

An Economic Analysis of Marijuana Legalization in Florida

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Abstract

The US government spends billions of taxpayers' dollars each year enforcing marijuana prohibition laws. However, the past 40 years have seen a drastic change in how Americans view marijuana and its legal status. Since 1996, 23 states have legalized the medicinal use of marijuana, 14 states have decriminalized it, and 4 states as well as the District of Columbia have completely legalized its use. Recent political events in Florida suggest that there will be major developments in the legal status of marijuana at sometime in the near future. This is the first study to focus on the budgetary implications marijuana legalization would have in the state of Florida. The study concludes that the combined annual savings and increase in tax revenue that would come from legalization would total \$145.7 million annually in the short run and \$285.5 million annually in the long run.

JEL classification: H71; H72; K42

Keywords: Marijuana; Regulatory Policy; Drug Policy

Section I: Introduction

According to the most recent Gallup poll, 54% of the American population believes that recreational marijuana use should be legal (Motel, 2014). Compare that to 40 years ago, when only 12% of Americans supported the legalization of the drug (Motel, 2014). Undeniably, there has been a drastic change in how Americans view marijuana, and while motivations for the legalization may differ across respondents, there are significant social and economic costs of prohibition that US taxpayers should consider. In the year 2012, according to the Federal Bureau of Investigation (2013), law enforcement made an estimated 1,552,432 arrests for drug abuse violations nationwide—of those 48.3 percent were marijuana related arrests, 5.9% for the sale or manufacturing of the drug, and 42.4% for possession of the drug. Those statistics sum up to a total of about 750,000 arrests resulting from marijuana prohibition per year. With these staggeringly high numbers, concern has been raised about how much of state and local government budgets have been directed towards arresting, prosecuting, and incarcerating offenders of these nonviolent crimes.

In 2005, Milton Friedman, along with over 500 other well-respected economists, sent an open letter to the president, Congress, governors, and state legislatures urging them to push this debate to the forefront of policy change. Motivated by Jeffrey Miron's research (2005), the letter argued the US government would save an estimated \$7.7 billion each year by ending prohibition. The letter proposed that, "at a minimum, this debate will force advocates of current policy to show that prohibition has benefits sufficient to justify the cost to taxpayers, foregone tax revenues, and numerous ancillary consequences that result from marijuana prohibition," (Hardy, 2005). Despite billions of

dollars of effort, prohibition is not successful in keeping marijuana away from minors. According to the Marijuana Policy Project, over 85% of high school seniors report that marijuana is 'easy to get' (Hardy, 2005).

Since 1996, 23 states have legalized medicinal marijuana, 14 states have decriminalized it, and 4 states, Colorado, Washington, Oregon, and Alaska, as well as the District of Columbia, have completely legalized its use. Although states differ in their legislation in regards to marijuana use, the drastic rise in legal medical use, and most recently legal recreational use is indicative of major developments in this arena over the next few decades.

This past November, in a surprising outcome, Florida residents voted against Amendment 2, which would have permitted the use of marijuana for certain medical conditions. A study, conducted in July 2014 by Quinnipiac University, found that 88 percent of Florida voters supported legalized marijuana for medical use, while only 10 percent opposed it (Schwartz, 2014).¹ The study also revealed that voters supported legalization of recreational marijuana 55 to 41 percent, which supported the notion that full legalization was not a far-fetched possibility. In a response to the overwhelming support for the policy change, the Drug Free Florida political committee, funded largely by Las Vegas casino magnate Sheldon Adelson, poured over \$5.5 million on marketing to oppose the change. Their advertisements attacked outrageous potential loopholes of the amendment, which swayed concerned residents to vote no. The constitutional amendment required over 60 percent to pass, and just fell shy with only 58 percent support.

¹ From July 17-21, the Quinnipiac Poll surveyed 1,251 registered voters with a margin error of +/- 2.8 percent.

If Florida had passed the amendment, it would have been the first southern state to adopt a medical marijuana law. This debate will undoubtedly reappear in the 2016 elections, as efforts to ensure that a medical marijuana law will be on the ballot have already begun to organize. With Florida's notably large population and bellwether status in American politics, any policy change for marijuana would result in a significant development in the legal status of the drug, and could arguably lead to more lenient policies taken by other southern states. Given the proven success hyperbolic propaganda has had in influencing voters, it is important to shift the focus away from politics, and to consider the economic impacts of legalizing the drug so that there will be a better-informed electorate. Legalization would have many effects, and generating a fiscal dividend does not, by itself, make it a better policy than prohibition; however, the magnitude of the fiscal benefit that may arise from legalization should be assessed in order for voters to form their own opinion.

