Senior Project

Department of Economics

Effect of Marijuana Legalization on Minority Prison and Parole Rates

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Abstract

As of 2023, there are 21 states that have fully legalized marijuana, and the number will surely continue to rise. Marijuana legalization is becoming ever more prevalent in the United States today. This study aims to analyze the effect of this legalization on the minority prison and parole rates in America. The analysis uses a two-way difference in differences approach to analyze the effects of medicinal and recreational marijuana legalization on the outcome variables. The analysis compares Blacks and Hispanics to Whites due to the apparent racial discrimination in the justice system. The results show that marijuana legalization leads to an increase in parole rates and decrease in prison rates overall. There are differences between race and gender in terms of prison and parole rate.

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1. Background

Marijuana is one of the most used federally illegal drugs in the United States. According to the CDC, about 48 million people were using marijuana in 2019 (*Data and Statistics*, n.d.). Marijuana can be used medicinally to help alleviate pain and reduce anxiety. However, it is also used recreationally to reap the same benefits. As of January 2023, 21 states including the District of Columbia in the United States have legalized marijuana for recreational use by citizens.

The purpose of this paper is to analyze the effects of legalizing marijuana on minority prisoner populations and minority prisoner parole rates. One would presume that legalizing marijuana will reduce prison rates overall because lots of prisoners are in jail for drug offenses, including marijuana related offenses. Looking at the minority prisoner population compared to the white prisoner population will show if minority populations are affected more for marijuana related charges. The parole rate findings will show if the legalization of marijuana had a positive effect on the minority prisoner population because more prisoners might be let on parole after the legalization.

The states have many reasons to legalize marijuana for recreational use. Some of these reasons include increased tax revenue from selling marijuana in dispensaries, job growth, investment opportunities, and not having to enforce laws regarding marijuana sale and possession (Krishna). States can collect considerable tax revenue. In 2022, the share of state tax revenue from Alaska, Colorado, Nevada, and Washington was 1.2%, 1.7%, 1.7%, and 1.5%, respectively (*Cannabis Taxes | Urban Institute*, n.d.). According to Pew Research, the main two reasons marijuana legalization proponents have to its legalization are for the health benefits and that they feel marijuana is no worse than other legalized drugs. The reasons not chosen as much

include the benefits of regulation such as tax revenue, the current enforcement is expensive, and that people should be able to do what they want (*Why Americans Support or Oppose Legalizing Marijuana | Pew Research Center*, 2015).

Racial discrimination can cause unjust imprisonment and marijuana charges reflect this unjustness in the United States prison system. The implications of marijuana laws are huge because of the effects imprisonment has on the mental and physical wellbeing of an individual. Being arrested for a drug charge can seriously alter one's life trajectory making it harder to get a job, receive student aid, or obtain future housing. The War on Drugs was put into effect in 1970 by Ronald Regan as an attempt to combat illegal drug use by increasing the penalties for usage and possession (*War on Drugs - Timeline in America, Definition & Facts*, n.d.). However, these laws have caused a surge in prison population for marijuana usage specifically for minorities because inner cities were hit the most in terms of law enforcement and police presence. Hetey et al. (2016) find that 60% of police stops in Oakland were of Africans Americans, though they make up only 28% of the population of Oakland. Once stopped, African Americans were significantly more likely to be handcuffed, searched, and arrested. These disparities remained statistically significant even after they controlled for more than two dozen factors relevant to officer decision making, including crime rates and the underlying racial and socioeconomic demographics where the stop was made (Hetey et al., 2016).

1. Literature Review

The prevalence of marijuana has been growing over the past few decades. The implications of marijuana legalization are crucial to understand in order for states to make future decisions regarding marijuana legalization. The current literature consists of research on how

marijuana legalization affects crime, government revenue, taxes, savings, and business expansion. Most of the literature revolves around Colorado and Washington because those were the first two states to legalize marijuana recreationally in the United States. The current literature also shows how the war on Drugs policy has impacted marijuana imprisonment for minorities.

Stanton et al. (2020) find legalization and retail sales of marijuana have not had any apparent effect on jail population rates in Washington State as a whole. Race disaggregated jail populations did appear to change following legalization and sales. However, these results are somewhat inconsistent. The jail population for Blacks increased in some counties but decreased in others. The female population also has different results across counties. The results from this study show that the jail populations may not be affected by marijuana legalization, but it is limited to Washington State only. If the jail population is not affected, then maybe overall crime is. Shana et al. (2017) explores the relationship between decriminalization of recreational and medical marijuana legalization and crime rates/arrests for drug abuse violations in all 50 states. The study finds that property and violent crime rates are lower in both decriminalized and medically legalized states, although not by a significant difference. However, the data does show that crime rates are consistently lower in these states, which makes sense due to the natural violence surrounding illegal drug sales. Analysis also reveals that there are no significant differences in 2014 crime rates based on the degree to which the state has legalized/decriminalized marijuana (completely illegal, decriminalized or medically legal, decriminalized and medically legal) (Shana et al. 2017). Hollingsworth et al. (2022) find that the legalization of recreational marijuana has a bigger impact on usage by both teens and adults than medicinal legalization. They also find that the presence of marijuana dispensaries is an important driver of increased usage by adults. This study is significant because increased usage by teens

and adults could potentially lead to increased prison populations in the future and is an important consideration for states when deciding to switch from medicinally to recreationally legal marijuana in their state.

