

The Effect of Marijuana Policy on Crime

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Abstract The effect of marijuana policy on crime is examined in this paper using a difference-in-difference method. The crime rates in states that legalized medical marijuana were compared to the rates in states that prohibit medical marijuana. This effect was investigated during two time periods: 1995-2010 and 2000-2010. The results suggest that legalizing medical marijuana from 2000-2010 resulted in an increase in both violent and nonviolent crime. During the period of 1995-2010, however, the results do not suggest any increase in these crimes.

Note: All tables are in the Appendix to this article.

I. Introduction

Over forty years after the “Controlled Substances Act” established marijuana as a Schedule 1 drug, the debate over marijuana’s legal status in the United States still rages. A Gallup poll in 2011 found that 50% of Americans favor the legalization of the drug, the highest it has ever been (Newport, 2011). Seventeen states have legalized medical marijuana since 1995, with several more voting on legalizing medical marijuana in the 2012 elections. Others have decriminalized the possession of marijuana so that possession of a small amount of the drug is no longer a criminal offense and cannot result in jail time.

Advocates for liberalizing marijuana regulations report that there is no evidence of a link between use of marijuana and the use of harder drugs and note that by legalizing marijuana, police could focus their attention on other areas of law enforcement (NORML, 2012). An editorial in *The Lancet* (1995) argues that smoking marijuana, even over long periods of time, has no adverse effect on health other than the effects of inhaling smoke. Another common argument in favor of medical marijuana is the economic benefits for the state. Taxing medical marijuana could earn the

state a significant amount of revenue. Harvard Professor Jeffrey Miron, widely considered to be the expert on the drug market, conservatively estimates the size of the marijuana market at \$14 billion (Nelson, 2010). Miron estimates that legalization of marijuana could yield over \$15 billion in tax revenue and lowering of law enforcement costs (Miron, 2010). In addition, some researchers have suggested that legalization of any drug will lower crime because of the decrease in incentives towards criminality (Trebach, 1978). As medical marijuana is a step towards legalization, its passage could result in a reduction of crime rates.

Opponents of liberalizing marijuana regulations often argue that it would lead to an increase in crime and other drug use. In a position statement, Drug Watch International argues, “many drug users commit murder, child and spouse abuse, rape, property damage, assault and other violent crimes under the influence of drugs” (Against, 2001). The organization also states that countries with lax drug policies have seen rises in crime since they adopted these policies. In a separate article they cite the Netherlands, where decriminalization of marijuana is essentially practiced. They claim that from 1988 to 1993,

the number of organized crime groups in that country rose from 3 to 93 (Why, 2002). Opponents to more liberal policies also argue that medical marijuana dispensaries can cause more crime (Ingold 1). As dispensaries grow and sell marijuana, they could become a frequent target for thieves and can cause crime rates in the area to rise.

While nationwide legalization is still likely years away from happening, many states have liberalized drug prohibition policies by decriminalizing marijuana or allowing it to be used for medicinal use. States that have decriminalized marijuana allow offenders to pay fines that vary by state rather than be arrested and spend time in jail. Laws that allow for medical marijuana also vary by state. In general, the laws result in marijuana dispensaries where a patient needs a doctor’s note to be able to purchase the drug. Those with a doctor’s note are also legally allowed to possess a small amount of marijuana, however they are not legally permitted to sell it. Two states, Colorado and Washington, voted to legalize marijuana completely in 2012. The drug’s legal status in those states is still unclear, though, as federal law still prohibits marijuana.

I address the question of marijuana policy's link to crime in this paper by looking at the effects of "medical marijuana laws" legalizing the purchase and possession of marijuana for medicinal use during two time periods: 2000-2010 and 1995-2010. I also examine the effect of passing medical marijuana laws in states where it is already decriminalized. I investigate this by using a difference-in-difference strategy that examines the crime rates before and after medical marijuana laws were passed. These states' crime rates are then compared to the "control" states, that is states that did not pass medical marijuana laws during the period. I do not investigate the effect that decriminalization laws have on crime, as only two states decriminalized marijuana from 1995-2010.

