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RESEARCH ARTICLE

Using Fixed Effects to Determine the Impact of the Legalization of Marijuana on Violent Crime Rates

Mark Gius

Department of Economics Quinnipiac University Hamden, USA.

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Corresponding Author: Mark Gius, Department of Economics Quinnipiac University Hamden, USA.

Abstract

The legalization of marijuana at the state level may result in a range of potential issues, including an increase in criminal activity. The present study focuses on the impact of the legalization of marijuana on violent crime rates. The present study differs fromprior research by examining four types of violent crime (aggravated assault, murder, robbery, and violent crime). This study will also examine the legalization of both recreational and medical marijuana. Finally, this study will use a 40-year (1981-2021) state-level panel data set. A fixed effects model that controls for both state-level and year fixed effects was used. All observations were weighted using state-level population, and standard errors were corrected using a clustering method. Results suggest that the impact of the legalization of marijuana is mixed. The legalization of medical marijuana reduces the overall violent crime rate, the robbery rate, and the aggravated assault rate, while the legalization of recreational marijuana increases the robbery rate but reduces the aggravated assault rate

Keywords: Marijuana, Violent Crime, Fixed Effects.

1. Introduction

Although still classified as a controlled substance under federal law, many states started to decriminalize the possession and use of marijuana as far back as the 1970s. According to federal law, the consequences of marijuana use may include criminal penalties, the inability to purchase firearms, and being ineligible for federal employment, military service, and federal housing. Nonetheless, since 2015, Congress has prohibited the Department of Justice from preventing states from implementing their own laws regarding the possession, use, distribution, and cultivation of marijuana. Hence, a two-tier system regarding the legality of marijuana exists in the US, with 24 states allowing the recreational use of marijuana, 40 states authorizing the medical use of marijuana, but the federal government still prohibiting its possession, use and distribution.

Prior research on the legalization of marijuana has examined its impact on health and suicide, road safety, economic outcomes, and budgetary impacts. The present study will focus on the impact of the legalization of marijuana on violent crime rates. The primary way in which the legalization of marijuana may increase criminal activity is by way of legitimizing all drug use, such as prescription drugs, opiates, and other illicit substances. This increased usage of illegal drugs will result in more drug-related arrests in addition to increases in associated crimes, such as prostitution, unlawful weapons possession, assaults, robberies, and gang-related activities. In addition, to the extent that marijuana may considered a gateway drug, the legalization of marijuana may result in more persons making the transition from marijuana to other more potent drugs, thus resulting in more crime. Finally, the opening of marijuana dispensaries, which, by virtue of federal banking laws, are cash-only businesses, may prove tempting targets to criminals who may want to steal not only the marijuana but also the cash receipts from these dispensaries. Hence, the legalization of marijuana may create several opportunities for an increase in overall criminal activity.

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Although prior studies have examined the impact of the legalization of marijuana on property crimes and some violent crimes, most of these studies used limited data sets and only focused on recreational or medical legalization (Sabia, Dave, Alotaibi, and Rees, 2024; Wu, Wen, and Wilson, 2021; Brinkman and Mok-Lamma, 2019; Dragone, Prarolo, Vanin, and Zanella, 2019; Maier, Mannes, and Koppenhofer, 2017; Morris, TenEyck, Barnes, and Kovandzic, 2014). The present study will differ from these prior studies by examining four types of violent crime, looking at both recreational and medical use of marijuana, and using a 40-year state-level panel data set.

2. Literature Review

Given the recent legalization efforts regarding the use of marijuana, there is limited research on the impact of state-level legalization on a variety of outcome measures, including criminal activity.The focus of the present study will be on the impact of the legalization of marijuana on violent crime rates.

One of the earliest studies to examine this topic was Morris, et al. (2014). Morris, et al. (2014) used state-level panel data for the period 1990-2006. This study only examined the legalization of medical marijuana. During the period examined, only eleven states had legalized medical marijuana. Using a fixed effects model with clustered standard errors, the authors examined the impact of the legalization of medical marijuana and other explanatory variables on seven dependent variables: homicide rate, rape rate, robbery rate, assault rate, burglary rate, larceny rate, and auto theft rate. Results indicate that the legalization of medical marijuana was associated with a reduction in only murder and assault. For all other crimes, the legalization of medical marijuana was statistically insignificant.

