MARIJUANA POLICY DIFFUSION IN THE UNITED STATES

A Thesis
by
JACKSON VALENTINE

Submitted to the School of Graduate Studies
at Appalachian State University
in partial fulfillment of the requirements for the degree of
MASTER OF ARTS IN POLITICAL SCIENCE

December 2020
Department of Government and Justice Studies

MARIJUANA POLICY DIFFUSION IN THE UNITED STATES

A Thesis
by
JACKSON VALENTINE
December 2020

APPROVED BY:

_____
Dr. Adam J. Newmark
Chairperson, Thesis Committee

_____
Dr. Phillip Ardoin
Member, Thesis Committee

_____
Dr. William Hicks
Member, Thesis Committee

_____
Mike McKenzie, Ph.D.
Dean, Cratis D. Williams School of Graduate Studies

Abstract

MARIJUANA POLICY DIFFUSION IN THE UNITED STATES

Jackson Valentine
B.A., University of North Carolina at Chapel Hill
M.A., Appalachian State University

Chairperson: Dr. Adam Newmark

The diffusion of marijuana policy in the United States is a relatively new area of study in political science. I uncover some of the causes and methods of marijuana diffusion in this thesis by organizing my data from all 50 states in an Event History Analysis to measure what causes a state to increase its likelihood of adoption. Using fiscal health of the state, ideological position in the government and in the citizenry, partisan control of a state, and amount of surrounding state with a pro-marijuana policy, I examine how these variables affect each state's likelihood to adopt. With a series of Cox Proportional Hazards models, I determine (1) that states generally adopt pro-marijuana policies when they are in a good fiscal situation, (2) more liberal and Democratic states are more likely to adopt a pro-marijuana policy, and (3) recreational and medical marijuana policies spread via regional diffusion.

Acknowledgments

I'd like to thank my thesis committee for helping me with this research project; hopefully the first of many to come. Dr. Ardoin and Dr. Hicks have been wonderful professors and mentors during my time at Appalachian State, and they deserve more than the credit I can offer them in this space. A special thanks goes to my committee chairman, Dr. Adam Newmark, for his helpful suggestions, edits, and moral support throughout the many long nights spent collecting and organizing data for this thesis. I'd also like to thank the Graduate School at Appalachian State for giving me the opportunity to study this topic, and the support to see the project through. Finally, and most importantly, I'd like to thank God for giving me the desire and ability to carry out such a large and time-consuming project. Without Him, none of this would have been possible.

Table of Contents

List of Tables

List of Figures

Introduction

As final ballots were tallied across America in 1996, few major domestic policy shifts were projected from the election season. President Clinton was slated for a second term, and the Republican Congress had already passed many of the items on its lengthy legislative agenda. However, for one state, the 1996 election season was one that would go down in history. Voters in California were going to the polls to vote on Proposition 215, known as the Compassionate Use Act of 1996 (California General Assembly 1996. *Prop 215, S.B. 420*). With 56% voting in favor of the initiative, California became the first state in America to legalize Cannabis for medical use. This event also marked the beginning of a slow decline in America's "War on Drugs" that had started in the Nixon Administration and was perpetuated by the Reagan and Bush Sr. Administrations. Oregon, Washington, Alaska, Maine, and others soon followed with their own medical marijuana programs, and many would eventually move into full recreational legalization. These pro-marijuana reforms spread relatively quickly given the tough anti-marijuana stance that most politicians had taken prior to 1996.

There are many reasons that a state might liberalize marijuana policies. The recently discovered medical benefits of cannabis have been one of the biggest arguments from marijuana legalization supporters, and many medical marijuana patients suffering from chronic pain, insomnia, and anxiety have attested to the effectiveness of cannabis (Webb and Webb 2014). Many states seeking to liberalize their marijuana laws have framed it as a medical issue, often adding words like "care" and "compassion" in marijuana bills to shift the focus away from legalizing a drug and placing the emphasis on medicine. Additionally, the previous dogma that marijuana is a so-called "gateway drug" has been largely disproved

by the medical field (Tarter et al. 2006). The gateway hypothesis was a common thread among anti-legalization efforts, and disproving this hypothesis gave states one more reason to consider reforming their marijuana laws. States have also been known to look towards revenue-generating programs such as marijuana when times get tough. Liberalizing marijuana laws and taxing the product sold in a legal market would surely help replenish the state treasury coffers in an economic recession or an important election year.

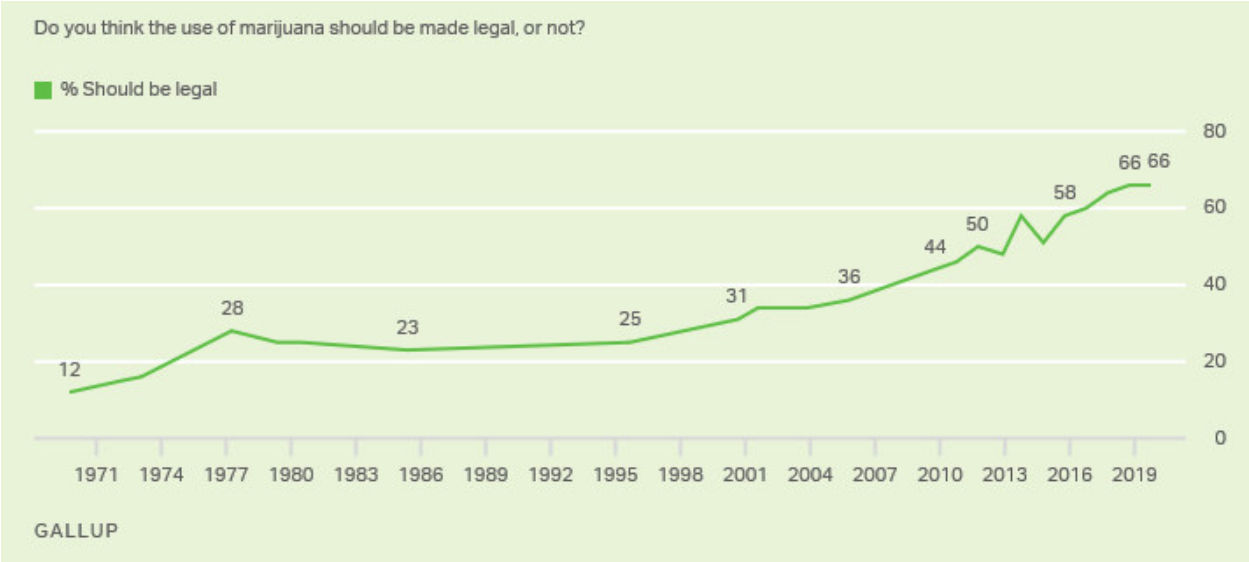
Today, 11 states have full recreational legalization, 34 have a medical marijuana program, and 25 have decriminalized marijuana.[1] Public opinion appears to endorse these policies, as support for legalization has steadily increased since the 1970s (Figure 1). There's certainly an appetite for changing marijuana policies among the public, but this does not explain the mechanics of state marijuana policy adoption. This thesis examines how, and why, pro-marijuana policies have spread so rapidly. Through statistical analysis, I examine internal characteristics of states, as well as outside factors that increase the likelihood that a state will adopt pro-marijuana policies. This is known as the study of policy diffusion.

Since De Tarde's *Laws of Imitation* (1903), policy diffusion has played an essential role in political science literature. Diffusion scholarship, especially the recent rise of quantitative methods in diffusion research, has provided actors with valuable data that can be utilized in the policymaking process. My findings on how marijuana policy spreads throughout the states could potentially aid lawmakers and outside actors in determining the best climate to push an initiative or bring legislation to the floor. From here, I will review the literature on marijuana policies and diffusion research, examine my data through a series of means comparisons, present results of multivariate analyses, and finish discussing these

[1] NORML.org/laws

findings as they pertain to this topical area and in regards to what we know about the ways policies spread across states.

Figure 1 – Support for Marijuana Legalization in the US



Literature Review

Marijuana Policy

Perhaps the most unique attribute of marijuana policy is its illegal federal status. Other diffusion scholarship has focused on legal policy changes such as adoption of lotteries and taxes or tax breaks. These are important policies to consider, but few diffusion studies have examined how federally illegal policies spread through states. Marijuana is a unique policy area that deserves further study, and it is important that the factors affecting different levels of legalization are made clear to all stakeholders involved. Here I discuss how marijuana policy spreads, methods in which to quantify it, and where political scientists could further pursue the study of marijuana policy.

Congress has classified marijuana as a "Schedule 1 Drug," meaning that it has no medical benefits and a high potential for abuse (O'Keefe 2013). Therefore, marijuana policy must be examined within the broader scope of resistance to federal mandates. When a state decides not to follow federal guidelines or refuses federal orders, it is resisting federal mandates, which creates a power struggle that is generally solved by the judicial branch. Much work has been done in this area of political science, such as the research on resistance to No Child Left Behind (Shelley 2012), the Affordable Care Act (Balla and Deering 2015), and a standardized federal identification, or "REAL ID" (Regan and Deering 2009). However, marijuana policy is different in that states are legalizing what the federal government deems explicitly illegal. Since Gonzales v. Raich (2005) established the right of the federal government to regulate cannabis under the Commerce Clause, federal DEA and FBI agents have become the final arbiters in situations that were traditionally dealt with by

the judicial branch. This would lead us to believe that the depth of federal government enforcement would have an impact on state adoption, but interestingly enough, Hannah and Mallinson (2018) find that there is no statistical correlation between state marijuana policy adoption, and liberal vs. conservative presidential administrations (or explicit DEA signals regarding marijuana). So, marijuana policy does not seem to spread from the top-down or bottom-up; the federal government hasn't affected state's decisions (though that would probably change with a federal reclassification of marijuana), and it does not seem likely that states will pressure the Justice Department to reclassify marijuana anytime soon. Looking at individual state characteristics will provide us with a better understanding on how these policies diffuse.

In a comprehensive Event History Analysis on medical marijuana diffusion, Bradford and Bradford (2017) give us a detailed account of factors affecting the spread of marijuana policy. Their data show that neighboring states adopting legalization do indeed put the states around them more at risk for adoption, but this is somewhat counterbalanced by the fact that ideological distance between states increases with legalization (in other words, a Democratic state and a Republican state will become ideologically further apart after one state legalizes). This will in turn reduce the likelihood of legalization from the neighboring state. Not surprisingly, the analysis also indicated that ideology of the mean voter (more liberal) as well as the average income (higher incomes) in each state increases the likelihood of legalization. Hannah and Mallinson (2018) note that outside actors play a crucial role in marijuana policy, something that an EHA has been known to leave out. In their study, the authors find that "ecological capacity" impacts the adoption of marijuana policy, meaning that variables such as legislative professionalism and the availability of the ballot initiative increase the

likelihood of adoption. These initiative campaigns are generally spearheaded by outside groups such as the National Association for the Reform of Marijuana Laws (NORML) and the Marijuana Policy Project (MPP) via monetary donations and petition collection. Conversely, their analysis finds that the number of self-proclaimed "evangelicals" in a state contributes significantly to keeping marijuana legalization off the table in the first place, which is consistent with Haider-Markel's (2001) and Berry and Berry's (1990) research regarding opponents keeping issues off the agenda. Finally, Kim (2016) finds that among other factors already presented here, poor state fiscal health and higher levels of incarceration also increase the likelihood of marijuana legalization, suggesting that states potentially choose legalization to increase state revenue.

