Legal Issues*, by Todd Garvey and Charles Doyle; and Rosalie Liccardo Pacula et al., “Developing Public Health Regulations for Marijuana: Lessons From Alcohol and Tobacco,” *American Journal of Public Health*, April 17, 2014.

⁹ The two major strains of cannabis are indica and sativa; some plants are hybrids. Industrial hemp is a different variety of *Cannabis sativa* and is the same plant species of marijuana. However, hemp is genetically different and is distinguished by its use and chemical makeup (e.g., containing a THC concentration level of less than 1%), as well as by different cultivation practices in its production. For more information on industrial hemp, see CRS Report RL32725, *Hemp as an Agricultural Commodity*, by Renée Johnson.

¹⁰ For lists of common cannabinoids and their claimed effects, see SC Labs, “Cannabinoids,” at <http://sclabs.com/learn/learn-cannabinoids.html>; CannLabs, “Cannabinoids,” at <http://www.cannlabs.com/the-science/cannabinoids/>; or Steep Hill Labs, “Cannabinoid and Terpenoid Reference Guide,” at <http://steephilllab.com/resources/cannabinoid-and-terpenoid-reference-guide/>.

psychoactive content, whereas the leaves and flowers (buds) of the plant have increasing concentrations of THC. The hair-like trichomes on the buds are coated with a translucent resin that contains the highest concentration of THC on the plant. Marijuana plants are also either male or female. If female plants are grown in controlled environments, separate from pollination of male plants, then the female plants are capable of growing buds that produce more resin. This process is used to grow *sinsemilla* (Spanish for without seed) varieties of marijuana, which typically contain 10%-18% THC content (about three times the level of conventional, commercial-grade marijuana derived from pollinated plants).¹¹

Marijuana consumption methods vary. Marijuana is generally consumed by smoking the dried plant matter. A “joint” is made by rolling marijuana in cigarette paper whereas a “blunt” is made by hollowing some or all of the tobacco from a cigar and replacing it with marijuana. Although smoking habits vary by user, a typical joint contains less than half a gram of marijuana, and each “hit” or drag on the joint contains approximately one-twentieth of a gram of marijuana.¹² Numerous other devices for consuming marijuana exist, ranging from glass pipes to vaporizers (which heat the chemicals in marijuana, but avoid creating the smoke irritants associated with combustion).

Cannabis can also be processed into a number of different products, all with their own THC concentration levels and typical methods of consumption. For example, hashish or “hash” is made by pressing trichomes together into a brick-shaped product with more than 40% THC content.¹³ THC is also capable of being dissolved in fats, oils, and alcohol for use in the creation of “edibles,” such as candy or baked goods.¹⁴

Why a Federal Excise Tax on Marijuana?

Economic analysis as a general rule suggests that excise taxes are less desirable than more general taxes (such as income or broad based sales taxes) because they distort prices of different commodities. This section discusses several possible reasons for imposing an excise tax on marijuana: (1) reflect external, or spillover, costs to society; (2) discourage use, particularly for youth; (3) prevent too rapid a fall in price; (4) fund related programs; and (5) raise revenue.

Taxes to Reflect External Costs

Economic efficiency occurs when the price of a commodity (at the margin) equals its costs. If consumption of marijuana imposes costs on others, then the consumer cost is too small and economic efficiency could be achieved by imposing a tax equal to consumption cost. This rationale has often been used for similar commodities, such as alcohol and tobacco.¹⁵

¹¹ Jonathan Caulkins et al., *Marijuana Legalization: What Everyone Needs to Know* (Oxford: Oxford UP, 2012), p. 8.

¹² *Ibid.*, p. 22.

¹³ *Ibid.*, p. 8.

¹⁴ For definitions of terms relating to marijuana, see Leafly Glossary of Cannabis Terms, at <http://www.leafly.com/knowledge-center/cannabis-101/glossary-of-cannabis-terms>; and “Marijuana 101 – The Ultimate Weed Glossary” at <http://www.marijuana.com/news/2012/05/marijuana-101-the-ultimate-weed-glossary/>.

¹⁵ The external cost cannot account for these taxes, however. Tobacco taxes appear to be imposed at rates well above their external costs to society, whereas alcohol taxes are imposed well below their external costs. After increasing an (continued...)

In considering this justification and the level of tax economic analysis suggests, the external costs should be separate from the costs the user bears. For example, if a substance causes early death, the value of the lost years of life and the individual's own costs in treating illness falls on the individual. Society bears the loss of tax revenue from those lost earnings and some of the costs of treating illness that fall on private or social health insurance. However, society also receives gains from the early death in the amount of smaller health costs and transfer payments (such as Social Security) in the future. These future costs should be discounted. At least in studies of other substances, these external costs are typically much smaller than the total costs.¹⁶ A 1991 study by Manning et al. used this method to estimate the external costs of alcohol and tobacco.¹⁷ Adjusting these estimates for price changes, those results imply a cost of \$30 billion for alcohol, which will be used to estimate the cost for marijuana, for which no study of this nature exists.¹⁸ As with the case of tobacco, these external costs are typically much smaller than the total costs.

Although no U.S. study of marijuana of this nature could be located, it is possible to investigate the likely magnitude of a tax necessary to correct for externalities of marijuana use by examining studies that compare the costs of cannabis use to alcohol.

A British study ranked different drugs by harm on a scale of 1 to 100.¹⁹ Overall, alcohol ranked 72, whereas cannabis ranked 20, or 28% of alcohol. Considering just the external harm, alcohol ranked 47 and cannabis ranked 9, or 19% of alcohol. A Canadian study found an even smaller ratio of health costs per user, about 12%.²⁰ It is also likely that the non-health costs of marijuana are lower than for alcohol. For example, part of the spillover effect of alcohol is in the effect of traffic accidents, but studies tend to find that marijuana impairs driving ability less than alcohol.²¹

(...continued)

estimate from a 1994 study by inflation, the external cost per pack of cigarettes is estimated to be around \$0.42. See CRS Report 94-214, *Cigarette Taxes to Fund Health Care Reform: An Economic Analysis*, by Jane G. Gravelle and Dennis Zimmerman. After the latest increase in federal cigarette taxes to \$1.01 a pack in 2009, the total taxes were estimated at \$2.32 (including state and local taxes and the tobacco settlement, which functions as an excise tax). See CRS Report RS22681, *The Cigarette Tax Increase to Finance SCHIP*, by Jane G. Gravelle. The external cost of alcohol is estimated at 97 cents per ounce, compared with combined federal and state taxes of 26 cents per ounce. See CRS Report R43350, *Alcohol Excise Taxes: Current Law and Economic Analysis*, by Sean Lowry.

¹⁶ For example, one study of alcohol places the total costs of U.S. alcohol consumption (additional health costs, loss of productivity, and other costs such as criminal justice) at \$223 billion annually. The study identifies 58.5% of those costs as falling on others, which indicates that these costs are \$130 billion. Ellen E. Bouchery et al., "Economic Costs of Excessive Alcohol Consumption in the U.S., 2006," *American Journal of Preventive Medicine*, vol. 41, no. 5, November 2011, pp. 516-524, at [http://www.ajpmonline.org/article/S0749-3797\(11\)00538-1/pdf](http://www.ajpmonline.org/article/S0749-3797(11)00538-1/pdf). As noted in the text, estimates adjusting for lifetime costs are \$30 billion.

¹⁷ Willard G. Manning et al., *The Costs of Poor Health Habits* (Cambridge, MA: Harvard University Press, 1991).

¹⁸ These calculations are based on data on external cost per ounce compared with tax collection per ounce and tax revenues. See CRS Report R43350, *Alcohol Excise Taxes: Current Law and Economic Analysis*, by Sean Lowry.

¹⁹ David J. Nutt, Leslie A. King, and Lawrence D. Phillips (on Behalf of the Independent Scientific Committee on Drugs), "Drug harms in the UK: a Multicriteria Decision Analysis," *Lancet*, November 2010, vol. 376, pp. 1558-1565.

²⁰ Gerald Thomas, and Christopher G. Davis, "Cannabis, Tobacco and Alcohol Use in Canada: Comparing risks of Harm and Costs to Society," Reprinted from "Cannabis" issue of *Visions Journal*, 2009, 5 (4), p. 11, at <http://www.heretohelp.bc.ca/visions/cannabis-vol5/cannabis-tobacco-and-alcohol-use-in-canada> and Comparing the Perceived Seriousness and Actual Costs of Substance Abuse in Canada, Canadian Centre on Substance Abuse, March 2007, at <http://ccsa.ca/Resource%20Library/ccsa-011350-2007.pdf#search=rehm>.

²¹ Mark D. Anderson, Benjamin Hansen, and Daniel I. Rees, "Medical Marijuana Laws, Traffic Fatalities, and Alcohol Consumption," *Journal of Law and Economics*, vol.56, no. 2 (2013), pp. 333-369. This study reports that medical marijuana legalization was associated with decreased traffic fatalities. The study also noted that cannabis impairs functions such as reaction times in laboratory studies, but does not appear to impair driving in actual studies (which are summarized) because drivers engage in compensatory behavior. Under the influence of alcohol, drivers take more risks.

Evidence also suggests that smoking marijuana is inversely related to domestic violence.²² The Canadian study found larger enforcement costs for marijuana, but that effect is probably due to marijuana's illicit status. (For additional discussion of some of the various social effects of marijuana, see **Appendix A**.)

In addition to indications that the externalities of marijuana are smaller per user than alcohol, the prevalence of marijuana use is smaller. According to the National Survey of Drug Use and Health (NSDUH), alcohol usage in 2013 for the population 12 and older was 66.3% in the past year and 52.2% in the past month, whereas marijuana usage was 12.6% and 7.5% respectively.²³ Thus marijuana usage is 19% (based on use in the past year) and 14% (based on use in the past month) as common as alcohol usage. These numbers suggest that the external costs of marijuana range from \$0.5 billion to \$1.7 billion.²⁴

To translate this amount into a tax per ounce requires an estimate of the total market size and the price. A 2014 report issued by the White House Office of National Drug Control Policy (ONDCP) provides estimates of the unit price, total expenditure, and total consumption weight of marijuana in the United States.²⁵ The calculations extrapolate from two sets of data: (1) the NSDUH, which is a self-reported survey of drug use habits; and (2) survey data from drug-offense arrestees in a limited number of areas designated as Arrestee Drug Abuse Monitoring (ADAM) jurisdictions.²⁶ The report finds that from 2002 to 2010, the amount of marijuana consumed in the United States likely increased by about 40%.²⁷ The ONDCP report also provides estimates of \$30 billion, \$41 billion, and \$60 billion (given various assumptions) for total U.S. expenditures on marijuana in 2010.²⁸ Additionally, the report indicates that THC levels in marijuana increased from 2000 to 2010.²⁹

²² A new study is not available, but a news article describes it. See Christopher Ingraham, "Study: Couples Who Smoke Marijuana are Less Likely to Engage in Domestic Violence," *Washington Post*, August 26, 2014. An abstract of the study, to be published in the *Psychology of Addictive Behavior*, can be found at <http://www.ncbi.nlm.nih.gov/pubmed/25134048>.

²³ National Institute of Health, National Institute of Drug Abuse, at <http://www.drugabuse.gov/national-survey-drug-use-health>. This usage reflects the current illicit market.

²⁴ The smaller number is the smallest relative harm (12%) multiplied by the smaller usage rate (14%) times \$30 billion. The larger number uses the largest relative harm (28%) multiplied by the larger usage rate (19%) times \$30 billion. This cost could rise with legalization and lower prices, but the subsequent calculations made in this section are per unit (per ounce) and do not depend on the size of the market. If the market expands to include more casual users, the external effect per unit could decline. This estimate does not take into account the net external benefits of marijuana consumption. There are few studies that have quantified the social benefits of marijuana production (e.g., through medicinal or therapeutic methods).

²⁵ White House Office of National Drug Control Policy, *What America's Users Spend on Illegal Drugs: 2000-2010*, February 2014, at http://www.whitehouse.gov/sites/default/files/ondcp/policy-and-research/wausid_results_report.pdf. A detailed explanation of the limitations (such as underreported drug use of survey participants) of each of the data sources used in the report's analyses begins on p. 46.

²⁶ Most of the ADAM jurisdictions are medium to large cities within a region. See White House Office of National Drug Control Policy, *What America's Users Spend on Illegal Drugs: 2000-2010 Technical Report*, February 2014, at http://www.whitehouse.gov/sites/default/files/ondcp/policy-and-research/wausid_technical_report.pdf.