To date, there is no academic literature that specifically addresses the economic impacts of marijuana legalization in the state of Florida. Previous studies have analyzed its effects on a national scale or have looked at its effects on other states, but none have considered Florida. I will evaluate the economics of marijuana legalization using Florida as a model potential market. This study will estimate and discuss the reductions in government expenditure and the increase in revenue realized through the taxation of the drug. By employing a net present value evaluation on the commercialization of marijuana in the state of Florida, similar to the research tactics of Miron (2005) and Stiffler (2012), I aim to conclude whether there are significant economic benefits for the state of legalizing the drug.

The results of this study conclude that Florida's government could reduce their annual expenditure in the short run by \$25.5 million and increase their tax revenue by \$120 million if they legalize marijuana. In the long run expenditure savings will increase to \$85.5 million annually, and annual tax revenues will increase to \$200.5 million.

In Section II I discuss the existing literature that relates to this subject. Section III contains a description of the theoretical framework this study is based on. I describe the data that I will be using to predict the costs and revenues in Section IV. In Section V I describe in detail the procedure used in this study and explain why it is a logical and reasonable estimation of a net change in government expenditure and tax revenue. In the final section, I will conclude with a summary of my results and will attempt to project a 5-year financial forecast under a legalized regime. Based on these findings, I will suggest potential policy changes that would include reallocation of state resources.

Section II: Literature Review

There is nothing in the academic literature to date that specifically addresses the economic impacts of marijuana legalization in Florida. Even the most widely cited research in this field lacks conclusive data on the Sunshine state (Miron, 2005).² While there are few rigorous academic works on the subject, many individuals with strong opinions on the topic, think tanks, and advocacy groups have published reports online. These studies are often contaminated with bias, and must be taken with some degree of skepticism.

The works of economist Jeffrey Miron, who has published multiple reports assessing the budgetary implications of marijuana prohibition on both the United States as a whole (2005), as well as on the state of Massachusetts, individually (2002; 2003), will serve as a framework for this study. His research begins with the assumption that legalization would cause government expenditure to decline with a decrease in enforcement costs, and tax revenue to increase with the ability to levy taxes on the production and distribution of marijuana; therefore, he concludes that there are considerable gains to be made by ending prohibition. It is in following his methodology, that I will conduct my research and conclude what the budgetary implications of legalization would be for Florida.

Miron (2005) shows that the US government (state, local and national) would reduce their annual expenditure by \$7.7 billion with the termination of marijuana

² Miron (2005) uses a generalized assumption to estimate the fraction of possession arrests for Florida, as no factual data was available for the state. *Quoting from <http://fischer.lib.virginia.edu/collections/stats/crime/2000cb.pdf>: “(3) No arrest data were provided for Washington, DC, and Florida. Limited arrest data were available for Illinois and Kentucky.”

prohibition. The study also concluded that \$2.4 billion would be generated in tax revenue if marijuana were taxed like all other goods, and \$6.2 billion would be generated if a “sin” tax were implemented and the drug were to be taxed similarly to alcohol or tobacco. Miron (2003) estimates that for the state of Massachusetts, there would be a \$120.6 million annual reduction in expenditure, and a minimum of \$16.9 million annually in tax revenue if marijuana were to be legalized. If it were to just be decriminalized in Massachusetts, the annual savings in law enforcement would only be \$24.3 million (Miron, 2002). Miron’s later reports analyze a full legalization policy change over decriminalization, where criminal penalties for possession are repealed, but trafficking is still subject to criminal sanctions. This study will consider the same policy change for the following reasons: first, decriminalization only can eliminate arrests for possession and not for trafficking. Second, legalization has a significant effect on savings in prosecutorial, judicial, and incarceration expenses, while this effect is negligible with decriminalization. Lastly, decriminalization does not allow the taxation of the drug, while legalization does.

In November of 2012, the state of Colorado passed Amendment 64, which addresses the personal use and regulation of marijuana by providing a system to regulate and tax cannabis production and distribution with both an excise and sales tax. Prior to the measure passing, the Colorado Center on Law & Policy estimated that the amendment would produce \$60 million in combined savings and additional revenue for the state (Stiffler, 2012), with the potential to double after 2017 when the per unit percent excise tax will be increased. Twelve million dollars in government savings was predicted to result from reductions in criminal costs. Twenty-four million projected to be generated

from excise taxes on the wholesaler, with an additional \$8.7 million generated from new state sales tax revenue, as well as \$14.5 million to be generated from new local sales tax revenue. Current marijuana usage, the degree of responsiveness of current users to changes in price, the level of tax to be imposed, changes in production techniques and costs, cost and implementation of the regulatory policy, the extent of tax evasion, and costs associated with criminalization are all factors that were taken into consideration in the model used to produce these estimates (Stiffler, 2012). Using Colorado-specific data, Stiffler adopts the methodology of Miron (2005), and improves upon the estimate of reductions in law enforcement costs for Colorado, which include costs of arrests, prosecution, sentencing, and incarceration.

