Enlightening Experts: The Effect of Frames and Values on Expert Attitudes

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Entitled
Enlightening Experts: The Effect of Frames and Values on Expert Attitudes

For the degree of  Doctor of Philosophy

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ENLIGHTENING EXPERTS:
THE EFFECT OF FRAMES AND VALUES ON EXPERT ATTITUDES

A Dissertation
Submitted to the Faculty
of
Purdue University
by
Amelia Caron Andrews

In Partial Fulfillment of the
Requirements for the Degree
of
Doctor of Philosophy

August 2015
Purdue University
West Lafayette, Indiana
This dissertation is dedicated to the people who have made me the woman I am today…

To my Nana, who inspired me to dream

To my sister, who taught me to persevere

To my mother, who showed me the strength of my own spirit and always believed in her “work in progress”

It is dedicated to my family, who has always encouraged me to achieve greatness and to never settle for less.

Thank you-- I will always love you.
ACKNOWLEDGEMENTS

I would like to thank the individuals and agencies who made this research possible, particularly the Purdue University Extension and the partners in this project: the Purdue Climate Change Research Center and the Conservation Technology Information Center. I would also like to thank Karen Scanlon, Craig Dobbins, Marshall Martin, Ken Foster, Dan Towery, Steve Engelking, Bruce Erickson, Dale Clawson, as well as Liz Mathern at the North Dakota Farmers Union, Andrew Tuholski, Kylie Smith, and Megan MacKenzie Conaway for their assistance. I would also like to thank Dr. Eric Waltenburg for stepping in at the last hour to proxy my defense, and Dr. Daniel P. Aldrich for his continued advice and support—I would not have been able to do this without you.

I am especially grateful to my advisors, Dr. Leigh Raymond, Dr. Rosalee A. Clawson, and Dr. Benjamin M. Gramig, for inviting me to work on USDA Economic Research Service cooperative agreement No. 10.250, from which this project emerged, five years ago. From the beginning of the project you acted as my guide, giving me the freedom to be curious and stepping in to put me back on the right path when I made mistakes. You have always looked out for me and had faith in me when I found it hard to have faith in myself. More than co-authors and advisors, you have been a part of my family and I cannot imagine what my life would be like without you. From the bottom of my heart—Thank You.
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ABSTRACT


This dissertation is an examination of the framing process among domain experts—that is, authorities in specific policy fields. Driving this inquiry is a seemingly simple argument: frames influence how experts use their values to evaluate framed policy issues. Issue frames lead experts to consider the appropriateness of the values and mental models guiding their domain-relevant choices, and to change their attitude to resolve cognitive dissonance. The quality of this change rests on their perception of the values that issue frames stress. Focusing on farmers’ tillage choices, I use a mixed method approach to test my expectations through a series of originally designed interviews and field experiments. Results indicate that while issue frames may not have an independent influence, they can have a substantial impact on experts’ attitudes. This is not an independent influence, but rather rooted in experts’ prior experiences and values. Moreover, I find that experts’ interpretations of the values underlying novel issue frames determine whether they experience a positive, negative, or no framing effect. Results call to question the measurement of expertise within framing scholarship, and suggest that individuals seeking expert support need to facilitate a collaborative re-framing of environmental issues.
CHAPTER 1. INTRODUCTION

Policy scholars continue to devote increasing levels of attention to the role of domain experts, or authorities within specific policy fields, in the policy process (see Pielke 2007; Schlesinger 2009; Tamtik and Sá 2012). Their extensive knowledge, practice, and experience, has placed experts in the position to advise decision-makers, making them prominent actors in public policymaking, particularly in areas of environmental policy. A sizable literature has emerged to examine the impact of these experts on policy and politics (see Crow and Stevens 2012; Klucharev, Smidts, and Fernández 2008; Wagner and Petty 2011). Experts do not influence policy outcomes solely by offering decision-makers policy solutions and essential information, however, but also through their behaviors and choices.

The policy implications of experts’ actions have made them a frequent target of policy entrepreneurs. To illustrate, scientists and engineers in the field of energy production influence environmental issues such as land use, water contamination, and climate change, as well as issues of national security and the economy by choosing research and develop some alternatives and not others. As a result, the U.S. government, and other groups interested in promoting alternative energy sources, have used a series of grant programs in an attempt to direct these efforts (Goldberg 2001; Meyer 2007). The coordination of experts’ support and environmental behaviors, therefore, is essential to
environmental improvement. Yet, despite the implications of experts’ choices in addressing environmental challenges, it is unclear how the political environment shapes these experts’ attitudes and behaviors.