²⁷ White House Office of National Drug Control Policy, *What America's Users Spend on Illegal Drugs: 2000-2010*, February 2014, p. 3, at http://www.whitehouse.gov/sites/default/files/ondcp/policy-and-research/wausid_results_report.pdf.

²⁸ These are estimates based on specific assumptions and are not the same as a range or confidence interval of the estimated size of the U.S. marijuana market. The estimates are based on total consumption, and make no distinction between underground marijuana consumption and medical marijuana that is "legal" under certain state laws. White House Office of National Drug Control Policy, *What America's Users Spend on Illegal Drugs: 2000-2010*, February (continued...)

Using the ONDCP estimates of the market cited above (\$30 billion to \$60 billion), the estimates of external cost imply a tax of 0.8% to 5.3% of current price.

The White House's 2014 ONDCP report provides estimates of the price per gram of marijuana from 2000 to 2010. The nominal price of marijuana is roughly constant over the period, implying the inflation-adjusted price of marijuana was likely decreasing over time. In 2010, the White House report estimates that the price per gram of marijuana was \$7.11 per gram (\$199.08 per ounce), not accounting for differences in quality.

In addition, there are anecdotal prices recorded through anonymous sources and informal interviews with consumers or dealers in the underground market. Other researchers have used different techniques and newer data sources to estimate the price of marijuana across a wider range of locations. One website, priceofweed.com, contains anonymous, volunteer-submitted data on individual transactions across a variety of global locations, down to the level of particular towns or cities. Using data from priceofweed.com, the price of marijuana can be estimated as \$317 per ounce, after weighting the observations for the quality of marijuana reported.³⁰ However, it is unclear if data submitted to priceofweed.com are representative. Anecdotal reports in the media indicate that high-quality marijuana can be obtained in some areas, such as Washington State, for \$28 per eighth of an ounce (\$224 per ounce, but presumably less if bought in bulk).³¹ Another source suggests that consumers would have to pay at least \$10 per gram, or \$238 per ounce.³²

Tax rates ranging from 0.8% to 5.3% of the price might seem small to some, but marijuana prices are currently much higher than the production cost because of the illicit nature of the market. In a legal market, prices would be lower. These estimates of external cost range from \$1.60 to \$16.80

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2014, pp. 58-59, at http://www.whitehouse.gov/sites/default/files/ondcp/policy-and-research/wausid_results_report.pdf.

²⁹ Private studies of the marijuana market find both smaller and larger effects. Jeffrey Miron and Katherine Waldoock, *The Budgetary Impact of Ending Drug Prohibition*, Cato Institute, September 27, 2010, at <http://www.cato.org/publications/white-paper/budgetary-impact-ending-drug-prohibition>, estimate the market at \$13 billion although they acknowledge their estimates are small. Jon Gettman, "Marijuana Production in the United States," *The Bulletin of Cannabis Reform*, December 2006, http://www.drugscience.org/Archive/bcr2/MJCropReport_2006.pdf, estimates the quantity rather than market value. At \$200 to \$300 per ounce, his estimates suggest a market of \$106 billion to \$158 billion. See also Jon Gettman, "The Supply of Marijuana to the United States," for a discussion of the method of estimating the market, at <http://www.drugscience.org/Archive/bcr4/5Supply.html>.

³⁰ CRS analysis of data from Matthew Zook, Mark Graham, and Monica Stephens, *Data Shadows of an Underground Economy: Volunteered Geographic Information and the Economic Geographies of Marijuana*, Floating Sheep Working Paper Series (FSWP001), August 30, 2011. Zook et al. reported per ounce prices for high, medium, and low quality of \$377.02, \$245.14, and \$138.12, respectively. Observations in each category were 9,955; 5,353; and 1,194, respectively. Zook et al. removed some price-based entries from the raw data to reduce the risk of user-entry error. The data were collected across 11,860 U.S. cities. An "ounce" is equivalent to 28 grams, as some drug dealers in the underground economy use the convention of the 28 gram-ounce, instead of the precise 28.35 gram-ounce, for simplicity. [Priceofweed.com](http://priceofweed.com) does not ask users whether the marijuana was purchased through state-licensed dispensaries or through underground transactions. Zook et al. also report the distribution of prices for high-quality marijuana by state. Oregon had the lowest average state price for high-quality marijuana (\$256 per ounce) and Delaware had the highest (\$450 per ounce).

³¹ See the story of Ben Jammin, a long-time marijuana dealer, in Patrick Radden Keefe, "Buzzkill," *The New Yorker*, November 18, 2013, at http://www.newyorker.com/reporting/2013/11/18/131118fa_fact_keefe?currentPage=all.

³² Steven Easton, "Legalize Marijuana for Tax Revenue," Opinion in the Business Week Debateroom, *Bloomberg Business Week*, 2009, at http://www.businessweek.com/debateroom/archives/2010/03/legalize_marijuana_for_tax_revenue.html.

per ounce. The smaller estimate assumes a 0.8% tax and a \$200 price; and the larger estimate assumes a 5.3% tax and a \$317 price. Estimates discussed in subsequent sections suggest the price in a fully competitive market could be as low as \$5 per ounce, so that the tax would be greater relative to price.

If a typical joint contains a half of a gram of marijuana, then the largest estimate is the equivalent of \$0.30 per joint. For comparison, the federal tax on cigarettes is \$0.05 for each cigarette whereas taxes on alcoholic drinks range from \$0.04 for a five ounce glass of wine, \$0.05 for a 12 ounce beer, and \$0.13 for a 1.5 ounce shot of distilled spirits.³³ Thus, the tax on a joint would be about the same as the tax on a six-pack of beer. States (and sometimes localities) also impose taxes on alcohol and tobacco, and they presumably would also tax marijuana as Colorado and Washington have.³⁴ These state taxes are probably already in excess of the external costs of marijuana.

Although clearly many uncertainties surround attempts to measure the external costs of marijuana (as reflected in the range of estimates), the information that is available suggests a relatively small tax compared with current prices.

Discouraging Use, Including Among Youth

An argument can be made for imposing a tax to discourage marijuana users because these potential consumers underestimate long-term health costs and possible dependence when they begin to use the substance. This argument may be particularly important to underage use of marijuana.

Some disagree that marijuana is physically addictive, although it may result in dependence. A recent study found that about 9% of marijuana users become dependent.³⁵ Another study found that medical marijuana laws in the United States increase the probability of marijuana abuse or dependency by 15%-27% among adults aged 21 or older.³⁶

Information on the risks of marijuana could be improved with more research and dissemination of the results of that research. In the case of the risk of addiction or dependence, economists disagree on whether the behavior of users is suboptimal, at least in the case of adults. “Rational addiction” theories indicate that as long as consumers are informed they are making desirable choices.³⁷

³³ The cigarette tax is \$1.01 per pack of 20. For tax rates on alcohol, see CRS Report R43350, *Alcohol Excise Taxes: Current Law and Economic Analysis*, by Sean Lowry.

³⁴ Colorado imposes a 15% excise tax on cultivator, a 10% special sales tax, and the 2.9% standard sales tax. Washington imposes a tax on 25% at each sale point: from grower to processor, from processor to marketer, and at retail. The grower to processor tax does not apply if the grower and processor are the same.

³⁵ For the 9% estimate, see National Institute of Drug Abuse, “Is Marijuana Addictive?” at <http://www.drugabuse.gov/publications/research-reports/marijuana/marijuana-addictive>. For an accessible discussion with differing viewpoints see, Dr. Sanjay Gupta, “Why I Changed My Mind on Weed,” *CNN*, August 8, 2013, at <http://www.cnn.com/2013/08/08/health/gupta-changed-mind-marijuana/>; and the post of Dr. Robert Dupont at “Is Marijuana Addictive (Debate),” *Huffington Post*, September 12, 2013, at http://www.huffingtonpost.com/2012/09/04/is-marijuana-addictive_n_1851564.html.

³⁶ See Hefei Wen, Jason M. Hockenberry, and Janet R. Cummings, *The Effect of Medical Marijuana Laws on Marijuana, Alcohol, and Hard Drug Use*, National Bureau of Economic Research, NBER Working Paper No. 20085, May 2014, at <http://www.nber.org/papers/w20085>.

³⁷ See Gary Becker and Kevin Murphy, “A Theory of Rational Addiction,” *Journal of Political Economy*, vol. 96, no.4, (continued...)

Other economists argue that individuals can be engaged in hyperbolic discounting, in which they make time-inconsistent choices in the present that their future selves would not prefer.³⁸

An important issue in determining a tax that is intended for the best interests of the potential user is that the tax would also reduce income. If the purpose of the tax is to increase the user's welfare, that benefit must be offset by the reduced income. Individuals that typically consume multiple joints per day consume a disproportionate share of the marijuana used in the United States (a trend similar to alcohol use) and in heavier doses. Researchers have estimated that 20% of marijuana users constitute about 80% of consumption.³⁹ Like taxes on alcohol and tobacco, the majority of the burden of a marijuana tax would fall primarily on the heaviest users.⁴⁰

A tax on marijuana, like most excise taxes, is likely to be regressive, and this outcome might be considered undesirable (although current users are likely to benefit from a decline in price from making marijuana legal).

Evaluating the potential benefit to users of imposing taxes to discourage consumption depends on how users' participation in the market and the quantity purchased respond to the tax. It is assumed that the tax is passed on in price.⁴¹ Responses to price changes are generally expressed as elasticities by economists: the percentage change in quantity divided by the percentage change in price. For example, if the elasticity is -0.5, a 10% increase in price leads to a 5% decrease in quantity consumed. If the price elasticity is low, the tax alters behavior very little, while imposing a significant tax burden, and users are harmed by the tax although their small change in consumption may be closer to the optimal choice (i.e., the choice they would make fully accounting for the costs).

Gallet (2014) examines a combination of 42 studies on the demand for various illicit drugs, 13 of which measure the price elasticity demand of marijuana.⁴² After controlling for various factors related to the studies, Gallet's model predicts elasticities of demand for marijuana ranging

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1988, pp. 675-700.

³⁸ David Laibson, "Golden Eggs and Hyperbolic Discounting," *Quarterly Journal of Economics*, vol. 112, no. 2, May 1997, pp. 443-477. Hyperbolic discounting means that the value of future effects falls sharply initially and then settles to a slow decline, unlike exponential discounting in which the value falls by the same proportion in every period.

³⁹ Jonathan Caulkins et al., *Marijuana Legalization: What Everyone Needs to Know* (Oxford: Oxford UP, 2012), p. 27. This analysis is based on the 2009 National Survey on Drug Use and Health (NSDUH).

⁴⁰ Survey evidence suggests that a marijuana tax would be regressive (like most excise taxes), because lower-income individuals are more likely to be heavier consumers of marijuana. See Figure 4.6, Beau Kilmer et al., *Before the Grand Opening: Measuring Washington State's Marijuana Market in the Last Year Before Legalized Commercial Sales*, RAND Corporation, December 2013, p. 36, at http://www.rand.org/pubs/research_reports/RR466.html.

⁴¹ In a competitive market, where firms do not earn profits above the amount needed to pay capital suppliers, the tax must be passed on because price must cover all costs. Even in imperfect markets, both theory and empirical evidence (such as that derived from the alcohol and tobacco markets) indicate the tax is likely to be passed forward. This issue of the pass through of excise taxes to price and references to the empirical literature are presented in detail in CRS Report R43342, *The Medical Device Excise Tax: Economic Analysis*, by Jane G. Gravelle and Sean Lowry.