Based on the data scholars have collected thus far, political scientists can make the cautious assumption that marijuana legalization and the policies that follow are generally explained by individual state characteristics, rather than by geographical proximity or top-down diffusion (Hannah and Mallinson 2018). State specific factors, such as the availability of direct democracy, presence of evangelicals, and overall fiscal health determine a state's marijuana policy along with presence of policy entrepreneurs and other outside actors. I have noted that scholars must make the aforementioned assumption somewhat cautiously for two reasons. The first is that we simply don't have a large amount of time from which to collect data, since California was the first to adopt in 1996. It could be that initial diffusion of medical marijuana policy will differ from its diffusion 20 or 30 years in the future, or that actors and public attitudes will change once the "newness" of marijuana legalization wears off. The second reason is that all the studies mentioned in this section have been on medical marijuana specifically. Since Colorado became the first state to legalize recreational

marijuana in 2012, these policies have not been around long enough to warrant much research. The literature on recreational marijuana is almost exclusively confined to criminal justice (Dragone et al. 2019, Stufano 2018) and public health (Aydelotte et al. 2019, Shi et al. 2019). As more states legalize marijuana, more comparisons can be made between states, and more confident conclusions can be reached. The next section examines diffusion research more broadly, and how diffusion scholarship coincides with my analysis of state marijuana policy.

Horizontal vs. Vertical Diffusion

There are two ways that policies diffuse across jurisdictions in America: through a vertical (top-down) model or a horizontal (between states) model (Berry and Berry 2018). In a vertical approach, the federal government can force, coerce, or incentivize states and local governments to adopt a policy. Often, this is through Supreme Court mandates, executive orders, or laws passed in Congress. Examples of vertical diffusion include the 2015 ruling on same sex marriage (Obergefell v. Hodges 2015), President Reagan's Executive Order requiring a cost-benefit analysis on regulations (Executive Order 12292), and the Voting Rights Act of 1965 preventing states from implementing things like literacy tests. Following the Obergefell decision, the Supreme Court ruled that the 14th amendment compels all 50 states to issue marriage licenses to same sex couples, resulting in a remarkably rapid diffusion from the Judiciary to the states. President Reagan's executive order initiated top-down diffusion in an administrative setting, and the Voting Rights Act of 1965 showed how the legislative branch can similarly enact rapid vertical diffusion. However, in Shelby County v. Holder (2013), the Supreme Court eliminated a preclearance provision in Section 5

of the VRA, freeing up states to make changes to their voting system without clearing it with the federal government and reversing much of the VRA's original intent.

Diffusion can also occur in the opposite direction, where policies develop at the state and local level and move upward to the federal level through public pressure or coercion. Examples of this bottom-up diffusion can be found in many of the provisions of the Affordable Care Act that originated in Massachusetts' 2006 health care bill (Beland, Medrano, and Rocco 2018), as well as anti-smoking policies which originated in US cities and were eventually adopted by the federal government (Shipan and Volden 2006). In each of these cases, a policy originated at some level of government and was copied by another part of that government. This is the essence of vertical policy diffusion.

Horizontal diffusion is generally studied more often in American political science due to the high priority of federalism in our government structure (Shipan and Volden 2006). Horizontal diffusion is more easily achieved in federalism than in other types of government, as there are generally enough separate lawmaking bodies with similar characteristics to facilitate the spread of policy. Unitary governments also have separate lawmaking bodies, but are more tightly bound by the federal government, making horizontal diffusion difficult. On the other hand, confederal forms of government do not bind the independent lawmaking bodies together enough to allow much systematic policy diffusion. In a horizontal diffusion model, there are several ways that policies can diffuse to states, but the two prominent methods are regional diffusion and internal determinants (Berry and Berry 1990). Typically, both methods come into play when policies diffuse, and there can be issues with testing whether a policy has diffused regionally or internally. Berry and Berry (2018) note that it can

be difficult to empirically separate the two, given that bordering states potentially have similar internal circumstances.

Regional Diffusion vs. Internal Determinants

Regional diffusion theory claims that states are most likely to emulate policies from neighboring states (Walker 1969), and policy adoption can best be studied by observing states that border each other (Berry and Berry 2018). Within regional diffusion, there are three basic models that are the focus of political science literature: the neighbor model, the leader-laggard model (may be regional or internal), and the national interaction model (also known as the organizational diffusion model). The neighbor model is the idea that states which border each other are more likely to adopt the policies of their neighbors. Berry and Berry (1990) present evidence that the adoption of state lottery systems is, at least partially, an example of the neighbor model of diffusion. In the leader-laggard model, states tend to "learn" from other states (not necessarily from those that border them) and some states are more innovative than others. Jack Walker (1969) first proposed this model of diffusion in one of the earliest and most comprehensive articles in the literature. Walker proposed a sort of tree-like diagram with "leaders" at the top, mid-range innovators in the middle, and low-level "laggards" at the bottom. His analysis concluded that states like New York and California are most likely to innovate due to their professional legislatures, large urban populations, and higher income levels per capita (Grupp and Richards 1975). At the bottom of the "innovation tree" were states such as Mississippi and South Carolina, which tend to spend less time making laws, and have less dense urban populations. Gray's (1973) work on innovation adds that states may lead in certain settings, while lagging in others. Oil rich states such as Texas,

North Dakota, and Wyoming have led the nation in innovating oil and gas policies like fracking and offshore drilling, despite failing to innovate in many other policy areas.

Finally, the national interaction model is based on the concept that lawmakers and other policy entrepreneurs will interact with each other in various conferences, organizations, and think tanks. As policy adoption grows, these actors gain influence, causing others they interact with to also adopt a given innovation (Rogers 1995, Walker 1969), and these interactions will result in policies diffusing across states (Gray 1973). Non-partisan groups may facilitate national interaction, such as the National Conference for State Legislatures, the National Governors Association, and the United States Conference of Mayors. There are also varying degrees of partisanship among some interaction facilitators, such as the Republican dominated American Legislative Exchange Council (ALEC) and the Democrat dominated State Innovation Exchange (SIX). Policies are often created through national interaction in several different areas including higher education, which was led by Complete College America and various gubernatorial organizations (Gandara, Ness, and Rippner 2017), and same sex marriage bans, led by the Family Research Council and other religious actors (Haider-Markel 2001). There are also situations where government agencies can facilitate policy diffusion themselves, rather than accept policy diffusion from the outside. Stoutenborough and Beverlin's (2008) study of net metering policy is a great example of agency-facilitated policy diffusion. In this instance, various EPA offices around the country encouraged power customers to switch to "net metering," where customers may generate their own electricity and sell it back to the electricity company at market rate. This program grew as solar power became more affordable, and is now commonplace in many states, thus creating a prime example of horizontal policy diffusion by a government agency.

Horizontal diffusion also encompasses the "internal determinants" model, or the idea that state internal factors can explain policy adoptions. Berry and Berry note that the internal determinants model presumes that "political, economic, and social characteristics internal to the jurisdiction" are the primary factors causing a government to adopt a new policy (2018 p. 308). Of course, policies almost never appear out of thin air; the internal determinants model assumes that knowledge of policies from other jurisdictions is a prerequisite for diffusion, but internal factors *predict* the likelihood that policy is adopted, rather than simply learning and implementing from other states (Rogers 1995). The literature shows many factors go into the likelihood of a state to adopt, and the factors vary depending on the policy. Walker (1969) was the first to note that wealthier and more urban states are more likely to innovate, while later research further isolated these factors. Returning to Berry and Berry's (1990) study of lottery adoption, they found that fiscal health, election years, personal income, and percentage of religious fundamentalists in the population all played a role in whether the state would adopt. Similar determinants explain other economic policies, such as the adoption of income and sales taxes (Berry and Berry 1992).

Other factors influencing policy innovation include education level (Rogers 1995 ch. 7), professional nature of policy makers (Walker 1969, discussed in the "leader-laggard section"), and availability of "slack resources" (Cyert and March 1963). Lawrence Mohr (1969) synthesized these factors into one theory, suggesting that innovations are the product of motivation, overcoming obstacles to innovation, and availability of resources.

Finally, Berry and Berry (2018) add that there are five ways in which policies are generally diffused: learning, imitation, normative pressure, competition, and coercion. These techniques can be used in horizontal or vertical diffusion, such as the federal government

putting *normative pressure* on states to adopt a 0.08 BAC level on drivers by showing that fatalities occur at a higher rate when a driver is over that limit. The federal government also *coerced* states into adopting the 0.08 limit by withholding federal highway funds.

Political scientists have come up with many methods for isolating and testing various factors to determine what policies diffuse when and why. I now turn to some of the prominent methods that have been used in the diffusion literature.

Methodological Differences in Diffusion Research

Policy diffusion research has its beginnings in qualitative research of agriculture and other rural practices (see Ryan and Gross's (1950) study of hybrid corn seed adoption), and over time has followed the same trend as American political research toward more quantitative work. Therefore, it only makes sense to start with qualitative methods. Starke (2013) notes that there are three primary qualitative methods that scholars use in diffusion research: cross-case analysis, within-case process tracing, and counterfactual reasoning.

Cross-case analysis is generally an exercise in comparing a few non-random cases that share similar circumstances in order to assess competing explanatory claims (Mahoney 1999). Cross-case analyses are normally paired with other methods due to the somewhat basic bivariate correlations that are generally a result of this method. Process tracing is more interested in discerning a point in the process that causes an outcome (in this case, when a policy is adopted) (George and Bennett 2005). Van Evera (1997) refers to this as a "smoking gun" linking one or several independent variables with the outcome. An example of this is a bill that is copied and pasted verbatim from another source including errors made in the original bill (Sharman 2010). These types of "model bills" are a favorite of advocacy groups

like ALEC that seek to make horizontal diffusion easier. Finally, there is counterfactual reasoning, which is one of the more controversial methods in diffusion research. This method is primarily a thought experiment, or a "theory-guided reasoning about what might have been" (Starke 2013 p. 575). Andrew Karch (2007a) implicitly uses this method when studying three very different states that introduced bills almost simultaneously. In Karch's analysis, Virginia, Oregon, and Massachusetts implemented various welfare reforms (time limits, family caps, and Individual Savings Accounts) and new healthcare policies (Medical Savings Accounts and senior prescription drug programs) between 1994 and 2001. Karch uses counterfactual reasoning to look back at this policy climate and understand why states with different demographics and political cultures adopted similar policies in the same period.

Quantitative methods in policy diffusion research have become increasing popular as technology has improved, which has added another layer to the literature. Since Berry and Berry's (1990) analysis of state lotteries using an Event History Analysis (EHA), this method has been the primary way in which diffusion scholars have measured policy adoption in American politics. The Event History Analysis allows researchers to show which variables cause a state to be "at risk" for adoption, and how the variables interact with each other. Since the first use of quantitative methods in policy diffusion, scholars have examined variables such as availability of resources (Tweedie 1994) and severity of problem (Daley and Garand 2005) to show diffusion of climate change adaptation (Miao 2019) and sex offender laws (Easterly 2015), to name a few. The EHA has encouraged "comparability across studies" (Karch 2007b) and done much for defining characteristics that put a state at risk for adoption. However, this method can leave out the role of policy entrepreneurs and

transnational networks- a piece of the puzzle that is critical in American politics (see Mintrom's work on policy entrepreneurs in school choice (2000), stem cell research (2013), and climate change (Mintrom and Luetjens 2017)).