In Maier, et al. (2017), the legalization of both recreational and medical marijuana and their relationship to crime rates and arrest rates was examined. Data for the year 2014 was examined. In 2014, 23 states had legalized medical marijuana, while only two states (Colorado and Washington) had legalized recreational medical marijuana. Using a paired sample t test and comparing various crime rates before and after the legalization of marijuana, results indicated that there was a significant reduction is all crimes rates except for murder. However, upon further analysis, it was found that these reductions were due factors other than the legalization of marijuana.

Dragone, et al. (2019) used a difference-in-difference model along with county-level datato determine if adjacent states experienced different crime rates, based upon their legalization of recreational marijuana. Examining only Washington and Oregon (Oregon legalized recreational marijuana two years after than Washington), and using data for the period 2010-2014, results suggested that rapes dropped in Washington by up to 30% and property crimes dropped by up to 20% after the legalization of recreational marijuana in Washington.

Brinkman and Mok-Lamma (2019) looked at the impact of neighborhood dispensaries on local crime rates in Denver, Colorado. Using micro-level data for the year 2014, it was found that an additional marijuana dispensary was associated with a 19 percent reduction in crime in the immediate neighborhood, with no decrease in crime in adjacent neighborhoods.

Wu, Wen, and Wilson (2021) examined the impact of the legalization of recreational marijuana on various crime rates for the period 2007-2017. Using a difference-in-differences approach and county-level data for Oregon which legalized recreational marijuana during the period examined, it was found that the following crime rates increased after the legalization of recreational marijuana: violent crime, property crime, aggravated assault, burglary, larceny, and auto theft. For robbery, the legalization of marijuana was statistically insignificant. These results contradict the findings of most prior studies in this area.

Sabia, et al. (2024) used state-level data for the period 2000-2019 to determine if the legalization of recreational marijuana was significantly associated with changes in various crime rates. Using a difference-in-differences approach, the authors found that the legalization of recreational marijuana was associated with lower arrest rates for drug-related crimes, but it had no statistically-significant effects on property or crime rates.

The present study will differ from these prior studies by examining four types of violent crime (aggravated assault, murder, robbery, and violent crime); it will examine the impact of the legalization of recreational and medical marijuana; and it will use a 40-year (1981-2021) state-level panel data set.

3. Empirical Technique

To determine if the legalization of marijuanais related to violent crime rates, a fixed effects model that controls for both state-level and year fixed effects was used. All observations were weighted using state-

level population, and standard errors were corrected using a clustering method (the state is the level at which the standard errors are clustered).

The following equation was estimated in the present study:

$$Y_{i,t} = \alpha_0 + \alpha_i + \gamma_t + \beta' \mathbf{X} + \varepsilon_{i,t} \quad (1)$$

In the above equation, y denotes the crime rate, α_i denotes the state-level effects, γ_t denotes the year effects, and X denotes a vector of explanatory variables, includingtwo marijuana legalization dummy variables, one variable that equals one if the state legalized recreational marijuana and zero otherwise and another variable that equals one if the state legalized medical marijuana and zero otherwise.

Crime rates estimated in the present study include the violent crime rate, the murder rate, the robbery rate, and the aggravated assault rate. Crimes rates are defined as crimes per 100,000 persons. This model is similar to models used by other studies on this topic (Gius, 2019, 2014; Barati, 2016; Moody and Marvell, 2009; Moody, 2001; Olson and Maltz, 2001; Bartley and Cohen, 1998; Lott and Mustard, 1997). Explanatory variables include the percentage of the state population that is African-American, population density, percentage of population that has at least a bachelor's degree, per capita median real income, per capita alcohol consumption, and the unemployment rate. All data is at the state level and is for the period 1981-2021.