To estimate the total revenue that could be generated from the sale of marijuana, Stiffler (2012) first calculates the current consumption levels in Colorado, and then adjusts this figure to account for changes in consumption after the passage of the amendment to estimate a reasonable size of the drug market. The study then attempts to assess the change in price given a lower cost of production, and the change in quantity demanded given an elasticity of -0.52. The adjusted figure of market size and cost per ounce is then multiplied by a 15% excise tax, a 2.9% state sales tax and a 4.82% local level sales tax per ounce to calculate total tax revenue. Recent data show that these figures overestimated the actual revenues generated in the first 6 months by \$21.5 million (Lobosco, 2014). One of the main causes of this gap is that people are still purchasing marijuana on the black market. According to the Marijuana Policy Group, only 60% of consumers purchased the drug through legal channels.

I will improve upon these previous studies in three ways. First, the current study uses tax policy followed by Stiffler (2012) to improve upon Miron's methodology (2003; 2005) to examine the savings in state and local government expenditure and tax revenue generated in Florida that would result from legalization of marijuana. Secondly, substituting true data made available by Florida state agencies and recent publications for the generalized assumptions used by Miron (2005) permits a more accurate analysis for the state of Florida. Furthermore, an analysis of data and current regulatory policies from Colorado and Washington, that was not available to Miron, will allow this study to adjust its estimates to more realistic figures.

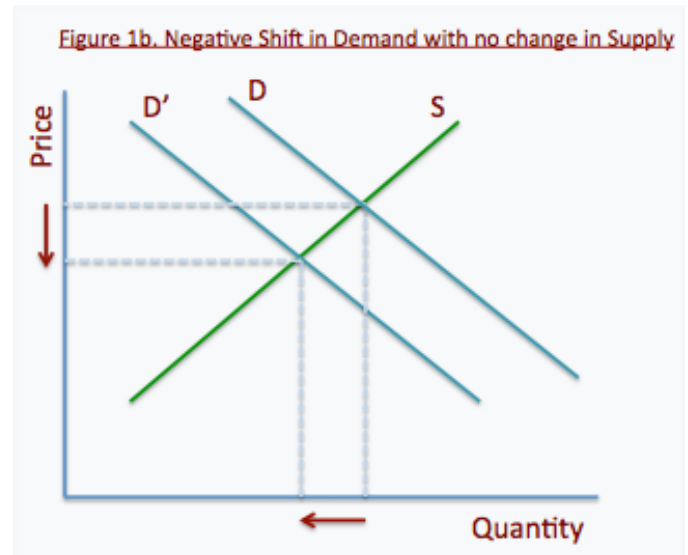
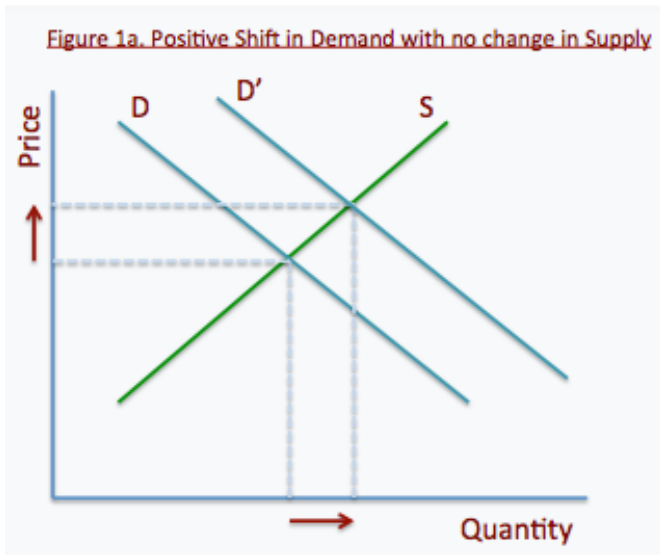
Section III: Theoretical Framework

This study begins with the assumption that legalization will cause a decrease in government expenditure and an increase in tax revenue, as prohibition necessitates high enforcement costs and prevents taxation on a large market. The reduction in expenditure would result from fewer arrests, prosecutions, and incarcerations under new legal stature of marijuana, while tax revenue will increase by regulating and levying taxes on the manufacturing and distribution of the drug.

This theoretical framework intuitively suggests that under a legalized regime, enforcement costs will be lower due to less illegal activity. However, in reality, this may not be as significant as the data would initially suggest, as resources would still be needed to regulate and enforce consumption laws such as public consumption, driving under the influence, underage consumption, and black market transactions. This study will have to revise its estimates of savings costs to account for ongoing illegal activity.