To account for these other factors, diffusion scholars have looked to other types of models. Regression models have been used to explain adoption of things like sanctuary city policies (Collingwood et al. 2018) and education reform (Finger 2018). Others have incorporated the Geographic Information System (GIS) into their models, allowing for a closer examination of distance between specific populations and its effect on diffusion (Berry and Baybeck 2005, Mitchell 2018). In a slightly simpler form of statistical analysis, Walker's "Innovation Scores" (1969) used averages and a factor analysis to provide strong evidence for the "leader-laggard" model discussed earlier, proving that more complex quantitative methods do not necessarily correlate to deeper knowledge. There has recently been evidence that bordering states with a policy will *decrease* the likelihood that a state will adopt said policy, or a "reverse policy diffusion" effect. Li's (2017) work on performance-based funding for public schools demonstrated that states may be less inclined to adopt this method of funding if they border states that have adopted the method. These adoption delays are due in part to states preferring to see how a policy is playing out in other areas before deciding to adopt. While it is unclear if this is generalizable to other areas of policy diffusion, this is certainly a topic that political scientists should explore further using both qualitative and quantitative methods.

Categorizing Marijuana Policies

Though pro-marijuana policies take many forms and have many different motivations, for the purposes of my analysis, I categorize them as follows: Illegal, Decriminalized, Medical, and Recreational. A state that has decriminalized marijuana has either (a) changed the penalty from criminal to civil or (b) changed the penalty from jail time to a fine. Each state that has passed a decriminalization bill meets these criteria, though possession amount and penalties vary. In my models, this category is a time series analysis of all 50 states starting one year before the first case of decriminalization (Oregon in 1973). Therefore, the time series runs from 1972 to 2020, and each state that decriminalizes marijuana drops out of the model at the year of adoption.

A state in the medical category has passed into law a medical marijuana program of any size or type. These states may or may not have licensed dispensaries, and they may allow marijuana to be prescribed for as few or as many diseases as they see fit. If there is a medical marijuana program at all, regardless of size, the state is included in this category. For my purposes, this category is a time series analysis of all 50 states from 1995 (one year before California first adopts medical marijuana) to 2020, with a state dropping out of the model on the year it legalizes a medical program.

Finally, the recreational category contains all states that have passed recreational marijuana into law. This category is the easiest to identify; if the state allows dispensaries to sell marijuana or allows marijuana to be legally grown by ordinary citizens, it is in the recreational category. The recreational category is a time series analysis of all 50 states starting in 2011, or one year before the first adoption (Colorado and Washington in 2012) and going through 2020.

These categories will help in determining which independent variables affect each type of marijuana policy. It is also important to note that states do not necessarily have to belong to only one category. States may have one or two policies, but not all three, such as West Virginia which has a medical program but has not decriminalized marijuana for ordinary citizens. Data regarding the year of adoption for each category were obtained from ballotpedia.org, a nonpartisan online encyclopedia of legislation and election results. Other scholars have used ballotpedia.org in their scholarship (Downie 2016, Wardle 2012), suggesting that it is a reliable source of information. Now that each policy category is made clear, I can turn to my research design.

Research Design

In this analysis, I look at factors affecting the legalization and decriminalization of marijuana in the American states. The study of marijuana is still in nascent stages due to the relatively recent implementation of medical and recreational legalization. Political scientists have only recently begun the long journey of applying methods used in other policy diffusion studies to the diffusion and adoption of marijuana policy, and I hope to add to their work with my broad analysis of three primary marijuana policies.

My research design examines adoption of marijuana policy using quantitative methods. While a qualitative analysis is beneficial to individual cases of marijuana policy adoption, in this study, I frame the issue at a macro level, meaning that I try to capture the factors contributing to adoption of marijuana policy in the aggregate. The best way to capture this is by using a quantitative analysis; this captures larger systemic factors as opposed to individual outcomes (Kuehn and Rohlfing 2016). As noted in the literature review, Berry and Berry (1990; 1992) are pioneers of the EHA, and many have adopted this as the preferred method for studying policy diffusion of everything from living will laws (Glick and Hays 1991) to school choice policies (Mintrom 1997). Given the successful use of this model by other diffusion scholars and the similarity between marijuana adoption and other policy adoptions studied, the EHA is appropriate for studying marijuana policy diffusion and should yield useful results.

Before the EHA became widely available to diffusion scholars, most of the literature consisted of various types of cross-sectional analyses that used state and local characteristics as the *independent variables,* while the *dependent variable* was either the year a policy was adopted (Gray 1973, Walker 1969) or whether a policy had been adopted by a certain point

in time (Regens 1980). These studies are useful, but they generally do not explain causes of diffusion when adoption is years, or even decades apart (Berry and Berry 1990). It is also not possible to determine the effect of "time sensitive" variables, such as the likelihood of adoption in an election year, or just after an election. The EHA allows us to see the likelihood that a state will be at risk for adoption by isolating different characteristics.

Another benefit of the EHA is that it can combine an analysis of internal determinant variables (such as ideological makeup and fiscal health of the state) with regional variables such as the presence of the policy in neighboring states. Using internal characteristics and presence of policy in neighboring states as the *independent variable*, and the likelihood of adoption as the *dependent variable* allows me to combine regional diffusion analysis and internal characteristic analysis into one model. This is precisely the purpose of EHA, and it is no surprise that it is the preferred method of analysis for diffusion scholars today.

This EHA model will use the likelihood that a state will adopt a policy as the dependent variable, and the internal determinants of the state (discussed below) along with neighboring state influence as the independent variables. In this way, I can isolate each internal characteristic of a state and its relationship to the three marijuana policy categories. Below I present six hypotheses to test in my analysis, and the methods used to quantify my independent variables.

Hypotheses

When studying marijuana policy, there is much to be gleaned from the broader diffusion literature regarding economic factors that affect policy adoptions. One of those factors is tax revenue, which Stanley (2019) has shown to be a determinant when deciding to adopt marijuana policy. Therefore, Berry and Berry's (1992) economic independent variables

used in their study of sales and income tax adoption are also useful in studying other revenue generating policies, such as marijuana legalization. States that have struggling economies turn to policies more popular than a simple increase in income or sales taxes, therefore:

HYPOTHESIS 1: Lower GSP per capita will increase the risk of adopting medical or recreational marijuana policies.

HYPOTHESIS 2: Lower personal income per capita will increase the risk of adopting medical or recreational marijuana policies.

Ideological and partisan differences will naturally come into play when examining an issue as contentious as marijuana. It has long been assumed that more heavily Democratic states will be more prone to pro marijuana policy adoption, though there is limited research when it comes to this assertion. Most of the association between Democrats and marijuana policy has come from pop-culture references and the fact that a very liberal state was the first to adopt medical marijuana policy and open dispensaries to the public (California). As it relates to ideology, I have two hypotheses to test in my analysis:

HYPOTHESIS 3: The more liberal a state's citizenry is, the more likely it is to adopt pro-marijuana policy.

HYPOTHESIS 4: The more liberal a state's government is, the more likely it is to adopt pro-marijuana policy.

Since the ideological position of a state and partisan position of a state may not always coincide (think of the southern party realignment), I have also included a measure of state government partisan control and a corresponding hypothesis.

HYPOTHESIS 5: An increase in Democratic control of a state government will increase the risk of pro-marijuana policy adoption.

When looking at a map of marijuana laws in the United States, one could observe a stronger "neighbor effect" in recreational adoption than in medical or decriminalization. All west coast states and Nevada have recreational legalization, Colorado, Michigan, and Illinois are standalones, and there is a cluster of states in the northeast. It is certainly possible that the likelihood of recreational or medical adoption will increase if one or more states surrounding it also have recreational or medical marijuana.

HYPOTHESIS 6: States with a greater number of bordering states with pro-marijuana policies will have a higher risk of adoption than states with fewer bordering states with pro-marijuana policies.

The use of these economic, regional, and ideological variables provide a comprehensive overview of what drives a state to "innovate," or adopt marijuana policy, as well as potential obstacles to legalization. Successful testing of these hypotheses could be used to potentially predict where and how future policy adoptions will occur; information that will be useful to lawmakers and advocates alike.

Independent Variables

To capture the relationship between a state's fiscal health and its likelihood to adopt, I have developed two economic variables for this analysis: (1) Gross state product per capita ($gsppercapita_{t-1}$) and (2) Average personal income per capita ($personalincomepercapita_{t-1}$) which will be used to test *Hypotheses 1 and 2*, respectively. The GSP per capita variable is calculated by taking the overall gross state product for each state in a given year, and dividing it by the mid-year population count, as reported by the census. Similarly, the personal income per capita variable is calculated by taking the average personal income for

each state in a given year and dividing it by the mid-year population. GSP and personal income data are obtained from the Bureau of Economic Analysis.

As for the relationship between pro-marijuana policy adoption and ideology, I have included two variables in my analysis: a citizen ideology variable (*citizenideologyscores*$_{s,t}$) and a government ideology variable (*governmentideologyscores*$_{s,t}$) which will be used to test *Hypotheses 3 and 4*, respectively. The citizen ideology score is designed to indirectly capture public opinion while the government ideology score is designed to capture the political climate of a state's government. For these two variables, I use a score developed by Berry et al. (1998) for each state and each year in the dataset. The full list of inputs can be found in the Berry et al. (1998) article, but they include things like interest group ratings of Congressional members and election returns. The various factors are combined into a singular score with lower scores indicating a more conservative citizenry or government, and higher scores indicating more liberal. These scores used as independent variables in this analysis will hopefully return a definitive answer as to whether the ideological position of a state influences the likelihood of marijuana policy adoption.[2]

To measure state party control, I use a Ranney Partisan Control Index (*ranneyindex*$_{s,t}$) which is used to test *Hypothesis 5*. Like the ideology scores mentioned above, the Ranney Index consists of many factors including which party controls state offices and the legislature, and by what margin. This index ranges from 0 to 1, where total Republican control is coded as 0, and total Democrat control is coded as 1 (Klarner 2013). This index further sheds light on the association between party, ideology, and likelihood of marijuana policy adoption.[3]

[2] These data are available at https://rcfording.com/state-ideology-data/
[3] These data are available at https://www.klarnerpolitics.org/datasets-1

Finally, I account for the "neighbor effect" with the variable (*neighbors*$_{it}$) which is used to test *Hypothesis 6*. This variable is simply the number of states that surround a given state at each point in time. For instance, Idaho had two neighboring states with decriminalization in 2001, so it was coded 2 for this variable until 2012, when it had three neighboring states with decriminalization. From 2012 forward, the neighboring state variable is coded 3. Summary statistics for all variables can be found in the appendix.

