

THE ANTI-TECHNOCRACY: THE UNSCIENTIFIC DETERMINANTS OF VOTING ON
CONTROVERSIAL SCIENTIFIC ISSUES

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ABSTRACT

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This research project analyzes voting behavior on stem cells, biofuels, and medical marijuana to ascertain what is important to citizens and legislators as they enact policies (citizens through the initiative process and legislators by roll call votes) on controversial scientific issues. It is found that political beliefs, personal values, and, in the case of legislators, considerations of electoral consequences are the predominant determinants of vote choice on the issues studied, indicating that even the esteemed standing of science in American society cannot shield such matters from politicization. The process by which science policies are enacted is no more unique than any other issue that is debated in a political setting.

The results of the analyses carried out in this research project suggest that initiative voting behavior might be more complex than what scholars have indicated. In light of what is presented here it cannot be claimed that partisanship is always the most significant determinant of how someone chooses to vote on an initiative. The current consensus on this topic must be called into question pending the possibility that a number of other issues might exist for which partisanship is a lesser or non-significant factor when other variables are considered.

The findings of this research project also suggest that the public choice theory of legislative behavior may have significant relevance to understanding the actions of legislators. The proposition that legislators are most likely to do that which benefits them most, whether it be for their professional advancement or for their own personal ideological satisfaction, is a useful

starting point for understanding what has been found in this research project. At least for the types of issues that are studied (and, as will be noted, there is little reason to expect these policies are somehow unique), constituents seem to be either a means to an end or, in instances where their support or lack of support does not provide a clear personal benefit to a politician, a trivial consideration.

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TABLE OF CONTENTS

LIST OF TABLES	vii
LIST OF FIGURES	ix
CHAPTER 1	
INTRODUCTION	1
Introduction to the Topic and Theory	1
The Use (or Nonuse) of Science in Policymaking	5
Case Selection Overview	11
APPENDIX	16
REFERENCES	26
CHAPTER 2	
LEGISLATIVE VOTING BEHAVIOR ON BIOFUELS	29
Introduction	29
Scientific and Political Debate	31
Two Key Influences on Legislative Behavior	37
Testing the Framework	40
Results and Findings	45
Conclusions	57
REFERENCES	61
CHAPTER 3	
INITIATIVE VOTING BEHAVIOR ON MEDICAL MARIJUANA	67
Introduction	67
Federal-State Conflict	68
Voters Turn to the Initiative	73
Who is Voting For (and Against) Marijuana and Why?	77
Implications and Conclusions	93
REFERENCES	98
CHAPTER 4	
INITIATIVE & LEGISLATIVE VOTING BEHAVIOR ON STEM CELLS	103
Introduction	103
Citizen Opinions of Stem Cell Research	106
Citizen Voting Behavior	109
Legislator Preferences	112
Implications and Conclusions	119
APPENDIX	123
REFERENCES	131
CHAPTER 5	
OVERALL IMPLICATIONS AND CONCLUSIONS	135

LIST OF TABLES

Table 1.1: Context of the Policies Studied.....	13
Table 1.2: Biofuels Analysis Details	17
Table 1.3: Biofuels Analysis Details	18
Table 1.4: Medical Marijuana Analysis Details	19
Table 1.5: Medical Marijuana Analysis Details	20
Table 1.6: Medical Marijuana Analysis Details	21
Table 1.7: Stem Cells Analysis Details.....	22
Table 1.8: Stem Cells Analysis Details.....	23
Table 1.9: Stem Cells Analysis Details.....	24
Table 1.10: Stem Cells Analysis Details.....	25
Table 2.1: Biofuels Voting Behavior in the House of Representatives: On Agreeing to House Amendment 81 to H.R. 6	46
Table 2.2: Biofuels Voting Behavior in the Senate: Motion to Table Senate Amendment 782 to H.R. 6	49
Table 2.3: Biofuels Voting Behavior in the House of Representatives: On Agreeing to House Amendment 156 to H.R. 1	52
Table 2.4: Biofuels Voting Behavior in the Senate: On Agreeing to Senate Amendment 476 to S. 782.....	55
Table 3.1: Examples of Organizations Endorsing Medical Marijuana.....	76
Table 3.2: Initiatives Studied and Percentage Support; Support by Party & Ideology.....	79
Table 3.3: Medical Marijuana Initiatives.....	88
Table 3.4: Legalization and Distribution Marijuana Initiatives.....	89
Table 4.1: Citizen Opinions of Stem Cell Research	107
Table 4.2: Missouri Stem Cell Research Amendment Voting Behavior	111

Table 4.3: Iterated Principal Factor Analysis Retaining One Factor	117
Table 4.4: Determinants of a Senator's Stem Cell Research Vote	118

LIST OF FIGURES

Figure 2.1: House of Representatives: Vote on Adopting Pro-Biofuels Amendment to H.R. 6 ...	47
Figure 2.2: House of Representatives: Vote on Adopting Pro-Biofuels Amendment to H.R. 6 ...	47
Figure 2.3: Senate: Vote on Tabling Anti-Biofuels Amendment to H.R. 6.....	50
Figure 2.4: Senate: Vote on Tabling Anti-Biofuels Amendment to H.R. 6.....	50
Figure 2.5: Predicted Probabilities: House of Representatives.....	53
Figure 2.6: Predicted Probabilities: Senate.....	56
Figure 3.1: States with Medical Marijuana.....	70
Figure 3.2: The Importance of Policy Image: Initiatives for Medical Marijuana vs. an Initiative Mandating Dispensaries.....	81

CHAPTER 1: INTRODUCTION

Introduction to the Topic and Theory

Societal conflict over policy regulating science and technology is nothing new. In fact, it can be traced back in Western civilization to the early modern period (c. 1500-1800 A.D.) when breakthroughs in scientific knowledge began to raise questions about the tenets of the Roman Catholic Church. For instance, Galileo's support of the heliocentric view of the solar system espoused by Copernicus, a belief in direct conflict with religious doctrine at the time, led to him being accused of heresy, his scientific research being banned, and his freedom curtailed through the enforcement of house arrest for the rest of his life. A more recent controversy between the teachings of the Catholic Church and the research conducted by scientists can be seen in the debate in the United States over the use of embryonic stem cells. Without the political authority they once had, churches must now seek to resolve conflicts between their doctrine and the practice of science in the manner in which most societal conflicts are resolved: through political debate in government institutions and enactment of public policy by legislators or, in states where the initiative process is used, citizens.

Certainly not all societal conflict over science is grounded in debates over religion, though. A great deal of scientific research is now funded by the use of taxpayer money and so there have been a number of conflicts over what research should be funded and the proper means of subsidizing it. Energy policy is a prime example. Climate change and foreign dependence on oil have spurred the United States to seek alternative energy sources by funding scientific research in renewable energy and enacting policies designed to promote one technology over another. Biofuels are one of the technologies benefiting from these policies. The debate over whether or not to mandate the use of ethanol and the government's subsidization of this

burgeoning industry have resulted in conflicts over science policy that are primarily economic in nature.

In some instances, the findings of science contradict established policy, resulting in conflicts over whether or not general scientific consensus should be reflected in law. One issue that highlights this problem is medical marijuana. The medical community has recognized the use of marijuana as a medicinal since at least 1870 when cannabis was listed in the U.S. Pharmacopoeia. However, federal drug law recognizes no legitimate medical use for this prohibited drug. In many states where the initiative process is used, medical marijuana advocates have been able to present the issue directly to voters, who have passed policies allowing for the medical use of marijuana in 11 out of 13 states where they have had a chance to directly vote on the issue. Conflict over whether or not to allow medical marijuana seems to be less about science and more about what individuals feel the role of government should be in restricting the use of this drug by people who could benefit from it.

Over time American society has become increasingly reliant upon scientific advancement and the use of technology. As has been illustrated in the cases mentioned above, disagreements over the use of science and technology now take place in political settings where the conflict is more about government's role in society and competing policy goals than about the science itself. Even in debates over climate change, it is clear that the motivations for the way in which the science is presented are primarily political in nature. In this research project, voting behavior on stem cells, biofuels, and medical marijuana is analyzed to ascertain what is important to citizens and legislators as they enact policies (citizens through the initiative process and legislators by roll call votes) on controversial scientific issues. Determining how decisions are made to enact scientific policies will help inform current political controversies and ones that are

likely to arise in the future. More broadly, the analyses that are conducted in this research project address long-running questions in political science regarding citizen voting behavior and the nature of legislative responsiveness; furthermore, the findings presented in this research project provide a definitive answer to the manner in which science policy is passed, identifying the role or lack thereof that scientific information has in the process of enacting policy.

Any endeavor seeking to analyze voting behavior on scientific policies must first provide a basic definition for what constitutes such policies. For the purpose of this project, a scientific policy is considered to be one that either legally promotes or limits what scientific research can be conducted and/or determines how science can be used in society. This is not a restrictive definition: policies may have additional attributes that could allow them to be classified as other types of policies as well. For example, as much as a policy on climate change would likely be considered scientific it could just as easily be classified as an environmental or energy policy. Using this general, non-exclusive criterion, the three cases chosen for analysis are defined as scientific policies. Biofuels policy has promoted ethanol research and use, stem cells policy has tried to define the government's role in either promoting or limiting scientific research into this area, and medical marijuana policy has determined whether or not a particular medical treatment is available for use. The importance of science to these types of policies may seem to be obvious upon first inspection, but this research project will show that, at least when a decision must be made to support or oppose such policies by casting a vote, science is often overshadowed by stronger influences affecting policy enactment such as individual beliefs and values.

The science policy literature has put forward a number of reasons for why conflict over science exists and how this conflict leads to particular policy outcomes. This literature will be discussed but ultimately it will be found to be wanting in a number of respects. It fails to

appreciate what scientific policy conflicts are truly about: fundamental differences in political beliefs and personal values and, in the case of legislators, considerations of electoral consequences. It will be claimed that scientific issues should be seen as being similar to any other political issue, and if one is to study how science policy is enacted, one must look to the extensive literature in American political science concerning policy enactment. If this claim is correct, this way of studying science policy will provide strong explanatory utility, indicating that science policy is not unique and extensive study of the passage of these policies as has been done in the tradition of the science policy literature is unwarranted. If this claim is wrong, this research project will not yield much meaningful explanation utilizing the methods of political science, and so the scholars writing in the science policy community will be vindicated in their approach and be seen as providing much-needed understanding for an area where enactment of policy is unique.

The opportunity to conduct an in-depth examination of voting behavior on these controversial scientific issues will also be used to address important questions in political science. Is partisanship the main determinant of vote choice on these issues? If not, what does that mean for the current understanding of citizen voting behavior on initiatives? What determines how legislators vote on these issues and what does it say about the nature of legislative responsiveness? What insight can legislative voting behavior provide to better understand why scientific information is or is not used in decisions to enact policy? This research project is written with the aim of addressing debates in both the science policy and political science literature. It is intended that the methods and understandings provided by these two different bodies of knowledge will be able to complement one another, thereby leading to new answers to existing questions.

The Use (or Nonuse) of Science in Policymaking

Science and scientists hold an esteemed position in American society. In a nationwide survey conducted by the Pew Research Center (2009), 84% of those surveyed agreed that science's effect on society is mostly positive, and 70% of those surveyed believed that scientists contribute a lot to society's well-being, a number only surpassed by teachers and members of the military. Since scientific experts are held in high regard, there is a large degree of deference to their decisions among the general public and political actors (Selinger & Crease 2006). But respect for scientists does not necessarily mean that scientists should be free to enact their policy preferences on issues related to their areas of expertise. The interaction between science and policy is much more complex than a mere deference to the opinions of experts.

Mike Hulme (2009) has proposed three models for how science and policy can interact. The first is the decisionist model. In this model politicians determine the policy ends while qualified experts establish and evaluate the means available to achieve those desired ends. An example would be if Congress enacted a law stipulating the reduction of arsenic in drinking water but left it to scientists to determine what level and the most efficient means of obtaining that result. The second is the technocratic model. In this model technical experts are able to stipulate both the goals of scientific policy and the means to achieve it. If scientists were given this authority over an issue such as climate change, they would be able to decide whether or not action should be taken to reduce greenhouse emissions and to determine the measures necessary to meet their stated objectives. The third model is a hybrid of these two and is known as the co-production model. Scientists and policymakers are both given roles in defining ends and means through joint scientific and non-scientific institutions and the public has an expanded role in the enactment of policies.

The United States seems to use a co-production model. The use of this model stems from the democratic pressures exerted on the implementation of scientific policy and the fact that a right to conduct scientific research is not explicitly guaranteed by the constitution, which means that science is subject to political debate and a weighing of competing interests (Brown and Guston 2009). This combination of politics and science can lead to what has been termed the “politicization of science,” defined by Chris Mooney (2006) as “any attempt to inappropriately undermine, alter, or otherwise interfere with the scientific process, or scientific conclusions, for political or ideological reasons.” The debate over climate change is an example of this phenomenon. Science has been used by both sides of the debate to press a particular political agenda. The result has been selective use of scientific information to formulate policy, with some policymakers wanting to make use of the information that is available from the scientific community, some wanting to make use of information put out by think tanks, and others wanting to ignore the information completely and maintain the status quo. On some issues, scientific information is respected and usually incorporated into policy design and implementation, such as the information medical doctors produce about vaccines, though even policy based upon this scientific knowledge has been questioned in recent years. On many other issues, scientific information is ignored in the interest of political concerns, such as proposed requirements to teach intelligent design alongside evolution.

Roger Pielke (2007) has emphasized the importance of political context in determining whether or not scientific information is incorporated into policy. In situations where there is a greater consensus of values and low uncertainty, scientific information is likely to be sought after and used in the formation and implementation of policies. The banning of the use of lead in paint is an excellent example. The preservation of health and the use of government policy to

protect children are important values for most citizens and there is no scientific uncertainty as to the dangers of lead. By conclusively demonstrating the deleterious effects of lead exposure for children, science was able to inform the final policies that resulted, which in the United States was the banning of lead in consumer paint products. Where values are conflicting and a high degree of uncertainty exists, no degree of scientific information is able to settle which policies should be pursued and how they should be carried out. Policies concerning cloning illustrate this point well. The science that determines how to clone, the effects of cloning, or the benefits of cloning is not where conflict on this issue primarily resides – it is in the ethical question of whether or not living (or dead) things should be cloned. The result is a value debate to which science cannot provide a satisfactory answer. In addition, the science on cloning is still developing, and so uncertainty exists as to its potential.

For politicians and voters to be able to use the scientific information that scientists produce, science must be able to adequately answer the questions that regulators and political actors pose. It has been shown that in many instances science is not able to provide complete answers for these questions (Weinberg 1970). For example, the controversy over the banning of bisphenol A (BPA) from children's products highlights this problem. A National Toxicology Program (2008) brief on BPA found that studies in humans did not provide sufficient evidence to conclude that BPA causes developmental or reproductive harm. On the other hand, laboratory animal studies did provide evidence of developmental toxicity for fetuses and infants but these studies were controversial for a number of reasons such as insufficient independent verification of results and the inability of scientists to agree on or fully comprehend the nature of the discovered effects. Unlike the example of lead in paint, science was unable to provide legislators

with a clear answer on whether or not BPA's effects were harmful enough to warrant government restrictions on the use of the chemical in children's products.

Since the scientific information in this area was ambiguous, it was of minimal assistance to a legislator, thus freeing him to instead base his decision off of his personal preferences and what was likely to benefit his electoral prospects most, though this is something he likely would have done regardless of what the science had said (Jones 1976). Returning to the example of climate change one can see how electoral and ideological considerations can trump scientific information. The Intergovernmental Panel on Climate Change's (2007) Fourth Assessment Report made the scientific consensus on climate change clear: global warming is real and there is over a 90% chance it is occurring as a result of anthropogenic (human) additions of greenhouse gases into the environment. Yet there are still many political actors like the newly elected Republican senator from Wisconsin, Ron Johnson, who claim that the theory of global warming is "lunacy." There is no shortage of individuals in the general public expressing a similar opinion. Such a disparity between the views of scientists and the beliefs of a number of political actors and voters can develop because scientific institutions and government operate through two very different processes.

The gap that has developed between scientific information and political discourse on a number of issues can in part be traced to incompatible conceptions of uncertainty (Manning 1988). Scientists understand that uncertainty is naturally a part of the scientific endeavor. The public and policymakers have a low tolerance for uncertainty, though. They prefer solutions that are deterministic and unambiguous. The standards society imposes on science may therefore constrain effective decision-making (Gunderson et al. 1995). Scientific information, which leaves room for doubt and further inquiry, experiences difficulty when being utilized in

environments where things are often framed in Manichaeian terms. Even areas where general scientific consensus exists experience this issue because some degree of uncertainty is inherent in all scientific output (Lemons 1996). Producing additional amounts of scientific information as a means of addressing this issue has not been shown to resolve the problem (Sarewitz 2004).

The research presented thus far has been rather skeptical about the role of science in determining policy outcomes. Part of the reason for this view could have something to do with how the American political system is designed. Sheila Jasanoff (1990) notes that “the formal and adversarial style of American regulatory decisionmaking highlights uncertainty, polarizes scientific opinion, and prevents efficient resolution of disputes about risk.” She goes on to note that instead of promoting consensus, “knowledge fed into such a process risks being fractured along existing lines of discord.” Chris Mooney has presented evidence underscoring just how political the process of using scientific information has become.

Mooney (2006) makes the bold claim that Republicans have waged “war” against science. Characterizing it as a war may be a bit of an exaggeration but Mooney does present some disturbing accounts of how Republicans under President George W. Bush manipulated scientific information and the governmental institutions responsible for producing it. One of the more well-known incidents concerns the suppression of climate change information from the EPA, including doctoring scientific memos. Also of note is how Bush appointed advisory boards and high level bureaucrats that were members of industry, thereby assuring that the information produced would be friendly to business. These examples provide clear evidence that scientific information is often used to support pre-determined policy positions and when it conflicts with these positions, scientific information is typically discounted and discredited.

It appears that for most policies, scientific information only makes it into the process when political actors or voters desire it. For a number of issues, scientific information that reinforces a pre-existing notion is sought after while in other areas the scientific information is not an important component at all. There are some areas where scientific information does take on a prime role, such as uncontroversial issues characterized by a consensus of values and a low degree of scientific uncertainty, but these policy areas are limited and much less common than areas where conflict exists, especially in today's environment of political polarization. When it comes to the use of scientific information in the policy process, Weiss's (1977) assessment rings true: "the consensus seems to be that most research studies bounce off the policy process without making much of a dent on the course of events." A reasonable conclusion is that scientific information is no different from other kinds of information sought during political debate: when this information reinforces existing beliefs and can be used for political advantage, it is sought after; when this information discounts firmly-held beliefs, it is rejected and dismissed.

The science policy literature has shown that science's role in the enactment of scientific policies is rather constrained and that political considerations have a pervasive influence on this process. Demonstrating that science is not the determining factor for expressed policy preferences on controversial scientific issues is important and this is certainly a significant finding from the science policy literature. However, the answer to the underlying question of what factors are important in enacting science policy, a question that should be understood as being the most important when discussing how scientific policies are passed, is unsatisfactory. Answering that science is not important explains very little about what actually does matter. By conducting a comprehensive study of voting behavior on controversial scientific issues using traditional theories and methods outlined in political science, this research project will fill this

gap in understanding. Research on legislative and initiative voting behavior for other issues, as is outlined in the next two chapters, suggests some possible answers to what is likely to be important in the enactment of controversial scientific issues: partisanship, ideology, values, and in the case of legislators, electoral prospects. If these determinants turn out to provide strong explanatory utility, then it will have been shown that indeed considerations of science are not necessary to deciding whether or not to vote for enactment of policies concerned with these issues. These results would indicate that the search by science policy scholars for a unique explanation to understanding the passage of controversial scientific policies is unnecessary.

Case Selection Overview

Casting a vote for a particular policy enactment indicates a preference. Findings from the science policy literature have indicated that science-based preferences have a rather limited role in policy enactment decisions but this literature has not provided much explanation as to what does matter. Thus, there is a need for a comprehensive look at the determinants of voting decisions on controversial scientific issues in order to determine what factors are important in those decisions (not to be confused with science's role in what the policies themselves include where science likely does have significance). The overarching theory of this research project is that voting behavior on scientific issues can be explained by the typical attributes thought to be important in political decision-making for most policy issues. To that end, scientific bills and initiatives have been selected for three issues and analysis is conducted of voting decisions on those policies to determine the degree to which political values and beliefs affect vote outcomes. Though a separate body of literature exists to explain science policy, its failure to reference existing political science theories and its exclusion of the techniques used by political scientists

to study policy enactment mean that it has provided incomplete answers, a problem that will be remedied by this research project.

Major works in the field of public policy have made it clear that differences in how issues are defined by elites and viewed by the public are important determinants of their level of support (Baumgartner and Jones 1993; Kingdon 1995; Stone 2002), and so there is reason to believe that how scientific policies are characterized will lead to differences in how individuals and legislators decide to vote on these issues. Accordingly, three cases have been selected in which the issues have been defined differently and where the political debates have centered on different underlying concerns: stem cells, biofuels, and medical marijuana.

As was mentioned previously, Roger Pielke (2007) has claimed that the role of science in the policy process is dependent upon the degree of scientific uncertainty present on an issue and whether or not a policy engenders debate over core beliefs. These characteristics differ for each of the policies studied (see Table 1.1), which makes these policy areas an appropriate sampling from the pool of recent scientific issues that have received political attention. They also lead to differing conclusions about the likelihood that political attributes will be able to explain voting behavior for each issue. It is expected that on issues where there the science is contested and/or core beliefs are threatened, there will be more political conflict; this conflict should increase the probability that political considerations will predominate over other concerns (such as science) when citizens and legislators vote on whether or not to adopt a controversial scientific policy.

Table 1.1***Context of the Policies Studied***

	Biofuels	Stem Cells	Medical Marijuana
Relevant Science Contested?	Yes	No	No
Core Beliefs Threatened?	No	Yes	No
<i>Probability of political attributes explaining vote choice</i>	<i>High</i>	<i>High</i>	<i>Low</i>

Instead of looking at Congressional and initiative voting for each of these three issues, biofuels and stem cells constitute the legislative voting portion of the research project (seeing what determines a legislator's vote choice when deciding to fund scientific research: biofuels being technical energy research and stem cells being controversial moral research) and stem cells and medical marijuana constitute the initiative voting portion (finding the determinants of citizen voting behavior when presented with two medical issues: stem cells being a controversial way to find potential cures and medical marijuana being about using a currently illegal drug to give more options in the treatment of chronic pain). Stem cells has been chosen as the one issue to compare both legislative and initiative voting behavior as it is a medical issue that involves government intervention in scientific research; it is also an issue where the actions taken in Congress became a point of contention in the state-level initiative debate.

Inclusion of legislator and citizen voting behavior in the same project is not a traditional approach used in political science. Typically these analyses are kept separate, with each having their own bodies of literature. Both are looked at in this research project because of the insight it can provide regarding how policy enactment of scientific issues varies depending on whether the policy is adopted through legislation or by initiative. The degree to which partisanship and

ideology affect voting decisions is likely to be impacted by whether or not debate over the issues is carried out in a professional legislature with partisan politicians or in a diverse public forum. For example, the electoral connection may have a unique effect on legislators that is not present for citizens. Also, the policies themselves may differ, as it would be expected that a law prepared in a legislative body would not be the same as one developed by a citizen interest group. These potential differences will be explored but it should be noted that science is still expected to have a limited role in policy with traditional political factors being able to explain voting decisions for both legislators and citizens.

The varying venues, types of policies studied, and availability of data do make it somewhat difficult to maintain consistency in the analyses performed; these variations are not a weakness of the analysis, though, as they will be used to provide more understanding of the cases studied, not less. The moral issue of stem cells is an excellent issue in which to compare how legislators and citizens respond to a scientific issue that touches upon the age-old conflict between science and religion. The technical issue of biofuels provides an excellent opportunity to determine the degree of responsiveness legislators have on a technical energy issue where the parties' stances have evolved over time and where there are strong constituent interests that demand the policy. The medical issue of medical marijuana, which enjoys broad support from the public but has received little attention in Congress, lends itself well to an examination of how citizens in different states form their voting decisions on a medical scientific issue where partisan cues are not easy to discern because elites have not been able to convey clear stances due to the rarity of legislation on the topic; this issue will be compared with the non-scientific issue of marijuana legalization to see the differences between how individuals view marijuana for medicinal vs. recreational use. Though the analyses may not always be exactly the same,

statistical techniques will be similar (for instance, logistic regression is carried out for each issue) and the underlying focus is the same: determining the degree to which political attributes influence voting decisions. The appendix included with this chapter provides more detailed descriptions of the analyses that will be conducted.