While this study isn't about whether or not states should legalize marijuana, these reasons are important to consider because the legalization of marijuana does not just affect prison and parole rates. There are many benefits that marijuana can have for alleviating certain medical conditions. Wilkinson et al. (2016) find that the most notable uses in the medical field are for HIV/AIDS cachexia, nausea/vomiting related to chemotherapy, neuropathic pain, and spasticity in multiple sclerosis. There are also several economic benefits to the legalization of marijuana. There are gains in tax revenue and spurs in economic growth. Marijuana dispensaries create jobs and there are business expansions in agriculture and also the service sector to support the new working population. Rent and property values tend to increase and there are savings from reductions in criminal justice expenditures. Another notable benefit to legalizing marijuana is that marijuana from reliable places is better for the safety of citizens who choose to consume it.

Some of the negative consequences to legalizing marijuana include the effects it could have on teenagers, the negative health effects, and its potential to become a gateway drug to harsher more dangerous substances. Wilkinson et al. (2015) find the negative effects of marijuana to be acute marijuana intoxication on driving abilities, unintentional ingestion of marijuana products by children, the relationship between marijuana and opioid use, and whether there will be an increase in health problems related to marijuana use, such as dependence/addiction, psychosis, and pulmonary disorders. Neil et al. (2023) find that legal medical marijuana, particularly when available through retail dispensaries, is associated with higher opioid mortality.

Racial disparities are continued to be a prevalent issue in the criminal justice system. These racial disparities could stem from implicit bias against minorities or be because minority cultures tend to have more crime within them. Kahn et al. (2016) find that officers in the United State are more likely to stop Black and Latinos compared to Whites. Blacks are three times more likely to have their cars searched during a stop. These racial disparities have continually harmed historically disadvantaged groups such as Blacks and Latinos for centuries. "In 2013, the state and federal prison population was 37% Black, 32% White, and 22% Hispanic. In contrast, that year, the U.S. population was 15% Black, 76% non-Hispanic White, and 19% Hispanic. Currently, nearly 3% of all Black male U.S. residents of all ages are incarcerated, while 0.5% of White males are" (Kahn et al. 2016). Marijuana legalization may not be able to change the unequal imprisonment of minorities because of all the other factors causing minorities to go to jail. However, marijuana legalization laws could shift implicit bias which shows the power laws have over public opinion and how beneficial marijuana legalization may be at reducing minority prison rates. If the overall mindset changes to marijuana not being harmful and police officers could adopt this mindset and shift their opinion about the severity of marijuana, then implicit bias against minorities and drug charges would lessen.

2. Theory

This study adds to the literature by looking at the United States as a whole when analyzing marijuana legalization data. The previous works have looked at marijuana legalization and crime. The most closely related study by Stanton et al. (2020) analyzed the relationship between marijuana legalization and jail population with specific attention to minorities and women for Washington state. The main variables in this study are marijuana legalization, minority prison rates, and minority parole rates. The expectation is that minority prison rates will

decrease in states where marijuana becomes legalized and parole rates will increase. The hypotheses are:

1. Prison rates will decrease for all races in states where marijuana is legalized.
2. Marijuana legalization will result in a greater decrease in the African American prison population than the White prison population.
3. Marijuana legalization will result in a greater decrease in the Hispanic prison population than the White prison population.
4. The parole rates for African Americans and Hispanics will be greater than Whites.

The first theory suggests that if marijuana becomes legalized then prison rates for all races should decrease. The African American and Hispanic populations are both put in jail far more often for drug related charges. Therefore, the rates of incarceration should drop more for those groups when marijuana is legalized. Also, parole rates for those groups should increase.

An alternate viewpoint is that overall drug charges could increase when marijuana becomes legalized. When marijuana becomes legalized the demand from consumers of all races may increase because it will be deemed safer. This increase in usage could end up putting more people in jail for crimes related to drug use since people that do drugs are more inclined to participate in risky behavior which would contribute to this increase in arrests. This is effectively making marijuana a gateway drug to other drugs or other criminal activities.

Another alternate viewpoint would be that police officers give out marijuana charges as excuse to get people in jail for other crimes, or just as an add on to more severe offenses that put them in jail. If this is the case, then we would expect to see no change in prison or parole rate data before and after the legalization takes place.