II. Literature Review

While there has been relatively little empirical research on the effects of marijuana policy on crime, several studies examine the correlation between marijuana use and criminal behavior. One study found that there is a link between marijuana and violent behavior. Using a sample of 612 African American inner city youths, Friedman (2001) found a correlation between marijuana use and weapons offenses. The coefficient

between marijuana use and weapons offenses was estimated to be 0.11, which was significant at the $p=0.01$ level. Yamada (1993) used a difference-in-difference identification strategy to estimate effects of alcohol and marijuana use on graduation rates. He found a correlation between marijuana use and failing to graduate high school among the 672 individuals used in the study. In addition, Yamada found no link between decriminalization of marijuana and increased usage of the drug. Pacula (2003) examined the relationship between marijuana use and crime. She found that there is an increase in marijuana use and both violent and property crimes committed. In addition, Pacula found a correlation between a decrease in the price of marijuana led to an increase in property and income-producing crime. She posits that as a lower price leads to a higher demand, then more marijuana use is associated with these increases.

Laboratory investigations have mostly found that one-time use of marijuana inhibits violent behavior and aggression (Mizcek et al, 1994; White and Gorman, 2000). There is some evidence, though, that long-term, chronic marijuana use leads to increased risk of violent behavior (White and Hansell, 1998; Kaplan and Damphousse,

1995). In addition, there is some evidence to suggest that marijuana use among juveniles leads to violence and property crime (Salmelainen, 1995; Fergusson and Horwood, 1997; Baker, 1998). Fergusson and Horwood (1997) examined the effect that early onset use (16 years old or younger) had on psychological adjustment later in life. They found that early marijuana use was linked with a host of problems later in life. It is unclear, however, to what degree these problems were due to the marijuana use itself. Baker (1998) conducted a study of 10,441 juveniles in Australia, which revealed that students who used marijuana frequently were more likely to assault someone or commit property damage. This relationship remained significant even after controls for other substance use and developmental characteristics were added.

Research into policy has found that decriminalization of marijuana does not increase usage of the drug (Yamada, 1993; Johnson, 1981; Sabet 2012). Johnson (1981) found that decriminalization does not increase usage among high school seniors and other young adults. Studies have found contrasting results about medical marijuana, and its effect on usage remains unclear (Sabet, 2012).

There have been several studies that looked into the link between medical marijuana dispensaries and crime. Scherrer (2011) examined the perceived crime in a neighborhood with a medical marijuana shop and did not find a statistically significant perceived increase in crime. Kepple (2012) examined cross sections of Sacramento, California, comparing the density of medical marijuana dispensaries to crime. Kepple's findings suggest that dispensaries are likely no more associated with crime than any business in a commercially zoned area, however she states that the relationship between crime and the dispensaries is likely more complicated than the description her study provides.

III. Data

I use data from nine different sources in this study. Crime data are based on the FBI uniform crime reports. These reports show the compilation of the crime data that is reported yearly from law enforcement agencies across the United States to the FBI. They describe a variety of crimes that have occurred during the year, such as murders, aggravated assaults, and thefts. I examined the crime rates for this study, as opposed to

the total crime numbers. To find the rates, the FBI calculated the number of crimes per 100,000 people in the population of the state. For instance, Table I, which provides summary statistics for the complete data used in the analysis, indicates that the mean violent crime rate is 432.27, which means that the average annual state crime rate is 432.27 violent crimes per 100,000 residents. In this study, the FBI uniform crime report data from 1995 to 2010 is used.

In addition, there are a variety of state controls obtained from the 1995-2010 Current Population Survey. The CPS is a monthly household survey conducted by the Bureau of Labor Statistics that ask a range of questions dealing with race, employment status, and household income. Welfare controls¹ are also used to create the models and describe the maximum amount of welfare that a family can receive within each state. The controls also included data on whether welfare reform was passed within a state, as well as if states pay more money to families who have another child while they're on welfare. Welfare data has only been released until 2008, though, so for 2009 and 2010 the welfare levels were assumed to be the same as the

2008 levels. Gun control is also controlled for with a dummy variable, with data from the NRA. Finally, three final controls were added with numbers from 1995-2010: per capita beer consumption, prisoners per capita, and police officers per capita. These controls were obtained from the Brewer's Almanac, the Bureau of Justice Statistics, and the FBI Uniform Crime Reports, respectively. A control for abortion will not be included in this study, as any effect on crime seen from the increase in abortion in the early 1970s should have already manifested itself by 1995.