APPENDIX

Table 1.2***Biofuels Analysis Details***

Scientific Issue	Biofuels
Statistical Model	Difference of Means
Bills/Ballots Studied	<p>Two amendments to the Energy Policy Act of 2005: House Amendment 81 (allowed “the Secretary of Energy the authority to include in the Strategic Petroleum Reserve alternative fuels, including ethanol and biodiesel and rename the reserve the ‘Strategic Fuels Reserve’”) and Senate Amendment 782 (would have had the effect of removing the Renewable Fuels Standard)</p> <p>Two more recent amendments: House Amendment 156 to H.R. 1: Continuing Appropriations Act (“Prohibit the use of funds in the decision of the Administrator of the EPA... to Increase the Allowable Ethanol Content of Gasoline to 15 percent”) and Senate Amendment 476 to S. 782: Economic Development Revitalization Act of 2011 (purpose was to “repeal the Volumetric Ethanol Excise Tax Credit”)</p>
Unit of Analysis	Different means of those legislators who voted in support of biofuels and those who voted to oppose biofuels, by party affiliation, for the House of Representatives and the Senate
Observations	<p>House of Representatives: 435</p> <p>Senate: 100</p>
Unique Datasets	2007 USDA Census of Agriculture
Dependent Variable	Vote for or against biofuels amendment in question for the House of Representatives and the Senate
Independent Variables of Interest	<ul style="list-style-type: none"> • Mean number of corn acres harvested in district or state for House Amendment 81 and Senate Amendment 782 • Mean number of cattle and calves in district for House Amendment 156 • Average 2004 & 2008 Democratic presidential vote in state for Senate Amendment 764 • Partisan affiliation of legislator for each amendment

Table 1.3***Biofuels Analysis Details***

Scientific Issue	Biofuels
Statistical Model	Logistic Regression
Bills/Ballots Studied	<p>Two amendments to the Energy Policy Act of 2005: House Amendment 81 (allowed “the Secretary of Energy the authority to include in the Strategic Petroleum Reserve alternative fuels, including ethanol and biodiesel and rename the reserve the ‘Strategic Fuels Reserve’”) and Senate Amendment 782 (would have had the effect of removing the Renewable Fuels Standard)</p> <p>Two more recent amendments: House Amendment 156 to H.R. 1: Continuing Appropriations Act (“Prohibit the use of funds in the decision of the Administrator of the EPA... to Increase the Allowable Ethanol Content of Gasoline to 15 percent”) and Senate Amendment 476 to S. 782: Economic Development Revitalization Act of 2011 (purpose was to “repeal the Volumetric Ethanol Excise Tax Credit”)</p>
Unit of Analysis	<p>House of Representatives: Individual members of the House</p> <p>Senate: Individual members of the Senate</p>
Observations	<p>House of Representatives: 435</p> <p>Senate: 100</p>
Unique Datasets	2007 USDA Census of Agriculture
Dependent Variable	<p>House of Representatives: Vote for or against amendment in question</p> <p>Senate: Vote for or against amendment in question</p>
Independent Variables of Interest	<ul style="list-style-type: none"> • Number of corn acres harvested in district or state • Number of cattle and calves in district or state • Average 2004 & 2008 Democratic presidential vote • Partisan affiliation of legislator

Table 1.4***Medical Marijuana Analysis Details***

Scientific Issue	Medical Marijuana
Statistical Model	Descriptive Analysis
Bills/Ballots Studied	California Proposition 215, Arizona Proposition 200, Nevada Question 9, Washington Initiative 692, Colorado Amendment 20, Montana Initiative 148, Alaska Measure 2, Oregon Measure 33, Nevada Question 7
Unit of Analysis	Exit poll respondents who voted on the initiatives in question
Observations	Total number of respondents per exit poll in each state who filled out enough information to be included in the analysis
Unique Datasets	Exit polls from Voter News Service and Edison Media Research
Dependent Variable	Vote for or against the medical marijuana initiative in question
Independent Variables of Interest	<ul style="list-style-type: none">• Partisanship of exit poll respondent• Ideology of exit poll respondent

Table 1.5***Medical Marijuana Analysis Details***

Scientific Issue	Medical Marijuana
Statistical Model	Logistic Regression
Bills/Ballots Studied	California Proposition 215, Arizona Proposition 200, Nevada Question 9, Washington Initiative 692, Colorado Amendment 20, Montana Initiative 148
Unit of Analysis	Respondents to the exit polls in each state these initiatives took place who filled out enough information to be included in the analysis
Observations	California: 729 Arizona: 721 Nevada: 722 Washington: 1108 Colorado: 593 Montana: 530
Unique Datasets	Exit polls from Voter News Service and Edison Media Research
Dependent Variable	Vote for or against the medical marijuana initiative in question
Independent Variables of Interest	<ul style="list-style-type: none">• Demographics• Religious Values• Political Beliefs• Voting Behavior on Moral/Rights Issues

Table 1.6***Medical Marijuana Analysis Details***

Scientific Issue	Medical Marijuana
Statistical Model	Logistic Regression
Bills/Ballots Studied	Alaska Measure 2, Oregon Measure 33, Nevada Question 7
Unit of Analysis	Respondents to the exit polls in each state these initiatives took place who filled out enough information to be included in the analysis
Observations	Alaska: 1016 Oregon: 844 Nevada: 1529
Unique Datasets	Exit polls from Voter News Service and Edison Media Research
Dependent Variable	Vote for or against the marijuana initiative in question
Independent Variables of Interest	<ul style="list-style-type: none">• Demographics• Religious Values• Political Beliefs• Voting Behavior on Moral/Rights Issues

Table 1.7***Stem Cells Analysis Details***

Scientific Issue	Stem Cells
Statistical Model	Logistic Regression
Bills/Ballots Studied	N/A
Unit of Analysis	Respondents to the survey who filled out enough information to be included in the analysis
Observations	2,275
Unique Datasets	Survey data from the Pew Research Center for the People & the Press
Dependent Variable	Expressing support or opposition to stem cell research
Independent Variables of Interest	<ul style="list-style-type: none">• Partisan Affiliation• Ideology• Abortion Beliefs• Religious Values• Level of Education• Stem Cell Knowledge

Table 1.8***Stem Cells Analysis Details***

Scientific Issue	Stem Cells
Statistical Model	Logistic Regression
Bills/Ballots Studied	Missouri Constitutional Amendment 2
Unit of Analysis	Respondents to the exit poll who filled out enough information to be included in the analysis
Observations	1,835
Unique Datasets	Exit poll from Edison Media Research and Mitofsky International
Dependent Variable	A vote for or against Missouri Constitutional Amendment 2
Independent Variables of Interest	<ul style="list-style-type: none">• Partisan Affiliation• Ideology• Abortion Beliefs• Religious Values• Level of Education

Table 1.9***Stem Cells Analysis Details***

Scientific Issue	Stem Cells
Statistical Model	Iterated Principal Factor Analysis
Bills/Ballots Studied	N/A
Unit of Analysis	State totals for survey respondents' answers to questions pertaining to their religious practice
Observations	Total survey respondents for each state
Unique Datasets	Pew Forum on Religion & Public Life Survey
Dependent Variable	Output will be a factor loading for each included variable and factor estimates for each state
Independent Variables of Interest	<ul style="list-style-type: none">• % Who Attend Church Weekly• % Who Rarely Attend Church• % Who Believe Bible is Literal Word of God• % Who Believe Bible is from Men, not God• % Who Pray Daily• % Who Seldom Pray

Table 1.10***Stem Cells Analysis Details***

Scientific Issue	Stem Cells
Statistical Model	Logistic Regression
Bills/Ballots Studied	2005 Stem Cell Research Enhancement Act
Unit of Analysis	Individual Senators
Observations	100
Unique Datasets	Senator's religious affiliation and a measure of a state's religiosity
Dependent Variable	Vote for or against Stem Cell Research Enhancement Act
Independent Variables of Interest	<ul style="list-style-type: none">• Partisan Affiliation of Senator• Average 2004 & 2008 Democratic Presidential Vote in State• Constituent Religiosity• Religious Affiliation of Senator

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CHAPTER 2: LEGISLATIVE VOTING BEHAVIOR ON BIOFUELS

Introduction

“We solved the energy crisis. The answer was ethanol. Corn plus magic equals gasoline,” said TV personality and comedian Stephen Colbert in an April 2008 broadcast of The Colbert Report. Unfortunately, a panacea for America’s energy dependency has been far more elusive. The United States accounts for less than five percent of the world’s population yet it consumes almost 25 percent of the world’s oil. In 2007, over one-third of the U.S. trade deficit was attributable to oil (Jackson 2008). Even though the United States is the world’s third largest oil producer, its production of oil has been in decline since the early 1970s. The inability of domestic supply to meet demand means that the United States has to import roughly half of its crude oil. Biofuels have been touted as a means of reducing this dependence on foreign oil, but they have by no means solved the United States’ energy crisis.

Oil is a finite resource, the combustion of which releases carbon dioxide into the atmosphere. Reliance upon a polluting, non-renewable fossil fuel raises serious concerns, two of which hold strong relevance for biofuels policy (Babcock 2007). One is energy security. A U.S. National Energy Technology Laboratory report, expressing a similar opinion as several other energy analysts (Bentley 2002; Deffeyes 2006; GAO 2007a; Goodstein 2004; Simmons 2005), has cautioned that “the world is fast approaching the inevitable peaking of conventional world oil production” (Hirsch 2005, 14). America’s reliance upon petroleum for 97% of its transportation needs (Williams 2008) places the country in a precarious position: if global demand for oil outstrips the ability of the world’s oil companies to supply it, the United States will face potentially severe and long-lasting economic consequences. Biofuels are a renewable resource

and they can be produced domestically; therefore, proponents have argued that increasing their use has the potential to enhance America's energy security.

Another concern of America's oil dependency is the impact such heavy fossil fuel reliance will have upon the environment. The Intergovernmental Panel on Climate Change's (2007) Fourth Assessment Report makes the scientific consensus on climate change clear: global warming is real and there is over a 90% chance it is occurring as a result of anthropogenic (human) additions of greenhouse gases into the environment. Since the use of petroleum is carbon-intensive, other means of fueling transportation have been proposed as a way to reduce America's carbon footprint. Some of these ways include electric and hydrogen powered cars but biofuels have also been suggested as an alternative to conventional gasoline use. Net greenhouse gas emissions from using biofuels may be lower than emissions from using oil, and so biofuels have been promoted as a means of combating global warming. The degree to which biofuels can replace oil and whether or not net greenhouse emissions are actually lower by using biofuels are still questions for debate.

America's addiction to foreign oil, as President George W. Bush once called it, was not considered too problematic during the 1990s when real oil prices were near historical lows. However, with the run-up in real oil prices in the last few years to all-time highs, finding domestic alternative energy sources to offset America's consumption of foreign oil became a major policy initiative, as indicated by the presidential, legislative, and media attention given to the issue. Policy proposals to address the issue have been met with much debate, both in the scientific community and in Congress. Despite constant fluctuations in the price of oil, biofuels remain a salient issue in energy policy, and detailing the controversy surrounding them will inform the analysis to be conducted later.

In spite of ongoing debate over the use of agricultural commodities for fuel and the controversial votes that have been taken place on this topic, empirical tests of the reasons for Congressional support or opposition to biofuels are lacking. This research project seeks to address this discrepancy by using statistical analysis to determine the motivations for individual legislators to vote for or against these policies. To accomplish this goal, it is important to review the political science literature relevant to such an inquiry in order to put the analysis in an appropriate theoretical context. Two views of legislative behavior will be outlined: one positing that legislators respond most strongly to their partisan/ideological affiliations and the other citing constituents and specialized interests in a representative's district as having the most significant impact on voting decisions. Logistic regression will be the primary means of analysis.

Scientific and Political Debate

A biofuel is any fuel derived from organic matter. In the United States, biofuels are made almost entirely from Midwestern corn. This corn is converted into ethanol, an alternative fuel capable of being used in concentrations as high as 25% in standard internal combustion engines and up to 85% in flex-fuel vehicles. In 2006 ethanol constituted 99% of American biofuels (Farrell et al. 2006) and in the following year it was estimated that corn made up 98% of the feedstocks used for ethanol production (Yacobucci and Schnepf 2007). Many individuals reading this chapter have likely consumed ethanol at some point in their lives: ethanol is ethyl alcohol, the intoxicating agent found in alcoholic beverages. It is created by the fermentation of starches into alcohol.

In the U.S., corn-based ethanol has primarily been used as an additive in 10% blends with gasoline. Ethanol allows gasoline to burn cleaner because it contains more oxygen and it also raises the octane level of gasoline blends. More importantly, it has been used as a replacement

for MTBE (methyl tertiary butyl ether), which once served both of these functions before being banned in many states due to its ability to contaminate groundwater supplies in small amounts (Tyner 2007). The Federal government furthered this transition by not protecting oil companies who manufacture MTBE from lawsuits related to MTBE contamination of public drinking water.

In 2007, approximately 6.5 billion gallons of corn-based ethanol was produced in the United States (Becker 2008). By 2012, this number is expected to reach 11.2 billion gallons of ethanol and will consume a third of the U.S. corn crop (GAO 2007b). Though 11.2 billion gallons sounds like a substantial amount (and it certainly is), it would only account for 7.4% of projected total gasoline demand in 2012. Since ethanol contains about two-thirds the energy of an equivalent amount of gasoline, this estimate can actually be reduced by a third (GAO 2007b). The implication is clear: corn-based ethanol alone will not be able to end America's dependence on foreign oil. For example, it is estimated that converting the entire grain harvest of the United States into ethanol could only meet 18 percent of U.S. automotive fuel requirements (Brown 2008).

Research and development is underway on second-generation biofuels such as switchgrass, but so far these technologies are not cost competitive with corn and it will likely be several years before their production rates reach the levels of conventional ethanol. Once these technologies become more economical and technologically feasible, the federal government hopes they, along with corn-based ethanol, will be able to replace 30% of the country's petroleum consumption, but this rate of replacement is not targeted until 2030 (Hahn-Hägerdal et al. 2008). For now and in the foreseeable future, corn-based ethanol will remain the predominant American biofuel.

The diversion of a substantial amount of U.S. corn for energy use has not been without controversy. In the scientific community, the debate has largely centered around two issues: does corn-based ethanol have a positive net energy balance (i.e. does it deliver more energy than what it takes to produce) and does the use of biofuels result in a reduction of greenhouse gas emissions? The net energy balance of corn ethanol has been debated since at least the 1970s (see Chambers et al. 1979). Though some scientists claim corn ethanol requires more energy to produce than what it can deliver (Pimentel and Patzik 2005), most have found that corn-based ethanol does have a positive net energy balance (Farrell, et al. 2006; Shapouri, Duffield, and Wang 2002; Manuel 2007). However, whether or not corn ethanol is a net energy winner or loser is still open to interpretation depending on what inputs to production are included (or excluded) in the calculations (Groode and Heywood 2008). The debate over lowered greenhouse gas emissions is also unsettled. While some scientists have claimed that corn ethanol results in fewer greenhouse gas emissions than conventional gasoline (Wang, Saricks, and Santini 1999; Manuel 2007), others have claimed that ethanol is actually more greenhouse gas intensive (Searchinger et al. 2008). Many, though, have claimed that ethanol's greenhouse gas effect is probably ambiguous (Shapouri, Duffield, and Wang 2002).

In the political arena, these scientific debates have garnered little attention, which should not come as a surprise given the uncertainty of scientists' findings in this area. As Roger Pielke (2007) has shown, when a high degree of uncertainty exists, objective scientific information is not likely to be the determining factor when deciding whether or not to adopt a particular policy. Instead, other concerns are likely to take precedence, such as economic or moral considerations. Climate change is a relevant example. There is little scientific uncertainty regarding the conclusion that humanity's production of greenhouse gases is contributing to climate change;

there is a great deal of uncertainty, though, as to what the effects will be (see Quiggin 2008), with varying estimates available based on highly complex models and hypothetical projections of current trends. Without a clear indication of what will occur without government intervention, positions on the issue have tended to align along predictable ideological divisions, with those favoring government regulation to protect the environment supporting climate change legislation and those favoring business-friendly anti-regulatory policies expressing opposition.

Given that biofuels policy is now well-established despite the contested nature of the science supporting it, political debate has instead revolved around economic concerns, namely the perceived role ethanol subsidies and biofuels mandates play in raising corn prices and the corresponding effects they may have on livestock feed and consumer food prices. Feed typically accounts for 60-70% of total livestock production costs in a year. Since corn makes up 90% of feed, it is not surprising that ethanol has taken center stage in political debates over corn being used for fuel instead of for food. A study by Keith Collins, former chief economist at the USDA, found that 25% to 60% of changes in U.S. corn prices could be traced to biofuels policy (Becker 2008). Though a multitude of factors have been blamed for record high prices of feed (see NDFU 2008), ethanol still remains a favorite culprit of its critics. The research connecting corn prices to rising consumer food costs, though, is tenuous. For example, it is estimated that less than 10% of a price increase in corn is translated into higher retail costs (Leibtag 2008). Though corn-based ethanol has contributed to higher prices in the market for corn, the farmer's share of retail food prices is only 19%, and other factors such as higher crude oil prices may be at work in retail food inflation since they can lead to significant increases in the packaging, transportation, and energy costs of food manufacturers (Anderson et al. 2008).

At first the general public embraced government policy to support the use of biofuels but over time they have become skeptical. For instance, a February 2006 Pew Research Center survey found that 72% of Republicans and 65% of Democrats favored increased funding for ethanol research; just two years later in February 2008 a Pew Research Center survey found that support had dropped to 59% among Republicans and 56% among Democrats (Pew Research Center 2008a). This shift in support occurred as ethanol became a flashpoint in the 2008 election with John McCain maintaining strong opposition to ethanol subsidies and mandates, a position that all but forced him to write off Iowa during the primaries due to that state's status as the number one producer of corn in the country. With McCain at the top of their ticket, Republicans decided to reverse their previously supportive stance on ethanol and included the following language in their party platform: "The U.S. government should end mandates for ethanol and let the free market work" (Kaiser 2008). Democrats, on the other hand, nominated a junior senator from Illinois, a state in the "Corn Belt" that has benefited from the government's pro-biofuels policies. It is not surprising that the party included favorable language in its platform: "We'll invest in advanced biofuels like cellulosic ethanol which will provide American-grown fuel and help free us from the tyranny of oil" (Bevill 2008).

Surveys released around the time of the election show the likely effect of this shift in elite positions. A September 2008 Pew Research Center survey found that about half of Republicans no longer supported increased funding for ethanol research whereas nearly two-thirds of Democrats now favored more government funding for this type of research (Pew Research Center 2008b). A state survey found similar results: a 2009 poll of Wisconsin residents by the University of Wisconsin-Madison found that less than 40 percent of Republicans supported government subsidies for ethanol research, whereas approximately 60 percent of Democrats

supported this form of government-financed research (Mitchell 2009). A more recent poll shows that public support for government subsidization of ethanol production has continued to erode over time: a Pew Research Center survey released in November 2011 found that only 45 percent of Democrats and 32 percent of Republicans now favored ethanol subsidies (Pew Research Center 2011). These polls indicate that the public, at first generally supportive of the government's biofuels policies, have lost their initial enthusiasm with a majority no longer supporting ethanol subsidization and Republicans becoming even more hesitant than Democrats to accept government intervention to increase its use.

At the same time that support for corn-based ethanol among the general public began to decline, an unusual coalition of interests was forming against its use: livestock lobbies concerned with rising feed prices, oil companies fearful of competition, and environmentalists worried about ethanol's environmental impact. One group of significant importance that joined ethanol opposition in 2008 is the Grocery Manufacturer's Association (GMA), which represents over 300 food and beverage companies. A memo from the GMA leaked that same year was posted by Iowa Senator Charles Grassley, a champion of ethanol subsidies, on his website. It included a strategy proposal for opposing ethanol that a lobbying group hired by the GMA had developed. The lobby group's plan was to take its case to voters and turn the tide of public opinion against ethanol. In addition, the group felt it would be necessary to win over progressive or business-friendly Democrats along with Republicans and Democrats from non-farm states that may have supported ethanol in the past (Cohen 2008). The ultimate goal as indicated by what was written in the memo was to "obliterate whatever intellectual justification might still exist for corn-based ethanol among policy elites" (Cummings 2008). Senator Grassley responded to this somewhat

acerbic language by providing a greater measure of his own, accusing the GMA of “treasonous” acts (Streitfeld 2008).

Senators and representatives have by no means been the only politicians involved in the fray. In 2008 Governor Rick Perry of Texas asked the EPA to consider temporarily waving ethanol blending requirements claiming that it was putting too much of an economic burden on Texas’ cattle industry. Farm groups and ethanol producers immediately began lobbying to keep the mandates in place. Governor Perry attempted to enlist the assistance of other governors to push his cause, but, unable to find even one other governor to join him, he instead found himself being opposed by a group of twelve Midwestern governors (Streitfeld 2008). The EPA eventually ruled against Governor Perry and ethanol’s proponents celebrated a hard-fought victory. This series of events demonstrated that those supporting ethanol, namely corn farmers, the agricultural lobby, biofuels producers, government agencies, and a number of powerful politicians, are a difficult group to oppose.

Two Key Influences on Legislative Behavior

Opposition to biofuels policy has been growing among the public and a number of important actors, yet it has often been assumed in the popular press that federal legislative support for biofuels remains strong. However, this assumption and the reasons for this presumed support have not been empirically tested. Two key influences on legislative behavior have been selected to provide the framework for conducting the analysis that follows: partisanship/ideology and the interests of constituents. Using the lens provided by each of these influences will provide important insight into the underlying question of this research project: what is the primary motivation for how a legislator decides to vote on biofuels legislation and what insight can it provide about the nature of legislative responsiveness?

Studies analyzing roll-call votes in the U.S. Congress often find that party affiliation is the best predictor of a politician's vote. For this reason, a partisan/ideological loyalty view of legislative behavior posits that party effects are strong in Congress (Aldrich 1995; Cox and McCubbins 1993; Jenkins and Nokken 2008; Rohde 1991; Sinclair 1997). Since parties exert a strong institutional influence, they have a great deal of power over the content and passage of legislation. This party influence can be defined as the pressure a party leader or caucus can apply to achieve discipline in party voting (Snyder and Groseclose 2000). To maintain a party's brand and its according reputation and ease of identification with the public, party leaders use their influence to provide favors such as committee appointments and district funding or invoke punishments such as dismissal from a committee and reallocation of funding away from a member's district to ensure party members vote in a desired way. Parties above all else desire to win elections (Downs 1957), and they will seek to do so by making sure their party members vote in a way that is most likely to achieve this outcome.

Ideology can be thought of as a collection of beliefs and values. Ideology reduces the costs of decision-making for voters and lawmakers by communicating a member's views on a wide range of issues (Hinich and Munger 1996). It could be contended that lumping party and ideology into one identifiable influence is inappropriate. However, it has been found that ideology can be accurately captured by party and regional loyalty (Heckman and Snyder 1997). Poole and Rosenthal (1997), for example, have found that a liberal (greater government intervention in the economy) and conservative (reduced role for government) scale based on party affiliation can account for legislators' voting decisions on 80% of all roll call votes cast between 1789 and 1985. Legislators choose their party affiliation based upon the perception that a party best fits with their ideology and that a party will allow them to promote their interests

(Mehmood and Zhang 2001). In light of these reasons and with the increasing ideological distance between the parties, a legislator's partisan affiliation is the variable used in the analysis to follow.

The partisanship/ideology view of legislative behavior has been criticized because of its lack of attention to the characteristics of a legislator's district (Krehbiel 1993). David Mayhew (1974, 27) has gone so far as to say that, "no theoretical treatment of the United States Congress that posits parties as analytic units will go very far." These detractors do not discount the relationship between partisanship and voting. However, they question whether it indicates a strong party influence within Congress. It could be that a member's party affiliation is correlated with the preferences of that member's constituents, and so members of Congress are concerned with constituency preferences most of all (Shannon 1968; Fiorina 1974; Bartels 1991; Erikson and Wright 2000). However, it must be noted that the actions of elected representatives are largely unknown to the average voter (Miller and Stokes 1963; Fiorina 1974; Arnold 1990). Legislators are responsive to constituents on high-profile issues that could threaten their re-election, but there is little evidence that they are directly influenced by the interests of their constituents on less controversial issues (Bertelli and Carson 2005).