⁴² Craig A. Gallet, "Can Price Get the Monkey Off Our Back? A Meta-Analysis of Illicit Drug Demand," *Health Economics*, vol. 23 (2014), pp. 55-68. See also *Altered State? Assessing How Marijuana Legalization in California Could Influence Marijuana Consumption and Public Budgets*, RAND Corporation, 2010, at http://www.rand.org/content/dam/rand/pubs/occasional_papers/2010/RAND_OP315.pdf; Kenneth W. Clements and Mert Daryal, *The Economics of Marijuana Consumption*, Economic Research Centre, Department of Economics - The University of Western Australia, September 1999, p. 42, at <http://www.drugpolicy.org/docUploads/Mari.pdf>; and Henry Saffer and Frank Chaloupka, "The Demand for Illicit Drugs," *Economic Inquiry*, vol. 37, no. 3 (July 1999), pp. 401-411.

between -0.15 and -0.31. In other words, a 1% increase in the price of marijuana results in a 0.15% to 0.31% decrease in the demand for marijuana. Consumer demand is relatively unresponsive to changes in price.⁴³ Thus, it is more likely that users would be harmed overall by a tax imposed for their own benefit, because gains in moving to more optimal consumption may be more than offset by lost income from the tax.⁴⁴

Government policy is often focused on limiting use of drugs (whether legal or illegal) by minors. Current, state marijuana legalization laws disallow purchases by those under 21 years old, but, as with other commodities, youth may still obtain them in various ways. Estimates of the price elasticity for minors tend to be larger. One study had an overall estimate of -0.44 but an estimate of -1.01 for ages 12-17 years old.⁴⁵ Thus taxes may be more effective in reducing usage among youth (assuming these youth are not purchasing marijuana through illegal markets or acquiring legally produced marijuana through informal, secondary channels without cost).

The policy question then may be how much of a tax burden should be placed on non-responsive adult users to limit consumption of youth. (A similar issue arises with taxation of tobacco.) This question has no quantifiable answer, but one objective that might be considered is to set the tax so that the price of marijuana does not fall substantially with legalization and expanded demand, especially among minors who are more responsive to price. The next section discusses the potential level of such a tax.

Capturing the Current Differential Between Cost and Price

The characteristics of a legalized, and low-cost, marijuana market, as well as the concerns discussed above about youth consumption, may suggest a tax to keep these prices from falling precipitously until the consequences of a legal market can be determined. Depending on those consequences, a relatively high tax may be retained, or the tax may be reduced.

After legalization, it is estimated that the cost of marijuana will decrease significantly because more will be produced and the implicit costs of evading law enforcement will decline. Many producers are currently confined to smaller-scale or indoor operations that lack economies of scale. Workers in the illicit trade of marijuana must also be compensated more than comparable workers in industries that are not subject to law enforcement risk (e.g., laborers harvesting fruits or vegetables). Although a legalized market for marijuana could develop in such a way that some firms are able to attain market power and charge higher prices for their particular brands of marijuana compared with generic brands, the market for marijuana could become more competitive. In a competitive market, firms earn no profit above the normal return necessary to attract capital (if they did, other firms would enter to exploit it).⁴⁶ Prices would, therefore, fall to reflect lower production costs.

⁴³ Following legalization, the elasticities of demand for marijuana could increase (become more price sensitive) as more casual users become part of the consumer base. However, it can be expected that the majority of demand will still be driven by heavy users, who would likely be less responsive to price changes because they may be dependent on marijuana.

⁴⁴ Overall welfare could be increased, depending on the use of the tax revenue.

⁴⁵ David Ruggeri, "Marijuana Price Estimates and the Price Elasticity of Demand," *International Journal of Trends in Economics, Management, & Technology (IJTEMT)*, vol. 2, no. 3 (June 2013), pp. 2321-5518.

⁴⁶ Because these firms are price-takers, and are not influential enough to affect prices prevailing in the market, higher profits could signal firms to enter the industry. As quantity increases, the price will decline. Profits will converge (continued...)

The difference between the projected cost in a legal competitive market and current prices (which largely reflect illicit production) provides a range within which a federal tax rate might be considered, at least initially. The tax should not be set too high (including any state and local taxes) to encourage illicit productions, so that this approach might be aimed at offsetting only part of the price reduction expected from the legalization of marijuana.

Caulkins (2010) estimates the costs of producing and processing legalized marijuana, under a number of methods and scenarios.⁴⁷ As shown in **Table 1**, Caulkins estimates that the production cost *per pound* of high-quality marijuana would be roughly equivalent to the current retail price *per ounce*. Outdoor production of marijuana is estimated to cost substantially less, per pound of output. However, marijuana cultivated outdoors is less likely to contain the higher levels of THC found in plants grown indoors in controlled growing environments. The estimated production costs in **Table 1** do not include processing costs, which are estimated to add an additional \$20 to \$35 per pound.

Table 1. Estimated Production Costs of Legalized Marijuana

Production Method	Estimated Cost per Pound
Indoor Production	
-Five foot by five foot “hobbyist”	\$225 + an in-kind compensation for the hobbyist’s time
-1,500 square foot residential house	\$200 to \$400
-One acre 50% covered with greenhouses	\$70 to \$215
Outdoor Production	
-Commercial-grade, low estimate	\$1
-Commercial-grade, mid estimate	\$8
-Commercial-grade, high estimate	\$10
-High-quality, <i>sinsemilla</i> -equivalent resin	\$265

Source: Jonathan P. Caulkins, *Estimated Cost of Production for Legalized Cannabis*, RAND Corporation, July 2010, at http://www.rand.org/pubs/working_papers/WR764.html.

Notes: See Caulkins (2010) for details on methodology. Indoor production costs include consumable materials (e.g., soil, water), lighting, labor, and structure/rent. Outdoor production estimates vary based on estimated yield, density of plantings, and labor costs. Calculations assume all output is commercial grade, but the THC-levels across all methods of production are not assumed to be equal. Production costs do not include processing costs, which Caulkins (2010) estimates could add \$20 to \$35 per pound.

Producing high-quality marijuana in greenhouses appears to cost, at the upper limit, \$215 plus \$35 per pound for processing, or around \$15 per ounce. Using outdoor production, of \$10 plus \$35 a pound, the cost is about \$2.80 per ounce. These products vary by THC concentration; as noted earlier, *sinsemilla* contains 10% -18% THC, or about three times the potency conventional commercial-grade marijuana that is pollinated.

(...continued)

toward normal levels, and the entry of new firms will cease.

⁴⁷ Jonathan P. Caulkins, *Estimated Cost of Production for Legalized Cannabis*, RAND Corporation, July 2010, at http://www.rand.org/pubs/working_papers/WR764.html.

In a different estimate, Easton (2009) indicates that government-sponsored marijuana in Canada can be produced at 33 cents per gram (\$9 per ounce or \$144 per pound).⁴⁸ He also suggests that, based on tobacco sales, the cost per gram of going to a retail market is about 10 cents per gram, or \$2.80 per ounce (\$44.80 per pound). Adding this amount to estimated costs leads to a cost (and expected price) of \$5-\$18 per ounce (\$80-\$288 per pound).

In jurisdictions where marijuana has become quasi-legal, prices tend to be lower than the street price in most cases but higher than these cost estimates. In an article indicating an increased price for medical marijuana in Canada, the price was listed as \$1.80-\$5 per gram to the final consumer, \$50-\$140 per ounce. In that same article, a lawyer representing numerous suppliers said his clients could supply for \$1-\$4 per gram, or \$28-\$110 per ounce.⁴⁹ The street price was listed as \$10-\$15 per gram, or \$280-\$420 per ounce. Of course, the price could be discounted if bought in larger quantities. These street prices are high compared with the averages in [priceofweed.com](http://www.priceofweed.com). Beginning in April 2014, the Canadian government set the price of medical marijuana at \$7.60 (CAD) per gram, which is higher than the current average and closer to the street price.⁵⁰ Small growers and homegrown marijuana will no longer be permitted under the new law. These prices are higher than the costs discussed above but also apparently do not reflect an unfettered and mature competitive market.

Actual prices can also be observed in Colorado marijuana shops through online websites, such as [Leafly.com](http://leafly.com). Leafly is a website and mobile phone application that helps users find marijuana shops, medical marijuana dispensaries, and doctors that prescribe medical marijuana located in their areas.⁵¹ Like the consumer website and application, Yelp (which is used to review restaurants, stores, and other sites of interest), Leafly provides consumer reviews of each location and various strands of marijuana and provides “menu” prices of products available at each shop. According to an examination by the authors of some of the most-reviewed marijuana shops in Denver, a gram of marijuana is priced around \$9 to \$15, an eighth of an ounce of marijuana can be priced around \$29 to \$40, and an ounce can be priced around \$190 to \$350.⁵² Some of the higher prices listed on Leafly include tax, but it is unclear from the “menu prices” whether some of the prices are before or after tax (although they are most likely before tax, unless noted).

Submissions to [priceofweed.com](http://www.priceofweed.com) report that marijuana prices in Colorado are lower than the national prices reported earlier, with high quality at \$238 per ounce and medium quality at \$197 per ounce (compared with \$377 and \$245 reported for the United States overall). These prices still reflect a mix of the illicit and legal markets but would presumably include taxes on any legal purchases.⁵³

Colorado prices provide some indication of falling prices with legalization, but prices appear not close to the cost of production. The prices in Colorado, however, may not reflect those in a fully

⁴⁸ Steven Easton, “Legalize Marijuana for Tax Revenue,” Opinion in the Business Week Debateroom, *Bloomberg Business Week*, 2009, at http://www.businessweek.com/debateroom/archives/2010/03/legalize_marijuana_for_tax_revenue.html.

⁴⁹ Brian Hutchinson, “Medical Marijuana Production in Canada Set for Dramatic Change,” *National Post*, January 17, 2014, at <http://news.nationalpost.com/2014/01/17/medical-marijuana-production-in-canada-set-for-dramatic-change/>.

⁵⁰ *Ibid.*

⁵¹ Leafly has reviews of locations wherever recreational or medical marijuana is available (not just Colorado).

⁵² CRS review of prices listed for various Denver-based marijuana shops on Leafly.com was on July 23, 2014.

⁵³ Data for Colorado, <http://www.priceofweed.com/prices/United%20States/Colorado.html>, visited October 27, 2014.

legal market because they are still in a quasi-legal status. Because the federal government does not recognize the legality of these operations, media reports indicate that these producers may have trouble getting banking assistance, including deposit accounts, much less business loans.⁵⁴ These operations are potentially subject to very large federal income taxes, which can be imposed without allowing for deductions because they remain illegal. These taxes can be the equivalent of excise taxes at the federal rate and can apply at each stage of production. (See discussion in **Appendix B.**) And marijuana businesses are still subject to the threat of potential enforcement from federal authorities.

In a 2010 study of the possible effects of legalization in California, researchers from the RAND Corporation estimate that the pretax retail price of marijuana would likely decrease by more than 80%,⁵⁵ suggesting a price of \$40-\$60 per ounce. Miron and Waldock, however, estimate a 50% price reduction, based on a comparison of prices in the United States and the Netherlands (sold in coffee shops).⁵⁶ This price reduction would suggest a price of \$100-\$150 per ounce on average. The Netherlands, however, is, like Colorado, not an instance of a fully legalized market because the Netherlands bans imports and has anti-drug laws on the books.

Although the range of projected prices in a fully legal market is wide, from a few dollars to \$100 per ounce, street prices of \$200-\$300 per ounce suggest that there could be a wide scope for a tax rate designed to align legalized marijuana prices close to current street prices of illegal marijuana. For example, if the eventual competitive price is \$50 per ounce and the average street price is \$250 per ounce, there is scope for taxes up to \$200 tax per ounce.

There are several caveats to this point. The first is state and local governments will likely collect a tax that will absorb some of the differential. The second is a tax that is set too high would encourage the illicit market, and one of the advantages of legalizing marijuana is to largely eliminate the illicit market, reducing law enforcement costs. Moreover, the potential scope of the difference is uncertain, but lowering tax and observing market conditions may be the best initial strategy.

Funding Marijuana Research and Information Programs

Some or all of the yield from a marijuana tax could be used to fund marijuana research. Medical marijuana, as noted, has been approved by 23 states and the District of Columbia. Research on the effects of medical marijuana, which would be helpful in providing guidance to patients and doctors, could be funded in part by the tax.⁵⁷ A recent report by the American College of

⁵⁴ See Eric Gorski, "Reluctance of Banks Leaves Pot Shops Looking for Secure Practices," *The Denver Post*, June 15, 2014; and Alex Altman, "Colorado's New Pot Banking Law Won't Solve Cash Problems," *TIME*, June 6, 2014.

⁵⁵ Beau Kilmer et al., *Altered State? Assessing How Marijuana Legalization in California Could Influence Marijuana Consumption and Public Budgets*, RAND Corporation, 2010, p. 53, at http://www.rand.org/content/dam/rand/pubs/occasional_papers/2010/RAND_OP315.pdf.

⁵⁶ Jeffrey A. Miron and Katherine Waldock, *The Budgetary Impact of Ending Drug Prohibition*, CATO Institute, 2010, at <http://www.cato.org/pubs/wtpapers/DrugProhibitionWP.pdf>. Note that only retail sales are licensed and taxed in coffee shops, as production is still illegal.