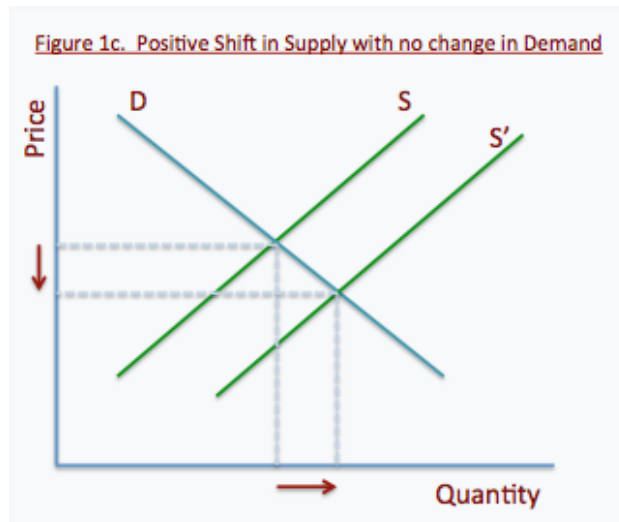
To measure the effects on tax revenue generation, the study is required to consider the effects legalization will have on the price and demand of the drug. Will demand shift positively or negatively? To address changes in consumption after legalization, the study will consider exogenous, non-price related effects, as well as endogenous, price related effects. Exogenous effects consider the attitude towards marijuana consumption irrespective of price. As shown in Figure 1a, consumption may increase once the illegal status of marijuana is lifted, as some consumers would be willing to use the drug after the taboo is removed. However, there also may be an offsetting reduction in consumption, seen in Figure 1b, as some consumers may no longer be enticed to use marijuana now that the “daringness” of the illicit drugs is gone. This phenomenon is referred to as the

“forbidden fruit” effect. Recent data from Center for Disease Control suggests that consumption amongst teens may lower under a regime that enacts regulations on production and sale of marijuana.³ The extent to how much these effects move demand is unclear.



Calculating the endogenous effects on consumption requires an assessment of future price, production costs, and price elasticity of demand. It is reasonable to assume that production costs will fall under legalization because producers will not have to pay a risk premium for participating in an illegal market. Additionally, under legalization, producers can expand their operations without the fear of attracting police attention, which would allow for economies of scale. This positive shift in supply, all things equal, would result in a lower price and a higher output, as shown in Figure 1c.

³ Nationwide past-30-day marijuana use for high school students rose from 20.8% to 23.1% from 2009-2011, while it dropped from 24.8% to 22% in Colorado during the same period. During this period, Colorado enacted regulations on the sale of medical marijuana.



The relationship between price and quantity of a good consumed is characterized by the elasticity of the good. Price elasticity measures the percent change in the quantity demanded of a good in response to a 1% change in its price. The greater the response to a change in price means a greater elasticity. A measure of elasticity with an absolute value less than 1 signifies an inelastic good. Economic theory suggests that elasticity rises as price falls, and that products such as marijuana, which are typically habitually consumed, tend to be more inelastic. Given what theory suggests, it is reasonable to assume the absolute value of the price elasticity of demand for marijuana is less than one, meaning that changes in price would not greatly affect the quantity of marijuana demanded.

Ultimately, it is an empirical question.

This theoretical framework fails to account for deviant behavior. For an example, predictions for Colorado tax revenue for the first 6 months after Amendment 64 was passed overshoot the actual revenue by \$21.5 million. This is mainly attributed to the assumption that the majority of consumers would purchase the drug through legal channels. In reality, 40% of consumers continued to purchase cannabis through the black

market. The framework also does not account for the fact that the more frequent users are more likely to own their own plants, and thus less likely to purchase marijuana through retail stores, in order to evade taxation.

While this fundamental theory suggests that tax revenue will increase, as there was none before, and government expenditure will decrease, the magnitude of these effects remains an empirical question. There are a number of factors that will influence the actual results. First, how much and in which direction will demand shift? How much will supply shift? What is the actual price elasticity of demand? Lastly, how much will consumers operate outside of the legal market?

Section IV: Data

Data provided by the Florida Department of Law Enforcement, Florida Department of Corrections, and Florida Courts will be used to predict government savings. Data on marijuana-related arrests rates in Florida, made available by Edwards et al (2013), was not accessible to Miron and will be used in this study. To estimate the savings in costs and tax revenue generated in Florida, this study will also use data from the National Survey on Drug Use and Health, and from the state population census to predict the size of the current and future consumption markets. While these are the best available data, limitations remain. Given that legalization has not yet occurred, there are no empirical data on state savings and revenue post legalization, so estimating figures using these data is the most appropriate method for this study. This study will attempt to consider all potential factors that would influence the accuracy of its results; however, there are still substantial holes in the framework that allow for inaccuracies in our predictions. The weaknesses in the data's ability to predict costs and revenues are mentioned respectively below.