Even though constituencies are often ignorant of their representative's legislative behavior, it does not mean that they are ignored. As one Congressman put it: "If it's good for [our state], we're for it. If it's not good for [our state], we're against it. It's that simple" (Browne 1995, 63). Legislators are constantly balancing between their roles as trustees (autonomy to act against constituency interest for the common good) and delegates (mouthpieces for constituency preferences) which often leads them to act as "politicos" (Davidson 1969). Acting as politicians means that in most cases, Congressmen and Congresswomen will vote based

on their personal interests but in cases where a bill is crucial to a district or where a vote is highly publicized, they will seriously consider constituency preferences (Lanoue and Emmert 1999).

Testing the Framework

In the past decade, there have been four pieces of legislation that have contained significant biofuels components. The first bill is the Farm Security and Rural Investment Act of 2002, also known as the 2002 Farm Bill. It contained the first energy title in the history of farm bill legislation. Not unusual for farm bills, it passed with broad support in the House and Senate. The second bill, the Energy Policy Act of 2005, was a landmark in biofuels legislation. Its most significant policy impact was the creation of the first Renewable Fuels Standard (RFS). The RFS mandated the production of 4 billion gallons of biofuels in 2006 and increased production requirements annually to 7.5 billion gallons by 2012. It, like the farm bill, passed with broad support in both chambers of Congress.

The two additional pieces of legislation were the Energy Independence and Security (EISA) Act of 2007 and the 2008 Farm Bill. The EISA Act of 2007 greatly expanded the RFS, increasing requirements to 9 billion gallons of biofuels in 2008 with annual step increases until reaching 36 billion gallons in 2022, with corn-based ethanol being capped at 15 billion gallons per year after 2015 (other feedstocks are to make up the difference). According to the bill's proponents, it will add approximately \$1.7 trillion dollars to GDP between 2008 and 2022 and support the creation of over 1 million jobs (RFA 2008). According to its critics, it is laden with expensive government subsidies that cost taxpayers money (Lesser 2008). Despite this and other controversies, the bill passed with wide margins in both the House and Senate. The last piece of legislation, the 2008 Farm Bill, was chosen because it significantly increased funding that was

originally allotted to biofuels in the 2002 Farm Bill. Congressional support for the 2008 Farm Bill was so strong that it had the unusual distinction of overriding a presidential veto.

It is apparent that these four bills are omnibus legislation, particularly the two farm bills. These bills are highly complex and long, addressing a number of issues which may share little relation to one another (Sinclair 1997). Omnibus legislation is typically used when there is uncertainty regarding the passage of particular items in the total package. Party leaders, knowing these items are controversial, will include them in the widely supported omnibus bill since they would be difficult to pass on their own. Omnibus legislation is considered to be an effective “agenda-control and coalition-building tool” (Krutz 2000, 533).

Perhaps placement of biofuels policy in these pieces of legislation was intentional. By placing these riders in bills that enjoy widespread support, biofuels are likely to be shielded from the intense debates that might occur if they were considered as individual pieces of legislation. Omnibus bills are almost always passed by Congress (for example, the average level of support for these four bills was 65% in the House and 70% in the Senate) and so conducting analysis on these bills will demonstrate larger support for biofuels than might actually be present. In addition, often legislators do not know the full contents of these bills (Krutz 2001). As Senator Robert Byrd once said of an omnibus bill: “Do I know what’s in this bill? Are you kidding? No. Only God knows what’s in this monstrosity” (Krutz 2000, 534). This research project seeks to determine what causes legislators to vote either for or against biofuels, and so as long as biofuels continue to be packaged in these omnibus pieces of legislation (and arguably an issue like biofuels is more likely to be recognized as part of the bill), then it can be contended that measuring support for these bills is also a sufficient measurement of biofuels support. However,

it can just as easily be contended that legislators are voting for these bills despite their biofuels provisions, not because of them.

In light of these concerns, specific analysis of four biofuels amendments will be conducted instead of analyzing the four aforementioned omnibus bills. Two amendments to the Energy Policy Act of 2005, one in the House and one in the Senate, have been chosen because they more directly measure biofuels support. The titles of the amendments explain their intent. House Amendment 81 allowed “the Secretary of Energy the authority to include in the Strategic Petroleum Reserve alternative fuels, including ethanol and biodiesel and rename the reserve the ‘Strategic Fuels Reserve’”; the purpose of Senate Amendment 782 was “to strike the reliable fuels subtitle of the amendment,” which would have had the effect of removing the Renewable Fuels Standard. It should be noted that the House vote was whether or not to accept the amendment whereas the Senate vote was whether or not the amendment should be tabled, meaning a yes vote in either case was a vote in support of biofuels. The House amendment failed primarily along partisan lines but the Senate amendment enjoyed broad support and so the RFS was not struck from the overall bill.

Two more recent ethanol amendments that have been chosen for analysis are to bills that were not passed into law. The first is House Amendment 156 to H.R. 1: Continuing Appropriations Act, 2011, a controversial Republican bill to fund the federal government for the remainder of fiscal year 2011. The amendment passed 285 to 136 and its purpose was evident from its title: “Prohibit the use of funds in the decision of the Administrator of the EPA entitled ‘Partial Grant of Clean Air Act Waiver Application Submitted by Growth Energy to Increase the Allowable Ethanol Content of Gasoline to 15 percent.’” The second is Senate Amendment 476 to S. 782: Economic Development Revitalization Act of 2011, a “jobs bill” that was sunk by the

nearly 100 nongermane amendments offered to it. The amendment passed 73 to 27 and its purpose was to “repeal the Volumetric Ethanol Excise Tax Credit,” a credit that had provided the ethanol industry with approximately \$6 billion a year but which was set to expire at the end of 2011 anyway (and which did). Unlike the previous two amendments, in this case a yes vote was a vote in opposition to government support of biofuels. Even though neither of these measures was enacted, that they failed by considerable margins is a possible indication that the political winds in favor of ethanol have begun to shift.

Granting that roll-call voting provides a proper indication of legislative intent and that the aforementioned biofuels-specific amendments adequately capture biofuels support, the issue then becomes how to incorporate the two key influences on voting behavior outlined earlier into a cohesive set of testable hypotheses. For purposes of this analysis, the following research questions will be analyzed:

Party/Ideology: To what extent does a Congressman or Congresswoman’s party affiliation impact support for biofuels? The Republican Party is more conservative (i.e. generally opposed to greater government intervention in the economy) and its party platform evolved over time to express opposition to ethanol subsidies. The Democratic Party is more liberal (i.e. more accepting of increased government intervention in the economy) and its party platform has remained supportive of biofuels. Therefore it is expected that biofuels policy will garner its greatest support from Democrats and its greatest opposition from Republicans.

Preferences of Voters: Do legislators take into account the preferences of voters in their district? Among voters, Republicans (and conservatives) are more likely to be skeptical of government interference in the free market whereas Democrats (and liberals) are more tolerant of government intervention; however, on this issue, partisan preferences are somewhat difficult to

disentangle. Republicans are more likely to be from rural districts (Gimpel & Karnes 2006) and these districts are much more likely to benefit from biofuels policies. However, Republican support for these policies has waned over time, though there is still a certain contingent of Republicans that support them. Democrats, meanwhile, are more likely to come from urban districts that have little to no agricultural presence yet they are much more likely than Republicans to support alternative energy policies. Environmentally-conscious Democrats have expressed reservations about the use of biofuels, though. Therefore it is difficult to predict in advance how legislators will respond to the diversity of these opinions. A reasonable supposition is that these mixed signals will result in the general opinions of constituents not having a significant effect on a legislator's voting decision.

Agricultural Interests: In addition to their overall voter base, there is reason to believe that legislators will be concerned with the regulatory and funding demands of well-organized interests in their district that lobby and support them (Rowley and Schneider 2004). A greater preponderance of agricultural constituents (particularly corn farmers) in a district should increase the likelihood that a representative will vote in favor of biofuels. One caveat is the presence of cattle farmers who would prefer to see ethanol support reduced due to its impact on feed prices. Therefore in Republican districts with significant corn acreage, there should be defections from the party's ideological stance opposing government subsidization of ethanol; in Democratic districts with significant numbers of cattle, there should be defections from the party's stance of supporting ethanol. It should be noted that oil interests are not included in the analysis as an opposition group as a number of the largest petroleum companies such as Exxon and BP have financial investments in ethanol production.

To test these research questions, logistic regression will be conducted for the House of Representatives and the Senate for the four aforementioned biofuels amendments. If the hypotheses above are correct, then the legislators supporting biofuels policy should have distinct partisan and district characteristics that differentiate them from legislators in opposition to these policies. The analyses that follow will compare a legislator's party, the agricultural characteristics of their district pertinent to this analysis (corn acres harvested and number of cattle and calves, adjusted for district population, obtained from the 2007 USDA Census of Agriculture), and the partisan identification of voters in a district (calculated using the mean democratic presidential vote share for the 2004 and 2008 presidential elections; previous literature confirms the validity of using presidential vote share as a proxy for district preferences (e.g. Erikson and Wright 1980; Ansolabehere et al. 2001; Masket 2007; Levendusky, Pope, and Jackman 2008)). Interaction terms are not included in the analyses that follow in part because their incorporation does little to alter the results but also because of the statistical challenges their inclusion presents for analyzing the small number of observations in the Senate.

Results and Findings

Table 2.1
Biofuels Voting Behavior in the House of Representatives
On Agreeing to House Amendment 81 to H.R. 6

<i>Independent Variables</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>Odds Ratio</i>
Party of Representative (Rep=0; Dem=1)	4.710***	(0.492)	111.036
Avg '04 & '08 Dem Presidential Vote	0.022	(0.017)	1.022
Number of Cattle & Calves (per 100 pop)	-0.008*	(0.004)	0.992
Corn Acres Harvested (per 100 pop)	0.007***	(0.002)	1.007
Constant	-4.011***	(0.852)	

* = $p < .05$; ** = $p < .01$; *** = $p < .001$

<i>Observations</i>	425
<i>Log Likelihood</i>	-114.485
<i>Model Significance</i>	$p < .0001$
<i>Pseudo R² Value</i>	0.607
<i>Percent Predicted Correctly</i>	91.29%

In the 2005 House vote on whether or not to include ethanol in the government's petroleum reserves, the odds ratios in Table 2.1 relate the story: party was the predominant predictor of how a representative decided to vote. A Democratic representative was 111 times more likely than a Republican to vote in favor of this pro-biofuels amendment. The preferences of general voters had no statistical impact on a representative's vote whereas the presence of specific interests represented by cattle and corn did indeed have an impact on how a legislator decided to vote. For every additional 10 cattle and calves per 100 people in a representative's district, they were 8% less likely to vote in favor of the amendment; for every additional 10 corn acres harvested per 100 people in a representative's district, they were 7% more likely to vote in favor of the amendment.

Figure 2.1

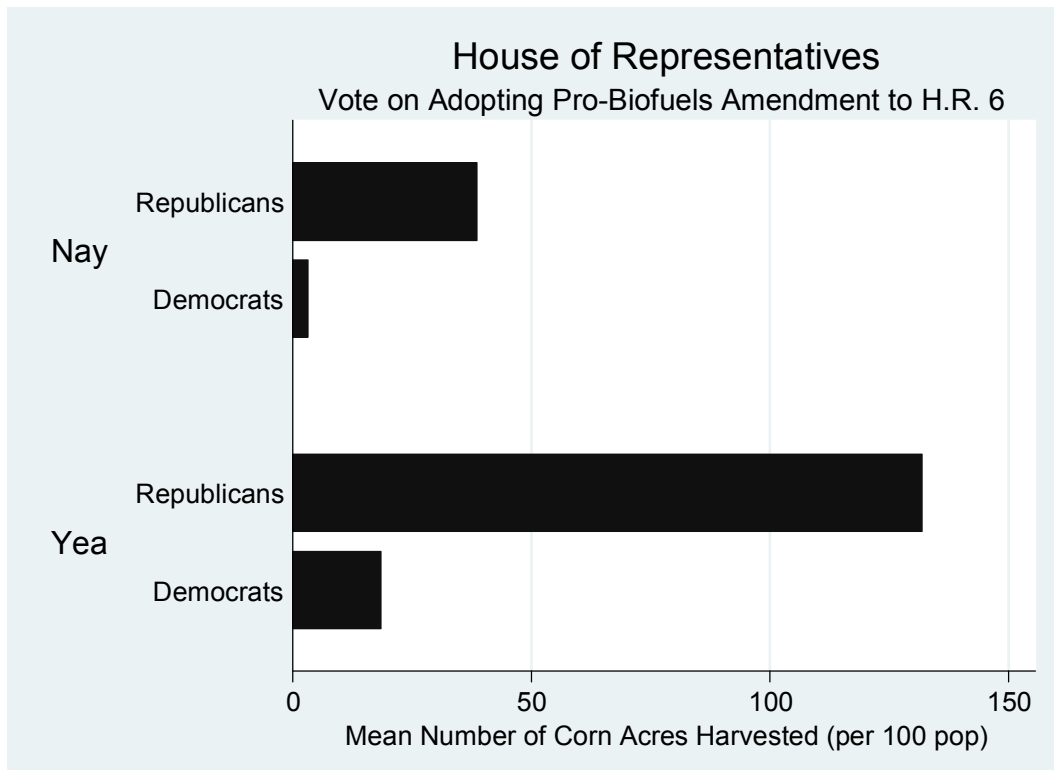
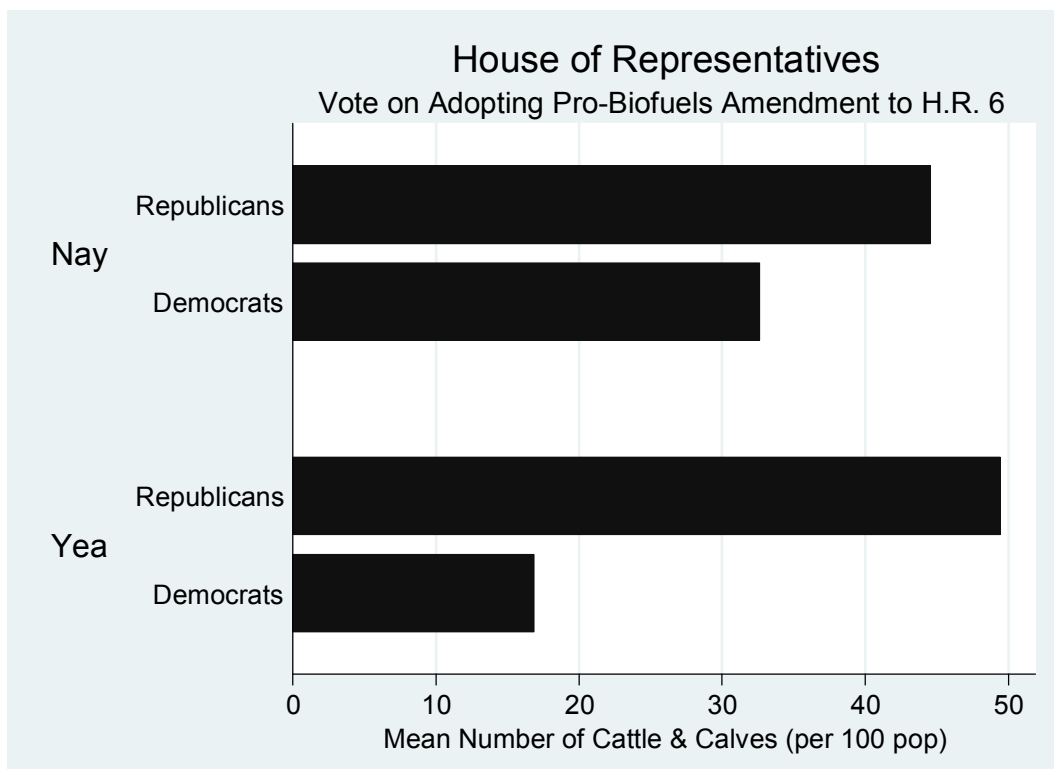


Figure 2.2



Analyzing the different means between those supporting and those opposing biofuels, by party affiliation, can provide additional insight into how agricultural characteristics affected representatives. As suspected, the effect of cattle and corn interests were not the same for the two parties. Democrats were largely unaffected by the presence of corn interests, as indicated in Figure 2.1. Since Democrats already have an incentive to vote in favor of the amendment, it makes sense that the presence of corn interests in their district would not have a substantial impact on their decision whether or not to support the amendment. The effect of corn interests is much more pronounced for Republicans; it takes significant corn interests in their district for them to overcome their partisan predisposition to vote against the amendment. For cattle interests in a district, the reverse is true as Figure 2.2 illustrates: the presence of cattle interests had a pronounced effect on the voting behavior of Democrats but did not seem to impact how Republicans voted. Again this makes sense since Republicans already have an incentive to vote against the amendment and the presence of additional cattle interests is unlikely to have much of an impact on that decision. For Democrats, having significant cattle interests in their district made it more likely that they would vote against the amendment despite their partisan predisposition to vote in favor of it.

Table 2.2
Biofuels Voting Behavior in the Senate
Motion to Table Senate Amendment 782 to H.R. 6

<i>Independent Variables</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>Odds Ratio</i>
Party of Senator (Rep=0; Dem=1)	1.136	(0.741)	3.114
Avg '04 & '08 Dem Presidential Vote	-0.125*	(0.052)	0.882
Number of Cattle & Calves (per 100 pop)	0.005	(0.008)	1.005
Corn Acres Harvested (per 100 pop)	0.084*	(0.037)	1.088
Constant	5.613*	(2.600)	

* = $p < .05$; ** = $p < .01$; *** = $p < .001$

<i>Observations</i>	97
<i>Log Likelihood</i>	-38.064
<i>Model Significance</i>	$p < .0001$
<i>Pseudo R² Value</i>	0.347
<i>Percent Predicted Correctly</i>	85.54%

The Senate presents an interesting contrast to the results of the House. The analysis in Table 2.2 seems to confirm that the Senate is more idiosyncratic in its voting than the House (Lee and Oppenheimer 1999): partisanship was not a statistically significant predictor of vote choice, the more conservative a state was the more likely a Senator was to vote in favor of biofuels (every additional percentage point voters gave to the Democratic presidential candidate in a state made a Senator about 12% less likely to vote in favor of tabling the anti-biofuels amendment), and the presence of corn interests had a considerable impact on how a Senator decided to vote (every additional acre of corn harvested per 100 people in a state made a Senator about 9% more likely to vote in favor of tabling the anti-biofuels amendment), whereas the presence of cattle interests did not have a statistically significant impact. That the House would be more partisan than the Senate is not surprising but it is interesting that there is no statistically significant impact from party in the Senate. And the finding that the more conservative a state's voters the more likely a Senator was to vote against their interests seems counterintuitive.

Figure 2.3

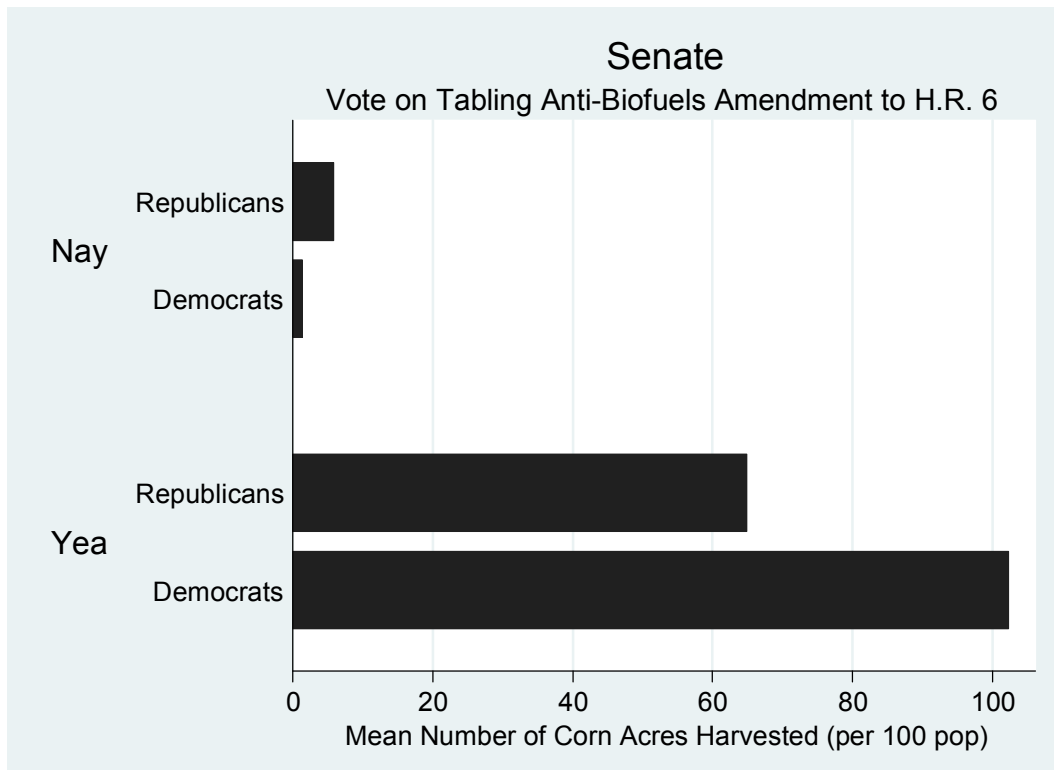
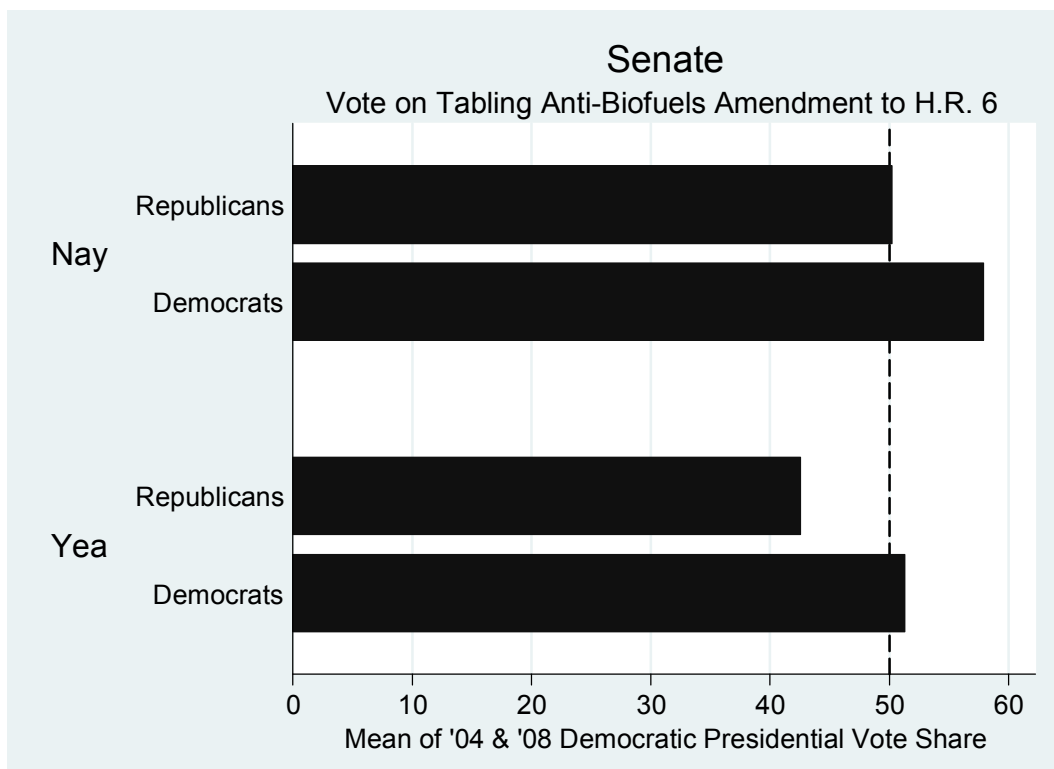


Figure 2.4



Looking at the different means between Senators that supported tabling the anti-biofuels amendment and Senators that opposed tabling the anti-biofuels amendment can provide insight into how corn interests and general voter preferences impacted a Senator's vote choice. Figure 2.3 indicates that the amount of corn acres harvested in a state was an important determinant in how a Senator decided to vote; unsurprisingly, the average for those voting against tabling the amendment was closer to 0 corn acres harvested per 100 people in the state, a significant difference from the high number of corn acres harvested for those voting to table the amendment. What is a bit unique from the House of Representatives is that corn interests impacted Democrats and Republicans in a similar way, pushing them both to vote for tabling the anti-biofuels amendment. Perhaps since partisanship was not a statistically significant predictor the presence or absence of corn became an even stronger way of differentiating those that expressed support for biofuels from those that expressed opposition.