3. Data Analysis

The necessary data for this study is data on state legalization of marijuana, prison rate data and parole rate data for each state split into race categories Black, Hispanic, and White populations. Prisoner data by race is available from the United States Bureau of Justice from 1978 until 2021. Parole rate data is also available from the United States Bureau of Justice, from 2001 until 2016. I will be creating my own database for all the states showing the year that marijuana legalization both medicinally and recreationally went into effect for the applicable states.

The parole rate data is a count of the year end parole population by race for each state. The races given from the data base are non-Hispanic White, non-Hispanic Black, Hispanic or Latino, non-Hispanic American Indian, non-Hispanic Asian, non-Hispanic Native Hawaiian, non-Hispanic two or more races, other race, and unknown race or ethnic origin. This analysis limits the data to non-Hispanic White, non-Hispanic Black, and Hispanic or Latino. This database has lots of missing data which is one limitation of this study. Of all 50 states plus the district of Columbia, 11 have some of their data missing. All of the states have some data except for Nevada. Alaska is missing data for the years 2012, 2014, 2015, and 2016. Georgia is missing data for Hispanic and Latino for the years 2010, 2011, and 2012. Hawaii is missing data for all years except 2013. The analysis is run with the data available, but it does note on the Bureau of Justice Department that the data may be non-comparable due to changes in reporting over the years. I am assuming these changes in reporting happened before the years if this analysis because it says that before the year 2000, Hispanic and Latino were considered separate categories. Some of the data they reported are estimates as well. Since the parole rate data is only

available to the year 2016, it is only applicable for the 9 states that legalized marijuana recreationally during or before 2016.

The data for prison rates is broken down into White, Black, and Hispanic for each state. The data I am using will be from the years 1978 until 2021. The data shows the number of prisoners per year by state. There were some missing values that I took out of the data set because they were represented as a negative number in the original file.

4. Methodology

The variables of interest in this study are prison rate and parole rate. The goal is to see how marijuana legalization can impact those two variables. This is a two-way fixed effects difference in differences model. The two fixed effects are entity, which will get rid of any differences across states, and year, which will get rid of any differences due to the year that marijuana became legalized. The regression model is:

$$\text{OutcomeVariable}_{st} = B_0 + B_1\text{MedLegal}_{st} + + B_2\text{FullyLegal}_{st} + X_{st} + \text{State}_s + \text{Year}_t + \varepsilon_{st}$$

This is the general formula for the two outcome variables. The first outcome variable is the prison rate which is the number of individuals in prison by race in state s and year t. The second outcome variable is the parole rate of individuals by race in state s and year t. MedLegal is an indicator variable equal to 1 if a state has legalized marijuana medicinally in a given year; zero otherwise. FullyLegal is an indicator variable equal to 1 if a state has fully legalized marijuana; zero otherwise. X represents the control variables. State and Year are state and year fixed effects, respectively. Lastly, ε is the error term.

The assumptions needed to conduct this research are that the legalization of marijuana did not affect states differently across years. The parallel trend test will tell whether or not the

prison and parole rates in the control groups are moving together with treatment group before the treatment is enacted.

5. Results

Table 1: Prison Rate Difference in Difference Model							
Regressors	Total	White Male	White Female	Black Male	Black Female	Hispanic Male	Hispanic Female
MedicalMarijuanaLegal	-3,266.05***	-2,034.20***	-346.21***	-1,745.61***	-82.00***	921.66**	38.11*
	(919.27)	(303.41)	(43.17)	(310.10)	(25.15)	(384.60)	(22.76)
FullyLegal	-4,245.39***	-2,243.27***	-417.55***	-1,398.49***	-71.38**	247.98	-15.67
	(872.46)	(521.45)	(64.53)	(306.51)	(32.83)	(451.79)	(23.68)
Intercept	5,105.99***	3,153.39***	661.26***	1,128.05*	-67.82	142.64	19.66
	(1,451.76)	(566.72)	(90.71)	(601.59)	(46.67)	(442.30)	(30.06)
Controls	No	No	No	No	No	No	No
State and Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Obs	2,244	2,221	2,221	2,213	2,215	2,087	2,082
Adjusted R-sq	0.8415	0.8237	0.7342	0.8613	0.7708	0.7871	0.7133
Overall Significance	124.58***	130.27***	57.32***	158.59***	92.73***	47.47***	28.65***

Note: robust standard errors are in parentheses. *, **, and *** indicate 10%, 5%, and 1% significance levels, respectively.

Table 1 is the regression results for marijuana legalization effects on prison rates in the United States. The analysis shows gender and race, and the total column is the effects legalization has on total prison rates for all race groups combined.

Overall prison rates decreased by 3266 prisoners after the medicinal legalization of marijuana, compared to if no legalization had happened. Overall prison rates also decrease when marijuana becomes legalized recreationally by 4245 prisoners. Both of these decreases are significant at the 1% level. Both White and Blacks have decreases in prison rates post legalization. The decrease for females is smaller for males but that is most likely due to their being less females in prion overall. Recreational legalization did not lead to any significant difference in prison rates for Hispanics.