This study will examine nine outcomes: aggregated violent crimes, aggregated property crimes, and sub-categories of each. The violent crime rate is the sum of four smaller crime rates: murder, forcible rape, robbery, and aggravated assault. Property crimes consist of three crimes: burglary, larceny theft, and motor vehicle theft. The summary statistics for the aforementioned controls and the crimes can be seen in Table I.

As the purpose of this study is to determine the effects that marijuana decriminalization and medical marijuana have on crime, two dummy variables were created:

¹They were obtained from Caitlin Myers and were based on Congressional Greenbooks and the Urban Institute's Welfare Policy Database.

“decriminalized” and “medical”. If policies were passed that legalized marijuana for medicinal purpose, medical was set equal to one. The same is true for policies decriminalizing marijuana and the variable decriminalized. Many states passed varying degrees of marijuana decriminalization, with some having harsher penalties than others. For example, residents of Alaska are allowed to possess up to four ounces of marijuana without breaking a law, while if Oregon residents are caught with up to an ounce of marijuana they are fined \$500. In both cases, though, marijuana is considered decriminalized and coded as equal to one in the model. As previously mentioned, only two states passed decriminalization laws from 1995-2010, and I will not be examining the effect that decriminalization has on crime rates. These states will be excluded from the analysis. I will examine, however, the possible effect that passing medical marijuana laws has in a state that has already passed decriminalization laws. The data on when medical marijuana was legalized was obtained from NORML (2012), while the data on decriminalization history was obtained from a 2010 Connecticut legislative report, “Marijuana De-

criminalization” (Scott, 2010).

Since many states passed these laws at different times of the year, the following year after the bill was passed is when the dummy is coded as equal to one. For instance, while Colorado first passed medical marijuana laws in 2000, the dummy is set to zero in 2000 and one in 2001. (See Appendix A for if and when states have passed laws either decriminalizing marijuana or legalizing for medical use.)

IV. Analysis

I used a difference-in-difference model to estimate these coefficients, by comparing the violent and nonviolent crime rates in states before and after they passed laws concerning medical marijuana. Nevada and Massachusetts are excluded from this study because both states also passed laws decriminalizing marijuana possession during the period analyzed. Table II shows coefficient estimates of six different models for the violent crime rate, using the econometric model:

$$\ln(\text{crime}_{st}) = b_1 \text{medical}_{st} + b_2 \text{medxdiscrim}_{st} + X_{std} + g_s + I_t + e_{st}$$

where s represents each state and t indicates each year. The dependent variable is each of

the nine crime variables used by the FBI Uniform Crime Reports. X is a vector of control variables, including per capita beer consumption, state welfare generosity, police officers and prisoners per capita, a concealed handgun dummy, and several variables regarding state economic conditions.

The first three columns of Table 2 present results estimated for the time period 2000-2010. The point estimates suggest that the legalization of medical marijuana laws led to increases in aggregate violent and property crime rates. The coefficients, however, are only statistically significant in the third model, which accounts for state linear time trends. These estimates suggest that medical marijuana laws have led to an increase of 4.36% ($p=0.01$) in violent crime and 8.20% increases ($p=0.01$) in property crime. These increases in crime are observed for all sub-categories reported in Model 3.

Models 1-3 suggest that there is a link between the passage of medical marijuana laws and an increase in violent crime. The reason for this apparent increase, however, is unclear. One possible reason for this rise in crime could be due to a lowering of the barriers of entry to the market. As it is easier to get high-grade medical marijuana,

there will likely be more dealers selling marijuana, which would cause lower prices and lower profits for everyone involved. This could lead to some violence among dealers who see a loss of income due to their new competitors. In her 2003 paper, though, Pacula states that gang violence over marijuana is unlikely due to the nature of the market. The vast majority of the marijuana sales are performed indoors so competitors do not often see their competition. While this does not completely rule out this link, it does make it seem less likely.