Figure 2.4 helps to make sense of the somewhat unusual finding that additional votes for a Democratic presidential candidate in a state make it less likely that a Senator will vote in favor of biofuels. It would seem from the means reported in Figure 2.4 that strategic voting was taking place. Those Senators in electorally competitive states by and large voted in line with what the general preferences of their constituents would suggest, with Republicans voting Nay and Democrats voting Yea. On the other hand, those from electorally safe districts (Democrats from liberal districts and Republicans from conservative districts) felt comfortable voting against the preferences of the general electorate in their state. It appears that the overall preferences of constituents were only important when a Senator had to worry about the median voter in their state, a rather disparaging view of legislative responsiveness.

Table 2.3
Biofuels Voting Behavior in the House of Representatives
On Agreeing to House Amendment 156 to H.R. 1

<i>Independent Variables</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>Odds Ratio</i>
Party of Representative (Rep=0; Dem=1)	-2.117***	(0.437)	0.120
Avg '04 & '08 Dem Presidential Vote	-0.058***	(0.015)	0.943
Number of Cattle & Calves (per 100 pop)	-0.003	(0.003)	0.997
Corn Acres Harvested (per 100 pop)	-0.023***	(0.004)	0.977
Constant	5.964***	(0.768)	

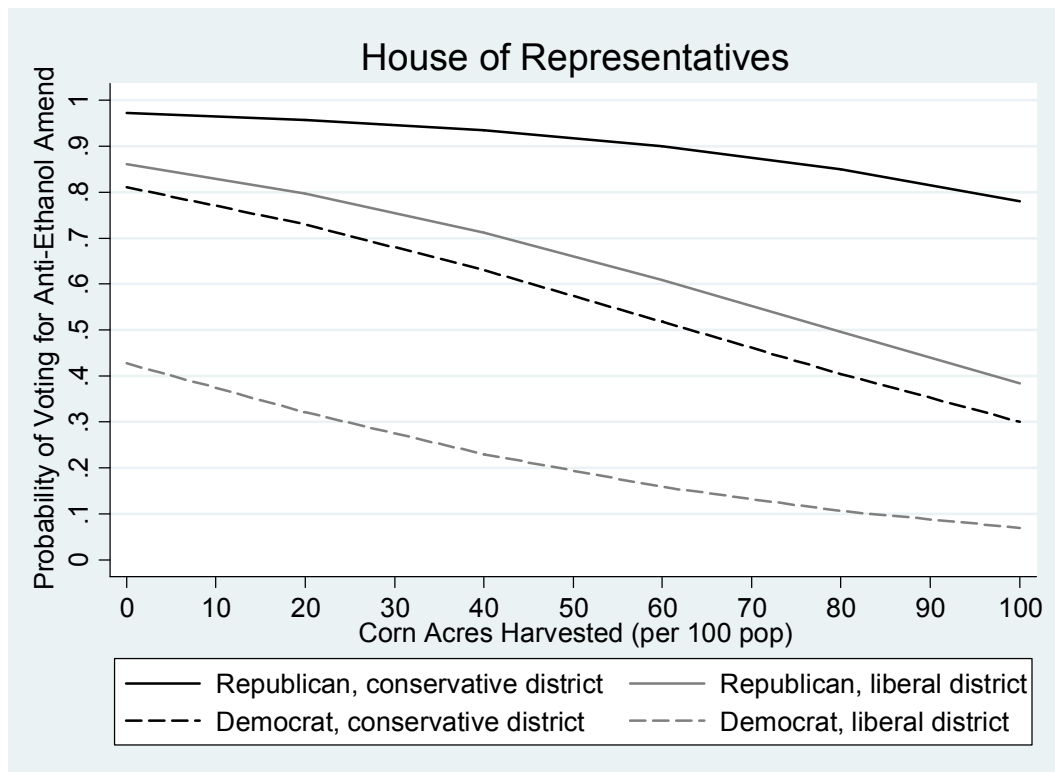
* = $p < .05$; ** = $p < .01$; *** = $p < .001$

<i>Observations</i>	423
<i>Log Likelihood</i>	-169.652
<i>Model Significance</i>	$p < .0001$
<i>Pseudo R² Value</i>	0.365
<i>Percent Predicted Correctly</i>	80.61%

For the analysis of voting on the two 2011 amendments, it should again be noted that a vote for the amendment in question now represents a vote in opposition to biofuels instead of in favor. House Amendment 156 to H.R. 1 sought to prevent the EPA from increasing the allowable amount of ethanol in gasoline from 10% to 15%. Though what was a statistically significant predictor of a representative's vote differs from the 2005 biofuels amendment vote, one thing does remain the same: party was the predominant predictor of vote choice. Democrats were 88% less likely than Republicans to support this anti-ethanol amendment. General constituent preferences and the presence of corn interests were also important in determining a legislator's vote; cattle interests did not have a statistically significant impact. The odds ratios in Table 2.3 show that every additional percentage point voters gave to the Democratic presidential candidate in a district made a representative about 6% less likely to vote in favor of the anti-ethanol amendment; for every additional acre of corn harvested per 100 people in a district, a representative was about 2% less likely to vote in favor of the anti-ethanol amendment.

Figure 2.5

Predicted Probabilities



There are no major surprises in the results but by themselves they do not provide the kind of precision that is necessary for directly comparing how these different interests weighed on a legislator's mind. A predicted probabilities graph is better suited for that purpose. Figure 2.5 provides predicted probabilities for Democrats and Republicans with different district characteristics. For the purposes of the figure, a conservative district is considered to be one in which the average Democratic presidential vote share in 2004 and 2008 was 35% and a liberal district is considered to be one in which the average Democratic presidential vote share in 2004 and 2008 was 65%; the number of cattle and calves, which was not a significant predictor, was held at its mean. The partisan difference on this issue is abundantly clear from the figure: predicted probabilities for a Democrat voting against biofuels are lower at every point than Republicans.

It is also clear how important the general preferences of constituents were in determining how a representative voted. For example, the probability of a Democrat from a conservative district with no corn interests voting against biofuels was near 0.8 whereas the probability for a Democrat with no corn interests from a liberal district was closer to 0.4; for Republicans with significant corn interests such as an acre of corn harvested for every person, the amount of this difference was the same with Republicans from conservative districts having a probability near 0.8 and Republicans from liberal districts having a probability around 0.4. This result suggests that for Republicans from conservative districts it would take a substantial amount of corn interests in their district to vote in favor of biofuels whereas for Democrats from liberal districts even a small amount of corn interests in their district is enough to solidify their decision to vote in favor of biofuels. This result is consistent with legislative responsiveness to general constituent preferences, a finding confirmed in Figure 2.5 by the fact that Republicans from liberal districts have similar predicted probabilities as Democrats from conservative districts. That general constituency preferences mattered in the House in 2011 but not in 2005 should come as no surprise given how the partisan/ideological preferences of voters have become more crystallized on this issue over time.

Table 2.4
Biofuels Voting Behavior in the Senate
On Agreeing to Senate Amendment 476 to S. 782

<i>Independent Variables</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>Odds Ratio</i>
Party of Senator (Rep=0; Dem=1)	-0.755	(1.161)	0.470
Avg '04 & '08 Dem Presidential Vote	0.130	(0.096)	1.139
Number of Cattle & Calves (per 100 pop)	0.081*	(0.033)	1.085
Corn Acres Harvested (per 100 pop)	-0.189***	(0.053)	0.828
Constant	-2.767	(4.179)	

* = $p < .05$; ** = $p < .01$; *** = $p < .001$

<i>Observations</i>	100
<i>Log Likelihood</i>	-16.216
<i>Model Significance</i>	$p < .0001$
<i>Pseudo R² Value</i>	0.722
<i>Percent Predicted Correctly</i>	95.00%

On voting for the 2011 amendment to end a major ethanol tax credit, the Senate again distinguishes itself from the House. As before, partisanship is not a statistically significant predictor of vote choice in the Senate. Instead the results in Table 2.4 indicate that it is the number of cattle and calves per 100 people in a state and the number of corn acres harvested per 100 people in a state that determined how a Senator decided to vote; general constituent preferences did not have a statistically significant impact. Cattle and corn interests operate in their expected directions with an additional cattle/calf per 100 people in a state making it about 9% more likely that a Senator would vote against biofuels and an additional acre of corn harvested per 100 people in a state making it about 17% less likely that a Senator would vote against biofuels.

Figure 2.6

Predicted Probabilities

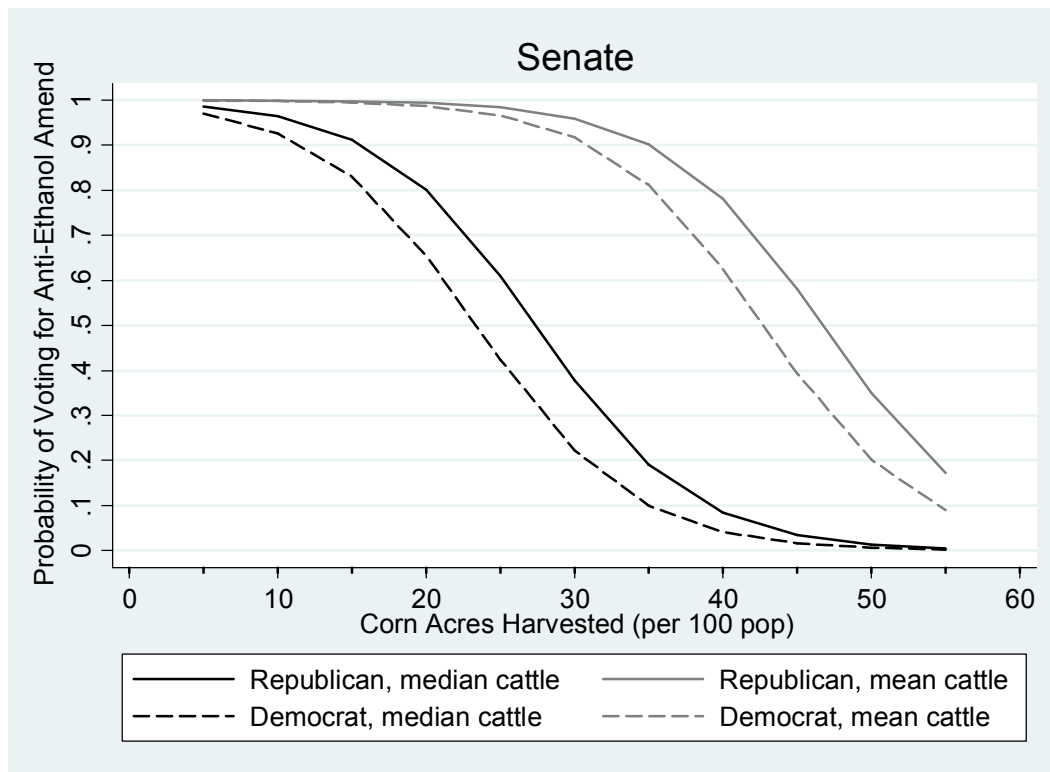


Figure 2.6 confirms that partisan differences were for the most part inconsequential in determining a Senator's vote choice since Republicans and Democrats had similar values. The figure shows Republican and Democratic probabilities of voting in favor of the anti-ethanol amendment for different state characteristics; the approximate median cattle value used was 20 cattle and calves per 100 people in a state and 65 was used as an approximation for the mean cattle and calves per 100 people in the state; the average 2004 and 2008 Democratic presidential vote share, which was not a statistically significant predictor, was held at its mean. Since Senators were more sensitive to corn interests in their state than representatives, probabilities are listed from an approximation of the median value of corn acres harvested per 100 people in a state at 5 to an approximation of the mean value of corn acres harvested per 100 people in a state at 55. Figure 2.6 provides evidence of the conflict between cattle and corn interests when

determining vote choice on biofuels legislation. In districts with high numbers of cattle, substantially more corn interests were needed to push a Senator to vote in favor of ethanol; in districts with low numbers of cattle, the threshold amount of corn interests needed was considerably lower. In either case, Senators were more responsive to corn interests than their House counterparts: values close to the mean corn acres harvested per 100 people in a state at the rightmost point of the figure rapidly begin to approach a 0 probability of voting against biofuels.

Conclusions

This chapter has been able to ascertain that two views of legislative behavior, sometimes thought to be mutually exclusive when explaining legislative behavior, both have relevance for determining support or opposition to biofuels in the U.S. Congress. However, it should be noted that these two views have varying importance depending on the chamber of Congress under investigation. In the House of Representatives, the influence of party/ideology appears to predominate over the influence of constituencies. This is not to say, though, that constituencies were entirely unimportant. If district characteristics strongly favored a particular outcome, they could push a representative to vote against their partisan and ideological predisposition. In contrast to the House, the party/ideology view seems to hold little relevance in determining a Senator's vote on biofuels. In the Senate it was the influence of constituencies that predominated over party/ideology, though even constituency influence was not fully realized as only specific interests in a state or specific electoral situations seemed to matter.

An overall conclusion from this analysis of voting behavior on biofuels is that the House of Representatives is a more partisan body than the Senate and the Senate is more sensitive to the influence of specific constituency interests. Also, as public opinion began to crystallize on the issue, the House became more responsive to general preferences of constituents whereas Senators

did not exhibit this same level of responsiveness, which is not at odds with the reality of these two differing institutions. Representatives to the House usually come from smaller districts than Senators and they are elected every two years instead of every six; both of these facts should serve to tie representatives closer to the preferences of their districts than Senators. And that partisanship was not a significant determinant of vote choice in the Senate but of great significance in the House is not surprising given that the Senate requires a supermajority to pass legislation whereas the House only requires a simple majority. The one thing that was similar in both chambers was the impact that a specific constituency, corn, had on vote choice.

In the four logistic regressions conducted in this chapter, the number of corn acres harvested per 100 people was the only predictor of vote choice that was statistically significant in all of the models. One result of this agricultural constituent pull in both chambers of Congress was that a number of Republicans defected from their official party line. Confirmation of such a phenomenon can be discerned from Minnesota Republican Brad Finstad's comments who, in response to the GOP's inclusion of a line disparaging ethanol subsidies in its party platform, was quoted as saying: "It's a little alarming that we as a Republican Party are taking that stance. In corn country there will be some independence from the GOP on the issue" (Way 2008). Another result was that Democrats who did not represent corn interests were more comfortable with voting against the official stance of their party. Evidence of this result is indicated by the fact that Chuck Schumer, D-NY, was the main sponsor of the amendment to repeal the Renewable Fuels Standard and that Barbara Boxer, D-CA, was an ardent supporter of the amendment championed by James Inhofe, R-OK, to end the Volumetric Ethanol Excise Tax Credit.

The differences between these two chambers of Congress and the finding that specific constituency interests were important in both are certainly fascinating results but can the

implications of this chapter's findings be realistically extended beyond biofuels? Unless these biofuels amendments are uniquely distinct from all other legislation considered in Congress, there is reason to believe so. At the very least, sweeping generalizations that party/ideology is singularly important to a representative's voting decision or that the interests of constituents are a legislator's lone concern cannot be sustained in light of the evidence presented here. The balanced view that legislators must juggle their allegiance to party and ideology against the interests of their constituents and that the House is overall a more partisan and responsive body than the Senate is not only intuitively appealing but confirmed by the statistical analysis carried out in this chapter. Future scholars of Congressional voting behavior should take note of the sometimes competing interests faced by legislators and ensure that constituent influences are adequately captured in their analyses.

Another conclusion from this analysis is that even for a technical scientific issue of environmental importance like biofuels, political considerations are likely to trump scientific concerns. Since the scientific information in this area has been unclear, legislators can use this ambiguity to instead base their decisions off of their personal preferences and what is likely to benefit their electoral prospects most, though it can be argued this is something they likely would do regardless of what the science said. Like the contentious issue of climate change in American politics, one can see how ideological and electoral considerations often trump scientific information.

In 1925, Henry Ford told the New York Times that ethanol would be the "fuel of the future" (Kovarik 1998). Since that time, it has often been joked that it was the fuel of the future and always would be. Some 80 years later though, in 2005, this began to change and for once it seemed that ethanol's time had finally arrived; the industry had come to receive a great deal of

government support in the form of tariffs against ethanol imports, mandates for production, and subsidies and tax credits. However, since that time ethanol has started to experience more and more legislative defeats, an indication that its future may be anything but sure.

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CHAPTER 3: INITIATIVE VOTING BEHAVIOR ON MEDICAL MARIJUANA

Introduction

It is estimated that over 1 million people across the country are breaking federal law right now under the recommendation of their physicians and in compliance with their state's regulations (ProCon.org 2012). Since 1996, voters in eleven states and state legislatures in nine states have implemented laws allowing for the medical use of marijuana, a direct violation of the Controlled Substances Act. The U.S. Supreme Court has ruled that national drug law supersedes state law (the relevant cases will be described in greater detail later in this chapter) but to date the Supreme Court has been unwilling to invalidate these incompatible state laws. The reemergence of marijuana use as a salient public policy issue beginning in the mid to late 1990s has been the cause of these ongoing political incongruities, and it is an issue that continues to generate a great deal of controversy to this day.

Marijuana policy has elicited much interest from the media and advocacy groups have written a great deal about the topic, but academic study has been less frequent. Outside the medical literature, the research that does exist has mostly been concerned with drug regulations and the inherent conflict between federal and state policy (e.g. Mikos 2009). To date, there has not been an exhaustive study to determine what makes voters likely to vote for or against marijuana for medical use and what makes them likely to vote for or against marijuana for recreational use. What factors are important in determining a voter's policy preference on this salient state policy issue? Can their views be traced to their partisan affiliation? Are their views a result of their ideology and personal values? This chapter seeks to address these questions by analyzing exit poll data over a ten-year period from 1996 to 2006 for nine citizen ballot initiatives regarding marijuana use. Not only can this analysis provide a better understanding of

voting behavior on this particular issue but it can also provide insight into initiative voting behavior by citizens more broadly.

This issue also lends itself well to an examination of determining why policies allowing for the scientifically validated use of marijuana have been implemented by voters yet when given the opportunity voters have, until recently, been reluctant to approve policies for recreational use. In addition to analyzing traditional factors thought to be important in determining voting decisions on these types of public policies, a proxy for scientific literacy will also be included to gauge whether or not one's scientific knowledge is important in determining vote choice. Furthermore, any significant differences in voting patterns between medicinal and non-medicinal initiatives will be noted. Given the number of states involved in the analysis, it will also be noted whether or not there is divergence in how citizens of differing states vote on this issue.

Before delving into voter behavior on these marijuana initiatives, though, first it is important to describe the federal and state conflict that has been discussed in previous literature. Doing so provides a contextual backdrop necessary to understand the complexity of the issue that voters face. It will also make clear the justification for studying this topic: state drug policy is moving ahead of federal policy despite the incompatibility of the two and voters are the primary cause of these state policy innovations, a fact that makes it all the more important to conduct analysis of this issue in order to discover the reasons underlying the voting decisions of citizens. Also important to an analysis of a particular policy area where citizens have been able to express their preferences at the ballot box is a discussion of the relevant literature on initiative voting. These past studies can suggest which voter characteristics are likely to influence an individual's policy preference on these issues.

Federal-State Conflict

In the United States, marijuana was legal under federal and state law for most of the country's history. In fact, from 1840 up until the 1940s, it was a recognized medicinal and was included in the *United States Pharmacopoeia*. However, by 1936 each state had implemented laws to regulate marijuana and in 1937, Congress passed the Marihuana Tax Act which effectively ended any legitimate use for the drug. The American Medical Association had fought the legislation, but they were unsuccessful in their efforts and after nearly a century of using marijuana to treat a number of medical ailments, marijuana was shunned in part because of the development of opium-derived drugs such as morphine (Eddy 2007).

Then in 1970, increased drug use and addiction in the 1960s spurred the passage of the Controlled Substances Act. This Act established five categories of drugs, with Schedule I being the most restrictive. Marijuana was placed in this category along with other drugs such as heroin and LSD, making it a more restricted substance than Schedule II drugs such as cocaine and methamphetamine. Schedule I drugs are considered to have a high potential for abuse and they have no accepted medical use under federal law. Penalties for users of these drugs can be severe: simple possession of marijuana can lead to a year in prison and a \$100,000 fine and growing marijuana can result in a five-year prison sentence and \$250,000 in fines (Eddy 2007). These restrictions on the use of marijuana run counter to scientific evidence supporting its potential medical use: "The accumulated data indicate a potential therapeutic value for cannabinoid drugs, particularly for symptoms such as pain relief, control of nausea and vomiting, and appetite stimulation" (Institute of Medicine 1999).

Around the same time as the passage of the Controlled Substances Act, the federal government launched its "War on Drugs" campaign, taking a strong prohibitionist stance on drug use. In the late 1970s, though, something strange occurred. A Washington D.C. man afflicted

with glaucoma who self-medicated with marijuana to prevent blindness was charged with cultivation of marijuana. He argued that his marijuana use was a medical necessity; a federal judge agreed. The ruling had the effect of forcing the federal government to supply the man with his needed medicine: marijuana. The government tried to challenge the decision a few years later but decided to settle out of court; and so, starting in 1978, the government has been providing FDA-approved marijuana grown at the University of Mississippi to a handful of patients under its Compassionate Investigational New Drug program (Guither 2005).

Figure 3.1

Plus signs indicate medical marijuana, Cigarettes indicate legalized marijuana

National NORML (USA)

That the government would deny marijuana's medicinal benefits at the same time it has been providing the drug to patients seems unusual. Perhaps even more unusual, though, is that beginning in the mid to late 1990s, states have been passing laws that directly conflict with federal regulations. At the time of writing this chapter, 20 states had enacted provisions allowing for the medical use of marijuana: Alaska, Arizona, California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Maine, Massachusetts, Michigan, Montana, Nevada, New Hampshire, New Jersey, New Mexico, Oregon, Rhode Island, Vermont, and Washington (see Figure 3.1 for a map from the organization NORML that indicates these states; Illinois and New Hampshire recently passed their medical marijuana bills into law which is why they are not identified). There are two ways in which these states' laws run afoul of federal drug policy. The first is that doctors are prohibited from prescribing Schedule I drugs. States have circumvented this regulation by allowing for physicians to "recommend" marijuana to treat a medical disorder instead of writing a prescription (i.e. physicians provide their approval for marijuana as a treatment but they do not assist in obtaining the drug for patients). States have also enacted policies to protect physicians from being prosecuted in state courts. However, states are unable to prevent federal prosecution, and federal authorities have threatened to strip physicians of their licenses if they discuss marijuana as a treatment option with patients, though a federal court ruling, *Conant v. Walters* (2002), has made this possibility very unlikely (Hall & Pacula 2003).

The second way in which state law conflicts with federal law is that the federal government sees all possession and cultivation of marijuana as illegal and does not recognize any legitimate medical defense. Patients in states with medical marijuana laws are free from state prosecution but federal authorities reserve the right to charge and arrest these individuals. Of further concern for these patients is how to obtain the marijuana they need. A number of states

do not have mechanisms to provide patients with a legitimate supply of the drug, instead tacitly encouraging their citizens to obtain marijuana through illegitimate means (Pacula et al. 2003). In cases where supply centers (known as dispensaries) are operating with state sanction, no guarantees can be provided against federal prosecution. Starting in President George W. Bush's first term, the attorney general directed federal prosecutors to begin raiding California's marijuana dispensaries. These actions began a clash between state and federal officials that could only be resolved by appeal to the federal judiciary (Gardner & Anderson 2008).