⁵⁷ See Mary Wilson, "In Medical Marijuana Debate, Arguments Return to Lack of Research, Transforming Health," January 29, 2014, at <http://www.transforminghealth.org/stories/2014/01/in-medical-marijuana-debate-arguments-return-to-lack-of-research.php>; and Ryan Jaslow, "Medical Marijuana: More States Legalizing, but Scientific Evidence Lacking," *CBS News*, December 13, 2013, at <http://www.cbsnews.com/news/medical-marijuana-more-states-legalizing-but-scientific-evidence-lacking/>.

Physicians noted that limitations on marijuana research are caused, in part, by barriers encountered for federal approval, the lack of high-grade, research-quality marijuana, and the general classification of marijuana as a Schedule I illegal drug.⁵⁸ The report discusses a wide range of conditions that marijuana may be beneficial for and urges study of the efficacy and side effects of marijuana.

With legalization it would also be more feasible to study a wide array of issues (as discussed in this report), such as externalities, addictive properties, and health effects on recreational as well as medical users. Revenue could also be used to finance information programs on both the risks of marijuana use and to discourage consumption by minors.

Raising Revenue

Historically, the primary purposes of excise taxes in the United States have been to raise revenue, including revenues for emergency spending.⁵⁹ Cigarette taxes have been used to offset higher spending levels on health care, such as the Children's Health Insurance Program (CHIP), in recent years.⁶⁰

Given assumptions about price and demand, an excise tax on marijuana can be designed in such a way to achieve a certain revenue target. This section provides some illustrations of how much revenue might be raised from an excise tax were marijuana to become legal. These revenue consequences are quite uncertain given the broad uncertainty about potential price and quantity in the market.

In addition, casual consumers may enter the marijuana market and increase revenue. These consumers may purchase marijuana because concerns about punishment are no longer present or because of a distaste for participating in illegal activities in general. These effects are not necessarily captured in the existing price elasticity estimates (which mostly reflect consumers that are determined enough to defy law enforcement to consume marijuana), and the legal market, even setting price aside, could be much larger than the current market for this reason.

The pace of legalization and taxation of marijuana at the state level could also affect potential revenue collected from a federal excise tax. If more states tend to legalize marijuana, and try to set their excise tax rates to roughly equalize the price of legal (under state laws) marijuana with illicit marijuana, then federal lawmakers could be more constrained in their ability to levy excise taxes on marijuana without encouraging production in the illicit market.⁶¹

Some analysts have tried to estimate the potential revenue that could be raised from nationwide legalization of marijuana using various economic models, and may in some cases include excise

⁵⁸ American College of Physicians, *Supporting Research into the Therapeutic Role of Marijuana*, 2008, at http://www.acponline.org/acp_policy/policies/supporting_medmarijuana_2008.pdf.

⁵⁹ For general historical context of U.S. excise tax policy, see CRS Report R43189, *Federal Excise Taxes: An Introduction and General Analysis*, by Sean Lowry.

⁶⁰ See CRS Report R40226, *P.L. 111-3: The Children's Health Insurance Program Reauthorization Act of 2009*, by Evelyne P. Baumrucker, Elicia J. Herz, and Jane G. Gravelle; and CRS Report RS22681, *The Cigarette Tax Increase to Finance SCHIP*, by Jane G. Gravelle.

⁶¹ Assuming that the federal tax rate more than offsets any decline in price due to the effects of legalization.

taxes.⁶² (Legalization itself would presumably increase revenues by moving more of national income into legal sectors subject to income, such as sales and business taxes, even without an excise tax.)

Miron and Waldock of the Cato Institute estimate that a federal excise tax could raise \$5.8 billion (in 2008 dollars) annually in excise taxes if marijuana is taxed at a rate equal to 50% of its price to consumers.⁶³ Their calculations assume the national market for marijuana at \$13.13 billion (in 2008), a 50% fall in price after legalization, and a 25% increase in consumption. They also estimate \$3.3 billion in annual savings in expenditures from law enforcement. Miron and Waldock do not report price and quantity separately, but they are probably estimating a tax of around \$50-\$75 per ounce. Miron and Waldock note that their market size estimates, which are extrapolated from survey data, are small by comparison with other estimates. At the same time, they appear to be assuming a greater response from consumers than that suggested by the literature review.

A Sample Calculation

This calculation outlines how to estimate revenues from an excise tax, using the example of a \$50 per ounce tax. It takes into account the effects on aggregate consumption and interactions with income taxes. The results depend on the specific assumptions about market conditions as well as state and proposed federal taxes.

To estimate revenue yield, data on price and quantity are needed. As noted earlier, data on the value of the market ranged from \$30 billion to \$60 billion according to ONDCP. The current price was estimated at between \$200 and \$300 per ounce. For this example, assume intermediate values of a \$40 billion market and a \$250 current price.

To illustrate the potential effect on revenue assume a fully legalized industry nationwide, assume a pretax price of \$50 per ounce, a state tax of \$50 per ounce, and the consequences of a federal tax of \$50 per ounce. The taxes and costs bring the total price to \$150 per ounce.

The federal excise tax collection, therefore, is \$50 multiplied by the quantity (in ounces). In the current market, quantity would be determined by dividing \$40 billion by \$250. If quantity did not change the federal excise tax revenue would be \$50 multiplied by \$40 billion divided by \$250, or \$8 billion. Collections, however, would be somewhat larger because the fall in price from legalization would increase consumption. Using a constant elastic formula, the ratio of the new quantity to the old is $(P^*/P)^E$, P^* is the new price, P is the old price, and E is the price elasticity (which is negative). Assuming a price elasticity of -0.25, the effect of legalization alone, which is assumed to reduce the price to \$50 per ounce, would lead to a 50% increase in quantity. With federal, state, and local taxes, the price is \$150 and the increase in quantity is 14%, leading to a projected excise tax collection of \$9.1 billion. By comparison, the tax on alcoholic beverages is \$10 billion, a much lower tax applied to a much larger market.⁶⁴

⁶² Most models of the potential revenue effects of a federal marijuana tax do not take into account potential exports and imports, as marijuana is still largely illegal in most overseas markets. If exports and imports were allowed, the standard tax treatment would be to tax imports of marijuana and exempt exports.

⁶³ Jeffrey Miron and Katherine Waldock, *The Budgetary Impact of Ending Drug Prohibition*, Cato Institute, September 27, 2010, at <http://www.cato.org/publications/white-paper/budgetary-impact-ending-drug-prohibition>.

⁶⁴ See CRS Report R43350, *Alcohol Excise Taxes: Current Law and Economic Analysis*, by Sean Lowry, for data.

The actual revenue gained is, according to standard estimating conventions, reduced by 25% to account for the loss of income and wage taxes because excise taxes produce a wedge between output and income.⁶⁵ Thus the projected revenue gain is \$6.8 billion.⁶⁶ As a reminder, this estimate is based on a series of assumptions, changes to which would alter the revenue estimate.

The yield will also depend on how widespread the movement for legalization is and whether medical marijuana is covered. Currently only Colorado and Washington allow recreational marijuana, and they represent less than 4% of the population, so the short-term yield might be less than \$300 million. More revenue would be gained if medical marijuana in other states were taxed.

Using Data from Colorado to Estimate Market Size

As previously mentioned, calculations based on data from the illicit market for marijuana might not be representative of a fully commercialized market. Given the scale of policy changes at the state level, tax collection data from Colorado and Washington could serve as early indicators of the potential tax base of a national legalized market.

Marijuana sales are subject to several layers of taxation at the state and local level. In Colorado, recreational marijuana sales are subject to three different state taxes: (1) a 15% marijuana excise tax on the unprocessed product, (2) a 10% retail marijuana excise tax, and (3) a 2.9% general sales tax. The approximate effective tax rate on marijuana products is between 15% and 25%, before the imposition of the state's 2.9% general sales tax.⁶⁷ Medical marijuana in Colorado is subject to the 2.9% general sales tax. Local taxes, such as the Denver city sales tax, can also apply on top of the state taxes.

From January 2014 to September 2014, Colorado has collected more than \$37.0 million in sales taxes, excise taxes, and retail license fees on recreational marijuana (in addition to \$13.7 million collected from medical marijuana sales taxes and license fees).⁶⁸

By extrapolating from the actual tax revenue data from Colorado, the national market for marijuana could be estimated. These calculations are detailed in **Appendix C**. After adjusting the September 2014 tax data from Colorado to control for usage rates in different states, it can be estimated that the national sales tax base for recreational marijuana could be between \$15.9 billion and \$17.0 billion per year (assuming market conditions currently in Colorado prevail nationally).⁶⁹ It is difficult to extrapolate medical marijuana data in Colorado to the general U.S.

⁶⁵ U.S. Congress, Joint Committee on Taxation, *New Income and Payroll Tax Offsets to Changes in Excise Tax Revenues for 2013-2023*, committee print, 113th Cong., 1st sess., February 12, 2013, JCX-5-13 (Washington: GPO, 2013).

⁶⁶ Again, this is the gain only from the excise tax, conditional on a legal market, and not from making marijuana legal, in which income taxes would increase.

⁶⁷ John Walsh, *Q&A: Legal Marijuana in Colorado and Washington*, The Brookings Institution, May 21, 2013, at <http://www.brookings.edu/research/papers/2013/05/21-legal-marijuana-colorado-washington>.

⁶⁸ Calculated from monthly reports at Colorado Department of Revenue, "Colorado Marijuana Tax Data," at <http://www.colorado.gov/cs/Satellite/Revenue-Main/XRM/1251633259746>.

⁶⁹ These estimates are based on different assumptions, and should not be considered as a range or confidence interval for what the projected national sales tax base of marijuana could be. The lower and higher estimates are based on different reported usage rates, based on age, from the NSDUH survey data. The higher estimate is based on the usage rates of 18-25 year olds and the lower estimate is based on the usage rates of those aged 26 and older. Surveys of drug habits tend to understate actual usage rates. See **Appendix C** for details.

population due to incomplete data in some states, but the tax collections data from Colorado indicate that medical marijuana consumption could roughly double that consumption base.⁷⁰

The combined medical and recreational marijuana sales in Colorado roughly extrapolated to the United States suggest a market of at least \$30 billion, which is small compared with most estimates considering that the price should be smaller than in the illicit markets. It may be that the Colorado market is insufficiently developed, and substantial levels of illicit sales are continuing (either due to lower prices on the illicit market or preexisting relationships between buyers and sellers in the black market). However, consumption in Colorado could be overstated due to non-resident sales (also known as “pot tourism”).

The estimates do, however, suggest that the issue of whether to exempt medical marijuana and how to enforce any medical exemption that might develop are potentially important issues.

Design Issues for a Federal Marijuana Excise Tax

Aside from the general level of the tax, there are a number of design issues for an excise tax discussed in this section.

Choosing the Stage of Production to Levy an Excise Tax

In general, an excise tax that is levied at earlier stages of production has lower administrative costs and fewer opportunities for tax evasion. In most situations, consumers vastly outnumber producers. Trying to implement an excise tax at the consumer retail outlet often results in a duplication of processes and increases the risk of tax evasion.⁷¹ As a result, federal excise taxes are generally levied on manufacturers and imports (with an exemption for exports).

Choosing the Excise Tax Base

In general, marijuana can be taxed based on a per unit measurement or the product price. Each tax base has its own advantages and disadvantages, and multiple tax bases could be combined.

Weight

A tax by weight is similar to the federal excise tax regime for tobacco because regulations limit the per unit size of cigarettes, cigars, etc. A tax by weight is relatively easy to administer (after accounting for moisture content). The tax could be levied based on the “wet” weight, right after

⁷⁰ This is not to say that the ratio of medical marijuana users to recreational users is always 1:1. Based on recent tax data, it appears that the recreational and medical marijuana sales bases (before state taxes are applied) are converging. See **Appendix C** for tax revenue data from Colorado on retail and medical marijuana. Given the lower tax rates on medical marijuana, those who already have a medical marijuana registration card have little economic incentive to purchase recreational marijuana.

⁷¹ For example, some retailers could offer “free” marijuana in combination with other goods and services. Products also tend to be more prone to theft at the retail level. In both of these situations, no tax would be paid. See Pat Oglesby, “State May Be Stuck with Second-Best Marijuana Taxes,” *State Tax Notes*, June 2, 2014, pp. 539-544.

the leaves and flowers are picked, or the weight after drying.⁷² A weight-based tax would need to be administered at the manufacturing level, as a retail-based weight tax could create significant issues for different types of products.⁷³ However, a weight-based tax could encourage the production of more potent marijuana.