There is some evidence that individuals who sell marijuana are more prone to violent crime. In the 1995 paper "Are Fluctuations in Delinquent Activities Related to the Onset and Offset In Juvenile Illegal Drug Use and Drug Dealing", 506 urban youths were examined and asked questions about drug use and drug dealing. The authors did not say what percentage of these dealers were selling marijuana, however they did state that marijuana was predominantly the drug of choice. The authors found that "the rates of person-related offenses, carrying a concealed weapon, and the total rate of offending increased with the initiation of either drug use or drug dealing"

(Van Kammen, 1995). Thus, as it is possible that medical marijuana legality leads to more drug dealers, more violent crime could result from this.

The subsections of violent crime offer interesting data about this increase. The murder rate and the aggravated assault rate show no statistically significant increases in any of these models. This further supports the idea that gang violence does not contribute to this rise in violent crime. Robbery is shown to statistically significantly increase in Model 3. This crime could be explained by the aforementioned study by Pacula, which found that when the price of marijuana drops, income-producing crime increases. This could be due to a loss in profit from medical marijuana being legalized. It is possible that to make up for lost income, drug dealers turn to robbery as an alternative method for sustaining themselves.

Models 1-3 also suggest an increase in property crime as a result of medical marijuana laws from 2000-2010. There are several possible explanations for this increase in crime. As previously mentioned, medical marijuana could lower the profits to many dealers, who would need a new source of income to make up for these lost

earnings. As they are already dealing marijuana (and thus breaking the law), they could be more likely to turn to theft or other income-producing crimes. Another possible source of this crime could come from the possible increase in dealers that medical marijuana should result in. The aforementioned 1994 paper that examined the link between drug dealing and crime can help to explain this rise in property crime. In the paper, the authors state, "Increase in car- and fraud-related crimes were intertwined with the onset of the illegal drugs dealing" (van Kammen, 1994).

Unlike the violent crime data, breaking property crime down into its subsections does not wildly differ in significance. In Model 3, every medical marijuana coefficient is positive and significant at either the 0.01 or 0.05 level. This seems to support the notion that dealers are supplementing their lost income by turning to property crime. The increase in the robbery rate in Model 3 further support this idea, as robbery is an income-producing crime.

These results are drastically different when the range is expanded to 1995-2010. Table II shows these results in the fourth through sixth columns. Surprisingly, with the

addition of the time trends in Model 6 the violent crime rate coefficient is -0.0365 ($p=0.05$). Two violent crime subsections are also negatively significant in this model: robbery rate and murder rate, with coefficients equal to -0.0676 ($p=0.05$) and -0.0755 ($p=0.10$). The coefficients on the various property crimes also change when the range is altered. In Models 4, 5, and 6 they are all insignificant at every level, suggesting that legalizing medical marijuana did not affect property crime rates from 1995-2010.

The contradictory results from examining 1995-2010 and 2000-2010 cloud the true effect of marijuana policy on crime. The four earliest states to legalize medical marijuana were California (1996), Washington (1998), Alaska (1998), and Oregon (1998). It is unclear if these states share a unique characteristic that would cause their crime rates to be lowered and would skew the results. Assuming that this is the case, it seems the most likely scenario is that these states have a fundamentally more relaxed view towards the drug than do other states. As they are the first to allow medical marijuana, they are also likely the ones with the most liberal views of the drug. This can be seen by the fact that Califor-

nia, Alaska, and Oregon were among the first to decriminalize it in the 1970s. This overall liberal view would likely make the drug relatively inexpensive and easy to obtain. While no data exists (to my knowledge) about the price of the drug before and after medical marijuana passed, I would argue that the change in price would be less severe in these states than in other states, as the drug's price was already quite low. This would result in dealer's losing less money in these states due to medical marijuana, thus resulting in a lower overall crime increase. The lack of data makes it impossible to support this idea with empirical evidence. As such, it remains unclear what the true reason is for the difference between these two ranges. What is undoubtedly true is that these two models clearly offer different results as to the actual effect of marijuana policy on crime.