Data on crime was obtained from the US Department of Justice. The reason for excluding data after 2021 was due to concerns about the impact of COVID on crime rates. All other state-level data were obtained from relevant Census Bureau reports. Descriptive statistics are reported on Table 1.

Table1. *Descriptive Statistics*

Variable	Mean	Standard Deviation
Violent Crime Rate (per 100,000 persons)	431.6	214.4
Murder Rate (per 100,000 persons)	5.6	3.2
Robbery Rate (per 100,000 persons)	115	87.4
Aggravated Assault Rate (per 100,000 persons	273.7	141.5
Percent African American	0.103	0.094
Percent College Educated	0.239	0.056
Population Density	181.7	247
Real Median Income	$16,704	$4,777
Per Capita Alcohol Consumption	2.42	0.56
Unemployment Rate	0.058	0.21

N=2050

4. Results and Concluding Remarks

Results are presented on Tables 2-5. These results suggest that the impact of the legalization of marijuana is mixed. The legalization of medical marijuana reduces the overall violent crime rate, the robbery rate, and the aggravated assault rate. The legalization of recreational marijuana increases the robbery rate but reduces the aggravated assault rate. The legalization of medical marijuana is not significantly related to the murder rate, and the legalization of recreational marijuana is not significantly related to the violent crime rate or the murder rate. The legalization of medical marijuana resulted in a 11.8% reduction in violent crime, a 19.5% reduction in robbery, and a 10.1% reduction in aggravated assault. Legalization of recreational marijuana resulted in 12.9% increase in robbery but a 5.3% reduction in aggravated assault.

Regarding the other explanatory variables, states with higher percentages of African-American residents, lower population densities, and higher per capita alcohol consumption had higher crime rates. These results are similar to the results found in prior studies in this area.

There have been numerous exogenous events in the past several years that may have had an impact on crime rates. Events such as the COVID pandemicmay have affected the level of criminal activity. Another factor that may have affected crime rates is the legalization of marijuana. The present study attempted to determine if the legalization of marijuana was significantly related to crime rates. Using a fixed effects model and data for a 40-year period, results of the present study indicatedthere are mixed results regarding the legalization of marijuana. However, it is important to note that, in the present study, it was found that the legalization of recreational marijuana resulted in the increase of only one type of crime. For allother crimes, the legalization of recreational

and medical marijuana resulted either in a decrease in crime or in no change at all. These results suggest that the legalization of marijuana does not adversely affect crime rates at the state level.

Table 2. *Fixed Effects Results: Violent Crime Rate*

Variable	Coefficient	Test Statistic
Constant	296.99	4.90***
Recreational Marijuana Dummy Variable	-0.308	-0.03
Medical Marijuana Dummy Variable	-50.83	-6.89***
Percent African American	1505.84	5.92***
Percent College Educated	-280.07	-3.03***
Population Density	-1.86	-16.79***
Real Median Income	-0.00516	-3.87***
Per Capita Alcohol Consumption	250.47	16.64***
Unemployment Rate	696.64	3.34***

*1% Significance = *** R^2 = 0.849*

Table 3. *Fixed Effects Results: Murder Rate*

Variable	Coefficient	Test Statistic
Constant	-3.835	-4.68***
Recreational Marijuana Dummy Variable	-0.131	-0.72
Medical Marijuana Dummy Variable	0.179	1.60
Percent African American	36.93	9.57***
Percent College Educated	4.14	2.95***
Population Density	-0.0064	-3.83***
Real Median Income	-0.000095	-4.68***
Per Capita Alcohol Consumption	3.42	14.98***
Unemployment Rate	-3.61	-1.14

*1% Significance = *** R^2 = 0.816*

Table 4. *Fixed Effects Results: Robbery Rate*

Variable	Coefficient	Test Statistic
Constant	55.09	1.66*
Recreational Marijuana Dummy Variable	14.83	2.27**
Medical Marijuana Dummy Variable	-22.41	-5.55***
Percent African American	185.52	1.33
Percent College Educated	-303.43	-5.99***
Population Density	-0.439	-7.25***
Real Median Income	-0.0044	-5.99***
Per Capita Alcohol Consumption	132.8	16.12***
Unemployment Rate	489.82	4.30***