We know that policy entrepreneurs design issue frames—that is, persuasive messages that provide alternative descriptions of a policy issue—to influence politically important populations of domain experts, such as doctors, farmers, and engineers. As tools that guide how the public thinks and feels about policy issues (Gamson and Modigliani 1987), issue frames can have a strong impact on public opinion. Policy entrepreneurs use these tools to solicit expert support to increase legitimacy for their cause and elevate their influence among both the mass public and decision-makers (Blatter 2009; Weible 2008). Yet, much of the work contributing to our understanding of framing effects and the conditions under which they are likely to occur is based on examinations of how the mass public processes and responds to issue frames. As a result, we know surprisingly little about how issue frames influence the attitudes and behaviors of expert populations.

In this dissertation, I address this gap by incorporating scholarship from political science, cognitive psychology, and communication to address my main research question: Do issue frames influence experts’ attitudes toward domain-relevant policy issues? To answer this question I identify farmers as a population of experts to explore how they evaluate and respond to issue frames as well as the role of values in this framing process. In doing so, this study seeks to merge our understanding of framing effects with scholarship surrounding expert reasoning to achieve three objectives: 1) to identify the extent to which frames influence experts' attitudes; 2) to identify the extent to which prior
values influence the nature of a frame's effect on experts, and 3) to illustrate the practical policy relevance of framing theory in the promotion of policy solutions to populations of domain experts.

To achieve these objectives I focus on how farmers manage soil in the process of planting and growing crops; more specifically, farmers’ tillage choices. Though scholars have traditionally hesitated to identify farmers as agricultural experts (Cerf, Papy, and Angevin 1998), I build on more recent scholarship that suggests expertise emerges from the evolution and application of farmers “lay knowledge”(Morton 2011; Nuthall 2012). This expertise may be particularly important in farmers’ tillage choices, which requires an intricate understanding of virtually all facets of a farming operation due to the implications for the short as well as long-term management and productivity of agricultural land (Rousse 2008; Uri, Atwood, and Sanabria 1999).

Throughout my study I use a mixed methods approach to investigate the impact of issue frames on farmers’ tillage attitudes. I first identify the factors that are important to farmers’ tillage choice using data from a series of interviews with experienced farmers and other agricultural experts. Here, I also identify the range of issue frames that promote tillage systems within agricultural discourse. Interview data indicate that considerations surrounding profitability are most important to tillage choice, although environmental impacts are also a concern, if to a lesser extent. Moreover, I identify the profit frame as the dominant frame used to discuss various tillage systems.

I use my analyses of interview data as the foundation for two originally designed experiments. The first is a national survey experiment that examines the impact of profit and payment frames on farmers’ interest in conservation tillage. Experimental results
indicate that subjects evaluate issue frames based on their prior tillage attitudes and behaviors. This leads to positive reactions toward frames discussing payments for ecosystem services and negative reactions toward the dominant profit frame among farmers with low levels of prior conservation tillage adoption. I build on these results in a second field experiment, where I find that the influence of farmers’ environmental values on their attitudes toward no-till, a variant of conservation tillage, varies across issue frames. Results suggest that issue frames discussing the implications of tillage choices for neighboring communities may be more successful in promoting environmentally friendly tillage techniques than existing appeals based profit and good stewardship.

In achieving my objectives, I highlight the need for investigations of issue framing to move beyond a focus on mass public opinion, and to consider the importance of issue frames across other important segments of the population. Moreover, this study invites a broader reexamination of the conceptualization and measurement of expertise in contemporary framing research. The cognitive characteristics that lead to superior performance and reasoning are often overlooked in a literature that largely equates political knowledge and expertise, leaving lingering questions surrounding the application of framing research to such experts. By accounting for these distinctive characteristics of expertise, it will be possible to build a discussion that transcends existing disciplinary divides to inform the larger policy community. This research can, then, help policy entrepreneurs and advocates to develop more persuasive appeals and have a greater impact on policy change and success.
1.1 Frames, Values and Public Attitudes

Policy actors use issue frames to define “the essence” of political issues (Gamson and Modigliani 1987, 143), by providing verbal or visual cues that highlight specific dimensions of policy issues to influence individuals’ perceptions of those issues (Chong and Druckman 2007b; Gamson and Modigliani 1987, 1989). In doing so, frames alter the relative importance of considerations individuals use to form policy attitudes (Nelson, Clawson, and Oxley 1997; Nelson, Oxley, and Clawson 1997). For example, individuals tend to weigh considerations of civil liberties more heavily in establishing their support or opposition for a prospective hate speech rally than those of public order when exposed to frames that discuss the rally as a “freedom of speech” issue (Nelson, Clawson, and Oxley 1997). This leads to a framing effect when individuals change their attitude due to frame exposure (Chong and Druckman 2007a).