Table 2 is the regression results for marijuana legalization effects on parole rates in the United States.

Table 2: Parole Rate Difference in Differences Model

Regressors	Total	White	Black	Hispanic
MedicalLegal	-862.15*	-83.15	-346.47	271.78
	(470.87)	(277.06)	(240.16)	(226.44)
RecreationalLegal	-666.33	490.37	10.05	390.06
	(984.05)	(427.40)	(223.59)	(243.06)
Intercept	1,840.78***	1,430.55***	147.10	71.82
	(525.49)	(288.31)	(220.60)	(153.11)
Controls	No	No	No	No
State and Year Fixed Effects	Yes	Yes	Yes	Yes
Number of Obs	813	755	754	707
Adjusted R-sq	0.9818	0.9492	0.9678	0.9276
Overall Significance	597.75***	874.58***	736.22***	173.38***

Note: robust standard errors are in parentheses. *, **, and *** indicate 10%, 5%, and 1% significance levels, respectively.

The medical legalization of marijuana caused a decrease in parole rates by 862 prisoners compared to if no legalization had occurred, significant at the 10% level. None of the other coefficients are significant, meaning that parole rates are either not affected by marijuana legalization or controls are needed in the regression. There are however limitations to the parole rate data such as lots of missing data as previously mentioned.

Table 3: Prison Rate Difference in Differences Model

Regressors	Total	White Male	White Female	Black Male	Black Female	Hispanic Male	Hispanic Female
MedicalMarijuanaLegal	-3,575.37***	-2,211.74***	-346.68***	-1,511.02***	-63.77***	613.73*	22.24
	(760.51)	(299.75)	(39.58)	(260.65)	(23.69)	(344.81)	(20.13)
FullyLegal	-4,603.98***	-2,554.95***	-446.89***	-1,312.01***	-66.19*	4.94	-29.29
	(941.20)	(584.27)	(67.68)	(330.11)	(39.93)	(361.96)	(24.34)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State and Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Obs	1,938	1,916	1,916	1,908	1,910	1,848	1,847
Adjusted R-sq	0.8964	0.8537	0.7804	0.9130	0.8279	0.8610	0.7885
Overall Significance	188.66***	178.79***	71.00***	248.06***	128.33***	70.06***	38.56***

Note: robust standard errors are in parentheses. *, **, and *** indicate 10%, 5%, and 1% significance levels, respectively.

Table 3 shows the prison rate including a control variable for median household income. Adding the control variable decreases the parole rates for all regressors except Black female, Hispanic male, and Hispanic female.

6. Conclusion

The data supports that medicinal and recreational marijuana legalization decreases prison rates for Whites and Blacks, but not for Hispanics. Since the prison rate data was collected for all crimes, there could be another crime that increased Hispanic prison rates. Another reason for Hispanic prison rates increasing could be that marijuana legalization led to marijuana becoming a gateway drug giving rise to harsher drug use.

The total parole rates decrease which was not hypothesized. Parole rates may decrease due to prisoner income or due to the type of crime they were imprisoned for. More research is needed to determine the impact of marijuana legalization on parole rates and gender disparities.

Due to the overall decrease in prison rates and the potential health benefits marijuana can have in alleviating ailments, along with increases in tax revenue, states can look to this research as a reason to legalize marijuana. White males saw the largest decrease in prison rates, with a drop in prison rates almost double that of Black males. However, it was hypothesized that minorities would see the greatest decrease in prison rates. Black males prison rates decrease by 1300 after recreational legalization but the average number of Black male prisoners in 2021 was around 8000 which means there was a 16 percent decrease in the number of Black male prisoners. The legalization of recreational marijuana led to a decrease of 1028 more prisoners than the legalization of medicinal marijuana. This additional decrease could be a reason for states

to consider legalizing recreationally. However, there are other factors to consider such as the

negative effects of increased marijuana usage recreational legalization has on teens and adults.