In response, the Supreme Court has heard two cases on medical marijuana and in both instances has sided with the federal government. In *U.S. v. Oakland Buyers' Cooperative* (2001), the issue at hand was whether or not state marijuana distribution centers could use a medical necessity defense as a means of circumventing federal prohibition on marijuana. The Supreme Court ruled unanimously that dispensaries could not. Clarence Thomas wrote: "It is clear from the text of the [Controlled Substances Act] that Congress has made a determination that marijuana has no medical benefits worthy of an exception. Unwilling to view this omission as an accident, and unable in any event to override a legislative determination manifest in a statute, we reject the cooperative's argument" (Thomas quoted in National Center on Addiction and Substance Abuse at Columbia University 2001). In the second case, *Gonzales v. Raich* (2005), concerning two medical marijuana patients and their caregivers, the Supreme Court ruled in a six to three decision that regardless of state laws allowing for the legitimate use of marijuana, the federal government retains its power to regulate interstate commerce in illegal drugs under the Controlled Substances Act. This power allows the federal government to prosecute medical marijuana patients and any individuals growing marijuana for state-sanctioned medicinal purposes (Okie 2005).

These cases suggest that the Supreme Court has taken a definitive stance on the issue, but even in the judiciary there has been ambiguity when it comes to policies regulating medical marijuana. The Supreme Court stayed a lower court decision, *Conant v. Walters* (2002), that protected physicians from federal prosecution for participating in state marijuana programs. The Ninth Circuit Court decision that was upheld stated: “[The federal government] may not initiate an investigation of a physician solely on the basis of a recommendation of marijuana within a bona fide doctor-patient relationship, unless the government in good faith believes that it has substantial evidence of criminal conduct” (Eddy 2007). More significantly, the Supreme Court refused to hear an appeal from a California state court decision in 2009 regarding the legality of California’s medical marijuana law. In that case, the court’s decision was that federal drug law did not render California’s law null and void. By refusing to hear an appeal, the Supreme Court effectively validated the conflicting state law (Savage 2009).

The largest development in the federal-state conflict over medical marijuana did not actually occur in court, though; instead it was a result of the transition from President Bush to President Obama. Attorney General Eric Holder released a memo in late 2009 notifying federal prosecutors that in states with medical marijuana laws, prosecuting patients, caregivers, and dispensaries in compliance with applicable state and local law would no longer be a priority. The federal government had effectively called a truce with the states. The memo makes clear the federal government’s changing focus of its drug enforcement priorities: “As a general matter, pursuit of these priorities should not focus federal resources in your States on individuals whose actions are in clear and unambiguous compliance with existing state laws providing for the medical use of marijuana” (Ogden 2009).

Voters Turn to the Initiative

Given the federal government's relative intransigence on officially endorsing the medicinal use of marijuana, changing drug policy has in large part fallen to voters through the use of state initiatives, as indicated by the fact that the first five states legalizing medical marijuana did so by initiative. The initiative process can trace its origins to the turn of the twentieth century, and it is a process most common in Western states. Two influences were strongest on bringing about its passage: the Progressive and Populist movements. Progressives believed that a professional citizenry and a governmental elite free from the unsavory influence of powerful interests and money could address the challenges posed by Industrialization. Populists, on the other hand, distrusted any concentration of power in the hands of an elite and believed that common people should have the primary say in governmental matters (Sabato, Larson, & Ernst 2001). It has been argued that nowadays, the Populist vision of initiatives has prevailed (Cain & Miller 2001).

The dominance of the Populist vision of direct democracy over the Progressive view is worth mentioning because it was the Progressives who were instrumental in bringing about drug prohibition in the past, most notably the Eighteenth Amendment to the Constitution which made the production and consumption of alcohol a federal offense. Progressives believed in using the government's power to regulate social practices as a means of bettering society (Kyvig 2000). It would seem that the experiences of the latter half of the twentieth century have greatly diminished the moral idealism of the American public on the issue of drug prohibition.

Direct policymaking by citizens through the use of the initiative is more prevalent in the United States than anywhere else in the world (Butler and Ranney 1994). The initiative process is currently allowed by twenty-four U.S. states and one thing that keeps its usage to a manageable level is the imposition of qualification requirements for initiatives to make it to the

ballot. Far more initiatives are proposed than ever reach the ballot because the amount of signatures required can be daunting and the time period to acquire them can be restrictive. These qualification requirements ensure that only well-funded and well-organized initiatives make it before the voters (Bowler & Donovan 2008).

In the case of marijuana, proponents of these initiatives have found little trouble finding the money necessary to collect signatures. George Soros, a billionaire and proponent of liberal social policies, has spent millions of dollars of his personal wealth supporting drug decriminalization initiatives. Soros has primarily spent his money hiring professional signature-gathering firms to ensure that that these initiatives meet the qualification requirements necessary to get on the ballot (Ellis 2002). Herbert Kleber, director of the substance-abuse division of Columbia University's medical school, has remarked of Soros' influence on marijuana policy: "I can't think of another situation where a few individuals have so dominated and changed the nature of a debate" (Bank 2001).

Being well-financed has been critical to voters having the opportunity to express their policy preferences on marijuana, but the influence of citizen interest groups has also been important considering that initiatives supported by citizen groups are more likely to be passed (Gerber 1998). One of particular note is Americans for Medical Rights. It began as Californians for Medical Rights and provided a great deal of financial and logistical support to helping pass a medical marijuana initiative in that state. After the California initiative passed, the group began mobilizing in other states, changing its name and broadening its focus. It stayed active in California and played an important role in making sure once the initiative passed that the state moved forward with implementing the new regulations (Boehmke 2005). The impact of these groups has been enhanced by the fact that no powerful economic interests have spent any

substantial money to oppose them. Spending by narrow economic groups can be influential in defeating initiatives (Donovan et. al. 1998), but thus far no powerful organized interests have coalesced in opposition to medical marijuana. In fact, the opposite has occurred: many influential health organizations have made clear their support for the medicinal use of marijuana, thereby bolstering the legitimacy of the positions held by citizen groups (see Table 3.1 for a sample list of endorsements).

Table 3.1

Examples of Organizations Endorsing Medical Marijuana	
The Institute of Medicine	Kaiser Permanente
The American Academy of Family Physicians	Lymphoma Foundation of America
American Bar Association	National Association of Attorneys General
American Public Health Association	National Association of People with AIDS
American Society of Addiction Medicine	National Nurses Society on Addictions
AIDS Action Council	New England Journal of Medicine

Note: information from *Drug War Facts*, 4th edition

All of these factors have resulted in a high success rate for medical marijuana initiatives. The only two states where medical marijuana initiatives have failed to pass are South Dakota and Arkansas. South Dakota's 2006 medical marijuana initiative fell approximately 2% short of passing (48%) and Arkansas's 2012 medical marijuana initiative lost by a razor-thin margin of 51% to 49%; these were impressive results given the conservativeness of these states' electorates. If Arkansas' medical marijuana initiative had passed it would have been the only state in the south with such a program. The most recent state to adopt medical marijuana using the initiative process was Massachusetts in 2012.

Perhaps the most complicated path to approving the drug for medical use is the rather unique case of Arizona. In 1996, nearly two-thirds of Arizonans voting in the election approved Proposition 200, which allowed physicians to prescribe Schedule I drugs. Since under federal

law a physician prescribing these drugs can lose their license to practice, medical marijuana was not implemented despite passage of the initiative. Soon thereafter, state legislators responded to Proposition 200's passage by enacting a bill requiring FDA or Congressional approval before marijuana could be prescribed. Then, in a rebuke of the legislature's action, voters failed to ratify Proposition 300 in 1998 which would have validated the legislature's changes. Given the chance to pass a comprehensive decriminalization and medical marijuana initiative in 2002, voters failed to enact the measure, with 57% voting it down. But in 2010 by the slimmest of margins, Arizonans finally approved a medical marijuana initiative. It took 14 years for Arizonans to establish a system for marijuana's medicinal use, a testament to its political salience and an indication that it is not likely to be just a passing fad.

Marijuana initiatives that have sought to legalize the drug for recreational use or expand its legal distribution have not met with the same level of success as medical marijuana. Prior to 2012, Massachusetts' 2008 Sensible Marijuana Policy Initiative which decriminalized possession of small amounts of marijuana is the closest voters had come to statewide legalization; California's much-discussed 2010 Regulate, Control, and Tax Cannabis Act, fell three points short of passing but in 2012 Colorado and Washington voters for the first time passed initiatives legalizing the recreational use of marijuana. Clearly voters are able to differentiate between the initiatives being presented to them and they are making important distinctions between medicinal and recreational use of marijuana. Accounting for the reasons that voters are approaching these two issues differently can provide insight into how voters reach decisions on ballot initiatives and the important variations between these two policy types.

Who is Voting For (and Against) Marijuana and Why?

Understanding how citizens make their voting decisions on matters of public policy is important in a country such as the United States where policy issues are put directly before citizens. When citizens are given the power to decide matters of public policy, what is important in that decision? Earlier research on ballot initiatives found that partisanship was of little significance to a voter's choice; initiatives were thought to lack the partisan involvement and labels that act as familiar cues in a voter's decision-making process (Cronin 1989; Magleby 1984). Without partisan cues, voting at the ballot box was seen as a complex intellectual endeavor for voters. However, more recent research has called this belief into question. In an extensive study of a multitude of different types of initiatives (social, economic, etc.) across states and across time, it was found that partisanship was the most useful predictor of voter behavior (Branton 2003). This work built upon previous research which found that voters were able to make reasonable evaluations of initiatives which were often based on their partisan and ideological orientations (Bowler and Donovan 1998). More specific to the topic at hand, an analysis of, among other things, California's medical marijuana initiative found partisanship as the best predictor of an individual's vote (Smith and Tolbert 2004). Will these findings on partisanship hold for marijuana initiatives?

To answer this question, nine marijuana ballot initiatives over a ten-year period are analyzed using exit poll data from Voter News Service and Edison Media Research (see Table 3.2 which details the initiatives studied). Data from all marijuana initiatives proposed since the mid 1990s was not available, which has limited the analysis to the nine ballot measures for which exit poll surveys were conducted. Interestingly, support for the measures remained relatively similar across states: six initiatives allowing medical marijuana received an average of

59% of the vote with a range from 54% - 65%, and initiatives legalizing marijuana or mandating dispensaries received an average of 44% of the vote with a range from 43% - 44%.

Table 3.2

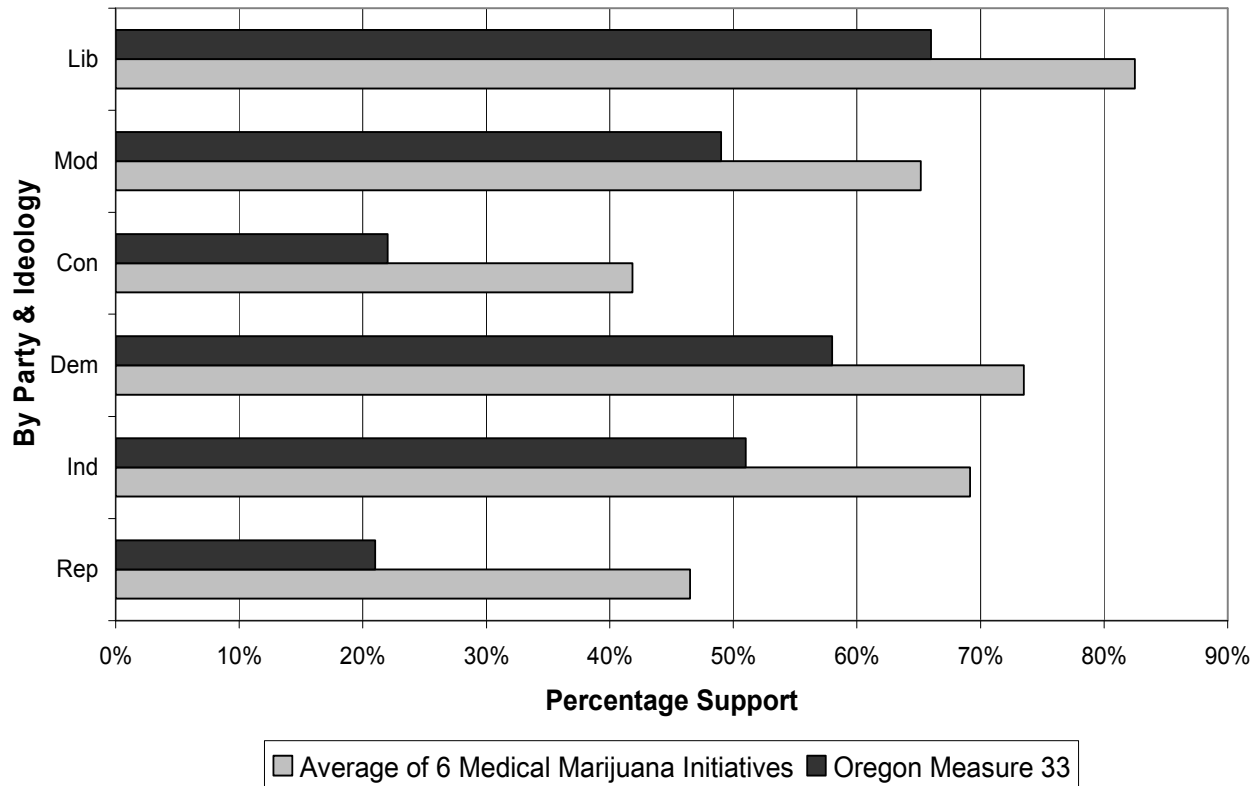
Initiatives Studied and Percentage Support					Support by Party & Ideology					
State	Year	Ballot Number	Ballot Purpose	Yes Vote	Rep	Ind	Dem	Con	Mod	Lib
California	1996	Proposition 215	Allow Medical Marijuana	56%	36%	66%	72%	34%	61%	78%
Arizona	1996	Proposition 200	Allow Prescriptions	65%	57%	75%	76%	55%	69%	83%
Nevada	1998	Question 9	Allow Medical Marijuana	59%	53%	72%	72%	49%	67%	81%
Washington	1998	Initiative 692	Allow Medical Marijuana	59%	40%	64%	74%	34%	65%	83%
Colorado	2000	Amendment 20	Allow Medical Marijuana	54%	41%	66%	68%	34%	57%	79%
Montana	2004	Initiative 148	Allow Medical Marijuana	62%	52%	72%	79%	45%	72%	91%
Alaska	2004	Measure 2	Legalize Marijuana	44%	28%	55%	60%	26%	48%	76%
Oregon	2004	Measure 33	Mandate Dispensaries	43%	21%	51%	58%	22%	49%	66%
Nevada	2006	Question 7	Legalize Marijuana	44%	29%	51%	54%	26%	50%	63%

The numbers in Table 3.2 of the final percentage of yes votes for the initiatives and breakouts of support by party and ideology taken from exit poll surveys are telling in and of themselves. It is clear that medical marijuana initiatives have met with much success at the ballot box, whereas legalization and increased distribution initiatives have consistently met with failure. When legalizing marijuana for medicinal use is presented to voters, it is a cross-cutting issue able to obtain slight to modest support from Republicans and conservatives, significant support from Independents, Democrats, and moderates, and overwhelming support from liberals. Support drops off across all categories for recreational legalization and increased distribution initiatives, with particularly significant drops in the number of Republicans and conservatives supporting the issue. It would seem that policy type is the primary determinant of success: a diverse group of individuals supports medicinal marijuana whereas full legalization and expanded distribution engenders more partisan and ideological divisiveness.

The broad support medical marijuana has garnered is likely because of its image as a medical issue. A study on the framing of medical marijuana has confirmed that overall the medical frame has been the one most consistently used (Golan 2010). How an issue is defined and viewed by the public is important to its level of support (Baumgartner and Jones 1993; Kingdon 1995; Stone 2002). In the case of marijuana, there is a significant difference between being viewed as a policy intended to help chronically ill patients or as a means of making it easier for individuals to obtain marijuana. A survey by the Pew Research Center (2010) found that the greatest opposition to medical marijuana came from respondents who believed that legalizing medical marijuana would make it easier for people to get marijuana even if they did not have a legitimate medical need. Evidence of this belief impacting voting can be seen from the failure of Oregon Measure 33. It would have mandated dispensaries, allowed naturopaths to recommend medical marijuana, and required dispensaries to provide medical marijuana to indigent patients for free; it failed by the same margin as legalization initiatives. Oregon already allows for chronically ill individuals to grow marijuana at home as authorized by the passage of Measure 67 in 1998, and so the question before voters was no longer about whether or not patients should be permitted to use marijuana for medicinal reasons; it was instead about how those patients should be supplied the drug. This distribution question is fundamentally different than the medical question, and this redefinition of the policy image led to significant drops in support compared to medical marijuana initiatives (as indicated in Figure 3.2). Of particular note is the drastic drop in the amount of conservatives and Republicans willing to support the policy.

Figure 3.2

**The Importance of Policy Image:
Initiatives for Medical Marijuana vs. an Initiative Mandating Dispensaries**



It is evident from the data presented thus far that there are partisan and ideological differences on these issues, though partisan effects do not seem as strong as previous literature would suggest. It is appropriate, then, to conduct multivariate logistic regression to control for other factors to determine if partisanship is indeed the most useful predictor of voter behavior on marijuana initiatives. Some state Democratic parties have endorsed medical marijuana but for the most part, involvement by major political parties has been limited; thus, without many established partisan cues and with the relative newness of the issue, it is hypothesized that factors other than partisan identification may have significance. Several characteristics that could be relevant to the decision calculus for and against marijuana are studied. These characteristics can be grouped into four general categories: demographics, religious values, political beliefs, and

voting behavior. Since the questions posed to voters were not entirely the same for each state and year, the variables included for each initiative are not constant. Gender, age, race, party identification, and ideology were asked in all exit polls (though age was posed categorically, not continuous); education and religion were asked in most of them; and other questions were specific to less than a few states. The result of this variation means that the statistical analyses are not able to contain the same exact variables, an unfortunate limitation of the data that is worth noting. Question wording and response rates also had some slight variations but the format and survey methods used were similar. Though these exit polls are not fully consistent, they tend to be reliable measures of voter attitudes since they are asked immediately after an individual casts their vote and do not suffer from the recall problem found in results from the National Election Study.

The first category, demographics, is likely to influence an individual's vote on marijuana policy in a number of ways. National polls have found significant differences in gender and age regarding opinions of legalizing marijuana (Carroll 2005). Overall men are more likely to be supportive of marijuana. Since men are greater users of marijuana, perhaps this finding is not surprising (Greenfield & O'Leary 1999). Race may have an impact, but it is not entirely clear how. More minorities are sentenced for marijuana infractions than whites (Mosher & Akins 2007), and so one could assume that they might prefer more relaxed drug laws; since those receiving drug sentences are many times not able to vote, it is unclear if their preferences will impact minority groups as a whole. Generational differences have usually been present on issues concerning lifestyle choices (Clarke et al. 1999), and one would expect that younger individuals would be more receptive to these issues than older individuals as younger people are much more supportive in general of marijuana legalization for recreational use (Carroll 2005). But an

argument could be made that older people, who might be able to use marijuana for their ailments, may be receptive to medical marijuana.

Differences in education used to be important in the past, but the gap has closed considerably since the 70s (Carroll 2005). Of particular interest for this analysis is the distinction between those who graduated college and those without a college degree. Jon Miller (2009) has demonstrated that the strongest predictor of adult scientific literacy is the number of college science courses that a person has taken. In fact, 75% of the variability in levels of scientific literacy can be predicted from how many college science courses that different individuals have taken. Since all students pursuing four-year degrees in the United States must complete at least two half-year science courses, being a college graduate will serve as a proxy for scientific literacy. If there are significant differences between those who have a college degree and those who do not, it may be an indication that scientific knowledge is having an identifiable impact on voting behavior.

Religious characteristics are also included in the analysis as polling has shown differences in this area when it comes to marijuana legalization policy (Carroll 2005). It is expected that individuals having no religion will be more likely to vote in favor of marijuana policy since they are not required to abide by religious doctrines forbidding the use of drugs. On the other hand, it is expected that those viewing the issue from a fundamentalist religious perspective would take prohibitionist stances; therefore, those identifying themselves as born-again Christians should oppose marijuana policy. Also, individuals claiming to be a part of the “religious right” are expected to vote against marijuana policy since liberalizing drug laws is not in line with the type of agenda associated with that view.

Of particular importance in the analysis is the political beliefs series of variables, especially partisanship. Though the number of Independents in the country has increased over the years, the far majority of politically-active Americans identify with one of the two major parties. This party identification is formed early, remains relatively stable over time, and is strongly correlated with an individual's attitudes. In fact, a party label is often adopted as part of someone's identity, a loyalty to a group not unlike devotion to a religious denomination or support for a sports team (Abramson, Aldrich, Rohde 2007). It serves an important purpose as a shortcut on how to form attitudes in the future, not unlike how a brand loyalty is used as a shortcut in purchasing decisions. In other words, party identification is often used as a heuristic to improve decision-making in the face of new or complex problems (Lewis-Beck et al. 2008).

Political elites take advantage of these partisan cues to frame issues in ways that will appeal to voters (Jacoby 2000). Marijuana is an issue in which this type of framing can be important because on the one hand its use may be viewed as a legitimate medical treatment but on the other hand its use may be seen as abuse of a potentially harmful drug. Medical marijuana has been discussed by elites in these terms, but clarity on the issue is still lacking. There has been only minor involvement by the national political parties and at the state level, as indicated by those states passing medical marijuana through legislative activity, medical marijuana has enjoyed support from both Republicans and Democrats. Until it has been adopted and characterized by political elites it is unlikely voters will perceive a clear partisan stance on the issue. For example, the issue of abortion did not become politically polarized until elites found it convenient to do so (Stimson 2004). Elites play on established attitudes and they can foster the creation of new attitudes on emerging issues. The transfer of elite messages to the masses is usually through the mass media, which primes (sends messages that become the considerations at

the front of people's minds), frames (determines what terms one should think of an issue in), and sets agendas (tells people what to think about) (Iyengar and Kinder 1987).

The lack of issue crystallization on medical marijuana means that partisan voters may view it in a dissimilar way than legalization, a policy area where differentiation is clearer. Republican elites consistently take tougher stances on crime and drug policies whereas Democratic elites are more nuanced in their stances (Canes-Wrone et al. 2011). Since crime is a valence issue, one where Republicans and Democrats both agree they are against it, typically the parties try to outdo one another on their ability to address the issue, with Republicans often accusing Democratic opponents of being soft on crime. However, some notable Democrats have pursued policies more closely resembling the Republicans' harsher stances on crime and drug policy. Republican consistency and Democratic ambivalence should lead to Republicans voting against marijuana legalization policy and Democrats having mixed stances, assuming partisans are following the cues provided by party elites or are structuring their opinions in a similar way. In regard to medical marijuana, there could be a lack of voting based on partisanship due to uncertainty over what actually constitutes a partisan stance on the issue, though it is expected that Republicans would be less likely to show support.

Another important influence on the development of political attitudes is ideology (see Jacoby 2002). Ideology and partisanship are often related, especially in the current political environment where there is a great deal of ideological polarization among elites (Poole 2005), but they are not one and the same. In 2004, nearly half of Republicans did not identify as being conservative and only a little over a third of Democrats identified as being liberal (Gelman 2008). In comparison to partisanship, ideology is thought to operate "on a nearly emotional level, triggering habitual responses to stimuli in the political environment" (Lewis-Beck et al.

2008). Its effects are greatest for those who are the most politically aware. However, it should be noted that most Americans often do not think in these terms (Converse 1964). This lack of consistent ideological thinking could be a result of ambivalence (Zaller & Feldman 1992). People hold conflicting considerations for and against political issues, something important to consider when viewing an issue such as marijuana for medicinal use or recreational use. These issues have components of health, morality, justice, and crime and drug policy. Even though conflicted opinions exist, it is expected that liberals will vote for marijuana because of their greater tolerance and openness on lifestyle issues and their sympathy for disaffected groups. Conservatives would be expected to be less supportive because of their traditional social stances but if a sufficient number of libertarian-leaning individuals claim this category for their ideology, conservative voters may actually provide some support to marijuana initiatives.

In addition to measuring the effects of partisanship and ideology, a variable for President Clinton's favorability has been included to capture how individuals make political evaluations. During the time of some of these initiatives, Bill Clinton was dealing with the fallout of his indiscretions in the White House. He was also a president who had famously smoked marijuana but did not inhale. It is expected that those who have a favorable view of Bill Clinton as a person will be more likely to allow someone the lifestyle choice of smoking marijuana for medicinal purposes. An individual's belief that crime/drugs are the most important issue will also be looked at in order to better ascertain how the marijuana issue is being framed in voter's minds.