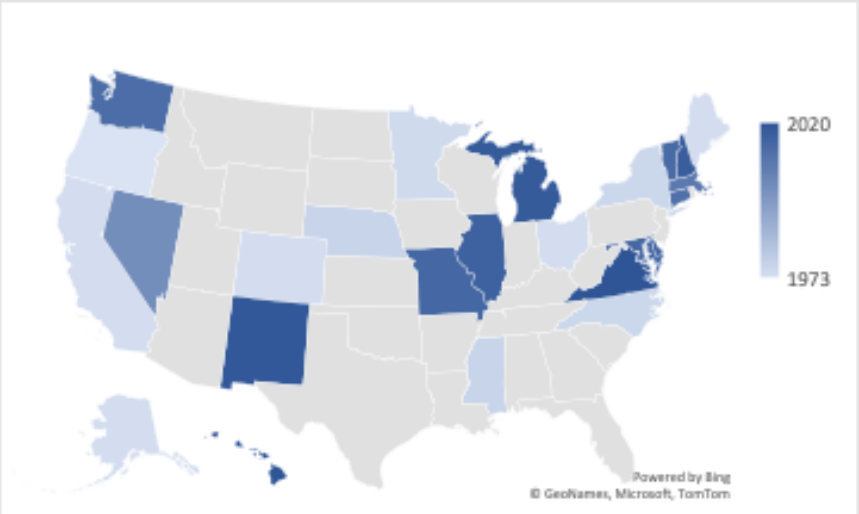
Data Overview

As previously mentioned, states are classified in the following categories: Illegal, decriminalized, legal for medical use, or legal for recreational use. In a state where cannabis is totally illegal, those found to be in possession will be arrested and taken to a holding facility for a period of time. Currently there are eight states that fall into this category, but it is important to note that a state can have a medical marijuana program in place while still jailing those in possession without a medical license (Arizona, Utah, and Montana are examples of this and do not fall into the illegal category). Additionally, these "illegal" states will vary in their aggressiveness in enforcing the laws on marijuana; states are put into these categories based on their statutes and not on the degree of enforcement. States in the "illegal" category will not be included in my analysis, as the absence of a policy cannot be studied in this context. Table 1 summarizes the status of each state's marijuana policies.

The decriminalized category encompasses 25 states, some of which may come as a surprise. A few of the most traditionally conservative states were pioneers in decriminalizing marijuana in the mid-1970s. Mississippi, North Carolina, Alaska, and Nebraska all led the effort to decriminalize, while more traditionally, pro-cannabis states like Washington and Nevada did not manage to pass decriminalization until the 2000s. A report from the 1972 Schafer Commission describing the relatively benign nature of cannabis is likely the reason behind the wave of decriminalization in the 1970s (Schafer Library of Drug Policy 1972). This report found that the federal government had overplayed the harmful effects of cannabis and the "tough-on-crime" approach taken by the federal government had been costly and ineffective. Figure 2 shows that a handful of states used this report to justify

decriminalization in the 1970s, though the anti-drug countermovement that followed ensured decriminalization would be halted until the early 2000s.

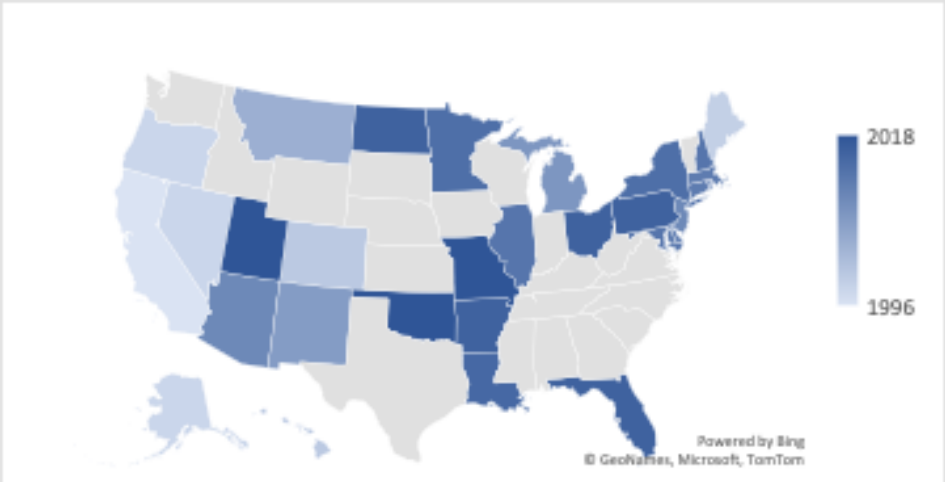
Figure 2 - Marijuana Decriminalization in the US



Data from ballotpedia.org

The medical category is the largest category in the dataset with 34 states in the union operating some sort of medical marijuana market (shown in Figure 3). The eight states with medical programs and no decriminalization emphasize the somewhat odd and contradictory way that states have approached cannabis. There is by no means a linear movement from complete illegality to full recreational legalization, meaning that states may not adopt pro-marijuana policy in order of their liberalizing nature (decriminalization to medical use to recreational use). States can move between these categories in what can be a somewhat random fashion, and my analysis seeks to uncover what factors contribute to that.

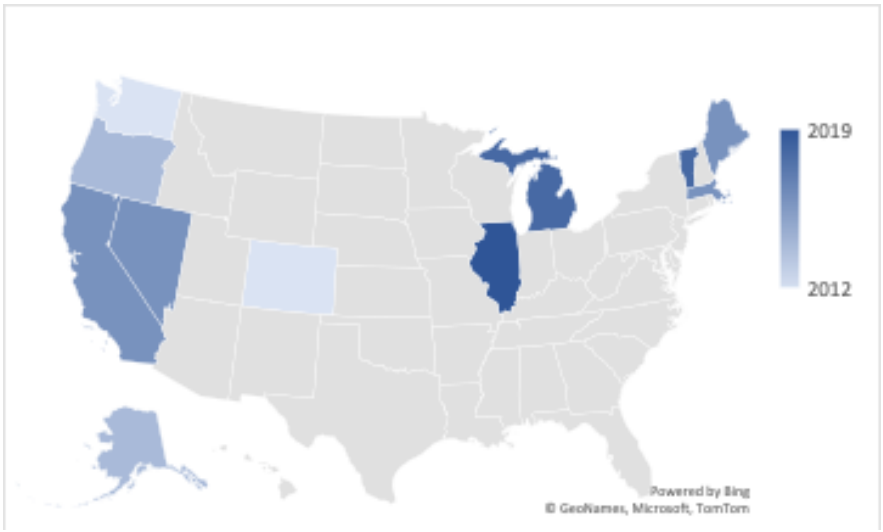
Figure 3 - Medical Marijuana in the US



Data from ballotpedia.org

Finally, Figure 4 shows that the recreational category is the smallest with 11 states boasting a fully legal marijuana market for anyone over 21. As in all the categories, these states differ on many facets of the policy such as the maximum amount one can purchase and possess, what is considered an open-container, and how purchases are made. In my analysis, I am only interested in whether the law has been enacted or not in each state, rather than variation within each of these categories.

Figure 4 - Recreational Marijuana in the US



Data from ballotpedia.org

Table 1 - Marijuana Policies by State

ILLEGAL	DECRIMINALIZED	MEDICAL	RECREATIONAL
ALABAMA	ALASKA	ALASKA	ALASKA
IDAHO	CALIFORNIA	ARIZONA	CALIFORNIA
KANSAS	COLORADO	ARKANSAS	COLORADO
SOUTH CAROLINA	CONNECTICUT	CALIFORNIA	ILLINOIS
SOUTH DAKOTA	DELAWARE	COLORADO	MAINE
TENNESSEE	HAWAII	CONNECTICUT	MASSACHUSETTS
WISCONSIN	ILLINOIS	DELAWARE	MICHIGAN
WYOMING	MAINE	FLORIDA	NEVADA
	MARYLAND	HAWAII	OREGON
	MASSACHUSETTS	ILLINOIS	VERMONT
	MICHIGAN	LOUISIANA	WASHINGTON
	MINNESOTA	MAINE	
	MISSISSIPPI	MARYLAND	
	MISSOURI	MASSACHUSETTS	
	NEBRASKA	MICHIGAN	
	NEVADA	MINNESOTA	
	NEW HAMPSHIRE	MISSOURI	
	NEW MEXICO	MONTANA	
	NEW YORK	NEVADA	
	NORTH CAROLINA	NEW HAMPSHIRE	
	OHIO	NEW JERSEY	
	OREGON	NEW MEXICO	
	VERMONT	NEW YORK	
	VIRGINIA	NORTH DAKOTA	
	WASHINGTON	OHIO	
		OKLAHOMA	
		OREGON	
		PENNSYLVANIA	
		RHODE ISLAND	
		UTAH	
		VERMONT	
		WASHINGTON	
		WEST VIRGINIA	
		Compiled by author- Data from NORML.org	

One thing to note from the information above that I have not included in my analysis is the priming effect observed from a medical program to recreational legalization. In every case of recreational legalization, the state already had a medical marijuana program in place. Put another way, no state has jumped from decriminalization to recreational, or from illegal to recreational. Though I have only 11 states to observe, it seems that states must be introduced to marijuana through a medical program before moving to full recreational legalization. Perhaps distribution mechanisms must already be in place from a medical market (grow houses, dispensaries, transportation companies) before the shock of recreational legalization can be absorbed by a state. With this information in mind, I can now begin some statistical analysis, and I will start with a comparison of means test.

Comparing Adopters and Non-Adopters

In the tables below, I compare independent variable means in adopting states with non-adopting states across the three marijuana policy categories.[4] The rows of each table list independent variables used in the analysis. Columns one and two separate adopters and non-adopters, while columns three and four report the t-score and p-value for each test.[5] Column one displays the mean of each independent variable for states that *have* adopted the marijuana policy and column two displays the mean of each independent variable for states that *have not* adopted the marijuana policy. All tables have the same difference of means test, but a different policy category is examined in each. For example, Table 2 compares means of the 34 states at their year of medical adoption ("Adopters" column) with all years from non-adopters. There are 34 data points from which to calculate the mean of adopters (one data point at the year of adoption for each state with a medical program), while there are 910 data points from which to calculate the mean of non-adopters (all data points that don't coincide with an adoption year). An adopting state is considered a non-adopter until the year of adoption. The format is identical for Tables 3 and 4.

Table 2 provides the results of a means comparison between adopters and non-adopters of medical marijuana. The financial variables provide evidence rejecting *Hypotheses 1 and 2*, as adopters have a higher average GSP and personal income per capita than non-adopters with significant p-values. Though the difference is small in the GSP per capita variable, personal income per capita shows an almost $7,000 difference between adopters and non-adopters (*p-value= 0.001*). Moving to the ideology variables, the results

[4] Note: All results have been rounded to the hundredth decimal place, except GSP and personal income per capita, which have been left in-tact to show the relationship between those variables and the likelihood of adoption.
[5] All p-values are from two-tailed tests.

show higher scores among adopters in both the citizen and government ideology variables (though only citizen ideology reaches significance at *p-value= 0.03*). Since higher scores connotate a higher level of liberalness, this confirms that more liberal states are more likely to adopt pro-marijuana policy, and thus confirming *Hypothesis 3*. The Ranney Index variable similarly shows that adopters have a higher (more Democratic) mean than non-adopters, but it is not statistically significant (*p-value= 0.21*). As expected, the neighbors variable reports that adopters on average have a higher number of states surrounding them with a medical marijuana program compared to non-adopters (1.47 states compared to 0.67 states, *p-value= 0.001*).