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Appendix

Prison Rate by State
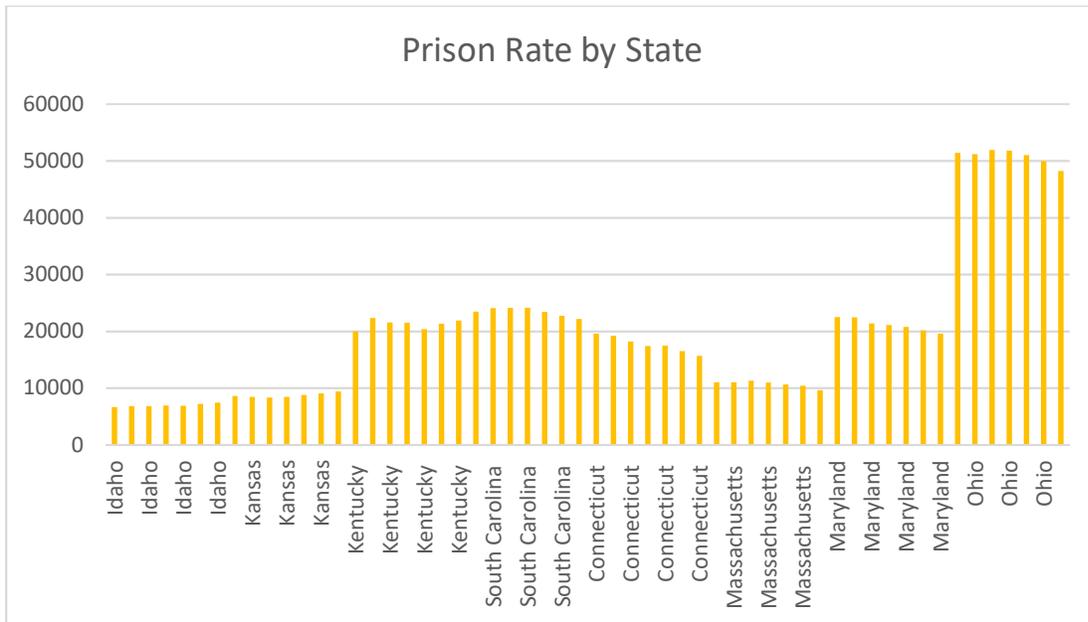
SAS Codes

```
proc import datafile="/home/u60687151/My Sas/ParoleData.xlsx"
        out=work.Parole
        dbms=xlsx
        replace;
getnames=yes;
sheet="Parole_Report_22-Feb-23_03_44_4"n;
run;

data parole2;
set parole;
        if C="" then Race="Total";
        where A ne "";
        drop B C;
        rename A=State;
```

```
run;

proc transpose data=parole2 out=parole3;
        Var _all_ /*"2001"n*/;
        By State;
        id Race;
run;

data parole4;
set parole3;
        where _name_ ne "State" and _name_ ne "Race" and _name_ ne "T" and _name_ ne "U";
        drop _label_ White Black Hispanic Total _name_;
        total2= input(total,10.0);
        White2=input(White,10.0);
        Black2=input(Black,10.0);
        Hispanic2=input(Hispanic,10.0);
        Year2=input(_name_,10.0);
run;



data parole5;
set parole4;
        if Year2>=2004 and substr(State,1,7)="Montana" then DID=1;
        else if Year2>=2004 and substr(State,1,7)="Vermont" then DID=1;
        else if Year2>=2006 and substr(State,1,12)="Rhode Island" then DID=1;
        else if Year2>=2007 and substr(State,1,10)="New Mexico" then DID=1;
        else if Year2>=2008 and substr(State,1,8)="Michigan" then DID=1;
        else if Year2>=2010 and substr(State,1,7)="Arizona" then DID=1;
        else if Year2>=2010 and substr(State,1,10)="New Jersey" then DID=1;
        else if Year2>=2011 and substr(State,1,8)="Delaware" then DID=1;
```

```
        else if Year2>=2011 and substr(State,1,20)="District of Columbia" then DID=1;

        else if Year2>=2012 and substr(State,1,11)="Connecticut" then DID=1;

        else if Year2>=2012 and substr(State,1,13)="Massachusetts" then DID=1;

        else if Year2>=2013 and substr(State,1,8)="Illinois" then DID=1;

        else if Year2>=2013 and substr(State,1,8)="Maryland" then DID=1;

        else if Year2>=2013 and substr(State,1,13)="New Hampshire" then DID=1;

        else if Year2>=2014 and substr(State,1,9)="Minnesota" then DID=1;

        else if Year2>=2014 and substr(State,1,8)="New York" then DID=1;

        else if Year2>=2015 and substr(State,1,7)="Georgia" then DID=1;

        else if Year2>=2015 and substr(State,1,9)="Louisiana" then DID=1;

        else if Year2>=2016 and substr(State,1,8)="Arkansas" then DID=1;

        else if Year2>=2016 and substr(State,1,7)="Florida" then DID=1;

        else if Year2>=2016 and substr(State,1,12)="North Dakota" then DID=1;

        else if Year2>=2016 and substr(State,1,4)="Ohio" then DID=1;

        else if Year2>=2016 and substr(State,1,12)="Pennsylvania" then DID=1;

        else DID=0;

run;


data parole6;

set parole5;

        if Year2>=2012 and substr(State,1,8)="Colorado" then DID2=1;

        else if Year2>=2012 and substr(State,1,10)="Washington" then DID2=1;

        else if Year2>=2014 and substr(State,1,6)="Alaska" then DID2=1;

        else if Year2>=2014 and substr(State,1,6)="Oregon" then DID2=1;

        else if Year2>=2015 and substr(State,1,20)="District of Columbia" then DID2=1;

        else if Year2>=2016 and substr(State,1,10)="California" then DID2=1;

        else if Year2>=2016 and substr(State,1,5)="Maine" then DID2=1;

        else if Year2>=2016 and substr(State,1,13)="Massachusetts" then DID2=1;

        else if Year2>=2016 and substr(State,1,6)="Nevada" then DID2=1;

        else DID2=0;
```

```
run;


proc means data=parole6;

run;


ods output ParameterEstimates=PEforModel1 DataSummary=ObsModel1
FitStatistics=AdjRsqModel1  Effects=OverallSigModel1;

proc SurveyReg data=parole6;

Class State Year2;

        Model1: Model total2 = DID DID2 State Year2 /solution adjrsq;

run;


ods output ParameterEstimates=PEforModel2 DataSummary=ObsModel2
FitStatistics=AdjRsqModel2  Effects=OverallSigModel2;

proc SurveyReg data=parole6;

Class State Year2;

        Model2: Model White2 = DID DID2 State Year2 /solution adjrsq;

run;


ods output ParameterEstimates=PEforModel3 DataSummary=ObsModel3
FitStatistics=AdjRsqModel3  Effects=OverallSigModel3;

proc SurveyReg data=parole6;

Class State Year2;