The final set of variables has to do with an individual's voting behavior on other initiatives. The way in which individual's determine to vote on one initiative could share similarities with their vote on another. Controversial policy issues such as gay marriage and

affirmative action are included. Evidence has shown that people's political attitudes can be affected by more than just the individuals they associate with and the groups to which they belong. Political attitudes can also be impacted by the impersonal influence of others (Mutz 1998). When someone demands greater government intervention to address crime and violence when their neighborhood and they, themselves, have not been affected, their attitudes are being affected by the perception of other's attitudes. In this case, individuals may feel that medical marijuana users are a disaffected group deserving of expanded rights, and so this liberal stance as indicated by their votes for other disaffected groups would lead to pro-marijuana sentiment. Alternatively, those individuals taking the culturally conservative stance on these other ballot initiatives are expected to be more conservative when it comes to their views of marijuana.

The analysis that follows utilizes logistic regression with results presented as odds ratios. The results were grouped into two tables for clarity: Table 3.3 includes six initiatives looking at whether or not to allow medical marijuana and Table 3.4 includes three initiatives looking at marijuana legalization and expanded distribution of medical marijuana. Obviously the initiatives in Table 3.4 are more progressive than those in Table 3.3. For example, it was thought that Oregon's initiative mandating dispensaries would create a back-door legalization of marijuana, and the Alaskan and Nevada measures explicitly sought to legalize the drug.

Table 3.3
Medical Marijuana Initiatives

<i>Independent Variables</i>	CA96-Prop215 <i>Odds Ratios</i>	AZ96-Prop200 <i>Odds Ratios</i>	NV98-Quest9 <i>Odds Ratios</i>	WA98-Init692 <i>Odds Ratios</i>	CO00-Amnd20 <i>Odds Ratios</i>	MT04-Init148 <i>Odds Ratios</i>
Demographics:						
Gender (<i>Male=1, Female=0</i>)	1.088	1.197	0.924	1.387*	1.145	1.655*
Race (<i>Minority=1, White=0</i>)	0.853	1.106	0.743	0.694	0.670	1.615
Age (<i>Ordinal by Categorical Range</i>)	0.862***	0.989	0.956	0.889***	0.874**	0.938
Education (<i>College Grad=1, Other=0</i>)	1.258	-	1.033	1.242	0.766	-
Religious Values:						
Religion (<i>No Religion=1, Religious=0</i>)	2.282**	-	-	-	-	2.409*
Born Again Christian (<i>Yes=1, No=0</i>)	-	-	-	-	-	0.522**
Religious Right (<i>Yes=1, No=0</i>)	-	-	-	0.984	0.578*	-
Political Beliefs:						
Republican Party ID (<i>Yes=1, No=0</i>)	0.590*	0.689	0.639	0.764	0.787	0.986
Democrat Party ID (<i>Yes=1, No=0</i>)	1.275	0.940	0.789	1.109	0.853	1.532
Conservative Ideology (<i>Yes=1, No=0</i>)	0.568**	0.600**	0.647*	0.366***	0.521**	0.412***
Liberal Ideology (<i>Yes=1, No=0</i>)	1.326	1.513	2.006**	2.117***	2.342***	2.188
Clinton as Person (<i>Favorable=1, Not=0</i>)	-	-	1.632*	1.726***	1.847**	-
Crime/Drugs (<i>Most Important=1, Other=0</i>)	0.871	-	1.077	-	-	-
Voting Behavior:						
Affirmative Action Ban (<i>Yes=1, No=0</i>)	0.545**	-	-	1.132	-	-
Gay Marriage Ban (<i>Yes=1, No=0</i>)	-	-	-	-	-	0.589
Expand Tribal Gaming (<i>Yes=1, No=0</i>)	-	3.664***	-	-	-	-
Partial Birth Abortion Ban (<i>Yes=1, No=0</i>)	-	-	-	0.695*	-	-
Raise Minimum Wage (<i>Yes=1, No=0</i>)	-	-	-	-	-	-
<i>Observations</i>	(729)	(721)	(722)	(1056)	(593)	(530)
<i>Log Likelihood</i>	-426.323	-402.972	-442.031	-618.419	-351.662	-281.930
<i>Model Significance</i>	p < .0001	p < .0001	p < .0001	p < .0001	p < .0001	p < .0001
<i>Percent Predicted Correctly</i>	70.23%	73.37%	67.59%	68.75%	68.97%	73.21%

* = $p < .05$; ** = $p < .01$; *** = $p < .001$

Table 3.4
Legalization and Distribution Marijuana Initiatives

<i>Independent Variables</i>	AK04-Meas2 <i>Odds Ratios</i>	OR04-Meas33 <i>Odds Ratios</i>	NV06-Quest7 <i>Odds Ratios</i>
Demographics:			
Gender (<i>Male=1, Female=0</i>)	1.354*	0.926	1.501***
Race (<i>Minority=1, White=0</i>)	0.739	1.143	0.749*
Age (<i>Ordinal by Categorical Range</i>)	0.859***	0.881***	0.886***
Education (<i>College Grad=1, Other=0</i>)	-	0.794	0.921
Religious Values:			
Religion (<i>No Religion=1, Religious=0</i>)	2.154***	1.258	-
Born Again Christian (<i>Yes=1, No=0</i>)	-	0.719	-
Religious Right (<i>Yes=1, No=0</i>)	-	-	-
Political Beliefs:			
Republican Party ID (<i>Yes=1, No=0</i>)	0.492***	0.477***	0.512***
Democrat Party ID (<i>Yes=1, No=0</i>)	0.866	1.104	0.854
Conservative Ideology (<i>Yes=1, No=0</i>)	0.509***	0.536**	0.517***
Liberal Ideology (<i>Yes=1, No=0</i>)	3.088***	1.479*	1.480**
Clinton as Person (<i>Favorable=1, Not=0</i>)	-	-	-
Crime/Drugs (<i>Most Important=1, Other=0</i>)	-	-	-
Voting Behavior:			
Affirmative Action (<i>Ban=1, Keep=0</i>)	-	-	-
Gay Marriage (<i>Ban=1, Allow=0</i>)	-	0.574**	-
Expand Tribal Gaming (<i>Yes=1, No=0</i>)	-	-	-
Partial Birth Abortion Ban (<i>Yes=1, No=0</i>)	-	-	-
Raise Minimum Wage (<i>Yes=1, No=0</i>)	-	-	1.908***
<i>Observations</i>	(1016)	(844)	(1529)
<i>Log Likelihood</i>	-599.963	-489.597	-949.723
<i>Model Significance</i>	p < .0001	p < .0001	p < .0001
<i>Percent Predicted Correctly</i>	69.19%	69.79%	64.29%

* = $p < .05$; ** = $p < .01$; *** = $p < .001$

The most interesting finding from these results is that when voters are given the choice whether or not to approve marijuana for medicinal use, their primary consideration is not their partisan identification. Consistent with previous results, California's medical marijuana proposition was indeed based in some part upon partisanship (Branton 2003; Smith and Tolbert 2004); however, this result cannot be extrapolated to other medical marijuana initiatives. When it is solely the issue of medical marijuana that is being decided, the primary political belief important to determining an individual's vote is their ideology. It seems that voters are not confused about where medical marijuana resides on the left-right political divide. The odds ratios suggest that voters see this issue as residing on the left side of the ideological scale. Other findings of note are that Clinton's favorability had a strong effect, with individuals saying they liked Clinton as a person being more likely to vote for medical marijuana. Generational differences were present on the issue, though effects were not significant for all of the states. In states where age did matter, older individuals were less likely than younger individuals to express support. Religion also seemed to affect how individuals voted on medical marijuana, with non-religious individuals being more likely to vote for medical marijuana and those with religious affiliation being against it. Race did not appear to have any noteworthy effects on the way individuals decided to vote.

Interestingly, education also did not appear to have any significant effects on how citizens decided to vote on these issues. What can be said from such a finding? It would likely be a stretch to claim that it indicates there is no role for scientific knowledge given that education is being used as a proxy but it does seem appropriate to claim that it indicates the role of scientific knowledge must not be pronounced enough in comparison to other influences like

political beliefs and personal values. It is clear from these findings that scientific knowledge is not the predominant influence on how citizens decide to vote on medical marijuana.

Table 3.4 shows that when it comes to legalization of marijuana, how the issue is seen by voters changes and partisanship becomes important, as indicated by the fact that Republicans are largely against steps to legalize marijuana. Though partisanship was important, it seems that this issue, like medical marijuana, is still primarily defined in ideological terms as that is where the main divide remains. Age was important in each of the three progressive marijuana initiatives, with older voters expressing opposition to legalization and expanded distribution of marijuana. Also, there are some interesting results with the voter initiatives. Those wanting to ban affirmative action, ban gay marriage, and ban partial birth abortion were all likely to vote against marijuana measures in general whereas those voting to expand tribal gaming and to raise the minimum wage were likely to vote for marijuana measures. Responses to these initiatives were likely picking up individuals' beliefs about the government's right to regulate lifestyle choices (e.g. if someone is likely to vote against allowing the medical procedure of partial birth abortion because of their personal values, then they are also likely to vote against allowing the use of an illicit drug) and individuals' feelings towards disaffected groups (e.g. if someone votes to ban policies designed to deny marriage rights to homosexuals because they find such a lifestyle morally unacceptable, then they are also likely to vote against allowing individuals to engage in other behaviors they find morally unacceptable). Religious values had effects in the expected directions with religious devotion equating to diminished likelihood of supporting marijuana, though it would seem that it had less of an impact on vote choice for legalization than it did for medical marijuana initiatives. Education (the proxy for scientific literacy) and race again seemed to have little effect on vote outcomes.

Another interesting finding is the result from crime/drugs as the most important issue for the two medical marijuana initiatives where the question was asked. Intuitively one would think that someone who claimed crime/drugs as their top issue would be less likely to vote for medical marijuana; with no statistical significance it is difficult to say this is the case. Plus in the two states where this question appeared, the effects were not in the same direction. What can be said is that it is unlikely that voters see medical marijuana in the crime/drugs frame, which may be one of the reasons why partisan preference disappears on this issue.

These distinct results suggest that differences in partisanship and ideology are probably explainable by how the issue is defined. In *The American Voter Revisited*, it is demonstrated that some types of issues align along partisan lines, some along ideological lines, some along both, and some along neither (Lewis-Beck et al. 2008). In the case of marijuana, it would seem that medical marijuana is aligning along an ideological scale whereas legalization is aligning along a partisan and ideological scale. Lifestyle issues have been shown to align along an ideological scale (Lewis-Beck et al. 2008), which further suggests that medical marijuana is being viewed in these terms as opposed to a crime/drug issue. California, though, presents an exception to this case. Since it was the first comprehensive medical marijuana initiative that was implemented, it received a great deal of media attention. California's attorney general and numerous law enforcement officials spoke out against the issue saying it would likely result in back-door legalization (with more dispensaries than Starbucks in some areas of California (National Public Radio 2009), this view may not have been too inaccurate), and so it is not unreasonable to conclude that many voters may have seen the issue differently than the medical marijuana initiatives in other states. Or perhaps there is something unique about California politics. California uses the initiative more than any other state and political elites often use the process to

push their agendas; perhaps, then, the initiative process in the state is just more partisan in general, with major politicians in the state such as the governor often indicating their support or opposition for certain initiatives.

A notable finding from these results is the significant impact of age. By and large, older Americans are not in favor of liberalizing marijuana laws. What could account for this discrepancy between older and younger Americans? It turns out that it is likely a result of familiarity with the drug. A 2002 Gallup poll found 46% of 18-29 year-olds had tried marijuana, 45% of those 30-49 had tried it, but only 14% of those aged 50 and over had ever tried marijuana. It is probable that not having tried the drug impacts how individuals view marijuana's use as a medicine. An AARP poll in 2004 found that only 34% of those 70 and older believed marijuana had medical benefits. For those aged 45-49, this number was 70%, over twice as much.

One last thing of note is that the variables across states differed in their importance, indicating that factors within each state can affect voters in varying ways. Perhaps this result can be traced to individual state political cultures. It has been claimed that, "state effects on partisanship and ideology account for about half of the variance in state voting in recent presidential elections" (Erikson, McIver, Wright, Jr. 1987). It is not entirely clear what constitutes a state political culture, but there is room to believe that it may have an impact on the results found here.

Implications and Conclusions

Marijuana has a complicated history in the United States. It has been at the center of many political conflicts, and it is an issue that remains salient to this day. The federal government's unwillingness to update its policies on marijuana despite evidence from physicians

showing that it has potential use as a medicinal drug spurred voters to turn to the initiative. Sensing that they would not have a receptive audience in the halls of Congress, interest groups and individuals concerned with the issue began to put the issue directly to voters and in some states, their local legislators. With public opinion on their side, these policy advocates believed that expanding the scope of the conflict would make it more likely that they would be victorious (see Schattschneider 1960). Considering that of the thirteen states where medical marijuana was placed on the ballot the policy passed in eleven, this belief was validated.

Skeptics of medical marijuana have claimed that it is merely an attempt by pro-legalization advocates to gain acceptance of marijuana among the American public. It is hypothesized that as the public becomes more comfortable with marijuana's use, they will be more likely to support its legalization. As one critic has said: "The marijuana lobby has effectively influenced the public and exploited compassion and sympathy for suffering patients to advance the cause of legal marijuana. By framing the issue so simplistically, the pro-marijuana lobby has set the stage for a cultural and social shift to ultimately achieve the legalization of marijuana..." (Voth 2006). Certainly a number of legitimately ill patients have benefited from the passage of these laws but if the ultimate goal of these policies is quasi-legalization, then it seems that the pro-marijuana policy advocates have found an excellent means of garnering support for the measures and with two states that had first legalized marijuana for medicinal use having legalized it for recreational use as well (Colorado and Washington), it may indeed confirm the suspicions of critics. Pro-marijuana advocates have been able to avoid patients using marijuana like a prescription drug from being framed primarily as a morality issue and instead have been able to cast it within a medical frame (Golan 2010), thereby garnering enough support from groups that traditionally might be hesitant to support

these types of policies – such as Republicans and conservatives – to assure passage. Morality issues such as drug legalization engender disagreement on core values (Meier 1994), and the differences in support between measures to allow for the medicinal use of marijuana versus those legalizing it for recreational use demonstrate this difference. Marijuana initiatives provide strong evidence for the powerful effects of issue definition in politics.

When it comes to using the ballot box to make laws on marijuana use, voters seem to be viewing medical marijuana primarily through an ideological lens, whereas both ideology and partisanship are determinants of their preferences on more progressive marijuana policies. Overall, though, ideology seems to be the key political dimension which determines policy preferences on marijuana policies, with other factors such as age, religious values, and preferences on morality-type issues being of significant importance as well. The importance of ideology in determining support for medical marijuana highlights the inconsistency in the positions of conservatives and liberals on current health policy debates. Conservatives have claimed that states have the right to opt out of the individual mandate required by the landmark healthcare bill passed in 2010 while liberals argue that federal law supersedes state law and so states are obligated to comply. On the issue of medical marijuana, these stances are reversed. Conservatives in positions of political power have tried to enforce federal law on this issue, arguing that states do not have the authority to pass drug laws that contradict federal regulations while at the same time, liberals have sought to pass these measures knowing that they directly conflict with federal law. It would seem that the age-old conflict between states and the federal government is utilized differently by conservatives and liberals depending on how conveniently it coincides with their desired policy goals.

Medical marijuana seems to be an issue that calls into question whether or not partisanship can be viewed as the chief influence on initiative voting decisions. Certainly for a number of initiative issues, partisanship is the most important determinant of an individual's vote, but there may be issues out there that have yet to be studied which would yield results similar to medical marijuana. The research conducted here only raises this possibility and further work in this area would be needed to make any definitive claims. One of the more interesting findings also relevant to future work by scholars studying initiative voting behavior is the distinct variation across states on this issue. For example, determinants of vote choice in California differed from other states, which should provide caution to researchers attempting to extrapolate analysis of initiative voting behavior in one state to other states. Explaining why so many variations across states occurred is beyond the scope of this research project, but such an examination could make for a fascinating research project for scholars interested in the topic.

One important conclusion to note relevant to the overall aims of this project is that scientific knowledge does not seem to be the driving force for how individuals decide to vote on a scientific issue like medical marijuana. Can this finding of the lack of a strong role for scientific knowledge be extended to the motivation for states to pursue medical marijuana policies in the first place? Possibly it can. Besides the fact that most states that have legalized medical marijuana have done so through citizen-led initiatives and citizen motivations for adopting medical marijuana are unlikely to be based on scientific knowledge, an argument can be made that for many states, these types of policies are being put forward in response to high levels of marijuana use in their state, not in response to scientific evidence regarding the potential benefits of the drug.

Using an estimate of the percent of a state's residents 12 and over who have used marijuana in the past year from the National Survey on Drug Use and Health (from a low of 6.94% in Utah to a high – no pun intended – of 17.51% in Alaska) and comparing it with whether or not a state has a medical marijuana policy, one can see that they are highly related. Of the top 25 states for marijuana use, 18 of these states have medical marijuana policies. Of the bottom 25 states for marijuana use, only 1 state has a medical marijuana policy and it happens to be New Jersey, the 26th ranked state for marijuana use. It is telling that the two states where medical marijuana initiatives have failed have very low rates of marijuana use, with Arkansas being ranked 40th and South Dakota 45th. Given that medical marijuana policies are relatively new, it is unlikely that adoption of these policies are driving these high rates of use especially considering that California, which has the longest-running medical marijuana program and some of the easiest means of obtaining the drug, is not even in the top ten for marijuana use.

In states where legislators and governors have legalized medical marijuana, there is the very real possibility that politicians are responding to pressure from citizens who desire more lax marijuana policies and that constituent concern is largely based on individuals' beliefs about government's right to regulate this type of behavior. An in-depth exploration of state motivations for policy adoption is better left for further study but the implications of this research indicate that there are much more plausible explanations for the adoption of medical marijuana policies than to presume it is because of newfound revelations about the scientific evidence supporting its use. If this were the case, given that it is virtually impossible to overdose on marijuana (Iverson 2000), the federal government would long ago have removed marijuana from its listing as a Schedule 1 drug, something it is highly unlikely to do anytime soon despite state progressivism on this issue.

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CHAPTER 4: INITIATIVE & LEGISLATIVE VOTING BEHAVIOR ON STEM CELLS

Introduction

Debates between religion and science date back in Western civilization to the early modern period (c. 1500-1800 A.D.). Scientific developments during that period raised serious questions about the traditional views maintained by the church. In most highly developed countries around the world, religion's importance has declined markedly since that time and in the public sphere, science has gained a degree of preeminence over religion. However, the United States remains an outlier in this area. In the U.S. 65% of individuals claim that religion is an important part of their daily lives (Newport 2009), a number that is far higher than what is common for wealthy nations: for example, the "death of God" in Europe is well known. The high level of religiosity present in the United States has engendered ongoing conflict over the roles of religion and science in public life. One area where this debate has recently played out is in stem cell research policy.

Stem cells have two key properties that differentiate them from other cells: they can divide without limit and they have the ability to become a number of specialized organ and tissue cells. There are two types of stem cells of interest to scientists: human embryonic stem cells and adult stem cells. In a three to five day embryo, embryonic stem cells are responsible for generating all of the specialized cell types and organs. They are able to become any cell type within the human body and are easy to culture, making them of special interest to researchers. Adult stem cells are ones that remain throughout an individual's life and they act as an internal repair system to maintain the health of the particular organ or tissue in which they reside. Since their purpose in the body has already been designated, a virus containing reprogramming factors must be injected into adult stem cells to make them take on properties similar to embryonic stem

cells. Also, it is difficult to isolate adult stem cells from mature tissues and culturing these cells has not been perfected (National Institutes of Health 2009).

Despite the complexity of this research and the obstacles that have yet to be overcome, using stem cells holds great promise. One significant benefit that could result from studying stem cells is that the process by which they transform into specialized cells could be discovered. An understanding of normal cell development could provide insight useful to correcting instances where this process goes awry, such as in cases of cancer or birth defects. More well-known potential benefits include the possibility of curing diseases currently thought to be incurable, such as Parkinson's, diabetes, and arthritis. In addition, there is a possibility that victims of spinal cord injuries could walk again. One day stem cells may even be used to grow replacement tissues or organs (National Institutes of Health 2009). However, stem cell therapy is still in its infancy; it may be some time before any of these benefits are realized, if ever.

Though embryonic stem cells hold greater potential for developing stem cell therapies than adult stem cells, embryonic stem cells are the most controversial and research involving them has experienced the most criticism and government restriction. Currently embryonic stem cells are obtained from existing stem cell lines or from in-vitro fertilization clinics. In-vitro fertilization requires the use of multiple embryos, and any that are not implanted into a patient will eventually die. These extra fertilized embryos can instead be donated with the informed consent of the female patient and they are then used to create stem cell lines. Once such a line has been made, the limitless dividing properties of stem cells means they can be maintained indefinitely. In creating these lines the embryos are destroyed.

The primary catalyst for debates over stem cell research can usually be traced to differing viewpoints about when life begins. Some individuals, especially those with strong religious

convictions, think that an embryo is a human life and artificially stopping the process of its development at any stage is tantamount to killing an innocent human being. Others argue that a human life does not begin until much later and even if embryos were considered potential human lives, the decision to terminate their development should be free for any woman to make. Though nuanced views are held by many, not unlike other moral issues there is a considerable degree of polarization on this topic.

This polarization has not been limited to the citizenry. In August of 2001, President George W. Bush signed an executive order that restricted federal funding to embryonic stem cell research. Only stem cell lines that were currently in existence at the time of the order would be funded. Congress responded by passing two bills that would have allowed new stem cell lines created through the use of embryos discarded from fertility clinics to be eligible for federal funding. The first bill, The Stem Cell Research Enhancement Act of 2005, passed in the House and the Senate. President Bush then used his first veto while in office to defeat the legislation. The second bill, The Stem Cell Research Enhancement Act of 2007, also met a similar fate.

It is clear that President Bush's personal values and religious views strongly influenced his decision to create the executive order and to veto these two pieces of legislation. In fact, when President Obama reversed President Bush's executive order, he was quoted as saying that his administration would make "scientific decisions based on facts, not ideology," a clear rebuke of Bush's personalized decisions (Childs and Stark 2009). Despite a number of journalistic accounts of these events, there has been little empirical exploration into whether or not personal values and religious views have translated into the voting behavior of citizens and legislators on this public policy issue. Previous research has accounted for what may motivate individuals to participate publicly on stem cell research policy (Goidel and Nisbet 2006), but this research has

not been extended to determining what accounts for their voting decisions. This chapter sets out to accomplish three tasks: first, to ascertain how important personal values and religious factors have been in shaping an individual's beliefs about stem cell research; second, using exit poll results from the 2006 stem cell research referendum in Missouri, to find out whether the values and religious factors determined to be significant in the first task affected citizens' voting behavior and whether or not these individual characteristics were more important than traditional political characteristics such as partisanship; and third, to determine if U.S. Senators voting on the 2005 stem cell research bill were more concerned with their constituents' preferences or their own personal policy preferences.

Citizen Opinions of Stem Cell Research

Analysis of 2001 and 2002 survey data from the Virginia Commonwealth University Life Sciences Survey has shown that an individual's personal values, ideological disposition, issue-specific knowledge, and degree of religious devotion are significant determinants of their support for stem cell research (Nisbet 2005). This previous study will be updated by using 2007 survey data from the Pew Research Center for the People & the Press to ascertain if support for stem-cell research remained tied to an individual's ideological and religious views around the time that the policies studied in this analysis were passed. Given the persistence of values and religious beliefs over time, it is hypothesized that even though much more media attention was given to the stem cell issue since 2002, those holding strong religious views will still not support this type of research.

Someone's support for stem cell research is determined by their answer to this question: "All in all, which is more important: conducting stem cell research that might result in new medical cures or not destroying the potential life of human embryos involved in this research?"

Respondents answering the former are coded as 1 as an indication of support for stem cell research; respondents answering the latter are coded as 0 as an indication of opposition to stem cell research. The following factors are included to determine the probability of supporting stem cell research: two variables for partisan affiliation (one for Republican and one for Democrats; Independents are the reference group), two variables for an individual's political ideology (one for conservatives and one for liberals; moderates are the reference category), opinion of abortion (coded as 1 for it should be legal in all or most cases, 0 if it should be illegal in all or most cases), church attendance (coded as 1 for attends at least weekly, 0 for attending less than this amount or not at all), college educated (coded 1 for having a college degree, coded 0 for not having a college degree), and stem cell knowledge (coded 1 if the individual answered that they know a lot about stem cells, coded 0 if they stated they know little to nothing about the issue).