Table 2 - Mean Comparison of Adopters vs. Non-Adopters- Medical

	Adopters	Non-Adopters	t-value	p-value
GSP per capita	48964.24	46185.46	-1.74	*0.08
Personal income per capita	41282.15	34618.79	-4.02	**0.001
Citizen ideology	52.29	46.7	-2.2	*0.03
Government ideology	46.11	42.15	-1.49	0.14
Ranney index	0.49	0.45	-1.24	0.21
Neighbors	1.47	0.67	-4.16	**0.001
			*p-value< 0.1	
			**p-value< 0.01	

Table 3 reports the results of a means comparison between adopters and non-adopters in the recreational category. The differences are similar to the results reported in Table 2, but the means for adopters and non-adopters are higher, perhaps due to the more constrained time series used in the recreational category (first states adopt in 2012). Financial variables yield results that once again reject *Hypotheses 1 and 2*, as adopters appear to have higher average GSP and personal income per capita compared to non-adopters. However,

significance is only reached in the personal income variable (*p-value= 0.09*), leading me to only reject *Hypothesis 2* in this comparison. Mean differences among the two ideology variables in this test show a large 11-point gap between adopters and non-adopters, and with a significant p-value on each (*p-value= 0.01*), I can confidently assert that these comparison results are not by chance. *Hypotheses 3 and 4* are confirmed in the recreational category. Unlike in the medical category, the Ranney Index variable reaches significance (*p-value= 0.06*) and shows a difference of 0.10 between adopters and non-adopters. This suggests that heavily Democratic states are more likely to adopt pro-marijuana policy than split or heavily Republican states, thus confirming *Hypothesis 5.* The small difference of mean between adopters and non-adopters and its high p-value lead to no confident conclusions regarding *Hypothesis 6.*

Table 3 - Mean Comparison of Adopters vs. Non-Adopters- Recreational

	Adopters	Non-Adopters	t-value	p-value
GSP per capita	55180.91	50776.43	-1.5	0.13
Personal income per capita	51465.55	47263.21	-1.66	*0.09
Citizen ideology	61.38	49.08	-2.54	*0.01
Government ideology	51.78	38.96	-2.46	*0.01
Ranney index	0.54	0.44	-1.88	*0.06
Neighbors	0.55	0.37	-0.85	0.4
			*p-value< 0.1	

Finally, Table 4 displays results from the decriminalized category. The financial variables are excluded from this test because inflation adjusted data are not available from the Bureau of Economic Analysis for the entire period that marijuana has been decriminalized (starting in 1973). Results here are on par with results from the other two

categories, with higher citizen and government ideology scores among adopters compared to non-adopters. The differences are less stark than in the recreational category, but are sizable, nonetheless. More liberal states seem to be much more likely to adopt decriminalization, confirming *Hypotheses 3 and 4.* The Ranney Index variable again reaches significance (*p-value= 0.08*) and shows adopting states to be, on average, about 0.06 more Democratic than non-adopters, confirming *Hypothesis 5*. Oddly enough, the neighbors variable reports different results in the decriminalization category, showing that non-adopters have more surrounding states with decriminalization than adopters. However, with a high *p-value* of 0.29, it is difficult to make any assumptions on this, leaving *Hypothesis 6* unanswered in this test.

Table 4 - Means Comparison of Adopters vs. Non-Adopters - Decriminalized

	Adopters	Non-Adopters	t-value	p-value
Citizen ideology	55.13	47.46	-2.37	*0.02
Government ideology	56.11	48.35	-2.66	**0.008
Ranney index	0.6	0.54	-1.75	*0.08
Neighbors	0.84	1.02	1.06	0.29
			*p-value< 0.1	
			**p-value< 0.01	

No doubt that difference of means tests are a surface level statistical tool, but these results provide some useful preliminary information on the likelihood of marijuana policy adoption. It appears from these tests that a state's fiscal situation affects marijuana policy adoption in a different way than I had originally hypothesized, though it is consistent with other studies that find wealthier states more likely to adopt policies (Walker 1969). My basis for formulating *Hypotheses 1 and 2* rests on the assumption that states would look to adopting marijuana policy to stimulate a lagging economy, but these mean comparisons

indicate that states that have adopted pro-marijuana policies are financially better off than states without adoption. My hypotheses (*Hypotheses 3 and 4*) on ideological and partisan characteristics of adopting states were confirmed in each of these mean comparisons, suggesting that more liberal and more Democratic states are likely to adopt pro-marijuana policy. The differences are largest in the recreational category, which could indicate that only the most Democratic and liberal states make the jump to full-on recreational legalization. The neighbors variable did not provide much meaningful information in these tests, only reaching significance in one category. To be thorough in my analysis, more complex statistical analysis is needed to test my hypotheses, and for this I turn to an Event History Analysis.

Causes of Adoption

With my data organized as an Event History Analysis, I can apply a variety of techniques to test the effect of my independent variables on the three marijuana policy categories. The estimation technique I use here is a Cox Proportional Hazards Model (Cox 1972), which seems to best fit the type of data and length of time that I seek to analyze. This technique attempts to explain how the risk of adoption (the dependent variable) changes with a one unit increase in each independent variable. The hazard ratio displayed in the first column is how the Cox model reports the relationship between an independent variable and risk of adoption, with values above one demonstrating an increase in likelihood of adoption and values below one demonstrating a decrease in likelihood of adoption. Since each variable is measured differently, the hazard ratios for each variable will need to be interpreted differently. For the financial variables (GSP and personal income), the unit of measurement is in dollars; therefore, a hazard ratio above one would indicate how much the risk of adoption increases with each dollar. The two ideology variables are measured by a scoring system, so the hazard ratio will reflect adoption likelihood in relation to a one-point increase in a state's ideology score. The Ranney Index variable is measured from 0 to 1, making the unit of analysis a tenth of a decimal place (meaning that the hazard ratio indicates the likelihood of adoption with each 0.1 increase in the Ranney Index). The neighbors variable will reflect adoption likelihood in relation to an increase in one neighboring state adopter.

Table 5 shows the first Cox model for states with medical marijuana. The neighbors variable clearly affects risk of adoption more than all other variables in the model. With a hazard ratio of 1.51 (*p-value=0.02)*, having neighboring states with medical marijuana substantially increases the likelihood of a state adopting medical marijuana. An increase in

just one state adopting a medical program leads to a 50% increase in likelihood of adoption for surrounding states.

Financial variables appear to work in opposite directions, with GSP per capita displaying a value slightly above one and personal income per capita slightly below one. Though the difference is small, both variables reach statistical significance, indicating that an increase in a state's GSP per capita increases the risk of adoption, while an increase in a state's personal income per capita will decrease the risk of adoption.

Both ideology variables also seem to affect risk of adoption, and since the unit of measurement has a smaller scale in this variable (0-100), the hazard ratios are larger and a bit more meaningful. A more liberal government increases risk of medical marijuana adoption (by about 6% for each one-unit score increase, *p-value=0.005*), slightly more than a more liberal citizenry (4% for each one-unit score increase, *p-value=0.02*).

These findings demonstrate enough information to address my hypotheses for the medical category. *Hypothesis 1* predicts that lower GSP per capita would increase the likelihood of adoption because states will need new sources of revenue. Since this relationship does not hold true, *Hypothesis 1* has been rejected. However, *Hypothesis 2,* predicting that states with lower personal income per capita will adopt marijuana policy is supported for medical adoption.

Hypotheses 3 and 4, predicting that states with a more liberal citizenry and government are more likely to adopt, is also supported by the model. The Ranney Party Control variable does not reach statistical significance in this category, therefore I cannot confidently reach any conclusions regarding *Hypothesis 5.* Finally, the Neighbors variable has the largest hazard ratio in this category, indicating that the number of neighboring states

with medical marijuana increases the likelihood of medical adoption and confirming *Hypothesis 6.*

Table 5-Adoption of Medical Marijuana Policies in the States

	Hazard Ratio	Standard Error	z-value	p-value
GSP Per Capita	1.000078	0.0000311	2.52	*0.01
Personal Income Per Capita	0.9997985	0.0000499	-4.04	**0.001
Citizen Ideology	1.05	0.02	2.27	*0.02
Government Ideology	1.06	0.02	2.8	**0.005
Ranney Party Control	1.15	2.62	0.06	0.95
Neighbors	1.51	0.26	2.34	*0.02
	Log Likelihood= -156.46		LR chi^2= 53.12	
			chi^2 p-value <.0000	
			* *p-value< 0.1*	
			** *p-value< 0.01*	
			Cox Proportional Hazards Model	

As noted, only 11 states have adopted recreational marijuana policies as of 2020. While there are a relatively low number of states in the recreational category, three of the independent variables reach statistical significance (Table 6). One thing that stands out in this category is the divergence between the financial variables. GSP per capita displays a hazard ratio slightly above one (hazard ratio= 1.000083, *p-value= 0.01*) indicating that it increases the risk of adoption, and personal income per capita displays a hazard ratio slightly below one (hazard ratio= 0.9998451, *p-value= 0.03*), suggesting it decreases the risk of adoption.

The ideology variables indicate that an increase in ideology score (a more liberal score) increases the likelihood of recreational adoption, though statistical significance is only reached in the government ideology variable (hazard ratio= 1.08, *p-value= 0.06*). The

Ranney Index provides a hazard ratio that indicates a decrease in the likelihood of adoption as the index approaches 1 (more Democratic), but its high p-value suggests I cannot be confident in the results (*p-value= 0.26*). Finally, while the neighbors variable appears to be a powerful predictor of adoption in the medical model, it does not reach significance in the recreational model, and cannot be used to draw conclusions about its effect.

In the recreational category, only three of my hypotheses are supported or rejected. *Hypothesis 1* is rejected, as higher GSP per capita increases the likelihood of recreational adoption, while *Hypothesis 2* is supported, as an increase in personal income per capita decreases the risk of recreational adoption. A higher ideology score increases the risk of recreational adoption, but only at the government level. The citizen ideology variable does not reach statistical significance; therefore, *Hypothesis 4* is supported, but there is not enough data to support or reject *Hypothesis 3.* The lack of statistical significance in the Ranney Index and neighbors variable means that I cannot draw any conclusions about *Hypotheses 5* or *6* in this recreational model.

Table 6 - Adoption of Recreational Marijuana Policies in the States

	Hazard Ratio	Standard Error	z-value	p-value
GSP Per Capita	1.000083	0.0000496	1.67	*0.01
Personal Income Per Capita	0.9998451	0.0000698	-2.22	*0.03
Citizen Ideology	1.04	0.04	1.03	0.31
Government Ideology	1.08	0.04	1.87	*0.06
Ranney Party Control	0.03	0.08	-1.13	0.26
Neighbors	1.53	0.71	0.92	0.36
	Log Likelihood= -51.69765		LR chi^2= 13.57	
			chi^2 p-value< 0.01	
			** p-value< 0.1*	
			Cox Proportional Hazards Model	

Table 7 displays the last full model in my analysis for the decriminalization category. Due to a lack of inflation adjusted data from the BEA for the length of time needed in the decriminalization model, I have not included the financial variables here. Among the two ideology variables, an interesting development occurs in my decriminalization model. Government ideology achieves statistical significance, and its high hazard ratio indicates that a more liberal government will greatly increase the risk of adoption, more so than in the medical or recreational categories (hazard ratio=1.10, *p-value= 0.001*). Citizen ideology does not reach significance in this model.