Potency

Most potency-based tax proposals are based on the per-ounce THC content. In comparison to a weight-based tax, a potency-based tax could be more complicated and costly to enforce and administer. The largest administrative hurdle to a potency-based tax is ensuring that lab testing of marijuana strains is accurate and reliable. Regulations defining the number and weight of any samples that producers need to submit for testing would be required. According to one lab in Oakland, CA, samples of two grams can be used to evaluate the potency of up to two pounds of marijuana. Costs of these lab tests can be much as \$100-\$120 per sample, and as low as \$60-\$75 per test with a bulk discount. If marijuana is legalized, it can be expected that more labs that perform similar services will enter the market, and possibly reduce the price of testing. More competition in testing could encourage the development of more reliable technology, but it could also lead growers to pick a lab that tends to understate the amount of THC in a product.⁷⁴

Ultimately, it could be difficult to measure final THC content with any degree of reliability, given the nature of some marijuana products. Another disadvantage to a tax based on THC potency is that it could encourage more consumption of less-potent marijuana. If the public health costs of smoking marijuana outweigh the health costs of consuming more potent marijuana, then the effects of this option might be undesirable.⁷⁵

An alternative potency calculation could be based on the ratio of THC to cannabidiol (CBD). Such a tax base could encourage consumers to purchase marijuana with more sedative effects.

Price

A tax could be levied as a percentage (ad valorem) of the manufacturers or retail sales price of marijuana. Ad valorem taxes have several advantages: they (1) automatically adjust for changes in price, and (2) can be easily applied to a wide variety of products that might otherwise be difficult to quantify in a per unit manner. Both the tax regimes in Colorado and Washington use some form of an ad valorem tax on wholesalers as one method to tax marijuana, and H.R. 501, the Marijuana Tax Equity Act of 2013, proposes a 50% tax on the producer or importer price. The main disadvantage of an ad valorem tax is the required regulations to specify the taxable price the taxes apply to.

⁷² The “wet” weight of a marijuana harvest is approximately four to five times its dry weight. See Jonathan P. Caulkins, *Estimated Cost of Production for Legalized Cannabis*, RAND Corporation, July 2010, p. 24, at http://www.rand.org/content/dam/rand/pubs/working_papers/2010/RAND_WR764.pdf.

⁷³ For example, a tax on the “final weight” of a large, THC-infused baked good could be more than a tax based on the final weight of an individual, THC-infused lozenge, even if both products contained the same amount of THC. See Jonathan P. Caulkins et al., “High Tax States: Options for Gleaning Revenue from Legal Cannabis,” *Oregon Law Review*, vol. 91 (2013), pp. 1041-1068.

⁷⁴ Pat Oglesby, “State May Be Stuck with Second-Best Marijuana Taxes,” *State Tax Notes*, June 2, 2014, pp. 539-544.

⁷⁵ Jonathan P. Caulkins et al., “High Tax States: Options for Gleaning Revenue from Legal Cannabis,” *Oregon Law Review*, vol. 91 (2013), pp. 1041-1068.

A manufacturers tax (i.e., imposed after the plant is first grown and harvested) is the most simple form of administration because there are generally fewer firms involved in manufacturing than retailing. Most federal excise taxes are imposed at the manufacturer stage (e.g., tobacco, alcohol, firearms). For vertically integrated firms that are both manufacturers and retailers (or some other sort of intermediate firm, such as a wholesaler), regulations need to identify how to construct a manufacturers price if no market transaction takes place.

In contrast, a retail tax regime, resembling a sales tax, could be created to capture any price markup due to the type of product or any “market power” of firms with branding or advertising advantages. The price of a product containing marijuana or THC could be determined by a number of characteristics other than its intoxication potential.⁷⁶

Special Considerations

In the case of a per unit tax (e.g., weight or potency), the tax rate can be indexed for inflation using some sort of measure of price changes, such as increases in the Consumer Price Index (CPI). Most other federal excise taxes are unindexed (e.g., alcohol, tobacco, gasoline), and, as a result, have declined in real value over time, absent legislative increases in statutory tax rates.⁷⁷

Given the uncertainty over prices and demand after legalization, sunset provisions for the tax could be incorporated into any initial authorizing language of a marijuana tax. Sunset provisions could encourage legislators to revisit marijuana tax laws to better reflect the evolving conditions of the nascent, legalized industry. For example, the initial tax rate for legalized marijuana could be set low enough to undermine the illicit market, but then increased gradually to set the tax rate high enough to limit consumption. Alternatively, legislation could delegate authority to the Secretary of the Treasury (or a similar official) to adjust tax rates according to certain criteria.

Other Options

Various methods of taxation could also be combined. For example, a general tax on marijuana could be levied based on price or weight, with either a surcharge for higher-THC products or differential rates for various products, such as edibles. Differential tax rates could help shape consumption in such a way that it could reduce some of the negative social costs of marijuana. But, different tax rates could add complexity and unequal tax burdens across various marijuana consumers.

By comparison, alcohol is taxed by potency (i.e., alcohol content) as well as category, with taxes per alcohol content lower for beer and wine than for distilled spirits. Cigarettes are taxed on a per unit basis. Cigars are subject to an ad valorem tax with a high ceiling, although the tax is imposed at the manufacturers’ level.

⁷⁶ For example, appearance or smell might affect price of dried marijuana. For baked edibles, the cost of flour, eggs, or sugar might affect the price of the final product.

⁷⁷ This is particularly the case with alcohol taxes, which have not been increased since 1993. See CRS Report R43350, *Alcohol Excise Taxes: Current Law and Economic Analysis*, by Sean Lowry.

Tax Treatment of Existing Plant and Product Inventories

The initiation of a federal marijuana tax could also raise the question of whether to integrate existing stocks of marijuana into the tax base.⁷⁸ Lawmakers would have to address the taxation of marijuana plants and any consumer goods sold in jurisdictions that have legalized medical and recreational sales. Integrating more preexisting marijuana plants and products into the tax base could enable producers and retailers to better meet the initial demand for marijuana (at prices potentially low enough to undercut the illegal market), reduce complexity between federal and local tax regulations, and increase initial federal tax revenue. However, some preexisting marijuana plants and products might not comply with new federal regulations or purity standards that are likely to accompany any federal tax regime.

An alternative option could include ample lead time between the enactment of such a tax and the effective date of the first legalized sales, giving producers sufficient time to comply with any federal regulations. Although this might help legal producers and retailers compete with the underground market, it would add complexity to the multiple layers of taxation of marijuana in some jurisdictions.

Colorado and Washington have taken slightly different approaches to this issue. In Colorado, retail licenses were initially issued to existing medical marijuana dispensaries (some of which were already growing their own plants).⁷⁹ In Washington, current plants grown indoors or outdoors can be converted to legal stocks if the owner has a producer license and the growing space meets all of the state's guidelines.⁸⁰

In general, when federal excise taxes are increased, untaxed floor stocks are subject to tax (sometimes with exemptions for small retail operations). The purpose is to prevent building up inventories in advance of the effective date of the tax.

Restrictions, Exemptions, and Special Tax Treatment

Several issues could arise concerning restrictions, exemptions, and special treatment under a federal tax on marijuana. Policy makers could choose to implement such regulations at the federal level or allow the states to make their own laws pertaining to each of these issues. Any of these differential tax treatments, however, would make the tax more complicated.

Age Restrictions

State laws in Colorado and Washington limit recreational marijuana purchases to individuals aged 21 or older. Age restrictions could have a limiting effect on the tax base, as surveys indicate that younger individuals use marijuana at higher rates than those over 26 years old.⁸¹ However, this

⁷⁸ For more information, see the discussion of transition issues and floor stocks taxes in CRS Report R43189, *Federal Excise Taxes: An Introduction and General Analysis*, by Sean Lowry

⁷⁹ See Colorado Department of Revenue, "Retail Marijuana Licensing Information," at <http://www.colorado.gov/cs/Satellite/Rev-MMJ/CBON/1251646187389>.

⁸⁰ See Washington State Liquor Control Board, "FAQs on I-502," at http://lcb.wa.gov/marijuana/faqs_i-502.

⁸¹ In the SAMSHA surveys, these respondents are divided into two age-based categories: 12-17 year olds and 18-25 year olds. According to surveys taken from 2011 to 2012, the national average of marijuana use in the past month was 7.55% for 12-17 year olds, and 18.89% for 18-25 year olds. By comparison, the national average for individuals aged (continued...)

trend could change post-legalization as the stigma among adult use lessens and the exotic appeal of an illicit drug lessens among youth. In any case, excluding these consumers from the legal tax base could support some underground production activity (which would be untaxed), or indirect sales of legally purchased marijuana through of-age connections (which could still be preferable to direct transactions with illicit dealers).

Customer Purchasing or Possession Limits

Under state law, Colorado residents are allowed to possess up to one ounce of marijuana and make as many transactions as desired as long as they do not exceed the one ounce limit. Non-Colorado residents are restricted to purchasing one quarter of an ounce (7 grams) in a single transaction. The restriction on non-residents is primarily intended to reduce the risks for larger-scale diversion or export. It has yet to be seen if this restriction has had a significant effect on diversion. More restrictive purchasing limits (by weight) coupled with an ad valorem tax rate can also serve to increase the effective tax rate on heavy users, who are more likely to benefit from a bulk discount.

Production Limits

Production limits could be enacted based on the total market size or per grower. Washington has a target of 80 metric tons (half for dried marijuana and half for marijuana-extract based products, such as edibles and lotions) for the maximum size of its marijuana market. The primary rationales behind this policy are to monitor possible diversion of sales to other states and guide the number of licenses issued.⁸² Colorado has no target. Similarly, concerns could be raised about the diversion of underground exports from the United States to countries where marijuana is still illegal. A tax administered closer to the beginning of the production chain might be more capable of monitoring such diversion. Mark Kleiman, Professor of Public Policy at UCLA and former marijuana policy consultant to the state of Washington, has been quoted as saying that a production limit could also reduce the power of larger producers who, if left unregulated, could increase the negative social consequences of marijuana consumption in pursuit of maximizing profit.⁸³

(...continued)

26 and older was 5.05%. See Table 3 in <http://www.samhsa.gov/data/NSDUH/2k12State/Tables/NSDUHsaeTOC2012.htm>. Whole numbers are reported in: <http://www.samhsa.gov/data/NSDUH/2k12State/NSDUHsae2012/NSDUHsaeStateTabs2012.htm#tab1>. Some researchers have found that survey data on marijuana use understates actual use, in the range of 20% -40%, particularly among adolescents and young adults. See Jonathan P. Caulkins et al., *Marijuana Legalization: What Everyone Needs to Know* (Oxford University Press, 2012), p. 17.

⁸² Eliza Gray, “New Laws Chart Course for Marijuana Legalization,” *Time*, October 19, 2013, at <http://nation.time.com/2013/10/19/new-laws-chart-course-for-marijuana-legalization/>.

⁸³ See Patrick Radden Keefe, “Buzzkill,” *The New Yorker*, November 18, 2013, at http://www.newyorker.com/reporting/2013/11/18/131118fa_fact_keefe?currentPage=all. One small scale study of underground cannabis growers in Norway found that there are several financial and cultural mechanisms that tend to prevent marijuana growers from growing from small-scale to large-scale operations. Some of these mechanisms would likely not hold in a largely unregulated, commercialized market. See Eirik Hammersvik, Sveinung Sandberg, and Willy Pedersen, “Why Small-Scale Cannabis Growers Stay Small: Five Mechanisms that Prevent Small-Scale Growers from Going Large Scale,” *International Journal of Drug Policy*, vol. 23 (2012), pp. 458-464.

In general, production limits generate inefficiency and can contribute to windfall profits for firms already in the market. Production limits have never been considered for any other commodity by the federal government and are unlikely to work for states and a national legal market.

Exemption or Inclusion of Medical Marijuana

The tax treatment of medical marijuana varies in the jurisdictions that have legalized medical marijuana. Each jurisdiction applies its general sales tax or a special gross receipts or revenue tax on medical marijuana. For example, medical marijuana sold in Colorado is subject to the 2.9% general, state sales tax but is not subject to the 10% retail marijuana state sales tax or the 15% retail marijuana excise tax.