        Model3: Model Black2 = DID DID2 State Year2 /solution adjrsq;

run;


ods output ParameterEstimates=PEforModel4 DataSummary=ObsModel4
FitStatistics=AdjRsqModel4  Effects=OverallSigModel4;

proc SurveyReg data=parole6;

Class State Year2;

        Model4: Model Hispanic2 = DID DID2 State Year2 /solution adjrsq;
```

```
run;



Data Table_Long;

        length Model $10; /* Makes sure the variable Model has the right length and its values
are not truncated */

        length Parameter $30; /* Makes sure the variable Parameter has the right length and its
values are not truncated */

        set  PEforModel1 PEforModel2 PEforModel3 PEforModel4 indsname=M; /*"indsname"
creates an indicator variable (here I call it "M") that tracks the name of databases use in the "set"
statement */

        keep Model Parameter EditedResults;

        if      M="WORK.PEFORMODEL1" then Model="Model1";

                else if M="WORK.PEFORMODEL2" then Model="Model2";

                else if M="WORK.PEFORMODEL3" then Model="Model3";

                else if M="WORK.PEFORMODEL4" then Model="Model4";

                /*else if M="WORK.PEFORMODEL5" then Model="Model5";

                else if M="WORK.PEFORMODEL6" then Model="Model6";*/

        Where Estimate ne 0;


        if Probt le 0.01 then Star="***";

                else if Probt le 0.05 then Star="**";

                else if Probt le 0.1 then Star="*";



        Results=Estimate;

        EditedResults=Cats(put(Results,comma16.2),Star);

        output;


        Results=stderr;

        EditedResults=Cats("(",put(Results,comma16.2),")");
```

```
        output;

run;


proc sort data=Table_Long out=Table_Long_Sorted;
        by Model Parameter;
run;



/* Step 2: Create separate results columns (in the form of separate databases) corresponding to
each model */

data Model1Results(rename=(EditedREsults=Model1))
          Model2Results(rename=(EditedREsults=Model2))
          Model3Results(rename=(EditedREsults=Model3))
          Model4Results(rename=(EditedREsults=Model4));
             /*Model5Results(rename=(EditedREsults=Model5))
             Model6Results(rename=(EditedREsults=Model6));*/
        set Table_Long_Sorted;
        if Model="Model1" then output Model1Results;
        else if Model="Model2" then output Model2Results;
        else if Model="Model3" then output Model3Results;
        else if Model="Model4" then output Model4Results;
        /*else if Model="Model5" then output Model5Results;
                else if Model="Model6" then output Model6Results;*/
        drop Model;
run;



/* Step 3: Create the final results table that would include all models side-by-side*/
data Table_Wide;
```

```
        merge Model1Results Model2Results Model3Results Model4Results;

        by Parameter;

        if mod(_n_,2)=1 then Regressors=Parameter;


        length Order 3;

        if substr(Parameter,1,10)="total2 " then Order=1;

                else if substr(Parameter,1,4)="DID " then Order=2;

                else if substr(Parameter,1,5)="DID2 " then Order=3;

                else if substr(Parameter,1,7)="White2 " then Order=4;

                else if substr(Parameter,1,7)="Black2 " then Order=5;

                else if substr(Parameter,1,10)="Hispanic2 " then Order=6;

                else if substr(Parameter,1,6)="State " then Order=7;

                else if substr(Parameter,1,6)="Year2 " then Order=8;

                /*else if substr(Parameter,1,8)="ability " then Order=11;

                else if substr(Parameter,1,15)="male*raceethnic" then Order=12;

                else if substr(Parameter,1,7)="male*ed" then Order=13;

                else if substr(Parameter,1,13)="raceethnic*ed" then Order=7;*/

                else Order=100;


run;


/* Order the variables in the results table */

proc sort data=Table_Wide out=Table_Wide_Sorted(drop=Order Parameter);

        by Order;

run;


/*Step 4: Create the rows for other statistics*/


/* The row for Number of Obs */

data NumofObs(keep=Label1 Model1 Model2 Model3 Model4);
```

```
        merge ObsModel1(rename=(nvalue1=NVMoel1))
ObsModel2(rename=(nvalue1=NVMoel2)) ObsModel3(rename=(nvalue1=NVMoel3))
ObsModel4(rename=(nvalue1=NVMoel4));