Data for Expenditure Estimates

To estimate savings of state and local government expenditure, three main factors can be quantified with actual empirical data: reduction of police resources, prosecutorial and judicial resources, and correctional resources. Percentages of marijuana-related costs will be calculated for the \$300 million police budget, the \$443 million judicial budget, and the \$2.1 billion corrections budget to measure the total costs of prohibition enforcement. The omission of other possible savings, such as the cost incurred from persons on parole or probation who get sent to jail for a positive urine test, results in an

underestimation of the total savings (Miron, 2005). This conservative estimate also does not take into account reductions in prevention and treatment expenses that also may accompany legalization. It is reasonable to assume that actual effects of legalization on savings may be higher than what the data may suggest.

Additionally, it is important to note that a large proportion of government agency budgets are fixed and independent of the level of arrests or prosecutions. To better estimate criminal cost savings, this study distinguishes between fixed costs, such as personnel costs, which are paid irrespective of the level of activity, and marginal costs, which are the additional costs that come from arresting and prosecuting marijuana law violators. Miron (2003; 2005) based his estimates of state savings on criminal justice resources on the assumption that the technology is constant-returns to scale, so that average costs are equal to marginal costs. However, this resulted in a great overestimation of savings. A report released in 2005 by the National Organization for the Reform of Marijuana Laws, or NORML, pointed out that approximately 70% of criminal justice agency budgets are fixed, and thus only 30% of costs can be reduced by decreased violations in the short run (Austin, 2005).

Data for Revenue Estimates

This study estimates the number of marijuana consumers in Florida by using survey data from the 2013 National Survey of Drug Use and Health conducted by the Substance Abuse and Mental Health Services Administration. While this data does provide substantial insight into Florida's marijuana consumption habits, it is still difficult to determine an exact figure for the market size that would be able to participate in legal marijuana consumption for two reasons. Firstly, the survey lumps respondents who used

marijuana once in the past month or year into the same category as a respondent who used marijuana multiple times in the same period. Secondly, it is difficult to estimate the percentage of people 21 and older as the survey breaks numbers down by ages 12-17, 18-25, and 26 and older.⁴ This study assumes that the usage among ages 18-25 is evenly distributed, and uses a straight-line approach to adjust the cohort to a 21 and older cohort. Additionally, since our estimate is based on survey data concerning a topic that is both illegal and may carry a social stigma, underreporting must be assumed. This study will defer to Kilmer and Pacula's (2010) approximation of underreporting, which estimates that 20% of users do not report consumption.

⁴ To calculate figure for adults over the age of 21, the estimate for ages 18-25 was adjusted to eliminate the 42.3% of the population range who are too young to participate in the legal market.

Section V: Empirical Calculations

This study will follow a similar methodology to the one used in Miron (2005) to estimate savings in government expenditure, and the methodology used in Stiffler (2012) to estimate potential revenue growth. Both methods use clear and concise logic to provide the best possible approximations for each of the estimates.

Expenditures

To estimate savings of state and local government expenditure, Miron (2003; 2005) focuses on three main factors: reduction in arrests require fewer police resources, elimination of prosecutions require fewer prosecutorial and judicial resources, elimination of marijuana related incarcerations require fewer correctional resources. He multiplies the percentage of marijuana-related arrests by the budget for police, the percentage of marijuana-related prosecutions by the budget for prosecutors and judges, the percentage of incarcerations for marijuana violations by the budget for prisons, and sums each component to yield a reasonable estimate of costs. Table 1 shows the step-by-step calculations used to find the total government expenditure savings for Florida. Each of the individual contributing estimates are subject to the assumptions and modifications as follows.

Table 1: Calculating Expenditure on Marijuana Prohibition, Short Term

Police Budget, Total:	\$300 million
Police Budget, Less Fixed Costs:	\$90 million
% of Arrests, Sale/Manufacturing of Marijuana:	0.5
Police Budget, S/M of Marijuana:	\$450,000
% of Arrests, Possession of Marijuana:	6.4
Police Budget, Possession of Marijuana:	\$5.76 million
Police Budget, Marijuana Violations:	\$6.21 million
Judicial Budget, Total:	\$443 million
Judicial Budget, Less Fixed Costs:	\$132.9 million
% of Felony Convictions for Marijuana:	9.8
Judicial Budget, Marijuana:	\$13 million
Corrections Budget, Total:	\$2.1 billion
Corrections Budget, Less Fixed Costs:	\$630 million
% of DOC Prisoners on Marijuana Charges:	1.0
Corrections Budget, Marijuana Violations:	\$6.3 million
TOTAL Marijuana Enforcement Budget:	\$25.5 million

As my model aims to better estimate savings than a static cost model, I am only applying cost reductions to the percentage of each agency's budget that varies with the level of arrests, prosecutions, and sentences. The model uses Austin's (2005) approximation of 30% to calculate the percentage of each agency's budget that is not fixed. Thus, the \$300 million police budget, the \$443 million judicial budget, and the \$2.1 billion corrections budget are all reduced by 70% so that the total variable costs for each budget become \$90 million, \$132.9 million, and \$630 million, respectively.