Medical marijuana, and the extent to which users are in medical need, is an issue that is contentious. This use might be more attractive to consumers who hesitate or dislike participating in an illicit market. Evidence suggests a negative correlation between medical marijuana and prescription drugs because deaths from prescription drug overdoses have declined in states with medical marijuana.⁸⁴

Although there is a possible justification for exempting this medical use, differences in the after-tax price of recreational and medical marijuana could also provide incentives for users to seek out medical prescriptions. As indicated by the analysis of tax data in Colorado, exempting medical marijuana from a federal tax could also significantly limit the tax base if strict standards for medical prescriptions are not enforced. Preventing such abuse, however, could significantly increase the cost of tax administration.

If medical marijuana is exempt, and the tax is imposed at the production level, producers would have to know the end use of the product. Thus, a segregation of sales of medical marijuana and a marking or stamping device would likely be necessary.

Exemption for Home Production

Rules vary across different products that are subject to excise taxation.⁸⁵ Colorado allows individuals to grow up to six plants for recreational use, and households can grow up to 12 plants. Washington does not allow home growing of marijuana for recreational use.⁸⁶ In comparison, in federal law, no home distilling of alcohol is legal, whereas wine and beer can be made in limited amounts, and tobacco can be grown without limit.

If home production is allowed and exempt from taxation, another issue is whether a quantity limit should apply and if so what that limit might be. Pat Oglesby, former chief tax counsel of the Senate Finance Committee and noted expert on state marijuana taxes, indicates that a single plant can yield 448 grams (or approximately a pound of marijuana) and the average user consumes

⁸⁴ Causation between the increase in medical marijuana consumption and decrease in prescription drug overdoses has yet to be determined. See Niraj Chokshi, “Medical Marijuana States See Fewer Drug Deaths,” *Washington Post*, p. A2, August 26, 2014.

⁸⁵ Among states where marijuana is legal for recreational or medical use, home-grow allowance laws vary based on weight or number of plants. See the National Organization for the Reform of Marijuana Laws (NORML), “State Laws,” at <http://norml.org/laws>.

⁸⁶ See Washington State Liquor Control Board, “FAQs on I-502,” at http://lcb.wa.gov/marijuana/faqs_i-502.

about 100 grams (less than four ounces) per year, so any home-growing limit would probably be seen as high.⁸⁷ At the same time, Oglesby (2011) argues that production for home use is not likely to be much of a threat to the tax because even with high illicit prices, even where homegrown is legal, users participated in the illicit market rather than growing their own. However, Caulkins et al., suggest that home production would seriously undermine enforcement because anyone in possession of nontaxed product could claim home production.⁸⁸ Banning home production could also increase the revenue generated from a marijuana tax.

Special Tax Rates for Small Producers

Small wine and beer producers are eligible for lower tax rates, so there is some precedent for tax reductions for small producers. This exemption or lower rate would be linked to a point of collection at the packaging and distribution level. The value of a lower tax for small producers is not clear. In general, however, it is more efficient to collect the tax from a few larger producers, and a benefit for small firms would act against that objective. Additionally, a small businesses exemption could encourage larger forms of evasion, because processing and distribution may be easier on a small scale.

Special Tax Rates for More Energy Efficient Production

Another possibility is to apply a lower tax to marijuana grown outdoors, which uses less energy than indoor growing. One study indicates that legalization could reduce the price of marijuana, and lead to less costly cultivation practices outdoors rather than indoors.⁸⁹ In contrast, concerns exist that outdoor marijuana cultivation could divert land and bodies of water, thereby generating another set of negative environmental effects.⁹⁰ Incentives to produce higher-potency marijuana (e.g., a tax rate based on weight) could encourage indoor production, where growing conditions can be better managed.

Occupational Taxes

Another federal tax option is levying a special occupational tax (SOT) on any business involved in the production, distribution, or sales of marijuana. SOTs are not licensing fees. Generally,

⁸⁷ See Pat Oglesby, "Laws to Tax Marijuana," *State Tax Notes*, January 24, 2011, pp. 251-269. Although more sophisticated, indoor plant operations are known to achieve higher yields, the point still stands that a single plant can typically supply more marijuana than a typical user consumes. Oglesby quotes estimates of annual consumption from Beau Kilmer et al., *Altered State? Assessing How Marijuana Legalization in California Could Influence Marijuana Consumption and Public Budgets*, RAND Corporation, 2010, p. 18, at http://www.rand.org/content/dam/rand/pubs/occasional_papers/2010/RAND_OP315.pdf.

⁸⁸ Jonathan Caulkins, et al., "Design Considerations for Legalizing Cannabis: Lessons Inspired by Analysis of California's Proposition 19," *Addiction*, Society for the Study of Addiction, 2011.

⁸⁹ Evan Mills, "The Carbon Footprint of Indoor Cannabis Production," *Energy Policy*, vol. 46 (July 2012), pp. 58-67.

⁹⁰ This issue has been covered in some media outlets, such as Matt Ferner, "California County Bans Outdoor Medical Marijuana Grows," *Huffington Post*, June 4, 2014, at http://www.huffingtonpost.com/2014/06/04/lake-county-medical-marijuana_n_5441027.html. This diversion could be the result of the high price of illicit marijuana attracting growers to enter the market, though. One study found that the amount of land needed to grow enough marijuana to roughly meet current demand levels would require a relatively insignificant share of U.S. farmland (<0.01%), assuming economies of scale using outdoor production techniques. See Jonathan P. Caulkins, *Estimated Cost of Production for Legalized Cannabis*, RAND Corporation, July 2010, p.25, at http://www.rand.org/content/dam/rand/pubs/working_papers/2010/RAND_WR764.pdf.

SOTs are levied as a flat fee annually on each firm and comprise a small amount of revenue relative to excise taxes. Currently, federal SOTs are collected on certain businesses in the tobacco or firearms industry. Segments of the alcohol trade were also subject to SOTs until they were repealed in 2008.⁹¹

The Marijuana Tax Equity Act of 2013 (H.R. 501) would impose an occupational tax of \$1,000 per year on each marijuana producer, importer, or manufacturer, and a \$500 per year tax for any other person engaged in a marijuana enterprise.

Tax Administration, Enforcement, and Other Regulations

History suggests that the role of enforcement and administrative efforts could be the difference between a sustainable and unsustainable federal tax regime on marijuana. The illicit trade and importation of bootleg spirits in the United States continued after Prohibition ended in 1934 until cuts in tariff rates on spirit imports were negotiated with trading partners (thereby lowering the price of legal spirits), and until the Department of the Treasury hired or assigned more than 1,000 agents to work on enforcing alcohol-related laws during the late 1930s.⁹²

Today, marijuana enforcement efforts would have to deter regular consumers from engaging in illicit transactions with dealers they have presumably built a relationship of trust with in terms of secrecy and product integrity. Additionally, enforcement would have to compel producers to obtain licenses and pay taxes. Without increasing resources for tax-enforcement authorities commensurate with federal-policy change, legalizing and taxing marijuana would likely undermine the long-term viability of any federal tax base.

Tracking the Production of Legal Marijuana

Some tax experts have noted that marijuana smuggling might be more prevalent compared with illegal alcohol production because marijuana is more compact and easier to transport than alcohol.⁹³ However, marijuana is more pungent than packaged alcohol.

Collecting a tax closer to the point of production, rather than point of sales, could reduce the number of taxable entities and increase the scale of tax units that would need to be monitored (e.g., greenhouses compared to joints). If the tax is applied early in the stage of production, some marker or evidence that the tax has been paid would be needed. As with the case of alcohol and tobacco, tax stamps could be used, or seals on packages (although packages can be opened and refilled, so this method is not completely foolproof). If sold as joints, individual marks could be put on each paper cylinder. Another possibility is the use of dye. New technological developments

⁹¹ For more information, see CRS Report R43350, *Alcohol Excise Taxes: Current Law and Economic Analysis*, by Sean Lowry.

⁹² Tun-Yuan Hu, *The Liquor Tax in the United States, 1791-1947* (New York, NY: Columbia University Graduate School of Business, 1950), pp. 90-96.

⁹³ Pat Oglesby, "Laws to Tax Marijuana," *State Tax Notes*, January 24, 2011, pp. 251-269.

are also discussed by Oglesby, such as genetic markers or tracking systems that would monitor production from seed to final sale.⁹⁴

Colorado developed several planks for its enforcement system. It tracks marijuana plants from “seed to sale” using radio frequency identification (RFID) tags attached to each plant.⁹⁵ When the plant is harvested, the leaves and buds are given a new RFID tag and a label printed with the plant’s authorized source.⁹⁶ Marijuana enterprises are required to report their inventory to the Colorado Department of Revenue’s Marijuana Enforcement Division through a linked-computer system called Marijuana Inventory Tracking Solutions (MITS). These systems are meant to complement traditional forms of enforcement, such as physical surveillance.

Labeling and Measurement

Regulations that would standardize weights and potency measurements would most likely need to accompany a marijuana tax regime. Such a regime would contribute to consumer safety and more accurate dosing. Additionally, the U.S. Department of the Treasury could develop marketing standards on the issues related to labeling and branding of different strains of marijuana.⁹⁷ These marketing standards are currently negotiated with industry representatives as a means to inform consumers and prevent competition from domestic and imported products that do not meet the same standards. For example, regulations could define what can be labeled “indica,” “sativa,” or certain types of hybrid strands.

Strict Enforcement of Medical Marijuana Prescription Standards

As previously mentioned, different tax rates in medical and recreational marijuana could create significant arbitrage opportunities for consumers. This is particularly the case for heavy users, who stand the most to gain from evading a significant excise tax burden.⁹⁸ Medical marijuana dispensaries are typically organized as nonprofit organizations. Thus, enforcement of regulations will also be important for proper collection of income taxes if these nonprofits are allowed to organize as Section 501(c) entities.

Distinguishing Marijuana from Industrial Hemp

Hemp has no commercial value as a psychoactive due to its low concentrations of THC. The 113th Congress made changes to U.S. policies regarding industrial hemp during the omnibus farm bill debate. The Agricultural Act of 2014 (H.R. 2642; commonly known as the “farm bill”) includes a provision that would allow certain research institutions and also state departments of agriculture

⁹⁴ Ibid.

⁹⁵ For visual examples of the RFID tagging system, see David Rosenberg, “Inside a Colorado Marijuana Dispensary,” *Slate*, June 30, 2014, at http://www.slate.com/blogs/behold/2014/06/30/theo_stroemer_a_look_at_medicine_man_one_of_colorado_s_largest_marijuana.html.

⁹⁶ Claire Swedberg, “Colorado Readies System for Monitoring Marijuana,” *RFID Journal*, December 16, 2013, at <http://www.rfidjournal.com/articles/view?11283>.

⁹⁷ In the domain of alcohol, for example, Treasury has issued regulations that specify exactly what kind of spirits can be labeled as “whisky.” See 27 CFR 5.22.

⁹⁸ Jonathan P. Caulkins et al., “High Tax States: Options for Gleaning Revenue from Legal Cannabis,” *Oregon Law Review*, vol. 91 (2013), pp. 1041-1068.

to grow industrial hemp, if allowed under state laws where the institution or state department of agriculture is located.⁹⁹ Because hemp is a useful agricultural plant, some might also think that it would be reasonable to legalize hemp for industrial production (and exempt it from taxation) if marijuana is legalized for commercial production.

For tax purposes, hemp could be distinguished from marijuana for purposes of taxes by its THC quantity. Oglesby notes that proposed legislation in the United States used a THC content of less than ½ of 1% and less than 1% by weight to distinguish hemp from marijuana. Europe and Canada currently allow hemp to be grown and require less than 0.3% THC by weight to distinguish legal hemp from illegal marijuana.

An argument made by Oglesby (and others) is that marijuana can be hidden in hemp fields, one reason that hemp is illegal. This claim is likely overstated, as cross-pollination would weaken the effectiveness of the marijuana plants.¹⁰⁰ As previously mentioned, higher-quality strains of marijuana require controlled climates isolated from pollination in order to reach peak THC potency.