The party control variable again shows that greater Democratic control lowers the likelihood of decriminalization, but the p-value is too high to confidently assert that conclusion (hazard ratio= 0.08, *p-value= 0.2*). Interestingly enough, the decriminalization model shows the Neighbors variable flipping and returning a hazard ratio significantly below one (hazard ratio= 0.60, *p-value= 0.05*). This result implies that an increase in surrounding

states with decriminalization actually *decreases* the risk of neighboring states doing the same, potentially confirming the reverse diffusion effect found by Li (2017).

Hypotheses 1 and 2 are neither confirmed nor rejected in the decriminalization category, as the financial data are not available. The reversal of the citizen ideology hazard ratio could imply rejecting *Hypothesis 3* for the decriminalization category, but the lack of statistical significance prevents me from confirming or rejecting this hypothesis. I can, however, confirm *Hypothesis 4,* as the high hazard ratio and low p-value clearly demonstrates that a more liberal state will be at higher risk of decriminalization. Once again, the Ranney Index variable does not reach statistical significance, and *Hypothesis* 5 is neither rejected nor confirmed. Finally, *Hypothesis 6* is rejected in the decriminalization model. The result seems to suggest that neighboring states with decriminalization lower the risk of adoption.

Table 7- Decriminalization of Marijuana in the States

	Hazard Ratio	Standard Error	z-value	p-value
Citizen Ideology	0.99	0.02	-0.45	0.65
Government Ideology	1.10	0.03	3.24	**0.001
Ranney Party Control	0.08	0.16	-1.3	0.2
Neighbors	0.60	0.15	-2.00	*0.05
	Log Likelihood= -128.31949		LR chi^2=32.44	
			chi^2 p-value<0.001	
			* *p-value< 0.1*	
			** *p-value< 0.01*	
			Cox Proportional Hazards Model	

One final note on these models should be addressed. None of my models that include all independent variables lead to any meaningful conclusions regarding the relationship between party control and risk of marijuana policy adoption. However, removing the government ideology variable from the model yields a hazard ratio in the right direction and a significant p-value for the medical and decriminalization categories, as shown in Table 8.

An issue of collinearity between government ideology and party control could be the reason behind these changes (Spearman's rho= 0.8, *p-value< 0.0000*). Since the 1970s, the ideology of a state government has generally coincided with the partisan control of the state (Levendusky 2010). Removing the government ideology variable from the two models above eliminates the collinearity between government ideology and party control, thus providing substantive results for the Ranney Index variable in Table 8. The Ranney Index in the medical category reaches a very high 95.77 hazard ratio (*p-value= 0.05*), suggesting that an increase in Democrat control greatly increases the risk of adopting a medical marijuana program.

The decriminalization category has similar results when the government ideology variable is removed. The Ranney Index hazard ratio increases to 9.92 (*p-value= 0.02*), demonstrating that more Democratic control also increases the risk of decriminalizing marijuana. These results lend support for *Hypothesis 5* in the medical and decriminalization models (this effect is not observed when removing government ideology from the recreational data).

Table 8- Revised Estimations of Marijuana Adoption

	Medical	Recreational	Decriminalization
GSP Per Capita	1.000083** (0.00003)	1.000102* (0.00005)	N/A
Personal Income Per Capita	0.999803** (0.00005)	0.9998469* (0.00007)	N/A
Citizen Ideology	1.05* (0.02)	1.06* (0.04)	1.01 (0.02)
Ranney Party Control	95.77** (166.49)	0.69 (1.92)	9.92* (12.88)
Neighbors	1.43* (0.26)	1.30 (0.57)	0.57* (0.14)
	Hazard ratio (standard error)	* *p-value< 0.01*	Cox Proportional Hazards Model excluding government ideology
		** *p-value< 0.001*	

Discussion

There are a few conclusions that warrant discussion across all three categories of marijuana policy. The inverse relationship between GSP per capita and personal income per capita are the same through each model (where available), with higher GSP per capita increasing the likelihood of adoption and higher personal income per capita decreasing the likelihood of adoption. This is likely caused by the different things that each variable captures. Gross state product isolates the health of the overall state economy at each point in time, while personal income isolates an individual's experience in the state's economy. The GSP variable measures value added from industry, investments, and wages combined in each state (Platt and Mead 2017) that may not coincide with, or even run counter to, personal income alone. In other words, a state may have a booming economy with relatively low wages compared to other states at the same time.

My hypotheses on both financial variables were developed with the notion that states in need of revenue will turn to marijuana policy adoption as they did in Berry and Berry's analysis of state lotteries (1990) and sales taxes (1992). However, using the same variables, I have achieved different results. The models above indicate that increasing GSP per capita puts a state at higher risk for adoption and are presumably not looking to marijuana to spur their economy. Instead, states doing well economically are more likely to adopt marijuana policies. Perhaps marijuana legalization is seen as a secondary issue to many states, to be considered only when more crucial factors (like industry success and unemployment) are not significant issues. States could also view marijuana as an issue of individual freedom rather than an issue of generating revenue, making a state's financial situation less relevant when considering adoption. This would differentiate my analysis from others that analyzed similar

policy areas like state lotteries and sales taxes (Berry and Berry 1990, 1992), and explain why *Hypothesis 1* is rejected in all models where it is tested.

The personal income per capita variable seems to capture what I had intended in *Hypothesis 2.* States with lower personal income are more likely to adopt marijuana legalization in both the medical and recreational categories, signaling that it could be individual experience within the economy, rather than the economy itself, that spurs a state to adopt. This conclusion echoes the findings in Berry and Berry's (1990) lottery study and lends credence to the idea that state governments may turn to marijuana if it thinks individual citizens are not doing well financially.

The ideology variables are a bit more straightforward, as all but one model confirms that more liberal states are at higher risk for marijuana policy adoption (my basis for *Hypotheses 3 and 4*). This squares with conventional thinking and previous analysis done by Walker (1969). While Walker probably didn't anticipate marijuana legalization, he correctly shows how states with more resources, more professional legislatures, and higher urban populations are more likely to innovate and adopt new policies. I am confident that including these variables in my models would yield similar hazard ratios to those achieved in the ideology variables above. The states with Walker's characteristics (wealthier, more urban, etc.) are also states with more liberal ideology scores. Therefore, it stands to reason that liberal states are more likely to adopt, and this is confirmed in my analysis.

The effect of the Ranney Index measuring party control was a bit more difficult to uncover. Due to the collinearity of the Ranney Index and the government ideology scores, party control initially seemed to have a reverse and insignificant effect on marijuana adoption. However, once the government ideology variable was removed from the model,

two of the three (medical and decriminalization) categories displayed a hazard ratio indicating that greater Democratic control of a state significantly increases the risk of adoption (Table 8). This makes perfect sense given that Democrat party control and a liberal state government are generally synonymous today. This variable also gets at Walker's (1969) idea of professional, wealthy, and urban states being more likely to adopt newer policies as those types of states tend to be controlled by Democrats rather than Republicans.

The neighbors variable fell mostly in line with *Hypothesis 6,* predicting that a state would be more likely to adopt if surrounding states also adopted. This effect was observed in the medical and recreational models (Tables 2 and 3) but reversed in the decriminalization model, showing that a state's risk of decriminalization decreases with each surrounding state that adopts decriminalization. It is not totally clear why the effect was reversed for this category, but it is not the first time reverse diffusion has been observed. Li's (2017) explanation for reverse policy diffusion in performance-based education funding centers on the idea that states may wait to see how policies work out in surrounding states before adopting themselves. It could be that states skeptical of decriminalization are watching statistics from surrounding states regarding decriminalization, such as property crime, marijuana use among teenagers, or education performance, before they decide to decriminalize themselves. One example that stands out when looking at a map of decriminalization is Idaho, which is surrounded by three decriminalized states, yet has not decriminalized marijuana themselves.

Conclusion

In this analysis, a few key findings have been established: (1) States do not look to medical or recreational marijuana as a way to boost their overall economy (rejection of *Hypothesis 1*); (2) States are more likely to adopt medical or recreational marijuana when average personal income is low (confirmation of *Hypothesis 2*); (3) More liberal and more Democratic states are more likely to adopt any of the three marijuana policies analyzed here (confirmation of *Hypotheses 3, 4, and 5*); And (4) states diffuse medical and recreational marijuana to surrounding states, though I observe a reverse relationship when it comes to decriminalization (partially confirming *Hypothesis 6*).

The models and analysis that I have presented here add to the sparse but growing literature on state marijuana policy that has thus far primarily analyzed implementation and consequences of marijuana policy (Aydelotte et al. 2019, Dragone et al. 2019). The few analyses that have focused on marijuana policy diffusion have focused on the influence of outside actors such as advocacy groups and evangelicals (Hannah and Mallinson 2018). My results coincide with findings in one of the only other time series analyses of state marijuana policy (Bradford and Bradford 2017), though their analysis showed that increasing personal income increased likelihood for adoption, whereas my analysis shows the opposite. This could be due to different methodology or a different time series used. Further study must be done on this issue to determine the best way to capture personal income and its relationship to the overall health of a state's economy.

In many ways, the Cox models presented here confirm what we intuitively knew all along: pro-marijuana policies are generally adopted by states in a more liberal political climate with a higher degree of Democratic control. While it may be nice to anecdotally

speak about marijuana laws in typical liberal strongholds like Washington or California, these anecdotes do not speak to the factual nature of state marijuana laws as they may have 15 years ago. Over half the country has legalized medical marijuana and more states are legalizing with every election cycle. While Democratic and liberal states did lead the charge on marijuana legalization, the pool of states left to legalize today are less liberal and more diverse, so quantitative techniques are necessary to tease out the underlying causes of adoption. Additionally, my analysis confirms what Bradford and Bradford (2017) found regarding the regional diffusion of medical marijuana policy, and I add that this regional diffusion is also observed in the spread of recreational marijuana.

However, my findings on the relationship between financial conditions of a state and its likelihood to adopt pro-marijuana policies are not as intuitive. These internal financial determinants are much more difficult to isolate and observe than others in my analysis. The fact that increasing GSP per capita increases the risk of adoption and increasing personal income per capita decreases the risk of adoption seems to be a bit of a conundrum. I have offered some potential explanations in the discussion section, but in general, it seems that the variables I used in this analysis do not reflect a state's need for revenue as much as I had anticipated (explaining why I reject *Hypothesis 1*). Future analyses on marijuana diffusion should examine other financial variables such as a state's unemployment rate or the level of deficit/surplus in a state's budget.

