The Effects of Legal Marijuana on Violent Crime

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Introduction:

The prohibition of illicit drugs has long been the status quo for drug policy in the United States. Proponents claim the policy reduces drug use and drug related crimes but, previous research has shown these to be dubious claims. As it stands, there is little empirical evidence comparing concurrent instances of prohibition to non-prohibition in the United States. Recently, states such as Colorado and Washington have legalized marijuana, a substance which previously was prohibited making research on the effects of its legalization possible.

The presence of legal marijuana should eliminate the presence of inherently violent black markets for the drug. With this in mind, I will use data on the crime rates in Colorado, Washington and Oregon, and proxy for the availability of marijuana using the number of dispensaries in a city or a binary variable indicating whether the city resides in a state with legal marijuana. I will also employ data from the American Community Survey to control for other factors that may be correlated with crime.

This study has some possible policy indications. If the legalization of marijuana does not significantly impact the rate of violent crime, the resources expended to apprehend "criminals" for crimes such as simple possession of the substance appear to have better uses. Furthermore, if legal marijuana has a significant negative impact on violent crime, prohibitions in general would need to be reconsidered. This appears unlikely because, according to previous research, the amount of crime inherent to a black market depends on the price point of the illicit substance. *The presence of legal marijuana will have an insignificant negative effect on violent crime meaning prohibition on the drug appears unnecessary.*

The rest of the paper proceeds as follows. section 2 details the literature of different of prohibition and looks into conclusions of previous studies on the policy. Additionally, these studies will help in explaining my own methods. section 3 explains my data, variables and empirical methods while section 4 details the results of my methods. Section 5 concludes the paper with policy implications of my results.

Literature Review:

Over the course of United States history, prohibition policies have been implemented to control what many proponents call immoral behaviors. These policies include prohibitions of varying scope and severity of alcohol, cocaine, heroin, prostitution, gambling and marijuana. Prohibitionists hold that not only does taking part in these vices have negative effects on the individual, but also the legal accessibility of these vices causes negative externalities, in terms of violent crime, for the society. The former, in many cases, is backed by medical science, but their is little evidence for the latter claim. In fact, there is little evidence that the policy of prohibition reliably accomplishes its main goals of reducing the availability of the vice and reducing the externalities caused by the vice. The following literature guides the economic theory and empirical methods.

Jeffrey Miron (2003) in his book, *Drug War Crimes* delves into the economic effects of prohibition. Miron comes to many conclusions regarding prohibition by analyzing data on the prohibitions of alcohol and drugs in the United States and crime data across countries. These conclusions include, prohibitions commonly fail their main policy goals of reducing use of and crime related to a substance and more pertinently, the prohibition of a substance can create inherently violent black markets. Miron claims the violence in these markets is primarily

correlated to the enforcement of a given prohibition and the income that can be generated by engaging in the illegal market. The latter cause is especially interesting considering the scope of this paper because marijuana has a relatively low price compared to drugs like cocaine and heroine so one would expect a lesser effect on crime from its legalization.

Goldstein (1985) describes how drugs relate to violent crime. He outlines 3 major models for drug related crime; *psychopharmacological, economic compulsive* and *systemic violence*.

Psychopharmacological violent crimes are crimes in which the user becomes inebriated on whatever substance and begins to commit crimes because of the way the drug makes them feel. This category of crimes occur most commonly in drugs like PCP or methamphetamine although because Psychopharmacological means either the victim or perpetrator was under some influence it is plausible with any drug. Typically, this is not the reason for drug related crime because it is much more difficult to carry out crimes when inebriated.

Inversely, it seems one would be much more motivated to commit self-benefiting crimes if they experienced withdrawals. This conveys the idea of the economic compulsive model. In this model, criminals are motivated to make quick money in order to purchase drugs (Goldstein 1985). This behavior would appear to become more prevalent as the drug became more addictive or expensive because more or higher value crimes would need to be committed to satisfy one criminal user. Due to the relative cheapness and addictive properties of marijuana compared to cocaine and heroine, it appears this sort of violence does not occur with marijuana.