Table 4.1
Citizen Opinions of Stem Cell Research

<i>Independent Variables</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>Odds Ratio</i>
Republican	-0.290*	(0.134)	0.748
Democrat	0.163	(0.135)	1.177
Conservative	-0.903***	(0.121)	0.406
Liberal	0.039	(0.171)	1.040
Abortion Legal	1.720***	(0.111)	5.584
Attend Church Weekly	-0.765***	(0.109)	0.465
College Educated	0.296**	(0.112)	1.344
Stem Cell Knowledge	0.519***	(0.109)	1.681
Constant	-0.068	(0.149)	

* = $p < .05$; ** = $p < .01$; *** = $p < .001$

<i>Observations</i>	2275
<i>Log Likelihood</i>	-1107.089
<i>Model Significance</i>	$p < .0001$
<i>Pseudo R² Value</i>	0.275
<i>Percent Predicted Correctly</i>	77.54%

The greatest single predictor of whether or not someone supports stem cell research is their opinion of abortion. If someone thinks abortion should be legal in all cases or legal in most cases, they are 5.6 times more likely to support stem cell research than individuals who think abortion should be illegal in all or most cases. Another strong predictor of someone's opinion of stem cell research is how often they attend religious services. Those who attend church at least once a week are about 54% less likely to be in favor of stem cell research. Ideology turns out to be an important predictor for conservatives but not for liberals. People who identify themselves as conservative or very conservative are 59% less likely to support stem cell research than moderates; liberals, on the other hand, exhibit no statistically significant difference in their support in comparison to moderates. Partisanship exhibits a similar relationship as ideology, though its impact is not nearly as strong. Republicans are 25% less likely to support stem cell research than Independents; Democrats and Independents do not exhibit any statistically significant differences in their patterns of support.

An individual's general level of scientific knowledge is approximated in the analysis by whether or not an individual has completed a college degree since it has been found that the strongest determinant of adult scientific literacy is the number of college science courses that a person has taken (Miller 2009). A statistically significant impact is found with those who are college educated being 1.3 times more likely to be in favor of stem cell research than those without a college degree. Though this effect pales in comparison to other factors such as religious devotion and opinions of abortion, it does have an effect that is on par with partisanship. It would seem that one's general level of scientific understanding is just as important as their partisan cues for interpreting this issue. In regard to having issue-specific knowledge of stem cells, it appears that those who are more knowledgeable about stem cells are

1.7 times more likely to support it. Being more knowledgeable, like having general scientific literacy, does have an impact but it is dwarfed by the much stronger influence of someone's deeply held values, particularly their view of abortion.

Citizen Voting Behavior

In 2006 Missouri voters had the chance to express their opinion on stem cell research. A referendum was placed on the ballot which asked voters whether or not they wanted their state to allow all types of stem cell research permitted by the federal government. This referendum would have barred the state legislature from interfering with stem cell policies in the state, and given the conservative leanings of the legislature, this had been a likely possibility (St. Louis Post Dispatch 2005). It was also thought that the initiative would send a signal to biotechnology companies that the state was a good place to relocate and conduct research. However, the initiative passed by only 51% to 49%, and the controversy and legal wrangling that ensued ended up serving as a setback for those in favor of bringing more stem cell jobs to the state. This section seeks to determine what factors were important in an individual's vote on this initiative.

To date, partisanship has been found to be the most useful predictor of voter behavior on ballot initiatives (Branton 2003). Voters are able to make reasonable evaluations of initiatives based on their partisan and ideological orientations (Bowler and Donovan 1998). Whether or not these findings on partisanship apply for the morally charged issue of stem cell research is not immediately clear. For instance, it is hypothesized that religion will have a measurable effect distinct from partisanship because it has a strong influence in the formation of political attitudes through its effects on an individual's underlying values and, especially for evangelical Christians, its creation of a strong group identity. Values are defined as an individual's general conception about the desirable and undesirable end states of human life. As discussed earlier,

differing values regarding the conception of life strongly influence opinions of stem cell research. Also of importance to citizen voting behavior on stem cell research is that psychological attachment to a religious group can help individuals form political attitudes for complicated issues like stem cell research (Wlezien and Miller 1997). Endorsements and messages by religious leaders provide cues for individuals to use in the development of their political attitudes, and so it is expected that religious affiliation will be important in this analysis.

Even though religion and values are likely to be important for determining how an individual decides to vote on the issue of stem cell research, partisanship is also likely to be important as most politically-active Americans identify with one of the two major parties (Abramson, Aldrich, Rohde 2007). Since stem cell research is closely tied to opinions on abortion in an individual's mind and abortion has become a partisan issue, it is expected that Democrats will mostly support it whereas opposition will be mostly found among Republicans.

Another important influence on the development of political attitudes is ideology (see Jacoby 2002). Ideology and partisanship are often related, especially in the current political environment where there is a great deal of ideological polarization among elites (Poole 2005). Ideology's effects are greatest for those who are the most politically aware. However, it should be noted that most Americans often do not think in these terms (Converse 1964), and so partisanship is probably a better indicator of political characteristics. There is evidence that the lack of consistent ideological thinking in the American electorate is a result of ambivalence (Zaller and Feldman 1992). People hold conflicting considerations for and against political issues, something important to consider when viewing an issue such as stem cell research which has components of health, morality, science, and economic policy. Even though conflicted opinions exist, it is expected that liberals will vote for stem cells because of their greater

tolerance and openness on these issues. Conservatives would be expected to be less supportive, especially evangelical Christians who often hold more traditional social views.

To determine whether or not it is partisanship or values that are most important to an individual's voting decision for or against stem cell research, exit poll data from Edison Media Research and Mitofsky International is used to construct a model with the following variables: an individual's vote on the stem cell amendment to the Missouri constitution (0 indicates a no vote, 1 indicates a yes vote), two variables for partisan affiliation (one for Republican and one for Democrats; Independents are the reference group), two variables for an individual's political ideology (one for conservatives and one for liberals; moderates are the reference category), opinion of abortion (coded as 1 for it should be legal in all or most cases, 0 if it should be illegal in all or most cases), and church attendance (coded as 1 for attends at least weekly, 0 for attending less than this amount or not at all).

Table 4.2

Missouri Stem Cell Research Amendment Voting Behavior

<i>Independent Variables</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>Odds Ratio</i>
Republican	-1.014***	(0.175)	0.363
Democrat	0.459**	(0.171)	1.582
Conservative	-0.727***	(0.152)	0.483
Liberal	0.384*	(0.184)	1.468
Abortion Legal	1.907***	(0.134)	6.731
Attend Church Weekly	-1.175***	(0.132)	0.309
College Educated	0.279*	(0.134)	1.321
Constant	0.191	(0.176)	

* = $p < .05$; ** = $p < .01$; *** = $p < .001$

<i>Observations</i>	1820
<i>Log Likelihood</i>	-769.333
<i>Model Significance</i>	$p < .0001$
<i>Pseudo R² Value</i>	0.383
<i>Percent Predicted Correctly</i>	81.15%

Table 4.2 contains a rather surprising result: partisanship was *not* the most important factor in someone's decision how to vote on the stem cell amendment. Religious factors and beliefs about abortion were the most important determinants of someone's vote for or against stem cell research. Partisanship had an effect – Republicans were 64% less likely to vote for stem cell research whereas Democrats were 1.6 times more likely to vote for it – but it was not the deciding factor. For political ideology, it seems that it had similar effects as partisanship: conservatives were 52% less likely to vote for the amendment and liberals were 1.5 times more likely to vote for it.

Interestingly it was an individual's opinion of abortion that was the single most important determinant of their vote: if someone thought abortion should be legal in all or most cases, they were 6.7 times more likely to vote for the stem cell research amendment than someone who wanted abortion to be illegal in all or most cases. Church attendance was the second largest determinant. Someone who attended church at least weekly was 69% less likely to vote for the amendment than someone who did not. Having a college degree was the least consequential determinant of an individual's vote with college-educated individuals being 1.3 times more likely to vote in favor of stem cell research. Though previous research has suggested that partisanship would be the most important variable of interest for this analysis, these findings confirm that personal values and religious devotion are the primary determinants of an individual's voting behavior on the controversial issue of stem cell research.

Legislator Preferences

At the state level, the initiative provides citizens with the ability to alter public policy through two primary means: directly by voting in policies they prefer and indirectly by influencing the behavior of their elected representatives. The initiative process can motivate

representatives to vote in laws they may not otherwise have been inclined to pass because legislators desire to preempt the possibility of the initiative process being used to create laws that run afoul of their preferences. For example, it has been shown that legislatures in states with the initiative pass abortion laws that more accurately resemble the preferences of the median voter in those states (Gerber 1996). Considering the issues raised by abortion and stem cell research are similar, such an effect could occur for stem cell legislation.

However, an opposite effect could also occur in state legislatures. Voters may pass initiatives that are binding on elected officials and government bureaucrats, but these political actors can seek out ways to obstruct the implementation or enforcement of these initiatives. Policies passed through initiative can often be too controversial to be handled by the legislature; the result is a lack of support from politicians to carry out new regulations required by the initiative (Gerber, Lupia, and McCubbins 2004). Evidence from the Missouri Stem Cell Research Amendment shows this to be the case, as conservative lawmakers in the state responded to passage of the amendment by stripping funding from a \$150 million research center at the University of Missouri in Columbia and creating enough controversy over the stem cell issue that biotechnology companies were deterred from relocating their stem cell research facilities to the state (Gross 2007).

Given this uncertainty regarding how the initiative process can impact the decisions of state legislators, it is appropriate when examining the preferences of elected representatives on the issue of stem cell research to look to the national level, where the threat of the initiative is unlikely to alter legislator preference. It is for this reason that this analysis focuses upon the votes of U.S. Senators on a national stem cell research bill. Of interest for this analysis is whether or not Senators are voting on stem cell research policy because of their sincerely held

political and religious beliefs or voting strategically to appease their constituents. And if there is no evidence of sincere or strategic voting taking place, then other possible factors such as the desire to implement sound scientific policy cannot be ruled out.

Party affiliation is usually the strongest predictor of a senator's vote and senators choose their party affiliation based upon the perception that a party best fits with their ideology and that a party will allow them to promote their interests (Mehmood and Zhang 2001). A liberal (greater government intervention in the economy) and conservative (reduced role for government) scale based on party affiliation can account for legislators' voting decisions on 80% of all roll call votes cast between 1789 and 1985 (Poole and Rosenthal 1997). The ideological differences between the parties often results in politicians taking starkly different positions on issues. For example, the issue of abortion has become polarized at the elite level with most Republicans lining up against it and most Democrats expressing support (Stimson 2004); in recent times there have been continuous efforts by Republicans at both the state and federal level to severely restrict the practice of abortion with many Democrats opposing such efforts. It is expected that the issue of stem cell research, which engenders similar concerns as abortion, will also be a partisan issue in Congress, and that these representatives' ideology and partisanship will be highly correlated on this issue.

Even though it has been found that legislators routinely advocate for policies that are not supported by the majority of their constituents (Fiorina and Abrams 2009), it would be naïve to assume that in all instances legislators vote their conscience and in fact there is evidence to suggest constituency policy preferences matter (e.g. Page and Shapiro 1983; Stimson, MackKuen, and Erikson 1995), particularly in instances of electoral insecurity (e.g. Griffin 2006; Sullivan and Uslander 1978). It has been found that legislators are usually responsive to

constituents on high-profile issues that could threaten their re-election (Mezey 2008), though there is not as much evidence to suggest they are directly influenced by the interests of their constituents (Bertelli and Carson 2005). This ambiguity makes it difficult to determine whether or not it is likely that strategic voting based on constituent interest is likely to take place. It could be argued that certain constituents would see stem cell research as a high profile issue to them. In particular, this could be said of devout Christians with conservative views on abortion. It is expected that if stem cells are considered a high profile issue and if legislators are listening to voters in their districts on this particular issue, there will be evidence of this demographic affecting their vote.

On an issue such as stem cell research that has a strong moral component, how do legislators vote? Do they vote based on their party allegiance / ideological preference, or do they vote in line with the views of their constituents? Previous research has shown that on the issue of abortion legislators were more likely to vote their own preferences rather than the preferences of their constituents (Medoff, Dennis, and Bishin 1995). Since abortion prompts many of the same controversies and concerns as stem cell research, it is not unlikely that similar results will be found. Before determining whether or not this is the case, what policies voters in a district or state prefer must be ascertained.

Determining the preferences of the constituents in a legislator's district or state has long been a problem for political scientists, though recent research has confirmed that the two-party presidential vote share is an appropriate proxy (Levendusky, Pope, and Jackman 2008). Since this data is readily available, measuring the partisan preferences of a district or state is relatively easy; measuring a district or state's religiosity is far more difficult. One way to do so would be to use the stated religious affiliation of constituents within a district or state (see Smith, Olson,

and Fine 2010). However, this method seems unsatisfactory for measuring the religiosity of a district or state. Unlike demographic variables such as race or occupation where the observed characteristic corresponds nearly perfectly with the variable of interest, a person's stated religious affiliation does not correspond to the importance of religion in their daily lives. Someone who is a practicing Catholic would likely have a stronger religious basis for their opinion on abortion than a Catholic who only went to mass on Christmas and Easter. The differences between denominations, and in particular the differences between individual churches within denominations, further complicates using religious affiliation as a proxy for religious preferences; the split in the Anglican Church between conservative and liberal parishes highlights this problem.

A better method of determining religious preferences within a district or state is to use survey data that asks questions relevant to religious devotion. Those who are strongly devoted to the practice of their religion are the most likely to have their political views influenced by their religiosity. In 2008 Gallup conducted representative statewide surveys asking individuals if religion was an important part of their daily lives. Gallup found that the South is the most religious region in the country with the Midwest being the second most religious and the Northeast and West being the least religious (Newport 2009). A 2007 Pew Forum Religious Landscape Survey conducted representative statewide surveys on religious practice that were more in-depth than the Gallup surveys asking, among other things, questions regarding church attendance, views of the Bible, and frequency of prayer (Pew Forum on Religion & Public Life 2007). Using answers to the questions from the Pew survey, a variable can be created that taps in to the religiosity of a state. The results of this factor analysis are listed in Table 4.3. Correlating the predicted state values of religiosity from the factor analysis with the answers to

the Gallup surveys on the importance of religion produces a correlation coefficient of 0.96. Accordingly, in the interest of parsimony, the Gallup survey measure will be used as the proxy for state religiosity in the analysis that follows.

Table 4.3
Iterated Principal Factor Analysis Retaining One Factor
Eigen-value = 5.28

Variable	Factor Loading
% Who Attend Church Weekly	0.9511
% Who Rarely Attend Church	-0.8634
% Who Believe Bible is Literal Word of God	0.9093
% Who Believe Bible is from Men, not God	-0.9712
% Who Pray Daily	0.9598
% Who Seldom Pray	-0.9689

Having developed an appropriate measure of a state's religious preferences, a model can be developed for understanding the primary determinants of a Senator's vote. The resulting model includes the following variables: a U.S. Senator's vote on the 2005 Stem Cell Research Enhancement Act (0 indicates a nay vote, 1 indicates a yea vote), the average of the 2004 and 2008 Democratic presidential vote share in a state, constituent religiosity as determined by the number of residents in a state responding that religion is an important part of their daily lives, and a dummy variable for a senator's religious affiliation (senators claiming to be of an evangelical faith are coded as 1 since these Christian denominations hold strong pro-life positions on abortion; Catholic Republican senators are also coded as 1 since Catholic doctrine maintains that stem cell research destroys human life; all others are coded as 0, including Democrats claiming to be Catholic because most Catholic Democrats in the Senate hold views on abortion that conflict with the principles of their faith, an indication that they might be less

devoted to the tenets of their religion than their Catholic Republican counterparts). Table 4.4 presents the results.

Table 4.4
Determinants of a Senator's Stem Cell Research Vote

<i>Independent Variables</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>Odds Ratio</i>
Democratic Party Affiliation	3.625***	(1.088)	37.527
Avg 2004 & 2008 Dem Pres Vote	0.059	(0.044)	1.061
Constituent Religiosity	-0.015	(0.032)	0.985
Evangelical or Catholic Republican	-1.307*	(0.633)	0.271
Constant	-1.843	(3.400)	

* = $p < .05$; ** = $p < .01$; *** = $p < .001$

<i>Observations</i>	100
<i>Log Likelihood</i>	-36.747
<i>Model Significance</i>	$p < .0001$
<i>Pseudo R^2 Value</i>	0.442
<i>Percent Predicted Correctly</i>	83.00%

The only significant variables in the analysis are a senator's partisan identification and religious affiliation. According to the results, Democrats were approximately 38 times more likely to vote for the bill, indicating that stem cell research, like abortion, is a highly polarized issue for the two parties. Religion also had an important influence on a senator's vote: being evangelical or a Catholic Republican meant a senator was 73% less likely to vote for the bill. Partisan preferences of constituent and constituent religiosity had no discernible effect on a legislator's vote. These results suggest that voting on a morally charged issue such as stem cell research is a personal decision based on a representative's individual partisan / ideological preferences and their personal religious beliefs. This finding should not be all that surprising: expecting a senator to compromise their moral convictions in order to better reflect the interests of the majority of their constituents would be asking for a degree of responsiveness that even many voters may not desire.

Implications and Conclusions

Stem cell research is a controversial political issue. Opinions of stem cell research are largely tied to one's view of abortion, and religion also has an important influence in how one perceives the issue. For some, the use of embryonic stem cells is tantamount to the killing of a potential human life, but for others, this research holds great promise for one day extending the lives of those with currently incurable afflictions like Parkinson's. Regardless of how an individual views the issue, the basis for these attitudes is tied to underlying values that are stable over time and unlikely to experience much change.

When it comes time to cast a vote at the ballot box, it is clear that deep-seated opinions about this type of research carry over to voting behavior. In the case of the 2006 Missouri constitutional amendment to allow for all types of stem cell research permitted by federal law, the single greatest determinant of someone's vote was their opinion of abortion. Religiosity was also a strong determinant of someone's decision to vote for or against stem cell research. Partisanship and ideology were significant, but they were not nearly as important as values and religion. This finding is important because it conflicts with previous literature suggesting partisanship as the greatest determinant of someone's voting behavior on ballot initiatives. Perhaps moral issues such as stem cell research are framed differently in citizens' minds, which is then reflected in their voting behavior. This topic is an area where further research is needed.

Some important distinctions and similarities can be made between the analysis of the survey results and analysis of the exit poll results. Though partisanship was not a primary influence in either, it is clear that partisanship was a more significant determinant for how to vote on stem cell research than it was for how individuals think about the issue outside the voting booth. Could this result be because the amendment being studied became so attached to the

Missouri senate race that was taking place in 2006? There is reason to believe so given that the exit polls predated the survey results and one would expect partisanship's influence to intensify with time, not diminish, as sorting takes place on the issue (Levendusky 2009). The Washington Post (2006) noted that it was "a campaign that focused on McCaskill's support for a stem-cell research referendum," resulting in a "mixing of the Senate race and stem cell initiative." Considering that 80% of those who voted in favor of stem cell research also voted for Democrat Claire McCaskill and that 78% of those who voted against stem cell research voted for Republican Jim Talent, it is clear there was some relation between the two. Also, it should be noted that support for stem cell research was greater when asked for a general opinion on the issue than when it came time to actually vote on a proposed policy.

One important similarity between the two analyses is that general scientific knowledge had a similarly minor impact in both. It is clear from these results that how an individual forms their opinion and their eventual voting decision on this scientific issue is predominated by how they view the issue of abortion, not by how educated they are about stem cell research. Since science is unable to answer questions such as whether or not life begins at conception and whether or not it is morally acceptable to terminate a developing fetus, it is unlikely that improving scientific literacy would promote a much greater acceptance of stem cell research. Improving citizen knowledge of stem cells would likely provide a marginal increase in support for this type of research but a sea change of opinion on the issue is much more likely to come from individuals reinterpreting how stem cell research coincides with their existing value structure than from new understandings of scientific information on the issue.

Senators, not unlike citizens, determine their vote for or against stem cell research based on their own personal values and political beliefs. When a Senator's vote and the preferences of

constituents happen to match, it is coincidental, not intentional. It seems that on a sensitive political issue where ideological polarization exists, legislators are not likely to listen to the preferences of their constituents. If citizens want their preferences on stem cell research to be represented in Congress, they need to elect legislators who share their ideological and religious background or who have a strong stated opinion on abortion. Evidence for the importance of these matters can be seen from the results of the 2006 Missouri senate race. Talent had a 100% rating from The National Right to Life Committee and voted no on the 2005 Stem Cell Research Enhancement Act; McCaskill replaced Talent by the slimmest of margins and had a 100 percent rating from Planned Parenthood Action Fund, voting yes on the 2007 Stem Cell Research Enhancement Act. This point is further emphasized by the fact that every Senator who voted on the 2007 stem cell bill who had also voted on the 2005 stem cell bill cast their vote in the exact same way. Now whether or not legislators are concerned with the preferences of interest groups who lobby them or activists in their district who feel very strongly for or against the issue is something not directly addressed by this research and remains a topic for further study.

There are a few potential explanations for why the effect of partisanship was significantly greater for legislators than citizens. Legislators have become very polarized over the last few years, with most of the change resulting from the Republican Party becoming more conservative as a whole (Hare et. al 2012). With legislators already being more partisan and ideological than the American public, it is not surprising that this additional polarization has led to more partisan voting in Congress. Another reason is that there are real consequences when legislators vote against the interests of their parties: legislators face losing their preferred committee assignments, losing much-needed campaign support, or angering partisan constituents. On the other hand, there are very few tangible consequences for citizens. It should not be surprising,

then, that very clear elite stances did little to change voting behavior on the Missouri initiative; the findings of this research clearly demonstrate that citizen voting was primarily based on personal values of individual voters, not the preferences of politicians.

The results of this analysis can be useful for determining how values and beliefs are likely to influence policy outcomes in Congress or ballot initiatives at the state level for issues that engender division between religion and science. If the number of conservative Republicans with strong religious beliefs and pro-life abortion opinions represented in Congress increases, the likelihood that legislation favorable to stem cell research will get passed diminishes (irrespective of the sitting executive). Legislators, though, vote their own conscience on these issues, and so they should not be taken as representing public opinion. At the state level, one can use the results of this analysis to determine the likelihood of success for stem cell research ballots that provide state constitutional guarantees for stem-cell research. These ballots are less likely to pass in conservative states with high levels of religious fundamentalism than in more liberal states where abortion is more widely accepted.

The current analysis is well suited for the aims of this research project but for the purpose of addressing other relevant questions in political science, it could be expanded in the future. Race and gender are excluded from the presented results but given the past importance these factors have had in the formation of abortion opinions (see Carter, Carter, and Dodge 2009), it may be advisable for future empirical research on this topic to provide more discussion of these variables. Also, for researchers interested in contributing to the literature on the link between political beliefs and knowledge (see McCright 2011), interaction terms could be used to further explore the potential relationships between the included variables.

APPENDIX

Text of the 2005 Stem Cell Research Enhancement Act

H.R.810

One Hundred Ninth Congress

of the

United States of America

AT THE SECOND SESSION

Begun and held at the City of Washington on Tuesday,

the third day of January, two thousand and six

An Act

To amend the Public Health Service Act to provide for human embryonic stem cell research.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the 'Stem Cell Research Enhancement Act of 2005'.

SEC. 2. HUMAN EMBRYONIC STEM CELL RESEARCH.

Part H of title IV of the Public Health Service Act (42 U.S.C. 289 et seq.) is amended by inserting after section 498C the following:

'SEC. 498D. HUMAN EMBRYONIC STEM CELL RESEARCH.

'(a) In General- Notwithstanding any other provision of law (including any regulation or guidance), the Secretary shall conduct and support research that utilizes human embryonic stem cells in accordance with this section (regardless of the date on which the stem cells were derived from a human embryo).

'(b) Ethical Requirements- Human embryonic stem cells shall be eligible for use in any research conducted or supported by the Secretary if the cells meet each of the following:

'(1) The stem cells were derived from human embryos that have been donated from in vitro fertilization clinics, were created for the purposes of fertility treatment, and were in excess of the clinical need of the individuals seeking such treatment.

`(2) Prior to the consideration of embryo donation and through consultation with the individuals seeking fertility treatment, it was determined that the embryos would never be implanted in a woman and would otherwise be discarded.