Models 7 and 8 interact the medical marijuana law indicator with an indicator that a state had decriminalized marijuana, the results of which can be seen in Table 3. These models suggest that the effects of medical marijuana laws may differ according to whether it is criminal to possess a small amount of marijuana. In Model 7, the interaction term for violent crime-

rate is not positively significant. The interaction term for property crime rate, however, is equal to 0.1187 ($p=0.01$). This suggests that there is a correlation between an increase in property crime and passing medical marijuana in a state that has already passed laws decriminalizing it. When the range of the study is increased to 1995-2010 in Model 8, nearly all of these effects are insignificant at any confidence level. The only coefficient that remains significant is the -0.0889 coefficient ($p=0.10$) of the burglary rate. This coefficient is very imprecisely estimated, though, with a standard error of 0.0513 . Thus, Models 7 and 8 suggest two very different outcomes for the true effect of legalizing medical marijuana in a state that has already decriminalized it. It is unclear as to why these different outcomes occur.

V. Conclusion

Estimates using data from 2000-2010 from the FBI Uniform Crime Reports suggest that, on average, the enactment of medical marijuana laws leads to increases in both violent crime and property crime, and that these increases are larger if the state had previously decriminalized marijuana. However, when the time frame analyzed is expanded to 1995-

2010, the results suggest that only property crime increases with the legalization of medical marijuana. This could be due to a variety of reasons, however it seems that the states that first passed medical marijuana laws saw a smaller increase in crime than the later states.

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Appendix A

State	Year Medical	Year Decriminalized	State	Year Medical	Year Decriminalized
Alabama	None	None	Missouri	None	None
Alaska	1998	1975	Montana	2004	None
Arizona	2010*	None	Nebraska	None	1977
Arkansas	None	None	Nevada	2000	2002
California	1996	1976	New Hampshire	None	None
Colorado	2000	1975	New Jersey	2010*	None
Connecticut	None	2011*	New Mexico	2007	None
DC	2010*	None	New York	None	1977
Delaware	2011*	None	North Carolina	None	1977
Florida	None	None	North Dakota	None	None
George	None	None	Ohio	None	1975
Hawaii	2000	None	Oklahoma	None	None
Idaho	None	None	Oregon	1998	1972
Illinois	None	None	Pennsylvania	None	2010*
Indiana	None	None	Rhode Island	2006	None
Iowa	None	None	South Carolina	None	None
Kansas	None	None	South Dakota	None	None
Kentucky	None	None	Tennessee	None	None
Louisiana	None	None	Texas	None	None
Maine	1999	1976	Utah	None	None
Maryland	None	None	Vermont	2004	None
Massachusetts	None	2009	Virginia	None	None
Michigan	2008	None	Washington	1998	None
Minnesota	None	1976	West Virginia	None	None
Mississippi	None	1977	Wisconsin	None	None
			Wyoming	None	None

*=Not relevant to the study

Tables

Table I. Summary Statistics			
	Mean	Std. Dev.	n
Crime Statistics			
Violent Crime Rate	432.276	201.247	800
Property Crime Rate	3564.991	962.365	800
Aggravated Assault Rate	278.174	143.024	800
Murder Rate	5.043	2.755	800
Forcible Rape Rate	34.478	11.726	800
Robbery Rate	113.585	68.823	800
Larceny Theft Rate	2468.408	637.897	800
Burglary Rate	743.893	254.726	800
Motor Vehicle	351.691	183.238	800
State Controls			
White	0.776	0.086	800
Black	0.093	0.09	800
Hispanic	0.074	0.086	800
Other	0.057	0.1	800
High School Degree	0.86	0.042	800
College Degree	0.261	0.051	800
Married	0.547	0.031	800
Real Wages	14.896	2.082	800
Unemployed	0.052	0.018	800
Gun Law	0.673	0.47	800
Welfare Controls			
Max Benefits	465.842	179.576	797
Welfare Reform Laws	0.945	0.228	800
Family Cap	0.019	0.136	800
Per Capita Controls			
Beer Consumption	22.657	2.738	800
Police Officers	0.747	0.205	800
Prisoners	1.336	0.427	800