The final model of drug related crime is systematic violence. Goldstein (1985) describes examples of systematic violence, but they can basically be understood as situations, which if

completely legal, would be dealt with by regulators, law enforcement or the courts, but because the businesses deal with illicit drugs, guns and violence provide the only opportunity for them to find justice. This form of drug-related crime causes the most drug related violence crime (Miron 2003). This represents debatably the largest issue with prohibition, which is, it forces black market venders to defend themselves and their products with no legal aid. In any black market for any substance, there will be violent crime, but with the correlation between drug use and crime, a black market for drugs would seem particularly dangerous (Goldstein 1985).

The effects of marijuana on crime are relatively unknown. While studies have been done, findings have been somewhat inconclusive. Pachula and Kilmer (2003) explain that much of the reason that the research is convoluted comes from the peculiarity of the testing and those being tested. As they point out, when a person fails a drug test it remains unclear when exactly he used in the last month. This has a large impact on their results as they find that those who engaged in marijuana use in the past month (i.e failed a drug test) were more likely than an average person to commit a violent crime, while those who self reported at the time of the crime were less likely to do something violent (Pachula and Kilmer 2003). These findings suggest that criminals are more likely to be users of marijuana, but they also show that marijuana use negatively impacts one's desire to commit violent crimes.

Estimating the degree marijuana causes crime can be quite difficult because of the impossibility of measuring the quantity of illegal and unregulated drugs. For this reason, Michael Conlin and Stacy Dickert-Conlin (2012) approximate the the effects of prohibition by looking at different counties in Texas with different liquor laws and seeing how the difference in the availability of alcohol affects the prevalence of crime. While alcohol and marijuana are certainly

viewed differently in the eyes of the law, we expect the reduction in availability to cause an increase in crime because either people will substitute illegal drugs or a black market for alcohol will form. The economic intuition is confirmed by their results, which show that increased availability of alcohol leads to decreased illicit drug related crime. Additionally, the researchers show alcohol and drugs are substitutes because instituting a higher drinking age causes a larger increase in juvenile drug crimes in wet counties compared to dry. These results show prohibition may not always execute its intended purposes.

One difficulty of approximating the negative effects of prohibition is finding an appropriate proxy for the degree of prohibition. Andrew Resignato (2000) uses the expenditure on drug enforcement to proxy the degree of enforcement in the prohibition policy. His reasoning is the more the prohibition is enforced, the more intense the effects will be. He also deposits that the violent and property crimes will be inversely related to the drug enforcement expenditure because each police locality will overallocate resources to drug enforcement. Resignato finds that there is little evidence that psychopharmacological and economically convulsive are driving forces in drug crimes. Instead, he finds that systematic factors are the most prevalent and the most affected by changes in enforcement. As previously theorized, he finds as enforcement increases, systematic violence becomes more prevalent. This finding shows that enforcement of the drugs, not the drugs themselves, may be the cause of increases in violent crime. With this in mind one must consider the negative implications of prohibition as a policy.

Prohibition has long been the status quo for marijuana policy in the United States. While marijuana has not been empirically shown to affect violent crime, it still makes up nearly 40% of drug related arrests, meaning that enforcement expenditure would be better used elsewhere

(http://www.drugwarfacts.org/cms/Marijuana#Share). While the results of prohibition have been mixed at best, the possible results of legalization are completely unknown because we do not understand how legal marijuana affects crime in the modern world. Luckily, Colorado and Washington can possibly give us a glimpse to the unknown.

Data and Methods:

Crime is typically seen as the result of factors like population density, poverty and unemployment. Additionally, the age group of 15-25 year olds appears to commit the highest rate of crimes (Barkan, 2012). By controlling for these factors as well as others that show a high correlation with crime including, whether or not the city is a college town (as defined by the wikipedia list of college towns) or the crime rate for the town in the previous year, we can see the effect that legal marijuana has on crime across different cities. I attempt to show the effects of one additional marijuana dispensary in terms of violent crime using an OLS regression. This technique has the benefit of being able to isolate the effect of marijuana availability on crime.

The empirical aspect of my research will include two OLS regressions, with Violent crime as the dependent variable, and the number of Marijuana dispensaries or a binary variable for whether the state has legal marijuana, as the main explanatory variables. The other variables listed above are used as controls. I use data from 2014 because it was the first year that marijuana dispensaries were truly beginning to spread throughout the states of Washington and Colorado. While the drug was first legalized in 2012 many counties initially barred the entrance of legal marijuana, but by 2014 dispensaries had spread to quite a few cities across both states. The 2014 data will hopefully show the difference between the cities that had legal marijuana and the one that continued to barr its entrance, in terms of violent crime.