*10% Significance = *; 5% Significance = **; 1% Significance = *** R^2 = 0.803*

Table 5. *Fixed Effects Results: Aggravated Assault Rate*

Variable	Coefficient	Test Statistic
Constant	207.9	5.77***
Recreational Marijuana Dummy Variable	-14.54	-2.05**
Medical Marijuana Dummy Variable	-27.66	-6.30***
Percent African American	1269.31	8.38***
Percent College Educated	13.28	0.24
Population Density	-1.26	-19.19***
Real Median Income	-0.00076	-0.96
Per Capita Alcohol Consumption	101.96	11.38***
Unemployment Rate	214.31	1.73*

*10% Significance = *; 5% Significance = **; 1% Significance = *** R^2 = 0.858*

5. References

1. Barati, M. (2016) "New Evidence on the Impact of Concealed Carry Weapon Laws on Crime," *International Review of Law and Economics*, 47, 76-83.
2. Bartley, William and Mark Cohen (1998) "The Effect of Concealed Weapons Laws: An Extreme Bound Analysis," *Economic Inquiry*, 36, 258-265.
3. Brinkman, Jeffrey and David Mok-Lamme (2019) "Not in my Backyard? Not so Fast. The Effect of Marijuana Legalization on Neighborhood Crime," *Regional Science and Urban Economics*, https://doi.org/10.1016/j.regsciurbeco.2019.103469.
4. Dragone, Davide, Giovanni Prarolo, Paolo Vanin, and Giulio Zanella (2019) "Crime and the Legalization of Recreational Marijuana," *Journal of Economic Behavior and Organization*, 125, 488-501.
5. Gius, Mark (2019) "Self-Protective Behaviors in the United States: Results from a Recent Survey," *International Journal of Applied Economics*, 16, 2, 43-54.
6. Gius, Mark (2014) "An Examination of the Effects of Concealed Weapons Laws and Assault Weapons Bans on State-Level Murder Rates," *Applied Economics Letters*, 21, 4, 265-267.
7. Guangzhen, Wu, Ming Wen, and Fernando Wilson (2021) "Impact of Recreational Marijuana Legalization on Crime: Evidence from Oregon," *Journal of Criminal Justice,* https://doi.org/10.1016/j.imjus.2020.101742.
8. Lott, John and David Mustard (1997) "Crime, Deterrence, and Right-to-Carry Concealed Handguns," *The Journal of Legal Studies,* 26, 1, 1-68.
9. Maier, Shana, Suzanne Mannes, and Emily Koppenhofer (2017) "The Implications of Marijuana Decriminalization and Legalization on Crime in the United States,"*Contemporary Drug Problems*, 44, 125-146.
10. Moody, Carlisle (2001) "Testing for the Effects of Concealed Weapons Laws: Specification Errors and Robustness," *Journal of Law and Economics*, 44, S2, 799-813.
11. Moody, Carlisle and Thomas Marvell (2009) "The Debate on Shall Issue Laws, Continued" *Econ Journal Watch*, 6 (2), 203-217.
12. Morris, Robert, Michael TenEyck, J.C. Barnes, and Tomislav Kovandzic (2014) "The Effect of Medical Marijuana Laws on Crime: Evidence from State Panel Data: 1990-2006," *PLoS ONE*, https://doi.org/10.1371/journal.pone.0092816.
13. Olson, David and Michael Maltz (2001) "Right-to-Carry Concealed Weapon Laws and Homicide in Large U.S. Counties: The Effect on Weapon Types, Victim Characteristics, and Victim-Offender Relationships," *Journal of Law and Economics*, 44, S2, 747-770.
14. Sabia, Joseph, Dhaval Dave, Fawaz Alotaibi, and Daniel Rees (2024) "The Effects of Recreational Marijuana Laws on Drug Use and Crime," *Journal of Public Economics*,https://doi.org/10.1016/j.jpubeco.2024.105075.