Effects of Federal Marijuana Laws on State Tax and Regulatory Regimes

Some experts have also noted that the decision, or delay, of legalization at the federal level could have significant effects on the development of marijuana tax policy at the state level. As long as marijuana remains illegal at the federal level, states with marijuana legalization laws could rely on a system of licensing private businesses to grow and sell marijuana, instead of systems in which a state-based monopoly regulates the sale of marijuana (i.e., as some states currently have over liquor retail sales).¹⁰¹ Proponents of state-based monopolies see them as a tool to regulate consumption (e.g., state-approved retail locations, restricted marketing), while opponents of state-based monopolies see them as susceptible to corruption, and driven mostly for purposes of raising revenue (a common critique of many state-run lottery commissions).¹⁰² Although the differences in the level of revenue extracted from a licensing scheme versus a state monopoly scheme might be difficult to predict or even negligible, the dominance of licensing systems across states could make it difficult for lawmakers to roll back such systems and encourage state monopolies (for whatever reasons)¹⁰³ in the future.

⁹⁹ For more information on hemp, see CRS Report RL32725, *Hemp as an Agricultural Commodity*, by Renée Johnson.

¹⁰⁰ For more comparisons on the production of hemp versus marijuana, see CRS Report RL32725, *Hemp as an Agricultural Commodity*, by Renée Johnson.

¹⁰¹ The reasoning behind this prediction is that state monopolies for marijuana production or distribution cannot occur while it is still illegal at the federal level because state governments cannot force the employees of such hypothetical operations to engage in the marketing of a drug that is illegal at the federal level. See Pat Oglesby, “States May Be Stuck with Second-Best Marijuana Taxes,” *State Tax Notes*, June 2, 2014, pp. 539-544.

¹⁰² For more analysis of the option for state-run monopolies on marijuana production or retail sales, see Pat Oglesby, “States May Be Stuck with Second-Best Marijuana Taxes,” *State Tax Notes*, June 2, 2014, pp. 539-544; and Jonathan P. Caulkins et al., “High Tax States: Options for Gleaning Revenue from Legal Cannabis,” *Oregon Law Review*, vol. 91 (2013), pp. 1041-1068.

¹⁰³ See Vice, “Mark Kleiman on Regulating Weed: VICE Podcast 022,” November 1, 2013, approximately 31:00-33:00, YouTube.

Conclusion

The uncertainty over many aspects of marijuana creates difficulties in arriving at conclusions about the possible effects of a legalized and taxed marijuana market.

These uncertainties include the post-legalization price of marijuana (and even the current illicit price), the size of the market, and the response of consumers to price changes. These aspects make the projection of revenues for a particular tax uncertain. The uncertainty about prices as well as the spillover and health effects of marijuana makes the setting of the level of the tax difficult. Even choosing how to impose the tax is limited by uncertainties as to differential consumer response to potency and price and the compliance costs of taxing for potency.

In terms of revenue-raising potential, it appears that the tax base for legalized marijuana sales is much more limited compared with alcohol or tobacco, at least in the short term. This outcome is particularly the case if medical marijuana sales are exempt from a federal marijuana tax.

Appendix A. Some Additional Social Costs and Benefits of Marijuana

The discussion in the text reported some broader information on the magnitude of the social costs and benefits of marijuana. This appendix discusses some of the components of those social costs.

Relationship Between Marijuana and Alcohol Consumption

One of the potential determinants of social costs of marijuana legalization is the relationship between marijuana consumption and alcohol consumption. Social costs of alcohol consumption have been well documented in academic studies.¹⁰⁴ If marijuana is a *substitute* for alcohol, then arguably marijuana has some positive spillover effects on society because marijuana consumption has fewer social costs than alcohol consumption.¹⁰⁵ However, if marijuana is consumed with alcohol, then arguably marijuana results in some negative spillover effects on society.

Researchers have not reached a consensus on this issue.¹⁰⁶ Many economic studies that measure the relationship between marijuana and other substances (i.e., cross-price elasticity of demand) do not capture long-term effects, could be measuring spurious relationships, or examine individuals who might not be representative of the national population.¹⁰⁷ Marijuana research is highly regulated in the United States. The National Institute on Drug Abuse, the agency primarily responsible for policy research, has been quoted in media sources that it “does not fund research focused on the potential beneficial medical effects of marijuana.”¹⁰⁸ Additionally, no study captures the effects of commercial and recreational legalization on the scale of Colorado or Washington because no other jurisdiction in the world has pursued such policies.

¹⁰⁴ In this report, see “Taxes to Reflect External Costs” and the section titled “Spillover Effects from Alcohol Consumption” in CRS Report R43350, *Alcohol Excise Taxes: Current Law and Economic Analysis*, by Sean Lowry.

¹⁰⁵ See Ruth Weissenborn and David Nutt, “Popular Intoxicants: What Lessons Can be Learned from the Last 40 Years of Alcohol and Cannabis Regulation?,” *Journal of Psychopharmacology*, vol. 26, no. 2 (February 2012), pp. 213-220; Gerald Thomas and Chris Davis, “Cannabis, Tobacco and Alcohol Use in Canada: Comparing Risks of Harm and Costs to Society,” *Visions*, vol. 5, no. 4 (2009), p. 11; and Wayne Hall, Robin Room, and Susan Bondy, *A Comparative Appraisal of the Health and Psychological Consequences of Alcohol, Cannabis, Nicotine and Opiate Use*, World Health Organization (WHO) Project on Health Implications of Cannabis Use, August 1995, at <http://www.druglibrary.org/schaffer/hemp/general/who-index.htm>. For a comparison of the social costs of alcohol and tobacco see Willard G. Manning et al., *The Costs of Poor Health Habits* (Cambridge, MA: Harvard University Press, 1991).

¹⁰⁶ For a summary of some of these studies, most of which analyze trends in youth consumption, see Table 15 in Kenneth W. Clements and Mert Daryal, *The Economics of Marijuana Consumption*, Economic Research Centre, Department of Economics - The University of Western Australia, September 1999, p. 42, at <http://www.drugpolicy.org/docUploads/Mari.pdf>. For a study on the effects of U.S. medical marijuana laws (MMLs) on alcohol consumption, see Hefei Wen, Jason M. Hockenberry, and Janet R. Cummings, *The Effect of Medical Marijuana Laws on Marijuana, Alcohol, and Hard Drug Use*, National Bureau of Economic Research, NBER Working Paper No. 20085, May 2014, at <http://www.nber.org/papers/w20085>. Wen et al. find that among those aged 21 and older, MMLs increased the frequency of binge drinking by 6%-9%, but MMLs did not affect drinking behavior among those 12-20 years old.

¹⁰⁷ For a more detailed discussion of the general shortcomings of this body of research, see Jonathan P. Caulkins et al., *Marijuana Legalization: What Everyone Needs to Know* (Oxford University Press, 2012), pp. 133-135.

¹⁰⁸ Gardiner Harris, “Researchers Find Study of Medical Marijuana Discouraged,” *New York Times*, January 18, 2010, at <http://www.nytimes.com/2010/01/19/health/policy/19marijuana.html>.

This uncertainty surrounding the relationship between alcohol and marijuana use is important because it limits the plausibility that a marijuana tax could be initially levied based on the external costs to society. For example, marijuana legalization could impose significant external costs or savings on society, even if marijuana consumption has a minor effect on the demand for alcohol due to the relatively large external costs of alcohol consumption.¹⁰⁹ Initiatives at the state levels in Colorado and Washington could provide researchers with an opportunity to better understand the effects of broader legalization policies.

Polydrug Use

In addition, the social costs of marijuana legalization could vary based on the relationship between the consumption of marijuana and other illicit drugs (commonly referred to as “polydrug use”). Studies indicate that marijuana has a lower risk of addiction and abuse than cocaine, crack, or heroin.¹¹⁰ Some claim that marijuana is a “gateway drug” to further illicit drug use. In survey data, about 10% of infrequent marijuana users in the past year report using other illegal drugs whereas the rate for “heavy” marijuana users (21-30 days per month) is slightly more than 25%.¹¹¹

Driving Under the Influence

Current research on the effects of marijuana use on traffic fatalities is limited by methodological and technological shortcomings. As noted earlier, some researchers have used controlled experiments to measure the effects of marijuana use on standard driving measurements, such as ability to track driving lanes.¹¹² Other researchers have studied the extent to which marijuana use has been linked to actual driving fatalities. Among non-alcohol drugs, marijuana is the most frequently detected substance in the general driver population as well as in drivers being involved in crashes.¹¹³ However, this is not the same as saying that there is a causal link between marijuana use and traffic fatalities. Studies using data from actual crash sites typically measure the driver’s blood, urine, or saliva for alcohol and metabolites released by the body in reaction to

¹⁰⁹ Most researchers argue that alcohol excise tax rates are set below the economically efficient level to compensate for social costs. One estimate finds the combined federal, state, and local taxes between 25 cents and 27 cents (in 2011 dollars) per ounce of pure alcohol compared with the external cost of 97 cents per ounce. See CRS Report R43350, *Alcohol Excise Taxes: Current Law and Economic Analysis*, by Sean Lowry.

¹¹⁰ Caulkins et al. (2012), pp. 131-132. Also see Hefei Wen, Jason M. Hockenberry, and Janet R. Cummings, *The Effect of Medical Marijuana Laws on Marijuana, Alcohol, and Hard Drug Use*, National Bureau of Economic Research, NBER Working Paper No. 20085, May 2014, at <http://www.nber.org/papers/w20085>. Wen et al. find that MMLs had no discernible impact on hard drug use in either youth or adults in U.S. states that legalized marijuana for medical purposes.

¹¹¹ See Figure 4.7 in Beau Kilmer et al., *Before the Grand Opening: Measuring Washington State’s Marijuana Market in the Last Year Before Legalized Commercial Sales*, RAND Corporation, December 2013, p. 37, at http://www.rand.org/pubs/research_reports/RR466.html.

¹¹² Giovanni Battistella et al., “Weed or Wheel! fMRI, Behavioural, and Toxicological Investigations of How Cannabis Smoking Affects Skills Necessary for Driving,” *PLoS ONE*, vol. 8, no. 1 (2013); and Rebecca L. Hartman and Marilyn A. Huestis, “Cannabis Effects on Driving Skills,” *Clinical Chemistry*, vol. 59, no. 3 (December 2012), pp. 478-492.

¹¹³ Guohua Li, Joanne E. Brady, and Qixuan Chen, “Drug Use and Fatal Motor Vehicle Crashes: A Case-Control Study,” *Accident Analysis and Prevention*, vol. 60 (2013), pp. 205-210. For data analysis, see Joanne E. Brady and Guohua Li, “Prevalence of Alcohol and Other Drugs in Fatally Injured Drivers,” *Addiction*, vol. 108, no. 1 (January 2013), pp. 104-114; and Amelia M. Arria et al., “Substance-Related Traffic-Risk Behaviors among College Students,” *Drug and Alcohol Dependence*, vol. 118, no. 2-3 (November 2011), pp. 306-312.

consumption of various types of drugs (including marijuana). Marijuana testing technology is currently limited in its ability to detect the level of marijuana intoxication at a given time. In the words of one study, “it is possible for a driver to test positive for cannabinal in the blood up to one week after use. Thus, the prevalence of nonalcoholic drugs ... should be interpreted as an indicator of use, not necessarily a measure of drug impairment.”¹¹⁴ For example, more advanced metabolite tests or mouth swabs would need to be developed to distinguish between a positive driving under the influence (DUI) test of a recent user and a chronic medical marijuana patient that has not been under the psychoactive effects of marijuana.

Criminal Incarcerations

Some claim that marijuana legalization could lead to savings in criminal justice spending at the federal, state, and local levels. Some of the estimates cited in media sources have been quite large. For example, Jeffrey Miron, a researcher at Harvard University, estimated in 2005 that legalizing marijuana would save \$7.7 billion per year in total enforcement costs at state and federal levels.¹¹⁵

However, subsequent research suggests that estimates could be much smaller.¹¹⁶ Sevigny and Caulkins (2004) estimated that 8% of state and federal prison inmates serving sentences for drug law violations were marijuana-only offenders.¹¹⁷ Some prisoners caught trafficking other drugs could have also possessed marijuana, but these individuals would have been incarcerated even if marijuana were legal.

According to the U.S. Sentencing Commission, 31.2% of offenders in FY2013 were sentenced to a federal prison for a primary offense related to drugs.¹¹⁸ The vast majority of these sentences are for drug trafficking.¹¹⁹ Of these drug-related offenses, 28.4% of the sentences were related to marijuana (the highest share among drug-related categories).¹²⁰ Federal legalization of marijuana would likely not affect federal inmates already serving sentences for marijuana-related charges. It is unclear how federal legalization of marijuana might impact the future federal prison population.¹²¹

¹¹⁴ Joanne E. Brady and Guohua Li, “Trends in Alcohol and Other Drugs Detected in Fatally Injured Drivers in the United States, 1999-2010,” *American Journal of Epidemiology*, vol. 179, no. 6 (2014), pp. 692-699.