My first model uses data from cities in Colorado excluding Denver in 2014. I use data from the Uniform Crime Report, the Colorado Department of Revenue, the American Community Survey, and a list of college towns to run the following regression:

(1) $\text{Violent Crime} = \beta_0 + \beta_1 \text{dispensaries/capita} + \beta_2 \text{population\_density} + \beta_3 \text{unemployment} + \beta_4 \text{poverty\_rate} + \beta_5 \text{college\_town} + \beta_6 \text{age\_15-25} + \beta_7 \text{lastyr\_crimerate} + v_i$

The variable violent crime is the number of Violent Crimes per one hundred thousand people. Values for this variable come from the Uniform Crime Report. Dispensaries/capita is the number of marijuana dispensaries per one hundred thousand people. Values for this variable were obtained by hand. To find out exactly how many marijuana dispensaries were in each city I looked at the licensing information provided by the Colorado Board of Revenue and coded in the number of dispensaries were in each city. Than by taking the number of one hundred thousand people in the city and dividing it by the number of dispensaries I obtained the value.

Age_15-25 is the percentage of the population between the ages of 15 and 25. As mentioned earlier, this age group has been said to be more likely to commit crimes. Initially, I attempted to control for the effects of age by controlling for the median age in each town, reasoning that higher median ages would be negatively correlated with crime. By taking the percentage of 15-25 year olds though, we can control for the most dramatic effects of age on crime. I obtained this variable directly from the American community survey.

The population density number shows how many thousand people live per square mile in each town. Higher populations usually lead to higher rates of violent crime (Nolan 2004). It stands to reason than that packing more people into the same amount of space would exacerbate

these effects. The measure for population density attempts to control for the differences among cities in terms the amount of people living in close proximity.

The numbers for the unemployment and poverty rates represent the percentage of individuals in each city who are unemployed and impoverished. Both of these rates come from estimates by the American Community Survey. As the rate of unemployment increases, we would expect a higher rate of crime, both violent and nonviolent, because people will be more economically motivated to commit crimes due to their lack of work. This though does not account for those who have abandoned the job search. In hopes of capturing all the effects of joblessness on crime I also control the poverty rate. By doing this, I am hoping to capture the percentage of individuals who would have obvious economic reasons for committing crimes. While neither of these measures will truly help me identify areas with career criminals, who may neither be impoverished nor looking for work, they will help me control for obvious differences in crime and isolate the effects of increasing marijuana availability.

The binary variable college_town is coded to one when the city in question is considered a college town by a wikipedia list. This variable was meant to capture increased crime due to the presence of a college and therefore presence of debaucherous young people.

The variable, lastyr_crimerate, shows the violent crime rate for the city for the previous year. The values for this variable should be close to the values of the current year violent crime. Due to the high correlation between the two variable, the previous year's crime rate will predict the most variability in the crime rates for the current year.

The reason Denver was excluded from the regression was due to the disproportionate number of dispensaries in Denver in 2014. Even after enlisting additional controls for

population, the disproportionate number of dispensaries had an extreme positive bias. This model aims to show the effect of an increase of one marijuana dispensary per one hundred thousand people in terms of violent crime.

My second model uses data from cities in Washington and Oregon in 2014. Cities from Oregon are used in the dataset to provide a counterfactual in the form of a state that does not have legal marijuana. Oregon contains a similar geographical and demographic makeup to Washington making it a natural comparison. I once again use data from the Uniform Crime Report, the American Community Survey, and a list of college towns to run the following regression:

$$(2)\text{Violent Crime} = \beta_0 + \beta_1 \text{washington} + \beta_2 \text{population\_density} + \beta_3 \text{unemployment} + \beta_4 \text{poverty\_rate} + \beta_5 \text{college\_town} + \beta_6 \text{age\_15-25} + \beta_7 \text{lastyr\_crimerate} + vi$$

Where wash is a binary variable indicating whether or not the city is in Washington. The controls from this regression are the same as model 1. This regression is meant to test the effects of the legality of marijuana in the state compared to a state without legal marijuana. Even though not every city in Washington has a dispensary, the policy of legal marijuana is supposed to implicate there is no enforcement on the drug throughout the state, indicating lower levels of violent crime because there is no need for an illegal market.