Importantly, individuals do not blindly accept issue frames; the extent to which frames influence individuals’ attitudes depends in part on the predispositions audience members bring to the table (Clawson and Waltenburg 2003). For instance, rather than evaluating the content of messages, some individuals may use cognitive-short cuts, such as source credibility (Druckman 2001) or stereotypes to respond to issue frames (Petersen et al. 2011). In contrast, other individuals may engage in active deliberation and use their values—that is, abstract beliefs “that a specific mode of conduct or end-state of existence is personally or socially preferable” (Rokeach 1973, 5)—to judge the strength and validity framed information. Here, individuals evaluate the compatibility of policies, candidates, or actions depicted in the information they have received with their value system (Feldman 1988b, 2003).
The latter form of the framing process requires audience members to have the motivation and ability to actively evaluate framed messages (see Petty and Cacioppo 1981, 1984; Petty et al. 1988). When this occurs, individuals may use their values or other predispositions to develop favorable and unfavorable thoughts toward framed policy issues which they then use to update their attitude. Evaluations based on some values may lead individuals to evaluate issue frames more favorably, thus leading to a standard framing effect. Those anchored in other values, however, may generate cognitive dissonance and contrast effects, whereby individuals are pushed away from the position advocated by the frame (Brewer 2002; Dardis et al. 2008; Slothuus and De Vreese 2010). The belief-importance model suggests that issue frames determine what values individuals use in this evaluative process and, thus, whether individuals experience positive, negative, or neutral reactions.

Although many scholars have examined political knowledge as a moderator of framing effects, little research examines how domain-experts respond to the framing process. “Domain experts” are individuals with extensive and well-organized knowledge that emerges from substantial experience and practice within a particular field (Hoffman 1998). These knowledge structures allow such experts to actively process domain-relevant information more efficiently and effectively (Nuthall 2012; Wiley 1998), while at the same time enhancing the need to evaluate the practical implications of relevant information.

Thus, domain experts’ engagement with, and understanding of, specific issue areas creates a heightened motivation and ability to collect and process issue-relevant information. The extent of this engagement are different for domain experts, however,
than for merely knowledgeable populations (Cellier, Eyrolle, and Marine 1997; Wiley 1998). The strength of domain experts’ engagement with a specific issue area makes their knowledge of the issue part of their personal identity (Fiske, Lau, and Smith 1990). Their direct and personal stake in outcomes within their area of specialization gives experts a high need to evaluate relevant policy issues and options. Moreover, experts retain a heightened awareness of the direct consequences their attitudes and behaviors have on conditions within their area of expertise (Hoffman 1998; Johnson 1988).

Bridging literatures in framing theory and those in expert reasoning, I hypothesize that issue frames do influence expert populations. Assuredly, these individuals have extensive and well-structured knowledge may provide some resistance to framing effects. Yet, the high need to gather, evaluate, and incorporate domain-relevant information indicates that experts are likely to actively evaluate the content of issue frames, and to update their attitudes in response. Moreover, because of this, experts are also likely to reference the values that issue frames emphasize to generate thoughts toward framed issues, which their updated attitudes will reflect. I thus, test two hypotheses in this study:

H1: Issue frames will influence domain experts’ attitudes toward policy issues that are relevant to their area of expertise.

H2: The values emphasized by domain-relevant issue frames determine the nature of framing effects among expert populations.

1.2 Farmers and Agricultural Tillage

As noted above, I investigate the relationship between issue frames, values, and expert attitudes in the context of farmers’ attitudes toward agricultural tillage. Although some scholars have resisted applying the label of “expert” to farmers, instead reserving
the term “agricultural expert” for those with a high level of formal agricultural education, recent scholarship demonstrates that farmers, too, demonstrate expert characteristics (Cerf, Papy, and Angevin 1998; Morton 2011; Nuthall 2012). From this alternative perspective, expertise emerges as farmers develop a detailed understanding of the interdependent components of a farming operation as they seek incorporate new information and practices to their knowledge to optimize performance. This allows experienced farmers to cultivate the requisite systems-knowledge to incorporate negative feedback and engage in abstract thinking characteristic of expert reasoning (Mauro, Mclachlan, and Van Acker 2009; Nuthall 2009).