        by Label1;

        where Label1="Number of Observations";

        Model1=put(NVMoel1,comma16.0);

        Model2=put(NVMoel2,comma16.0);

        Model3=put(NVMoel3,comma16.0);

        Model4=put(NVMoel4,comma16.0);

        /*Model5=put(NVMoel5,comma16.0);

        Model6=put(NVMoel6,comma16.0);*/

run;


/* The row for Adj R-sq */

Data AdjRsq;

        merge AdjRsqModel1(rename=(cvalue1=Model1))
AdjRsqModel2(rename=(cvalue1=Model2)) AdjRsqModel3(rename=(cvalue1=Model3))
AdjRsqModel4(rename=(cvalue1=Model4));

        by Label1;

        Where Label1="Adjusted R-Square";

        drop nvalue1;

run;


/* The row for Overall Significance */

data OSM1(rename=(EditedValue=Model1)) OSM2(rename=(EditedValue=Model2))
OSM3(rename=(EditedValue=Model3)) OSM4(rename=(EditedValue=Model4));

        set OverallSigModel1 OverallSigModel2 OverallSigModel3 OverallSigModel4
indsname=M;

        Where Effect="Model";

        Label1="Overall Significance";


        if ProbF le 0.01 then Star="***";
```

```
                else if ProbF le 0.05 then Star="**";
                else if ProbF le 0.1 then Star="*";


        EditedValue=Cats(Put(FValue,comma16.2),Star);


        if M="WORK.OVERALLSIGMODEL1" then output OSM1;
                else if M="WORK.OVERALLSIGMODEL2" then output OSM2;
                else if M="WORK.OVERALLSIGMODEL3" then output OSM3;
                else if M="WORK.OVERALLSIGMODEL4" then output OSM4;
                /*else if M="WORK.OVERALLSIGMODEL5" then output OSM5;
                else if M="WORK.OVERALLSIGMODEL6" then output OSM6;*/
        keep Label1 EditedValue;
run;


Data OverallSig;
        merge OSM1 OSM2 OSM3 OSM4;
        by Label1;
run;


/* Combine all rows for other statistics */
Data OtherStat;
        set NumofObs AdjRsq OverallSig;
        rename Label1=Regressors;
Run;


/* Step 5: Add other statistics to the results table */
Data Table_Wide_Sorted_WithStat;
        set Table_Wide_Sorted OtherStat;
run;
```

```
/* create new name for variables in the regression results table through defining a new format*/
proc format;
        value $VariableName(default=50) "total2"="Total"
                                                                "DID"="MedicalLegal"
                                                                "DID2"="RecreationalLegal"
                                                                "White2"="White"
                                                                "Black2"="Black"
                                                                "Hispanic2"="Hispanic"
                                                                "Number of
Observations"="Number of Obs"
                                                                "Adjusted R-
Square"="Adjusted R-sq"
                                                                "Year2"="Year"
                                                                "State Alabama"="Alabama"
                                                                "State Alaska"="Alaska"
                                                                "State Arizona"="Arizona"
                                                                "State Arkansas"="Arkansas"
                                                                "State
California"="California"
                                                                "State Colorado"="Colorado"
                                                                "State
Connecticut"="Connecticut"
                                                                "State
Delaware"="Delaware"
                                                                "STATE DC"="District of
Columbia"
                                                                "STATE FL"="Florida"
                                                                "STATE GA"="Georgia"
                                                                "STATE HI"="Hawaii"
                                                                "STATE ID"="Idaho"
                                                                "STATE IL"="Illinois"
                                                                "STATE IN"="Indiana
```