Results

The results of my first model, shown by model 1 in the figures section, indicate a small but insignificant decrease in violent crime from an increase in dispensaries. An increase of one dispensary per one hundred thousand people decreases the number of violent crime per one hundred people by just under 3 crimes, which is economically insignificant considering the

median violent crime rate is 253 crimes per one hundred thousand people. The effect was also statistically insignificant (P>t=.113). This falls in line with the previously stated theories (Miron 2003). The last year crime rate, while economically insignificant, was highly statistically significant, meaning it predicted most of the variability in the crime rate from city to city. Additionally, an increase of one percent in the unemployment rate (Figure 1: noJob) means an increase of 8 violent crimes per one hundred thousand. Once again this model shows that just as the theory would predict, an increase in marijuana availability had a negative and insignificant effect on crime. While legalization of marijuana does alleviate black markets, its black markets are inherently less violent than those for other more expensive drugs.

The results of my second model indicate a statically and economically significant effect on violent crime from being in a state where marijuana is legal. Model 2 in the figures section shows that cities in Washington experience just over 5 less crimes than cities in Oregon when controlling for factors other than marijuana policy. This effect is one again economically insignificant, considering the mean crime rate for these cities was 247 per one hundred thousand, and statistically insignificant (P>t=.78). Additionally the poverty rate was significant at a 5 percent level meaning for every 1 percent increase in poverty there is an increase of 4 violent crimes per one hundred thousand people. The previous year's crime rate best predicted variability for this years crime once again meaning the variable greatly increased the r squared when used. Once again the theory that marijuana has an insignificant impact on the rate of violent crime holds. This regression shows that even if all places in Washington do not benefit from local marijuana dispensaries, they benefit from the alleviation of black markets in their state.

Some of the control variables had unexpected coefficients. In model one, the coefficient of poverty rate was negative (figure 1:belowPov). This contradicts the theory but may be related to the negative coefficient on unemployment in model 2 (figure 2: unemRate). It is possible that because these variables control for similar economic effects (i.e motivation to commit crime) they each may be taking away for the effect of the other. Additionally, the variable college_town was highly insignificant in both regressions. While the effect of a collegetown was expected to be somewhat uniform, The data did not show this. These minor questions of the controls do not invalidate the main finding of these two regression, that marijuana has an insignificant impact on violent crime.

Conclusion

From these results, my main conclusion is that the presence of legal marijuana has a negative and insignificant effect on violent crime, and increasing the availability of legal marijuana also has a negative insignificant effect on violent crime. The findings show, the prohibition on marijuana does not accomplish one of its main goals, which is to reduce crime related to the substance. This means that the policy of prohibition, in terms of marijuana, is possibly outdated. This leaves us with some decisions in terms of policy recommendations.

One conclusion from this study may be that prohibitions cause crime rather than prevent it and therefore should all be eliminated. This surely represents the most extreme interpretation but, the results of the second regression do show the presence of a prohibition policy meant increased crime in Oregon. Still, this conclusion would overstate the scope and significance of my results. In order to prove prohibition in general causes an increase in violent crime a study of different prohibitions would need to be done. Additionally, prohibited substances like cocaine

and heroin have shown to have very different and more addictive properties than marijuana so these effects may warrant the prohibition of the drugs.

The more logical take away from my results would be that the presence of marijuana does not significantly impact the rate of violent crime meaning the prohibition on marijuana appears to be a waste of enforcers time. By prohibiting marijuana, prohibitionists believe the economy benefits because a reduction in violent crime and a lack of availability prevents people from harming themselves. While I have no empirical evidence to combat the latter, my results have shown the former to be patently false. While prohibition may make sense for drugs like cocaine and heroin, which can cause dependency and addiction issues, it makes less sense for a drug that has not shown these same qualities.