¹¹⁵ Jeffrey A. Miron, *The Budgetary Implications of Marijuana Prohibition*, Marijuana Policy Project, June 2005, at <http://www.prohibitioncosts.org/mironreport/>.

¹¹⁶ For specific critiques of Miron’s study, see Jonathan P. Caulkins et al., “What are the Pros and Cons of Legalization Generally?” in *Marijuana Legalization: What Everyone Needs to Know* (Oxford: Oxford University Press, 2012), pp. 129-130.

¹¹⁷ Eric L. Sevigny and Jonathan P. Caulkins, “Kinpins or Mules: An Analysis of Drug Offenders Incarcerated in Federal and State Prisons,” *Criminology and Public Policy*, vol. 3, no. 3 (July 2004), pp. 401-434. Other convictions that involved marijuana possession and another offense (e.g., robbery) could still result in prison time.

¹¹⁸ See Figure A in U.S. Sentencing Commission, *2013 Sourcebook of Federal Sentencing Statistics*, <http://www.ussc.gov/research-and-publications/annual-reports-sourcebooks/2013/sourcebook-2013>; and CRS Report R42937, *The Federal Prison Population Buildup: Overview, Policy Changes, Issues, and Options*, by Nathan James.

¹¹⁹ According to Department of Justice data, nearly 99% of sentenced drug offenders are sent to federal prison for trafficking offenses. For analysis of the most recent data, see CRS Report R42937, *The Federal Prison Population Buildup: Overview, Policy Changes, Issues, and Options*, by Nathan James.

¹²⁰ See Figure A in U.S. Sentencing Commission, *2013 Sourcebook of Federal Sentencing Statistics*, <http://www.ussc.gov/research-and-publications/annual-reports-sourcebooks/2013/sourcebook-2013>.

¹²¹ Another factor that could affect federal prison populations is any changes to federal sentencing guidelines for drug (continued...)

In state and local jails, drug violations account for about one-fifth of incarcerations and marijuana-only violations account for less than 10% of those charges.¹²² According to these estimates, legalizing marijuana could lead to 2% fewer prisoners in jails over time. Federal legalization would likely not affect state and local inmates already serving sentences for marijuana-related charges, and would not affect future state and local incarcerations in jurisdictions that do not choose to legalize it.

These benefits, large or small, would be related to legalizing marijuana, not taxing it. If taxes or regulations are so large or onerous that they encourage a continuation of the illicit market, some of these gains would be lost.

Marijuana-Related Crime, Violence, and Corruption

The majority of costs associated with the black market for illicit drugs are related to illegal stimulants and opiates, not marijuana. This is because the price per pound of these other drugs is typically more than marijuana. Many marijuana exchanges take place indoors among parties (such as friends and family) where there is less risk for conflict, whereas many other drug transactions take place outdoors among strangers or in public.¹²³

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trafficking. For more information, see CRS Report WSLG814, *Lower Drug Trafficking Penalties, Sentencing Commission Proposes*, by Charles Doyle.

¹²² Jonathan P. Caulkins et al., “What are the Pros and Cons of Legalization Generally?” in *Marijuana Legalization: What Everyone Needs to Know* (Oxford: Oxford University Press, 2012), pp. 129-130.

¹²³ Caulkins et al. (2012), p. 131.

Appendix B. Current Treatment of the Deductibility of Expenses for Marijuana-Related Businesses

Marijuana producers and retailers may not deduct the costs of selling their product (e.g., payroll, rent, and advertising) for the purposes of the federal tax filings.¹²⁴ The Internal Revenue Code (IRC) Section 280E states that

No deduction or credit shall be allowed for any amount paid or incurred during the taxable year in carrying on any trade or business if such trade or business (or the activities which comprise such trade or business) consists of trafficking in controlled substances (within the meaning of schedule I and II of the Controlled Substances Act) which is prohibited by Federal law or the law of any State in which such trade or business is conducted.

Media reports indicate that the Internal Revenue Service (IRS) has enforced this provision in audits of marijuana-related businesses by refusing to accept these business deductions.¹²⁵ Effectively this constitutes an implicit tax on marijuana-related businesses equal to the value of the tax benefit of such deductions if firms engaged in an industry that was legal under federal law.

Some businesses have challenged the IRS's practices through the courts. For example, Sacramento-based, Canna Care marijuana dispensary is challenging IRS tax penalties of more than \$800,000 in a case before the U.S. tax court in San Francisco, CA. Media reports indicate that the IRS refused to accept \$2.6 million in business deductions for employee salaries, rent, and other costs over three years (although the IRS allowed Canna Care to deduct the cost of the marijuana itself).¹²⁶

The discrepancies between federal and state and local tax treatments of marijuana-related businesses create economic incentives to engage in the underground economy. In addition to the uncertainty of federal tax enforcement procedures (and costs of any related legal assistance), the inability of marijuana businesses to deduct their business expenses is effectively an implicit tax up to 39.6% (if organized as sole-proprietor or partnership) or 35% (if organized as a corporation) of the cost of these expenses.¹²⁷ These implicit taxes are paid in addition to state and local sales and special excise taxes.¹²⁸

¹²⁴ For more legal analysis, see CRS Report WSLG1101, *Federal Taxation of Marijuana Sellers*, by Erika K. Lunder.

¹²⁵ Katy Steinmetz, "Christian Pot Dispensary Takes on IRS," *TIME*, February 19, 2014, at <http://time.com/8764/medical-marijuana-legalization-pot-christian-canna-care-lanette-davies/>.

¹²⁶ "Medical Marijuana Dispensary Takes on IRS over What It Calls 'Punitive' Taxes," *Washington Post*, February 23, 2014, at http://www.washingtonpost.com/politics/medical-marijuana-dispensary-takes-on-irs-over-what-it-calls-punitive-taxes/2014/02/23/25fa6458-9cd3-11e3-ad71-e03637a299c0_story.html.

¹²⁷ With 35% being the top, marginal tax bracket for corporations and 39.6% being the top, marginal tax bracket for individuals under the federal income tax code.

¹²⁸ Colorado imposes a sales tax of 10% and an excise tax of 15% on retail marijuana sales, in addition to a general 2.9% state sales tax and any local sales taxes. See State of Colorado Department of Revenue, "Retail Marijuana Return Filing Overview," January 29-31, 2014, at <http://www.colorado.gov/cms/forms/dor-tax/RetailMarijuanaReturnFilingOverviewJan2014.pdf>. The state of Washington, which will allow recreational marijuana sales later in 2014, will impose an excise tax of 25% on the sales price of marijuana within an established, state-distribution system.

The status quo administration of federal tax laws creates an economic advantage for illicit marijuana sellers, who are not subject to direct taxation of their sales.

In the 113th Congress, the Small Business Tax Equity Act of 2013 (H.R. 2240) would exempt a business that conducts marijuana sales in compliance with state law from the IRC Section 280E prohibition against allowing business-related tax credits or deductions for expenditures in connection with trafficking in controlled substances.

Appendix C. Technical Calculations for the Estimate of a National Marijuana Tax Base from Colorado Data

An estimate of the total sales volume of a national sales base can be calculated by extrapolating tax collection data from Colorado or Washington. Data from both states likely underrepresent total demand because licenses for more production and retail businesses are pending. Additionally, it is unknown if the underground market for marijuana significantly declined from the opening of state-licensed stores.

For the purposes of this report, the most recent tax revenue data from Colorado are used to calculate an estimate of the state's marijuana tax base (dollar amount of total sales). The recreational tax base can be calculated using tax collections data from the 10% retail marijuana sales tax or the 2.9% general sales tax (which provide two measures to derive the total tax base), where tax base is equal to tax collections divided by the tax rate.¹²⁹ Because each of the two taxes yields slightly different tax bases, the two calculations are averaged to determine a monthly aggregate tax base for recreational sales.

For example, the Colorado Department of Revenue reported that the 10% retail marijuana sales tax collected \$2.9 million¹³⁰ and the 2.9% sales tax collected \$886,915 (on retail, non-medical marijuana) in September 2014.¹³¹ Using the methodology above, this would lead to tax base calculations of \$29.4 million and \$30.6 million, respectively.¹³² Averaging these two numbers leads to an estimate of \$30.0 million in recreational marijuana sales in the state of Colorado in September 2014.¹³³

The data from Colorado can then be extrapolated for each state and the District of Columbia to calculate an estimate of the national sales tax base. The recreational sales tax base averaged from the two data points in Colorado can be multiplied by each state's or district's population (indexed, relative to Colorado) and then multiplied by the marijuana usage rates (indexed, relative to Colorado) as reported by the National Survey of Drug Use and Health (NSDUH). In other words, this simple calculation assumes the primary sources of variation in consumption in each state or district are based on population and usage rates and does not assume major changes in price (e.g., the large-scale production of relatively cheap, unbranded marijuana; or variations in state tax rates) that could lead to further supply and demand effects. Using the August 2014 data from Colorado, it can be estimated that the national sales tax base for recreational marijuana could be \$14.5 billion or \$15.4 billion per year.¹³⁴ These estimates could be subject to revision, as recreational tax revenue in Colorado has been generally increasing since January 2014.

¹²⁹ It is more difficult to calculate the state tax base using collections data from 15% retail medical tax because this tax is calculated on state-set average prices for various categories of marijuana.

¹³⁰ The exact figure is \$2,940,346.

¹³¹ Colorado Department of Revenue, "Colorado Marijuana Tax Data," at <https://www.colorado.gov/pacific/revenue/colorado-marijuana-tax-data>.

¹³² The exact calculations result in tax base calculations of \$29,403,460 and \$30,583,276, respectively.

¹³³ The exact calculation is \$29,993,368.

¹³⁴ The lower and higher estimates are based on different reported usage rates, based on age, from the NSDUH survey (continued...)

A similar process can be used to calculate the medical marijuana tax base in Colorado, although there is only one tax levied on medical marijuana in Colorado (the 2.9% general sales tax). Based on September 2014 data, medical marijuana sales in Colorado were \$31.3 million.¹³⁵ From January to September 2014, monthly medical marijuana sales in Colorado have ranged between approximately \$31 million and \$35 million. In FY2013 (ending June 30, 2013), before the legalization of recreational marijuana, state sales tax collections data from the Colorado Department of Revenue imply an annual medical marijuana tax base of \$314.2 million in sales.¹³⁶ It is too early to conclude whether the opening of the recreational marijuana market has affected the demand for medical marijuana in Colorado.

However, it is difficult to extrapolate medical marijuana data in Colorado to the general U.S. population because of incomplete data in some states.¹³⁷ Additionally, the medical marijuana patient data could have a self-selection bias, as some individuals could have been willing to relocate to states permitting medical marijuana use, if they felt that they had few other options to alleviate their condition. Based on Colorado's tax collections data, medical marijuana consumption could double marijuana consumption total amounts, if not more. Even if medical marijuana regulations were more tightly enforced, post-legalization, users denied for a medical card could purchase marijuana for recreational purposes.

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data. The higher estimate is based on the usage rates of 18-25 year olds and the lower estimate is based on the usage rates of 26+ year olds. Surveys of drug habits tend to understate actual usage rates. These estimates are based on different assumptions, and they should not be considered as a range or confidence interval for what the projected national sales tax base of marijuana could be.

¹³⁵ This calculation is based on \$886,915 collected in September 2014 from the 2.9% general sales tax. See Colorado Department of Revenue, "Colorado Marijuana Tax Data," at <https://www.colorado.gov/pacific/revenue/colorado-marijuana-tax-data>.

¹³⁶ Calculations based on \$9.1 million in reported tax collections during FY2013. See Colorado Department of Revenue, "Colorado Medical Marijuana Dispensaries, Retail Sales and State Tax by County, Fourth Quarter, FY2012-13," at http://www.colorado.gov/cs/Satellite?c=Document_C&childpagename=Revenue-Main%2FDocument_C%2FXRMAAddLink&cid=1251647950747&pagename=XRMWrapper.

¹³⁷ Medical marijuana patient data is available at Marijuana Policy Project, "Medical Marijuana Patient Numbers," at <http://www.mpp.org/states/medical-marijuana-patient.html>. Some states do not disclose their number of medical marijuana patients, doctors, or caregivers.