In calculating costs to police resources purely related to marijuana prohibition, this study will have to estimate the portion of arrests that are "stand-alone" (meaning that the reason for the arrest was a marijuana violation as opposed to a "multiple-offense situation," where marijuana possession is recorded along with an arrest for another criminal offense that would have taken place regardless of possession). Fortunately, the

FBI/UCR handbook subjects all multiple-offense reporting to a Hierarchy Rule, which requires law enforcement agencies to identify and report only the offense that is ranked highest on the hierarchy list, when there are any Part I offenses involved.⁵ In situations where a Part I and a non-Part I offense occur, only the Part I offense is recorded.

However, if a multiple-offense situation occurs involving two non-Part I offenses, such as marijuana possession and a traffic violation, both offenses are reported. Given this breakdown, this study will assume that all reported marijuana-related arrests are due mainly to the possession or distribution of marijuana. In Florida, 6.4% of all arrests made are due to marijuana possession and 0.5% of arrests are due to marijuana distribution. As shown in Table 1, \$6.21 million (6.9% of the \$90 million annual police budget) is spent annually on marijuana enforcement.

In predicting prosecutorial and judicial costs, the study will have to apply a national percentage of felony convictions for marijuana offenses to each state, as this data on a state-by-state basis is not available. According to the US Department of Justice (2009), 33.4% of all felony convictions in state courts were due to drug violations with 14.6% due to drug possession and 18.8% due to drug trafficking in 2006. Of the percentage of all felony convictions in state courts due to drug trafficking, 11.8% was due to marijuana trafficking, 35.4% was due to other drugs, and 52.8% was unspecified. This study will assume that the fraction of marijuana convictions in the unspecified category equals the fraction for those that are specified, or 33.3%. Thus, 29.4% of total drug trafficking convictions can be assumed to be due to marijuana, or 5.5% of all felony

⁵ Part I offenses include: Criminal Homicide, Forcible Rape, Robbery, Aggravated Assault, Burglary, Larceny-Theft (except Motor-Vehicle Theft), Motor-Vehicle Theft, and Arson. See U.S. Department of Justice, FBI/UCR Handbook (2004), available at <http://www2.fbi.gov/ucr/handbook/ucrhandbook04.pdf>

convictions are due to marijuana trafficking. Additionally, the study will continue following Miron's (2005) assumption that the percentage of convictions attributable to marijuana possession is equal to the percentage for trafficking convictions, as there are no specifications for the possession category. Thus 29.4% of the 14.6% of possession convictions yields that 4.3% of all felony convictions in state courts was due to marijuana possession. In total, 9.8% of all felony convictions in state courts are due to marijuana offenses. Based on these calculations, Table 1 indicates that \$13 million of the total \$132.9 million judicial budget is allocated towards marijuana prohibition enforcement.

Due to variations in state penal systems, predicting the portion of corrections budget differs when assessing costs on a national scale versus an individual state, so this study will have to consider the specifics of Florida's penal system. Information on the percentage of marijuana related incarcerations is not available for most states, so when estimating the national total costs, Miron computes the population-weighted average from the data that exist, and imposes this percentage on all states. This study will attempt to provide a more accurate estimate using the most recent empirical data. Miron estimates that 1% of all federal and state inmates are serving time for marijuana offenses is consistent with the figure estimated by Calkins et al. (2012). Based on this figure, we can estimate that \$6.3 million of the \$630 million dollar DOC budget is used to cover marijuana enforcement costs.

These conservative calculations yield a total of \$25.5 million in annual savings; however, this figure will increase in the long-run as fixed costs will be able to be adjusted to fit future needs. Projecting out 5 years and assuming all fixed cost become variable costs, we calculate a total figure for the fifth year that would round out to be

approximately \$85 million⁶ in savings as shown in Table 2. This result is still substantially less than Miron’s 2005 estimate of \$288 million in savings from Florida alone. This is likely due to the fact that this study is using Florida specific data instead of population-weighted estimates.