The major con in relieving the prohibition on marijuana is the uncertainty it would create. While regulations for alcohol and tobacco exists and will provide a blueprint for how to regulate Marijuana, some things will have to be learned in the process of regulating. Marijuana has been illegal for so long in the United States, we cannot be sure exactly how the market will function when it is made legal. What is less uncertain are some of the obvious positive effects the legalization of marijuana could have. Firstly, as this paper has gone into great detail about, the lack of marijuana prohibition means the elimination of violent black markets which in turn will lower the rate of violent crime. In addition, legalization has other positive effects. The regulation of marijuana would allow for the substance to be taxed, meaning output that was previously unaccounted for is now shown and benefits all citizens. Additionally, the enforcement expenditure put towards arresting possessors of marijuana can be put towards other areas of government expense where they will hopefully create greater benefit. With the additional money,

the government should attempt to fund drug rehabilitation programs. These programs would reduce negative externalities resulting from the the use of more dangerous and detrimental illicit drugs. In conclusion, the results of this paper support the legalization of marijuana due to its insignificant effect on crime and the obvious benefits of reallocating enforcement expenditure.

Works Cited

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Figures:

Model 1:

Source	SS	df	MS	Number of obs	=	42
				F(7, 34)	=	32.86
Model	1000277.31	7	142896.758	Prob > F	=	0.0000
Residual	147847.489	34	4348.45555	R-squared	=	0.8712
				Adj R-squared	=	0.8447
Total	1148124.79	41	28003.0438	Root MSE	=	65.943

violentcri~e	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dispPerOHun	-2.900018	1.783376	-1.63	0.113	-6.524273	.7242373
popDen	1.350545	7.032252	0.19	0.849	-12.94071	15.6418
crimeAge	.4772888	3.117429	0.15	0.879	-5.858089	6.812667
lstYrCrime	.857071	.0775263	11.06	0.000	.6995185	1.014623
collegeTown	6.808301	36.34002	0.19	0.852	-67.0435	80.6601
belowPov	-1.730701	3.110564	-0.56	0.582	-8.052128	4.590727
noJob	8.462975	7.166021	1.18	0.246	-6.100131	23.02608
_cons	-1.305196	58.4141	-0.02	0.982	-120.0169	117.4065

Descriptive Statistics for Model 1:

Variable	Obs	Mean	Std. Dev.	Min	Max
violentcri~e	42	253.8286	167.3411	18.9	818.7
dispPerOHun	42	2.748896	6.112499	0	24.76473
noJob	42	7.216667	2.169513	2.7	12.2
belowPov	42	10.74048	4.622377	1.1	17.6
collegeTown	42	.1666667	.3771955	0	1
popDen	42	2.730627	1.485926	1.098941	8.152959
lstYrCrime	42	243.6619	172.3497	18	929.1
crimeAge	42	14.58571	4.067034	9.9	32.1

Model 2:

Source	SS	df	MS	Number of obs	=	121
				F(7, 113)	=	94.47
Model	3065664.58	7	437952.083	Prob > F	=	0.0000
Residual	523874.629	113	4636.05867	R-squared	=	0.8541
				Adj R-squared	=	0.8450
Total	3589539.21	120	29912.8268	Root MSE	=	68.089

violentcri~e	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
wash	-5.02495	17.96533	-0.28	0.780	-40.61751	30.56761
crimeAge	-2.485466	1.797692	-1.38	0.170	-6.047019	1.076087
lstYrCrime	.8309933	.0452972	18.35	0.000	.7412515	.9207351
popDen	8.175458	5.186898	1.58	0.118	-2.100723	18.45164
clgtwn	-3.961804	26.68675	-0.15	0.882	-56.83307	48.90947
unemRate	-5.371448	2.689562	-2.00	0.048	-10.69996	-.0429401
povRate	4.747276	1.857568	2.56	0.012	1.067098	8.427454
_cons	37.41117	39.45199	0.95	0.345	-40.75034	115.5727

Descriptive Statistics for Model 2:

Variable	Obs	Mean	Std. Dev.	Min	Max
violentcri~e	121	248.2719	172.9533	15.7	818.2
wash	121	.6446281	.480616	0	1
povRate	121	15.90248	7.799759	1.1	45.4
unemRate	121	10.92231	4.283855	4.4	35
clgtwn	121	.107438	.3109569	0	1
popDen	121	2.966777	1.274048	.5	7.91
lstYrCrime	121	248.3083	178.7607	22.1	870
dspPHun	121	.4659145	1.420479	0	7.956716
crimeAge	121	13.23554	6.559076	5.8	54.7