Going forward, there are four areas of analysis that would improve on my findings here. First, I believe isolating each category of states and focusing on one will be more beneficial than analyzing all three categories as I have here. My findings have uncovered some basic, yet important findings regarding marijuana policy diffusion. The baseline that I

have established can be built on for each category. For instance, another author could isolate the decriminalization category, and add many variables not included here such as public opinion and influence of policy entrepreneurs. Marijuana policy is heavily influenced by the presence of outside actors, and capturing the effect that these actors have on marijuana policy will be crucial to understanding diffusion more broadly. At the outset of this project, I attempted to account for this, but obtaining useful time series data proved to be difficult. Translating public opinion into a quantifiable variable for this type of analysis requires disaggregating national level data on marijuana opinion from the ANES or some other consistent survey source. Likewise, coming up with a consistent measurement of outside actor influence on public opinion was a challenge. In my models, I use citizen ideology scores developed by Berry et al. (1998) to capture public opinion. While this is an acceptable substitute, using state level public opinion data and an accurate measure of outside influence will be most beneficial for future marijuana diffusion analyses.

An area that I have also not addressed here is the influence of direct democracy on marijuana adoption. Except for Vermont and Illinois, all recreational marijuana adoptions have been accomplished via ballot initiative (ballotpedia.org), and findings are similar in the medical category. Political science scholarship has noted that the use of the ballot initiative increases with party competition, and the focus is primarily on wedge issues that either build support for your own base or force the other side to take an uncomfortable position (Leemann 2015). Many historically controversial issues like marijuana legalization, same-sex marriage, and the death penalty have been decided by some form of direct democracy, and the effect that the ballot initiative has had on diffusion of these policies cannot be understated.

Practically speaking, future scholars could easily incorporate the effect of direct democracy into this analysis by creating a series of dummy variables for each form of direct democracy. For instance, Nevada legalizes recreational marijuana in 2016 via ballot initiative and receives a 1 for the initiative dummy variable, and a 0 for referendum and legislation variables. Further digging could be done by examining *types* of ballot initiatives used in legalizing marijuana. Constitutional amendment initiatives have found success with keeping the status quo rather than changing a law (Haider-Markel 2001), and legislative referral initiatives or indirect initiatives may not necessarily reflect the true will of those who voted on them, which appears to be the case in the very complicated history of marijuana in Alaska.

One other area of study not present in this analysis is the scope of marijuana policy. I mentioned earlier that there are many ways states have decriminalized marijuana, with some decriminalizing possession of less than a few grams, and others decriminalizing possession up to a pound. Isolating one category of marijuana policy could allow for the study of the depth of decriminalization, or the depth of a state's medical or recreational programs. Kim, Hwang, and Berry's (2018) creation of an index of medical marijuana depth is a great addition to this line of study, and a similar index could be developed for decriminalization and recreational categories as well.

Finally, the relationship between marijuana policy and criminal justice should be further explored in the marijuana diffusion literature. I have taken a more financial and ideological research path in this thesis, but the glaring disparity in how marijuana law has been enforced cannot be ignored. Since 2010, African Americans have been around 3.5 times more likely to be arrested for possession of marijuana compared to while folks, showing a significant difference in how police patrol for marijuana possession and how state judicial

systems handle marijuana related charges (ACLU 2020). I mentioned earlier that a brief, but rapid diffusion of decriminalization policy occurred in the 1970s, and one of my theories behind this stems from the Schafer report essentially proving that the federal government had overblown the dangers of marijuana. Since a series of mandatory minimum sentence laws for drugs had recently been implemented around the time the Schafer report was released, it is possible that states decriminalizing marijuana in the 1970s did so in response to the racially biased policies set by mandatory minimum sentencing. Extending that logic further, states could be looking at the unequal enforcement of marijuana law in their state as a reason for altering the policy entirely, whether that means creating a medical marijuana program or full recreational legalization. Future scholars of marijuana diffusion will need to incorporate this aspect of criminal justice to paint the full diffusion picture.

More broadly, this type of diffusion analysis may soon be needed to study other types of drugs. In November of 2020, Oregon became the first state to decriminalize all narcotics and legalize psilocybin therapy, a psychedelic used to treat depression (Oregon Measure 110, 2020). Other states have indicated their interest in adopting similar measures, necessitating the study of drug law diffusion overall, rather than just marijuana. Scholars may soon find that marijuana policies diffuse differently than psilocybin policies, which diffuse differently than heroin policies, and so on. As more drug laws are liberalized, there will be no shortage of diffusion studies for political scientists. I believe that drug policy diffusion will garner an increasingly large portion of policy journals throughout the academic world, and my analysis here contributes to what is sure to be a growing field of study.

References

American Civil Liberties Union. 2020. *A Tale of Two Countries* 2nd ed.

Aydelotte, Jayson D., Carlos V.R. Brown, Lawrence H. Brown, Alexandra L. Mardock, Christine A. Mancheski, Shariq M. Quamar, and Pedro G. Teixeira. 2019. "Fatal Crashes in the 5 Years after Recreational Marijuana Legalization in Colorado and Washington." *Accident Analysis and Prevention* 132:105-284.

Balla, Steven J., and Christopher J. Deering. 2015. "Salience, Complexity and State Resistance to Federal Mandates." *Journal of Public Policy* 35: 459–76.

Belend, Daniel, Anahely Medrano, and Philip Rocco. 2018. "Federalism and the Politics of Bottom-Up Social Policy Diffusion in the United States, Mexico, and Canada." *Political Science Quarterly* 133:527-560.

Berry, William D., and Brady Baybeck. 2005. "Using Geographic Information Systems to Study Interstate Competition." *American Political Science Review* 99: 505–19.

Berry, Frances Stokes, and William D. Berry. 1990. "State Lottery Adoptions as Policy Innovations: An Event History Analysis." *American Political Science Review* 84:395-416.

---. 1992. "Tax Innovation in the States: Capitalizing on Political Opportunity." *American Journal of Political Science* 36:715-742.

---. 2018. "Innovation and Diffusion Models in Policy Research", In *Theories of the Policy Process.* Ed. Paul Sabatier and Christopher Weible. Boulder, CO: Westview Press.

Berry, William D., Richard C. Fording, Russell L. Hanson, and Evan J. Ringquist. 1998. "Measuring Citizen and Government Ideology in the American States, 1960-93." *American Journal of Political Science* 42:327-348.

Berry, William D., Richard C. Fording, Russell L. Hanson, Carl Klarner, and Evan J. Ringquist. 2010. "Measuring Citizen and Government Ideology in the American States: A Re-appraisal." *State Politics and Policy Quarterly* 10:117-35.

Bradford, Ashley C., and David W. Bradford. 2017. "Factors Driving the Diffusion of Medical Marijuana Legalisation in the United States." *Drugs: Education, Prevention, and Policy* 24:75-84.

California General Assembly, *The Compassionate Use Act of 1996.* Proposition 215 and Senate Bill 420.

Collingwood, Loren, Stephen Omar El-Khatib, and Benjamin Gonzalez O'Brien. 2018. "Sustained Organizational Influence: American Legislative Exchange Council and the Diffusion of Anti- Sanctuary Policy." *Policy Studies Journal* 47:735-773.

Comer, John C. 1980. "The Nebraska Nonpartisan Legislature: An Evaluation." *State and Local Government Review* 12:98-102.

Cox, D. R. 1972. "Regression Models and Life Tables." *Journal of the Royal Statistical Society. Series B (Methodological)* 34:187-220.

Cyert, Richard, and James March. 1963. *Behavioral Theory of the Firm* 1st ed. New Jersey, USA: Prentice Hall Inc.

Daley, Dorothy M., and James C. Garand. 2005. "Horizontal Diffusion, Vertical Diffusion, and Internal Pressure in State Environmental Policymaking, 1989-1998." *American Politics Research* 33:615-44.

De Tarde, Gabriel. 1903. *The Laws of Imitation.* The Mershon Company Press: Rahway, New Jersey.

Downie, Jocelyn. 2016. "Permitting Voluntary Euthanasia and Assisted Suicide: Law Reform Pathways for Common Law Jurisdictions." *QUT Law Review* 16:84-112.

Dragone, Davide, Giovanni Prarolo, Paolo Vanin. and Giulio Zanella. 2019. "Crime and the Legalization of Recreational Marijuana." *Journal of Economic Behavior and Organization* 159:488-501.

Easterly, Bianca. 2015. "Playing Politics with Sex Offender Laws: An Event History Analysis of the Initial Community Notification Laws Across American States." *Policy Studies Journal* 43: 355-378.

Fisk, Jonathan M., Elvis Davis, and Joseph A. Vonasek. 2018. "Pot"reneurial Politics: The Budgetary Highs and Lows of Recreational Marijuana Policy Innovation." *Politics and Policy* 46:189-208.

Gandara, Denisa, Erik C. Ness, and Jennifer A. Rippner. 2017. "Exploring the 'How' in Policy Diffusion: National Intermediary Organizations' Roles in Facilitating the Spread of Performance-Based Funding Policies in the States." *The Journal of Higher Education* 88:701-725.

George, Alexander L., and Andrew Bennett. 2005. *Case Studies and Theory Development in the Social Sciences*. Cambridge, MA: MIT Press.

Glick, Henry R., and Scott P. Hays. 1991. "Innovation and Reinvention in State Policymaking: Theory and the Evolution of Living Will Laws." *Journal of Politics* 53:835-850.

Gonzales v. Raich. 2005. 545 U.S. 1.

Gray, Virginia. 1973. “Innovation in the States: A Diffusion Study.” *American Political Science Review* 67:1174-1185.

Grupp, Fred W., and Allen R. Richards. 1975. “Variations in Elite Perceptions of American States as Referents for Public Policy Making”. *American Political Science Review* 69: 850-858.

Haider-Markel, Donald P. 2001. “Policy Diffusion as a Geographical Expansion of the Scope of Political Conflict: Same Sex Marriage Bans in the 1990s.” *State Politics and Policy Quarterly* 1:5-26.

Hannah, A. Lee, and Daniel J. Mallinson. 2018. “Defiant Innovation: The Adoption of Medical Marijuana Laws in the American States.” *Policy Studies Journal* 46:402-423.

Karch, Andrew. 2007a. *Democratic Laboratories: Policy Diffusion among the American States*. Ann Arbor, MI: University of Michigan Press.

---. 2007b. “Emerging Issues and Future Directions in State Policy Diffusion Research.” *State Politics and Policy Quarterly* 7:54-80.

Kim, Gook Jin. 2016. “Policy Innovation and Diffusion Through Policy Typologies: Examining the Predictors of Medical Marijuana Legalization in States.” *ProQuest Dissertation Publishing LLC.*

Kim, Gook Jin., Frances S. Berry, and Suk Joon Hwang. 2020. “Explaining the Strictness of Medical Marijuana Regulations in States.” *The Social Science Journal* https://doi.org/10.1016/j.soscij.2019.04.003.

Klarner, Carl. 2013. "State Partisan Balance Data, 1937-2011." https://doi.org/10.7910/DVN/LZHMG3. Harvard Dataverse, V1.

---. 2018. "State Legislative Election Returns, 1967-2016: Restructured For Use." https://doi.org/10.7910/DVN/DRSACA. Harvard Dataverse, V1.

Kuehn, David, and Ingo Rohlfing. 2016. "Are There Really Two Cultures? A Pilot Study on the Application of Qualitative and Quantitative Methods in Political Science." *European Journal of Political Research* 55:885-905.