Table 2: Calculating Expenditure on Marijuana Prohibition, Long Term

Police Budget, Total:	\$300 million
% of Arrests, Sale/Manufacturing of Marijuana:	0.5
Police Budget, S/M of Marijuana:	\$1.5 million
% of Arrests, Possession of Marijuana:	6.4
Police Budget, Possession of Marijuana:	\$19.2 million
Police Budget, Marijuana Violations:	\$20.7 million
Judicial Budget, Total:	\$443 million
% of Felony Convictions for Marijuana:	9.8
Judicial Budget, Marijuana:	\$43.4 million
Corrections Budget, Total:	\$2.1 billion
% of DOC Prisoners on Marijuana Charges:	1.0
Corrections Budget, Marijuana Violations:	\$21 million
TOTAL Marijuana Enforcement Budget:	\$85 million

This study recognizes that the above procedure overestimates the total reduction in expenditure. It would be appropriate to calculate and subtract the combined revenue that comes from fines offenders are required to pay under prohibition, and the proceeds from seized assets of marijuana offenders. This data, however, is not readily available for the state of Florida. Miron (2003; 2005) shows that the calculations for the offsetting revenues is almost negligible compared to the revenue generated by state and local

⁶ The \$85 million savings of the fifth year has been discounted to the present by using a real interest rate of 0.0%. When adjusting the 5-year nominal treasury rate of 1.31% for inflation using an expected inflation rate of 1.7% (Federal Reserve Bank of Cleveland, 2015), I calculated the real interest rate to be -0.39%. Rather than using this negative rate, I found it appropriate to use a real discount rate of 0.0%.

governments from legalization, adjusting for inflation; \$100 million in revenue compared to \$5.1 billion generated in 2005, and \$7 million in revenue compared to the \$122.4 million generated in 2003. Therefore, I do not expect to have found a large offsetting influence to my estimates for savings, and find it fair to leave it out of my model.

Revenue

To estimate the revenue generated from taxing the legal production and distribution of marijuana, I will estimate the current statewide consumption of marijuana, the projected statewide consumption given price and non-price effects on demand under legalization, and then calculate the tax revenue that would result from this expenditure based on subjecting the manufacturing and sale of marijuana to both excise and sales taxes.

Table 3: Calculating Annual State Consumption

Florida population:	19.7 million
Persons 21+ who reported use:	1,300,000
% of population who underreport:	20
Adjusted estimate for current users 21+:	1,560,000
Average annual consumption per user:	3.53 ounces
Total annual consumption:	5,506,800 ounces
Price elasticity:	-0.54
Forecasted price change under legalization:	-10%
Forecasted demand change:	+5.4%
Forecasted annual quantity demanded:	5,804,167 ounces

Based on data from the 2013 NSDUH survey, there are 1,300,000 current users above the age of 21 that reside in Florida. That is about 13.2% of the state’s adult population. Consistent with Kilmer and Pacula’s (2010) estimate of underreporting, this study adjusts its estimate with a 20% increase. Thus, revising the total number of users above the age of 21 to 1,560,000. According to Stiffler (2012), the average annual

consumption per American is 100 grams per year or 3.53 ounces. Thus, 1,560,000 multiplied by 3.53 ounces yields 5,506,800 ounces of marijuana consumed annually in the state of Florida.

To address changes in consumption after legalization, the study will consider exogenous, non-price related effects, as well as endogenous, price related effects on quantity demanded. In analyzing the exogenous effects, this study stays consistent with Miron's (2005) assumption that there is no shift in the demand curve under legalization. Miron claims any shift should be very minor with increase in demand most likely coming from casual users, and plausibly even being offset by a "forbidden fruit" effect. Moreover, including any increase in demand may potentially bias the estimate of tax revenue upward, as it does not account for the production and distribution of marijuana on the black market, which would continue to avoid taxation.

However, this study does employ a price elasticity measure of -0.54 on marijuana, in concordance with Kilmer and Pacula (2010). Thus, a 1% decrease in price of marijuana will result in a 0.54% increase in quantity demanded. According to a Colorado State University study, price per ounce of marijuana is forecasted to decrease by 10% after legalization to an average retail price of \$2,509 per pound, or \$157 per ounce (Brown et al, 2013). Building from an adjusted wholesale price, the study's forecast takes into account excise taxes on production, inflation, distribution costs, and producer and retailer markup rates. Applying Kilmer and Pacula's measure of price elasticity, we expect a 5.4% increase in quantity demanded, ultimately resulting in a post legalization demand of 5,804,167 ounces per year. A summary of the data and subsequent calculations and adjustments are shown in Table 3.