Table II. Marijuana Policy and Crime Rates

Dep Variable: ln(Crime Rates)	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Medical Only		Controls Included		Time Trends Included		Medical Only		Controls Included		Time Trends Included	
	2000-2010		2000-2010		2000-2010		1995-2010		1995-2010		1995-2010	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Violent Crime												
Violent Crime Rate												
<i>Medical</i>	0.0193	0.0508	0.0303	0.0356	0.0436 ***	0.0162	0.0315	0.0547	0.0003	0.0426	-0.0365 **	0.0163
Aggravated Assault Rate												
<i>Medical</i>	0.0455	0.0662	0.0571	0.0471	0.0229	0.0214	0.0490	0.0746	0.0057	0.0601	-0.0253	0.0199
Murder Rate												
<i>Medical</i>	-0.0499	0.0566	-0.0590	0.0682	0.0926	0.0648	-0.1242 **	0.0475	-0.1205 **	0.0454	-0.0755 *	0.0376
Forcible Rape Rate												
<i>Medical</i>	0.0416	0.0727	0.0563	0.0512	0.0548 ***	0.0164	0.0682	0.0570	0.0385	0.0462	0.0032	0.0137
Robbery Rate												
<i>Medical</i>	-0.0677	0.0529	-0.0585	0.0517	0.0738 **	0.0333	-0.0345	0.0518	-0.0500	0.0484	-0.0676 **	0.0325
Property Crime												
Property Crime Rate												
<i>Medical</i>	0.0109	0.0190	0.0078	0.0193	0.0820 ***	0.0284	-0.0253	0.0209	0.0037	0.0179	0.0053	0.0233
Burglary Rate												
<i>Medical</i>	0.0221	0.0209	0.0289	0.0231	0.0797 ***	0.0259	-0.0461 *	0.0270	-0.0093	0.0262	0.0152	0.0230
Larceny Theft Rate												
<i>Medical</i>	0.0048	0.0235	-0.0035	0.0209	0.0737 ***	0.0236	-0.0346	0.0229	-0.0059	0.0174	0.0047	0.0171
Motor Vehicle Theft Rate												
<i>Medical</i>	0.0569	0.0546	0.0763	0.0462	0.1315 **	0.0627	0.0726	0.0556	0.0804	0.0516	-0.0084	0.0660
Additional Controls	No		Yes		Yes		No		Yes		Yes	
Time Trends	No		No		Yes		No		No		Yes	
Interaction Term	No		No		No		No		No		No	

Note: ***, **, * Significant at the 0.01, 0.05, 0.10 levels, respectively.

Table III. Marijuana Policy and Crime Rates with an Interaction Term

Dep. Variable: ln(Crime Rate)	Model 7 Model 3 With Interaction 2000-2010		Model 8 Model 6 With Interaction 1995-2010	
	Coeff.	SE	Coeff.	SE
	Violent Crime			
Violent Crime Rate				
<i>Medical</i>	0.0384 ***	0.0160	-0.0327	0.0263
<i>Medxdecim</i>	0.0300	0.0304	-0.0068	0.0358
Aggravated Assault Rate				
<i>Medical</i>	0.0175	0.0222	-0.0399	0.0338
<i>Medxdecim</i>	0.0316	0.0357	0.0262	0.0427
Murder Rate				
<i>Medical</i>	0.0518	0.0770	-0.0327	0.0484
<i>Medxdecim</i>	0.2362 ***	0.0755	-0.0768	0.0786
Forcible Rape Rate				
<i>Medical</i>	0.0637 ***	0.0140	0.0030	0.0206
<i>Medxdecim</i>	-0.0517 **	0.0212	0.0004	0.0274
Robbery Rate				
<i>Medical</i>	0.0539 *	0.0310	-0.0217	0.0306
<i>Medxdecim</i>	0.1147 **	0.0517	-0.0823	0.0527
Property Crime				
Property Crime Rate				
<i>Medical</i>	0.0615 ***	0.0167	0.0524 **	0.0227
<i>Medxdecim</i>	0.1187 ***	0.0220	-0.0845	0.0523
Burglary Rate				
<i>Medical</i>	0.0608 ***	0.0167	0.0648 **	0.0259
<i>Medxdecim</i>	0.1096 ***	0.0287	-0.0889 *	0.0513
Larceny Theft Rate				
<i>Medical</i>	0.0604 ***	0.0180	0.0354 **	0.0153
<i>Medxdecim</i>	0.0774 ***	0.0229	-0.0551	0.0360
Motor Vehicle Theft Rate				
<i>Medical</i>	0.0748 ***	0.0255	0.1183	0.0871
<i>Medxdecim</i>	0.3283 ***	0.0418	-0.2274	0.1431
Additional Controls	Yes		Yes	
Time Trends	Yes		Yes	
Interaction Term	Yes		Yes	