Leemann, Lucas. 2015. "Political Conflict and Direct Democracy: Explaining Initiative Use 1920-2011." *Swiss Political Science Review* 21:596-616.

Levendusky, Matthew. 2010. *The Partisan Sort: How Liberals Became Democrats and Conservatives Became Republicans.* Chicago: Chicago, IL: University of Chicago Press.

Li, Amy Y. 2017. "Covet Thy Neighbor or "Reverse Policy Diffusion"? State Adoption of Performance Funding 2.0." *Research in Higher Education* 58:746-771.

Mahoney, James. 1999. "Nominal, Ordinal, and Narrative Appraisal in Macrocausal Analysis." *American Journal of Sociology* 104:1154-96.

Miao, Qing. 2019. "What Affects Government Planning for Climate Change Adaptation: Evidence from the U.S. States." *Environmental Policy and Governance* 29:376-394.

Mintrom, Michael. 1997. "Policy Entrepreneurs and the Diffusion of Innovation." *American Journal of Political Science* 41:738-770.

---. 2000. *Policy Entrepreneurs and School Choice.* Washington, D.C.: Georgetown University Press.

---. 2013. "Policy Entrepreneurs and Controversial Science: Governing Human Embryonic Stem Cell Research." *Journal of European Public Policy* 20:442-457.

Mintrom, Michael, and Joannah Luetjens. 2017. "Policy Entrepreneurs and Problem Framing: The Case of Climate Change." *Environment and Planning C: Politics and Space* 35:1362-1377.

Mitchell, Joshua. 2018. "Does Policy Diffusion Need Space? Spatializing the Dynamics of Policy Diffusion." *Policy Studies Journal* 46:424-451.

Mohr, Lawrence B. 1969. "Determinants of Innovation in Organizations." *American Political Science Review* 63:111-126.

Mooney, Christopher Z., and Mei-Hsien Lee. 1995. "Legislating Morality in the American States: The Case of Pre-Roe Abortion Regulation Reform." *American Journal of Political Science* 39:599-627.

National Commission on Marihuana and Drug Abuse. 1972. "Marihuana: A Signal of Misunderstanding. First Report of the National Commission on Marihuana and Drug Abuse." Washington, D.C.: U.S. Government Printing Office.

National Conference of State Legislatures. 2019. "Marijuana Overview." *Ncsl.org*

O'Keefe, Karen. 2013. "State Medical Marijuana Implementation and Federal Policy." *Journal of Health Care Law and Policy* 16: 39–58.

Platt, Joel D., and Ian Mead. 2017. "Gross Domestic Product by State Estimation Methodology." *Bureau of Economic Analysis*

Regan, Priscilla M., and Christopher J. Deering. 2009. "State Opposition to REAL ID." *Publius: The Journal of Federalism* 39:476-505.

Regens, James L. 1980. "State Policy Response to the Energy Issue." *Social Science Quarterly* 61:44-57.

Rogers, E.M. 1995. *Diffusion of Innovations* 4th. ed. New York, NY: The Free Press.

Ryan, Bryce, and Neal Gross. 1950. "Acceptance and Diffusion of Hybrid Corn Seed in Two Iowa Communities." *Iowa Agriculture and Home Economics Experiment Station* 29:663-708.

Schafer Library on Drug Policy. 1972. "Marihuana: A Signal of Misunderstanding." *The Report of the National Commission on Marihuana and Drug Abuse.*

Sharman, J. C. 2010. "Dysfunctional Policy Transfer in National Tax Blacklists." *Governance* 23: 623–39.

Shelby County v. Holder. 2012. 570 U.S. 529.

Shelley, Bryan. 2012. "Flexible Response: Executive Federalism and the No Child Left Behind Act of 2001." *Educational Policy* 26:117-135.

Shi, Yuyan, Ruopeng An, Yuhua Bao, Igor Grant, Di Liang, and Mark S. Wallace. 2019. "Recreational Marijuana Legalization and Prescription Opioids Received by Medicaid Enrollees." *Drug and Alcohol Dependence* 194:13-19.

Shipan, Charles R., and Craig Volden. 2006. "Bottom-Up Federalism: The Diffusion of Antismoking Policies from U.S. Cities to States". *American Journal of Political Science* 50:825-843.

Stanley, Charles. 2019. "Marijuana: Legalization and Sin Taxes." *Annual International Conference on Accounting and Finance*.

Starke, Peter. 2013. "Qualitative Methods for the Study of Policy Diffusion: Challenges and Available Solutions." *Policy Studies Journal* 41:561-582

Stoutenborough, James W., and Matthew Beverlin. 2008. "Encouraging Pollution-Free Energy: The Diffusion of State Net Metering Policies." *Social Sciences Quarterly* 89: 1230-51.

Stufano, Thomas. 2018. “Through the Smoke: Do Current Civil Liability Laws Address the Unique Issues Presented by the Recreational Marijuana Industry.” *Touro Law Review* 34:1409-1434.

Tarter, Ralph E., Duncan B. Clark, Levent Kirisci, Maureen Reynolds, and Michael Vanyukov. 2006. “Predictors of Marijuana Use in Adolescents Before and After Licit Drug Use: Examination of the Gateway Hypothesis.” *The American Journal of Psychiatry* 163:2134-2140.

Tweedie, Jack. 1994. “Resources Rather than Needs: A State-Centered Model of Welfare Policymaking.” *American Journal of Political Science* 38:651-672.

Van Evera, Stephen. 1997. *Guide to Methods for Students of Political Science*. Ithaca, NY: Cornell University Press.

Walker, Jack. 1969. “The Diffusion of Innovations Among the American States”. *American Political Science Review* 63:880-899.

Wardle, Lynn D. 2012. “The Proposed Minnesota Marriage Amendment in Comparative Constitutional Law: Substance and Procedure.” *Journal of Public Law and Policy* 34:141-168.

Webb, Charles W., and Sandra M. Webb. 2014. “Therapeutic Benefits of Cannabis: A Patient Survey.” *Hawaii J Med Public Health* 73:109-111.

Appendix

Economic variables

The fiscal health of the state (*gsppercapita*$_{s,t}$): Gross State Product per capita measured in 2012 chained dollars, as reported by the Bureau of Economic Analysis. State population taken from the Census Bureau's 2018 midyear estimates made available in December of 2018. This variable starts in 1995 and ends in 2018. To prevent Stata from dropping 2019 and 2020 from the models, the data from 2018 was repeated for the last two years.

The fiscal health of the citizens (*personalincomepercapita*$_{s,t}$): Average personal income per capita by state measured in 2012 chained dollars, as reported by the Bureau of Economic Analysis. State population was taken from the Census Bureau's 2018 midyear estimates made available in December of 2018. This variable starts in 1995 and ends in 2018, when the last data points are available. To prevent Stata from dropping 2019 and 2020 from the models, the data from 2018 was repeated for the last two years.

Ideology Variables

Citizen Ideology Scores (*citizenideologyscores*$_{s,t}$)- A score ranging from 0 (conservative) to 100 (liberal) that measures the overall ideology of the citizenry in a state. The full list of inputs that make up each score can be found in Berry et al. (1998). Data ranges from 1972 to 2016 and can be found at https://rcfording.com/state-ideology-data/. To prevent Stata from dropping 2017-2020 from the models, the data from 2016 was repeated for the last four years.

Government Ideology Scores (*governmentideologyscores*$_{t-1}$)- A score ranging from 0 (conservative) to 100 (liberal) that measures the overall ideology of the government in a state. The full list of inputs that make up each score can be found in Berry et al. (2010). Data ranges from 1973 to 2017 and can be found at https://rcfording.com/state-ideology-data/. To prevent Stata from dropping 2018-2020 from the models, the data from 2017 was repeated for the last three years.

Party Variable

Ranney Party Control Index (*ranneyindex*$_{t-1}$)- This index measures the overall partisan climate of a state using a variety of factors such as state legislature control, Congressional delegation, governorship, etc. The index ranges from 0 (Republican) to 1 (Democrat) and the data ranges from 1972 to 2010, which is the last year the dataset was updated. Nebraska has had a non-partisan legislature since 1934, therefore it is omitted from this variable (Comer 1980). A full list of index inputs as well as the full dataset can be found at Klarner (2013). To prevent Stata from dropping 2011-2020 from the models, I calculated the percentage of Democrat control of each state's lower chamber to fill the last 10 years (Klarner 2018). While this is not as robust as the Ranney Index, it maintains the same scale and provides some idea of partisan control.

Regional variable

Presence of neighboring states with a marijuana policy (*neighbors*$_{t-1}$): This data is reported by the National Association for the Reform of Marijuana Laws (NORML).

Category Data Points

Illegal- AL, ID, KS, SC, SD, TN, WI, WY

Decriminalized- AK, CA, CO, CT, DE, HI, IL, ME, MD, MA, MI, MN, MS, MO, NE, NV, NH, NM, NY, NC, OH, OR, VT, VA, WA.

Medical- AK, AZ, AR, CA, CO, CT, DE, FL, HI, IL, LA, ME, MD, MA, MI, MN, MO, MT, NV, NH, NJ, NM, NY, ND, OH, OK, OR, PA, RI, UT, VT, WA, WV.

Recreational- AK, CA, CO, IL, ME, MA, MI, NV, OR, VT, WA.

Summary Statistics

Table 9- Medical Category Summary Statistics

	Mean	Median	Standard Deviation	Min	Max
gsppercapita	46285.54	45241	9129.92	25912	78075
personalincomepercapita	34858.78	33802.5	9558.76	17488	64917
citizenideology	46.9	45.76	14.55	8.45	95.97
governmentideology	42.29	43.4	15.22	0.51	73.62
ranneyindex	0.46	0.46	0.16	0.13	0.84
neighbors	0.7	0	1.11	0	5

Table 10- Recreational Category Summary Statistics

	Mean	Median	Standard Deviation	Min	Max
gsppercapita	50883.86	49840	9607.88	33147	78957
personalincomepercapita	47365.71	46117	8320.68	32163	77289
citizenideology	49.38	47.35	15.94	13.48	97
governmentideology	39.27	32.99	17.19	17.51	73.49
ranneyindex	0.44	0.4	0.18	0.13	0.92
neighbors	0.37	0	0.69	0	3

Table 11- Decriminalization Category Summary Statistics

	Mean	Median	Standard Deviation	Min	Max
citizenideology	47.55	46.28	16.12	5.86	95.97
governmentideology	48.45	50.03	14.5	17.51	73.13
ranneyindex	0.54	0.53	0.19	0.13	0.99
neighbors	1.01	1	0.82	0	4

Vita

Jackson Valentine was born in Nashville, North Carolina to a wonderful and loving family. Jackson has pursued political science from a young age and did his undergraduate studies at The University of North Carolina at Chapel Hill, obtaining degrees in music performance and political science in 2017. In 2020, Jackson obtained a Master of Arts in political science from Appalachian State University, where he was a member of Pi Sigma Alpha.

Jackson has focused his study on American politics, and specifically how policies are diffused between states. In his free time, Jackson enjoys playing with his band, American Scream, and hand-whittling elegant wooden bird sculptures.