"STATE IA"="Iowa"

"STATE KS"="Kansas"

"STATE KY"="Kentucky"

"STATE LA"="Louisiana"

"STATE ME"="Maine"

"STATE MD"="Maryland"

"STATE MA"="Massachusetts"

"STATE MI"="Michigan"

"STATE MN"="Minnesota"

"STATE MS"="Mississippi"

"STATE MO"="Missouri"

"STATE MT"="Montana"

"STATE NE"="Nebraska"

"STATE NV"="Nevada"

"STATE NH"="New Hampshire"

"STATE NJ"="New Jersey"

"STATE NM"="New Mexico"

"STATE NY"="New York"

"STATE NC"="North Carolina"

"STATE ND"="North Dakota"

"STATE OH"="Ohio"

"STATE OK"="Oklahoma"

"STATE OR"="Oregon"

"STATE PA"="Pennsylvania"

"STATE RI"="Rhode Island"

```
                                                    "STATE SC"="South
Carolina"

                                                    "STATE SD"="South
Dakota"

                                                    "STATE TN"="Tennessee"
                                                    "STATE TX"="Texas"
                                                    "STATE UT"="Utah"
                                                    "STATE VT"="Vermont"
                                                    "STATE VA"="Virginia"
                                                    "STATE
WA"="Washington"

                                                    "STATE WV"="West
Virginia"

                                                    "STATE WI"="Wisconsin"
                                                    "STATE WY"="Wyoming"
                                                    "STATE US"="Country
Total"

                                                    "STATE ST"="State Total"
                                                    "STATE FE"="Federal
Total";


Run;


/* Print the clean results table */

ods excel file="/home/u60687151/My Sas/Table_ParoleRateNoControls.xlsx"
options(Embedded_Titles="ON" Embedded_Footnotes="ON"); /*Use the path to your MySAS
folder */

Title "Table 2: Parole Rate Difference in Differences Model";

footnote justify=left "Note: robust standard errors are in parentheses. *, **, and *** indicate
                                      10%, 5%, and 1% significance levels,
respectively.";

proc print data=Table_Wide_Sorted_withstat noobs;

        var Regressors;
```

```
        var Model1-Model4 /style(header)={just=center} style(data)={just=center
tagattr="type:String"};

        format Regressors $VariableName.;

run;

ods excel close;


proc import datafile="/home/u60687151/My Sas/PrisonRateWithIncome.xlsx"

        out=work.Prison

        dbms=xlsx

        replace;

getnames=yes;

sheet=Sheet1;

run;


proc means data=prison;

run;


data prison;

set prison;

Year2=Year*Year;

Year3=Year*Year*Year;

TY=DIDMed*Year;

TY2=DIDMed*Year*Year;

TY3=DIDMed*Year*Year*Year;

RY=DIDRec*Year;

RY2=DIDRec*Year*Year;

RY3=DIDRec*Year*Year*Year;

run;


proc SurveyReg data=prison;
```

```
/*Class State Year;*/
        Model1: Model TOTAL = Year Year2 Year3 DIDMed TY TY2 TY3 /solution adjrsq;
run;


proc SurveyReg data=prison;
/*Class State Year;*/
        Model2: Model TOTAL = Year Year2 Year3 DIDMed TY TY2 TY3 INC /solution
adjrsq;
run;


proc SurveyReg data=prison;
/*Class State Year;*/
        Model3: Model TOTAL = Year Year2 Year3 DIDRec RY RY2 RY3 /solution adjrsq;
run;


proc SurveyReg data=prison;
/*Class State Year;*/
        Model4: Model TOTAL = Year Year2 Year3 DIDRec RY RY2 RY3 INC /solution
adjrsq;
run;


ods output ParameterEstimates=PEforModel1 DataSummary=ObsModel1
FitStatistics=AdjRsqModel1  Effects=OverallSigModel1;
proc SurveyReg data=prison;
Class State Year;
        Model1: Model TOTAL = DIDMed DIDRec State Year INC /solution adjrsq;
run;


ods output ParameterEstimates=PEforModel2 DataSummary=ObsModel2
FitStatistics=AdjRsqModel2  Effects=OverallSigModel2;
proc SurveyReg data=prison;
```

Class State Year;

        Model2: Model WHITEM = DIDMed DIDRec State Year INC /solution adjrsq;

run;

ods output ParameterEstimates=PEforModel3 DataSummary=ObsModel3
FitStatistics=AdjRsqModel3 Effects=OverallSigModel3;

proc SurveyReg data=prison;

Class State Year;

        Model3: Model WHITEF = DIDMed DIDRec State Year INC /solution adjrsq;

run;

ods output ParameterEstimates=PEforModel4 DataSummary=ObsModel4
FitStatistics=AdjRsqModel4 Effects=OverallSigModel4;

proc SurveyReg data=prison;

Class State Year;

        Model4: Model BLACKM = DIDMed DIDRec State Year INC /solution adjrsq;

run;

ods output ParameterEstimates=PEforModel5 DataSummary=ObsModel5
FitStatistics=AdjRsqModel5 Effects=OverallSigModel5;

proc SurveyReg data=prison;

Class State Year;

        Model5: Model BLACKF = DIDMed DIDRec State Year INC /solution adjrsq;

run;

ods output ParameterEstimates=PEforModel6 DataSummary=ObsModel6
FitStatistics=AdjRsqModel6 Effects=OverallSigModel6;

proc SurveyReg data=prison;

Class State Year;

        Model6: Model HISPM = DIDMed DIDRec State Year INC /solution adjrsq;

run;

ods output ParameterEstimates=PEforModel7 DataSummary=ObsModel7 FitStatistics=AdjRsqModel7 Effects=OverallSigModel7;

proc SurveyReg data=prison;

Class State Year;

   Model7: Model HISPF = DIDMed DIDRec State Year INC /solution adjrsq;

run;