It is important to note that the calculations in Table 3 are based on the key assumption that the market will purchase their marijuana through legal channels. As witnessed in Colorado (Lobosco, 2014), the reality of that is far below expectation. If we adopt a market participation rate of 60%, as suggested by the Marijuana Policy Project, our market size decreases from 1,560,000 to 936,000 consumers (see Appendix for Table A3). Following our previous calculations in Table 2, that would yield 3,482,500 ounces consumed annually, given the annual average consumption rate of 3.53 ounces per user and the increase in quantity demanded of 5.4%.

A 15 percent excise tax charged directly on purchase of the drug, given a price of \$157 per ounce, yields \$23.55 of excise tax per each ounce of marijuana. The state level sales tax for Florida is currently 6%, not including additional local level sales tax rates, which can boost the total rate up to 7.5% in some municipalities. A 6% tax imposed on a state level produces \$9.42 per ounce in sales tax. With an additional 1% local level sales tax imposed, each ounce would produce an extra \$1.57.

Table 4 contains our estimates of additional tax revenue generated by legalization after adjusting for 60% market participation. The calculations show that in the short run the state would generate an additional \$82,012,882 in excise tax revenue, \$32,805,153 in state level sales tax revenue, and \$5,467,525 in local level sales tax revenue.

Table 4: Annual Tax Revenue with 60% Market Participation

Excise Tax:	\$82,012,882
Sales Tax:	\$32,805,153
Local Sales Tax:	\$5,467,525
Total:	\$120,285,561

Table 5 shows annual tax revenue estimates using our earlier estimate of 5,804,167 ounces consumed annually in Florida and an average adjusted price of \$157 per ounce of marijuana. We calculate that the state would produce an additional \$136,688,133 in excise tax revenue, \$54,675,253 in state level sales tax revenue, and \$9,112,542 in local level sales tax revenue under legalization. The \$200,475,928 total tax revenue is also discounted to the present using a rate of 0.0%, as explained in footnote 6.

Table 5: Additional Annual Tax Revenue, Full Market Participation

Excise Tax:	\$136,688,133
Sales Tax:	\$54,675,253
Local Sales Tax:	\$9,112,542
Total:	\$200,475,928

Even while using the conservative estimate in Table 4, we find that a revision of marijuana laws could yield \$120 million dollars in tax revenue annually, and if market participation increases in the long run, Florida could be generating over \$200 million annually in tax revenue. When using more accurate and Florida-specific data, my estimates for tax revenue are much higher compared to Miron's contrived estimate of \$48.2 million.

Section VI: Conclusion

Based on the findings calculated in the previous sections, it is clear that marijuana prohibition costs a significant amount of Florida taxpayers' money each year. In the short run, we can calculate the combined cost and lost tax revenue to total \$145.7 million annually, while only taking into consideration the change in variable costs from the police, judicial, and corrections budget, as well as taxation on 60% of the market. In the longer run, when fixed costs are assumed to become variable and market participation approaches 100%, we estimate that the combined savings and increase in revenue from ending prohibition will increase to \$285.5 million each year discounted to the present. While each of these estimates is only a small portion of Florida's \$77 billion state budget (0.2% and 0.4%, respectively), their numerical values are large enough to be significant in the eyes of Florida residents, and if reallocated towards other efforts could have a significant impact. To put it in perspective, these estimates represent 5-10% of the combined total of the police, judicial, and corrections budgets, and can provide substantial beneficial change even if it is reallocated within those three departments. Additionally, a regulated system could make marijuana harder to access for those who are under the age of 21, while current policy has failed to keep marijuana out of the hands of minors.

With increased efforts across the nation to end marijuana prohibition, the era of legalization is in the near future. While Amendment 2 failed to pass this past election, it is likely to reappear in the next one, making marijuana legalization not a question of if, but when. The economic benefit and potential social benefit that legalization could yield is likely significant enough for Florida voters to want to end prohibition in their state.

However, there are set backs that they must also consider. It is important to note that if neighboring states do not follow suit, intrastate issues will likely arise. This is a current problem that Colorado is facing as twelve sheriffs from Nebraska and Kansas are filing a lawsuit to battle the negative spill over effects that their states are experiencing. While Colorado is reaping the economic benefits of legalization, their bordering state departments are feeling the burden of increased marijuana use and trafficking. Until Federal law changes there will continue to be pressing issues within states that are in close proximity to legalized areas.

Appendix

Table A3: Calculating Annual State Consumption, 60% market participation

Florida population:	19.7 million
Persons 21+ who reported use:	1,300,000
% of population who underreport:	20
Adjusted estimate for current users 21+:	1,560,000
Adjusted for 60% market participation:	936,000
Average annual consumption per user:	3.53 ounces
Total annual consumption:	3,304,080 ounces
Price elasticity:	-0.54
Forecasted price change under legalization:	-10%
Forecasted demand change:	+5.4%
Forecasted annual quantity demanded:	3,482,500 ounces

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