`(3) The individuals seeking fertility treatment donated the embryos with written informed consent and without receiving any financial or other inducements to make the donation.

`(c) Guidelines- Not later than 60 days after the date of the enactment of this section, the Secretary, in consultation with the Director of NIH, shall issue final guidelines to carry out this section.

`(d) Reporting Requirements- The Secretary shall annually prepare and submit to the appropriate committees of the Congress a report describing the activities carried out under this section during the preceding fiscal year, and including a description of whether and to what extent research under subsection (a) has been conducted in accordance with this section.'.

Speaker of the House of Representatives.

Vice President of the United States and

President of the Senate.

Text of the 2006 Missouri Constitutional Amendment 2 (Stem Cell Initiative)

2006 Ballot Measure
Constitutional Amendment 2
Stem Cell Initiative

Submitted October 11, 2005

NOTICE: You are advised that the proposed constitutional amendment may change, repeal, or modify by implication or may be construed by some persons to change, repeal or modify by implication, the following provisions of the Constitution of Missouri - Sections 2, 10, 14, and 32 of Article I; Section 1 of Article II; Sections 1, 21, 22, 23, 28, 36, 39, 40, 41, and 42 of Article III; Sections 1, 14, 36(a), 37, 37(a), 39, and 52 of Article IV; Sections 5, 14, 17, 18, and 23, and subsection 17 of Section 27 of Article V; Sections 18(b), 18(c), 18(d), 18(k), 18(m), 19(a), 20, 31, 32(a), and 32(b) of Article VI; Section 9(a) of Article IX; Sections 1, 6, 11(a), 11(d), and 11(f) of Article X; and Section 3 of Article XI.

THE PROPOSED AMENDMENT

Be it resolved by the people of the state of Missouri that the Constitution be amended:

One new section is adopted by adding one new section to be known as section 38(d) of Article III to read as follows:

Section 38(d). 1. This section shall be known as the " Missouri Stem Cell Research and Cures Initiative."

2. To ensure that Missouri patients have access to stem cell therapies and cures, that Missouri researchers can conduct stem cell research in the state, and that all such research is conducted safely and ethically, any stem cell research permitted under federal law may be conducted in Missouri, and any stem cell therapies and cures permitted under federal law may be provided to patients in Missouri, subject to the requirements of federal law and only the following additional limitations and requirements:

- (1) No person may clone or attempt to clone a human being.
- (2) No human blastocyst may be produced by fertilization solely for the purpose of stem cell research.
- (3) No stem cells may be taken from a human blastocyst more than fourteen days after cell division begins; provided, however, that time during which a blastocyst is frozen does not count against the fourteen-day limit.
- (4) No person may, for valuable consideration, purchase or sell human blastocysts or eggs for stem cell research or stem cell therapies and cures.

(5) Human blastocysts and eggs obtained for stem cell research or stem cell therapies and cures must have been donated with voluntary and informed consent, documented in writing.

(6) Human embryonic stem cell research may be conducted only by persons that, within 180 days of the effective date of this section or otherwise prior to commencement of such research, whichever is later, have

(a) provided oversight responsibility and approval authority for such research to an embryonic stem cell research oversight committee whose membership includes representatives of the public and medical and scientific experts;

(b) adopted ethical standards for such research that comply with the requirements of this section; and

(c) obtained a determination from an Institutional Review Board that the research complies with all applicable federal statutes and regulations that the Institutional Review Board is responsible for administering.

(7) All stem cell research and all stem cell therapies and cures must be conducted and provided in accordance with state and local laws of general applicability, including but not limited to laws concerning scientific and medical practices and patient safety and privacy, to the extent that any such laws do not (i) prevent, restrict, obstruct, or discourage any stem cell research or stem cell therapies and cures that are permitted by the provisions of this section other than this subdivision (7) to be conducted or provided, or (ii) create disincentives for any person to engage in or otherwise associate with such research or therapies and cures.

3. Any person who knowingly and willfully violates in this state subdivision (1) of subsection 2 of this section commits a crime and shall be punished by imprisonment for a period of up to fifteen years or by the imposition of a fine of up to two hundred fifty thousand dollars, or by both. Any person who knowingly and willfully violates in this state subdivisions (2) or (3) of subsection 2 of this section commits a crime and shall be punished by imprisonment for a period of up to ten years or by the imposition of a fine of up to one hundred thousand dollars, or by both. A civil action may be brought against any person who knowingly and willfully violates in this state any of subdivisions (1) through (6) of subsection 2 of this section, and the state in such action shall be entitled to a judgment recovering a civil penalty of up to fifty thousand dollars per violation, requiring disgorgement of any financial profit derived from such violation, and/or enjoining any further such violation. The attorney general shall have the exclusive right to bring a civil action for such violation. Venue for such action shall be the county in which the alleged violation occurred.

4. Each institution, hospital, other entity, or other person conducting human embryonic stem cell research in the state shall (i) prepare an annual report stating the nature of the human embryonic stem cells used in, and the purpose of, the research conducted during the prior calendar year, and certifying compliance with subdivision (6) of subsection 2 of this section; and (ii) no later than June 30 of the subsequent year, make such report available to the public and inform the Secretary of State how the public may obtain copies of or otherwise gain access to the report. The report

shall not contain private or confidential medical, scientific, or other information. Individuals conducting research at an institution, hospital, or other entity that prepares and makes available a report pursuant to this subsection 4 concerning such research are not required to prepare and make available a separate report concerning that same research. A civil action may be brought against any institution, hospital, other entity, or other person that fails to prepare or make available the report or inform the Secretary of State how the public may obtain copies of or otherwise gain access to the report, and the state in such action shall be entitled as its sole remedy to an affirmative injunction requiring such institution, hospital, other entity, or other person to prepare and make available the report or inform the Secretary of State how the public may obtain or otherwise gain access to the report. The attorney general shall have the exclusive right to bring a civil action for such violation.

5. To ensure that no governmental body or official arbitrarily restricts funds designated for purposes other than stem cell research or stem cell therapies and cures as a means of inhibiting lawful stem cell research or stem cell therapies and cures, no state or local governmental body or official shall eliminate, reduce, deny, or withhold any public funds provided or eligible to be provided to a person that (i) lawfully conducts stem cell research or provides stem cell therapies and cures, allows for such research or therapies and cures to be conducted or provided on its premises, or is otherwise associated with such research or therapies and cures, but (ii) receives or is eligible to receive such public funds for purposes other than such stem cell-related activities, on account of, or otherwise for the purpose of creating disincentives for any person to engage in or otherwise associate with, or preventing, restricting, obstructing, or discouraging, such stem cell-related activities.

6. As used in this section, the following terms have the following meanings:

(1) "Blastocyst" means a small mass of cells that results from cell division, caused either by fertilization or somatic cell nuclear transfer, that has not been implanted in a uterus.

(2) "Clone or attempt to clone a human being" means to implant in a uterus or attempt to implant in a uterus anything other than the product of fertilization of an egg of a human female by a sperm of a human male for the purpose of initiating a pregnancy that could result in the creation of a human fetus, or the birth of a human being.

(3) "Donated" means donated for use in connection either with scientific or medical research or with medical treatment.

(4) "Fertilization" means the process whereby an egg of a human female and the sperm of a human male form a zygote (i.e., fertilized egg).

(5) "Human embryonic stem cell research," also referred to as "early stem cell research," means any scientific or medical research involving human stem cells derived from in vitro fertilization blastocysts or from somatic cell nuclear transfer. For purposes of this section, human embryonic stem cell research does not include stem cell clinical trials.

(6) "In vitro fertilization" means fertilization of an egg with a sperm outside the body.

(7) "Institutional Review Board" means a specially constituted review board established and operating in accordance with federal law as set forth in 42 U.S.C. 289, 45 C.F.R. Part 46, and any other applicable federal statutes and regulations, as amended from time to time.

(8) "Permitted under federal law" means, as it relates to stem cell research and stem cell therapies and cures, any such research, therapies, and cures that are not prohibited under federal law from being conducted or provided, regardless of whether federal funds are made available for such activities.

(9) "Person" means any natural person, corporation, association, partnership, public or private institution, or other legal entity.

(10) "Private or confidential medical, scientific, or other information" means any private or confidential patient, medical, or personnel records or matters, intellectual property or work product, whether patentable or not and including but not limited to any scientific or technological innovations in which an entity or person involved in the research has a proprietary interest, prepublication scientific working papers, research, or data, and any other matter excepted from disclosure under Chapter 610, RSMo, as amended from time to time.

(11) "Solely for the purpose of stem cell research" means producing human blastocysts using in vitro fertilization exclusively for stem cell research, but does not include producing any number of human blastocysts for the purpose of treating human infertility.

(12) "Sperm" means mature spermatozoa or precursor cells such as spermatids and spermatocytes.

(13) "Stem cell" means a cell that can divide multiple times and give rise to specialized cells in the body, and includes but is not limited to the stem cells generally referred to as (i) adult stem cells that are found in some body tissues (including but not limited to adult stem cells derived from adult body tissues and from discarded umbilical cords and placentas), and (ii) embryonic stem cells (including but not limited to stem cells derived from in vitro fertilization blastocysts and from cell reprogramming techniques such as somatic cell nuclear transfer).

(14) "Stem cell clinical trials" means federally regulated clinical trials involving stem cells and human subjects designed to develop, or assess or test the efficacy or safety of, medical treatments.

(15) "Stem cell research" means any scientific or medical research involving stem cells. For purposes of this section, stem cell research does not include stem cell clinical trials.

(16) "Stem cell therapies and cures" means any medical treatment that involves or otherwise derives from the use of stem cells, and that is used to treat or cure any disease or injury. For purposes of this section, stem cell therapies and cures does include stem cell clinical trials.

(17) "Valuable consideration" means financial gain or advantage, but does not include reimbursement for reasonable costs incurred in connection with the removal, processing, disposal, preservation, quality control, storage, transfer, or donation of human eggs, sperm, or blastocysts, including lost wages of the donor. Valuable consideration also does not include the consideration paid to a donor of human eggs or sperm by a fertilization clinic or sperm bank, as well as any other consideration expressly allowed by federal law.

7. The provisions of this section and of all state and local laws, regulations, rules, charters, ordinances, and other governmental actions shall be construed in favor of the conduct of stem cell research and the provision of stem cell therapies and cures. No state or local law, regulation, rule, charter, ordinance, or other governmental action shall (i) prevent, restrict, obstruct, or discourage any stem cell research or stem cell therapies and cures that are permitted by this section to be conducted or provided, or (ii) create disincentives for any person to engage in or otherwise associate with such research or therapies and cures.

8. The provisions of this section are self-executing. All of the provisions of this section are severable. If any provision of this section is found by a court of competent jurisdiction to be unconstitutional or unconstitutionally enacted, the remaining provisions of this section shall be and remain valid.

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CHAPTER 5: OVERALL IMPLICATIONS AND CONCLUSIONS

Three different issues representative of the types of scientific policies that are likely to be debated in a political setting have been chosen for analysis in part to ascertain citizen and legislative voting behavior peculiar to those issues but also to answer questions related to voting behavior more broadly. One benefit of an analysis of controversial scientific issues is that it is a policy area where one would think that concerns unrelated to political beliefs and personal values might take precedence. This analysis has demonstrated that even in cases where technical scientific information is relevant to decision making on an issue, concerns other than science are the most significant determinants of vote choice. Science policy is no more shielded from the influence of political considerations than any other policy area. This result raises the question as to whether or not there are any policy areas where political beliefs and personal values do not predominate.

Thus the findings of this analysis put to rest any claims regarding the “specialness” of science policy. The manner in which these policies are voted on and passed into law is not unique. This claim may not be surprising to political scientists who are accustomed to finding this result when examining vote choice but it might seem a bit surprising to science policy experts. Even the esteemed standing of science in the public realm cannot safeguard it from politicization. Unfortunately for a scientist who would like to have their research evaluated in the same manner in which it was conducted, it is clear that the enactment of science policy does not follow the scientific process and that what science has to say about an issue is less of a concern for citizens and legislators than the ways in which their party, religion, or personal ideology might influence them to vote.

Policy enactment requires a yes or no decision and there are good reasons to believe why this process seems to mix with the scientific process in the same manner as oil and water. Science is objective, logically consistent, based on the facts, open to skepticism about fundamental ideas, and concerned with discovering the way the world really works. Politics, on the other hand, is subjective, sometimes irrational, based on competing values, desiring of certainty for core beliefs, and concerned with the way that the world should be. When a scientific issue enters the political realm and a policy decision must be made, it should be no surprise that the issue fractures along lines of existing political divisions. For a policy to pass in a democracy three criteria must be met: there needs to be a majority that believes a problem truly exists, that a problem warrants government intervention, and general agreement on the policy means needed to achieve desired ends. Political beliefs and personal values are likely to enter into each part of this process. The needs and desires of the political community will differ from that of the scientific community and the way in which decisions are reached in these two communities is, by and large, incompatible.

An excellent example that demonstrates how these three criteria can result in competing policy preferences despite basic agreement on the science underlying an issue is climate change. Though skeptics remain, irregular weather patterns and mounting evidence from scientists have convinced many Americans that climate change is indeed real. Despite a growing awareness that climate change is happening, not everyone agrees that it warrants government attention. This feeling is prevalent in Congress as well. Senator Jay Rockefeller of West Virginia has said that he believes in climate change and the need to address it but he has been adamantly opposed to doing so through measures that would affect coal mining in his state. His belief in the problem but not in the need for robust government action is not an unusual position for environmental

issues. And even when citizens or politicians do believe that government should address a problem, in many cases they cannot come to an agreement on how. Cap and trade has often been touted as the model to replicate for regulating carbon dioxide given its success in reducing sulfur dioxide under the Clean Air Act but other methods of addressing climate change such as setting renewable portfolio standards or creating a carbon tax have also been floated. The three policy areas studied here clearly demonstrate that the reasons why a controversial scientific issue is able to make it on the agenda in the first place and the support or opposition it engenders can have little to do with the science itself.

This last point is particularly highlighted by the influence of special interests on the policy process. Without George Soros' financial backing to ensure enough signatures were gathered and the citizen groups who were instrumental in carrying this function out, it is unclear how many medical marijuana initiatives would have actually made it to the ballot. The lack of special interests opposing medical marijuana may have also been an important factor in the impressive pass rate for these types of initiatives. Biofuels legislation provides an excellent example of a policy area dominated by one particular group of special interests. When the only factor that is reliably consistent in determining a legislator's vote on biofuels is the amount of corn acres harvested in their district or state, it becomes clear that special interests can override factors such as the scientific debate relevant to a policy. On the issue of stem cell research the influence of special interests is less clear unless one considers churches as being special interests. Churches such as the Catholic Church that advocate against abortion and that have vociferously opposed stem cells policy may not be the deciding factor in determining a citizen's vote but they likely have some degree of influence in shaping congregants' views.

The influence of special interests raises questions about the nature of legislative responsiveness. The cases presented here provide a rather pessimistic view of the responsiveness of legislators to constituents. In the case of stem cell research, legislators casted their votes in line with their own preferences with little indication that they had much regard for the policy preferences of their constituents. Legislative voting behavior on biofuels policy indicated responsiveness but the nature of this responsiveness would seem to indicate that legislators are primarily concerned with voting in ways that would benefit them personally rather than in ways that would be in line with the views of the typical constituent in their district or state. Voting strategically when it is needed for electoral gain or voting in favor of policies to appease special interests in their district or state is probably not what the founders had envisioned when creating a republican form of government. Special interests have one of the most important things in politics: access. This access provides these groups with an opportunity to inform legislators about issues affecting them using selective information. It is just another way in which the science relevant to a matter can be superseded in the interest of politics.

The citizen initiative component of my analysis addresses one of the ongoing questions of direct democracy research: what factors determine how a citizen decides to vote on ballot initiatives? The current consensus of the field indicated that partisanship would be the main determinant of how individuals order their preferences on these controversial scientific issues but my results suggest that partisanship is not always the primary determinant of an individual's vote. One potential reason for why the results here differ is that the analyses have been conducted with the intention of including variables of interest specific to the issues being studied; furthermore, other variations such as different states and different issues have been included to make the results more generalizable. Considering that for a number of initiatives

partisanship was not the main determinant of an individual's vote, it has to be questioned whether or not the current consensus is correct. It is advisable in further research that, where possible, variables relevant to the topic at hand should be included. Given what has been presented here, it cannot be expected that for every issue partisanship will predominate.

An issue that has been raised by the analysis of marijuana initiatives is the amount of variation in voting patterns across states. This concern remains largely unexplored and unexplained in the literature and, considering it was not within the aims of this overall project, it is not answered here. However, acknowledging this fact is important to scholars writing in the direct democracy literature. One cannot assume that the voters of Montana are similar enough to the voters of California that if the same issue at the same time with even similar wording were to be presented to them, a pooled analysis could be conducted. At the very least it would be important to include a variable identifying the state of a respondent to any exit poll survey. Further research that attempts to explain variations in voting patterns across states would be a welcome addition to the field.

One issue this analysis does not put to rest is why support for scientific policies seems to drop off for individuals who are Republican and conservative. The answer likely lies in the types of views toward government intervention associated with these labels. The laissez-faire attitude most conservative Republicans have toward government intervention in economic matters is likely to make them less accepting of public solutions to scientific problems related to issues such as the environment. Pollution is an externality and addressing it requires the type of economic regulation conservative Republicans typically oppose. On issues related to government regulation of social mores, though, conservative Republicans advocate strong intervention on the part of the state to impose traditional standards of conduct; some of these

standards conflict with the policies desired by scientists. Another potential reason may be that conservative Republicans have the highest levels of religious devotion.

This research project is not intended to answer whether or not science and religion are incompatible but it can provide some insight into that debate; at the very least it highlights the ongoing salience of religion in American politics. On particular issues, there are instances where the tenets of one's religion might dictate that a particular public policy is unacceptable despite the fact that it could lead to the advancement of science. For example, embryonic stem cell research is incompatible with the stated doctrines of many religious institutions. It is also clear that certain fundamentalist interpretations of religious texts can result in the denial of scientific consensus, such as those who vehemently deny that evolution is the process by which humans were formed. However, on other issues such as climate change, there do not appear to be any major disparities that would make science incompatible with religion. Harming the earth's ecosystem does not seem in line with the doctrine of most religions which emphasize humankind's responsibility to the planet and those who reside on it. The findings of this analysis have shown that there are some matters where conflict between science and religion seems almost inevitable but in no way should these findings be construed to mean that the advancement of science on controversial issues will always be hindered by religion.

What do the conclusions of this research project mean for science policy in the United States? Rapid scientific development characterizes the present times and the complexity of scientific issues is only likely to increase as time goes on. Already the issues are fairly difficult to understand for someone without much formal science education. Climate change is a prime example. Can it reasonably be expected for the average citizen to fully comprehend the greenhouse effect, trend lines of temperature increases over decades with yearly fluctuations,

evidence obtained through such techniques as polar ice cores, the unknown effects of what might or might not occur with or without regulation, and proposed methods of addressing the issue that involve the creation of a market for an invisible, odorless gas that a typical person would never trade and sell? Given the United States' extensive use of the initiative process in about half of the nation's states, more and more these types of issues might be put directly before citizens for them to decide. Though this scenario might seem to suggest these matters are better left to legislators who ostensibly have the time and motivation to become more educated on science policy issues, there are compelling reasons that call such a belief into question.

The results of this research project can lead one to wonder whether or not "the public voice, pronounced by the representatives of the people, will be more consonant to the public good than if pronounced by the people themselves," as Madison stated in Federalist No. 10. Certainly the legislative process is more amenable to the inclusion of science as the content of legislation is primarily drafted by teams of legal experts after consultation with policy experts but if citizens were to have access to such resources, might they also be able to develop similar legislation? Given that the motivations for legislators to vote on scientific policies include pressures that push them to vote in ways that may not be in the best interests of the public at large (party and special interest pressures have less of an impact in direct voting by citizens), it is not clear that leaving science policy to politicians is all that much better than having citizens decide issues directly, especially if there were more of a standardized process for citizen-led policies that required consultation with subject matter experts before the language of a ballot could be approved, not just verification by a political official as is the current practice in most states with the initiative.

One unique approach of this research project has been the inclusion of both legislation and citizen initiatives. Comparing the content of the previously discussed Congressional 2005 Stem Cell Research Enhancement Act with the content of the 2006 Missouri Constitutional Amendment 2 citizen stem cell initiative (for the full language of both, see the appendix to Chapter 4) it is clear that the citizen initiative is longer and more complex than the legislation. Though the initiative had to receive enough signatures from voters to get on the ballot, clearly its content was not drafted in some sort of open forum of citizens; it exhibits the careful logic, attention to detail, and specific research language that only legal and scientific experts would know to include, indicating it was drafted in collaboration with experts. Critics of direct democracy (which included the country's founders) may have valid concerns regarding the dangers of mob rule but it seems unlikely that all citizen-led initiatives and the way in which they are voted on constitute such a definition. The content of initiatives can be as complex as legislation, can be based on sound science, and can be a successful way for citizens to bring about the incorporation of scientific consensus into policy as they have done on the issue of medical marijuana. And the faults associated with citizens voting directly on policies are not all that dissimilar from the faults associated with passing policies in a legislature: this research project has shown that legislators and citizens are both just as likely to allow their subjective values and beliefs to predominate over objective scientific information when casting their votes.

Regardless of whether or not science policy is left to politicians or to citizens themselves, the politicized process by which scientific policies are enacted in the United States can serve to undermine the objective use of science in the enactment of new policies. The American political system is primarily designed to resolve conflicts over values, not to create the "best" or most efficient policy. Given the nature of the policy process in the United States, in order to have all

other concerns become subordinate to the science available on an issue it might be necessary to remove democratic accountability from the process. So long as science policy is subjected to democratic pressures, it will be subject to the whims of politicians and voters. There does not seem to be a balanced position here. Anytime the process is opened to political actors and voters the concerns of the polity become pervasive. Even a government bureaucracy like the EPA, staffed with technocrats, is not immune to the pressures of politics because it has not been entirely removed from democratic processes. The head of the EPA is chosen by the president and approved by Congress and the budget and authority of the organization are defined by legislative decree. If, for example, Obama were to direct the EPA to set limits on the greenhouse gas emissions of power plants as a means of addressing climate change, Congress could seek to overturn the rules, the next president could roll back all of the rules with a simple directive, or interest groups could sue to block implementation. The Supreme Court provides a model for the independence that scientists would require in a “science only model” given that its decisions are not appealable and are not required to be democratically responsive, but even it fails on the desire for objectivity as most decisions on the bench stem from the justices’ personal ideologies, an unsurprising result given the political way in which they are chosen. Technocracy requires that scientific experts truly govern, and philosophically, this notion directly conflicts with the democratic principles of the American political system.

How is it, then, that other industrialized countries such as those in Western Europe have been able to pass policies currently supported by the vast majority of scientists like strong measures intended to limit carbon dioxide emissions? And how is that China, an autocratic country where technical experts could be relied upon to carry out science policy without interference from the public, has one of the worst environmental records in the world? These

questions are ripe for exploring in further research. The strong federalism, winner-take-all elections, and explicit separation of the executive and legislative functions in the United States could be compared with other institutional forms as a potential means of explaining why the science policy process in the United States functions the way that it does. Differences in the scientific literacy and political views of the populace could also be examined in such an analysis.

In summary, there are three main conclusions of this research project that are worth reiterating. One is that the passage of scientific policies does not warrant an entirely separate body of literature devoted to understanding the mix between science and politics. The process of enacting a scientific policy and the political considerations the process engenders do not make science policy unique and these types of policies can easily be studied using the empirical techniques of political science. A second conclusion is that initiative voting behavior is potentially more complex than what scholars have indicated. In light of what has been presented here it cannot be claimed that partisanship is always the most significant determinant of how someone chooses to vote on an initiative and so the current consensus on this topic must be called into question pending the possibility that a number of other issues might exist for which partisanship is a lesser or non-significant factor when other variables are considered. A third conclusion is that the public choice theory of legislative behavior may have significant relevance to understanding the actions of legislators. The proposition that legislators are most likely to do that which benefits them most, whether it be for their professional advancement or for their own personal ideological satisfaction, is a useful starting point for understanding what has been found in this research project. At least for the types of issues presented here (and there is little reason to expect these policies are somehow unique as noted earlier), constituents seem to be either a

means to an end or, in instances where their support or lack of support does not provide a clear personal benefit to a politician, a trivial consideration.