Such expert reasoning is most prominent among farmers, perhaps, as they make farm management decisions, such as choosing between tillage systems. The selection of a tillage method is fundamental to farming operations due to the implications for the long-term management and productivity of agricultural land (Rousse 2008; Uri, Atwood, and Sanabria 1999). Farmers have several options for tilling their soil to plant their crops, including the “no-till” crop management system in which agricultural land is undisturbed between harvest and planting, thereby reducing soil erosion and agricultural runoff while also increasing biodiversity (Horowitz, Ebel, and Ueda 2010; Lankoski, Ollikainen, and Uusitalo 2006). Because no-till systems offer several important environmental benefits, government agencies and other policy entrepreneurs have tried for decades to convince farmers to have a positive attitude toward this technique. As a result, the prevalence of several important frames on a topic about which most professional farmers have great expertise makes the case of framing for conservation tillage an excellent one for testing my theoretical questions.
In addition, as these efforts to promote no-till adoption continue to emerge, the practice has garnered substantial attention within agricultural as well as policy communities, more recently as a mechanism for carbon sequestration in the fight against climate change (CAGG 2010; Rousse 2008; Uri, Atwood, and Sanabria 1999). Yet, despite public and private efforts to entice farmers to use conservation techniques as well as a wide spread knowledge of techniques like no-till, a significant portion of the farming community continues to hold negative attitudes toward the practice (Andrews et al. 2013). The question for policymakers and conservationists that I address through my empirical investigation of the framing process among domain experts, then, can be articulated as “how can we make more farmers interested in no-till farming techniques?”

1.3 Organization of the Study

I present my analysis in following manner. I begin in Chapter 2 with a review of classic and contemporary scholarship in issue framing, as well as work in expert-reasoning. My intent is to bring more precision to our understanding of framing and framing effects and to distinguish domain experts theoretically from other knowledgeable populations, including how domain experts may process issue frames relevant to their area of expertise differently than other individuals. In doing so, I seek to lay a theoretical foundation, and to generate the basic hypotheses that guide my study.

In Chapter 3 I explain in more detail my choice of farmers and the issue of tillage choice as the case for testing these hypotheses. I first defend the idea of professional farmers as meeting the criteria for being thought of as a population of experts. Expertise implies both the existence of, as well as the ability to apply extensive and well-organized
knowledge within a particular area, characteristics that many professional farmers consistently demonstrate. Those traits are particularly pronounced as farmers evaluate topics with system-level consequences, such as the adoption of tillage practices. I also establish agricultural tillage as the domain-relevant policy issue, discussing the operational and environmental consequences of these tillage choices for farmers, and society at-large. This chapter also explores some of the important public policy implications of tillage choices by farmers in more detail.

In Chapter 4, I draw on literatures surrounding farmer adoption of best management practices (BMPs) to inform our understanding of farmers' tillage choices. This chapter explores prominent reasons farmers give for adopting (or not adopting) conservation tillage, as well as existing scholarly explanations for farmers’ adoption of BMPs more generally. In this chapter, I draw on in-depth interviews with 26 farmers, certified crop advisors (CCAs), and conservation specialists to identify the most prominent frames presented to farmers concerning conservation tillage, as well as the considerations that factor into farmers' evaluations of tillage practices. Here, it becomes clear that advisors, scholars, and farmers alike identify profit as the single greatest motivator behind farmers’ evaluations and adoption of tillage practices. Yet, additional ideas related to stewardship of the land, protecting local community well-being, and offers of payments to farmers for adopting conservation tillage also arise.

In Chapter 5, I examine my first research question in detail: to what extent do issue frames influence experts' attitudes toward policy issues relevant to their field of expertise. To answer this question, I analyze data from a national field experiment with expert row-crop farmers that tests the impact of profit and economic payment frames on
subjects' tillage attitudes. Surprisingly, the results indicate that it is unlikely that these issue frames exert a positive influence on farmers’ attitudes toward conservation tillage. Instead, it appears as though the effects of these issue frames are more variable based on individual-level characteristics, especially farmers’ prior attitudes toward conservation tillage. Indeed, these prior attitudes are sufficiently important that the profit frame actually elicits a negative influence among those who currently do not practice conservation tillage, the group most fervently targeted by policy practitioners.

I build on those surprising findings further in Chapter 6, arguing that farmers’ prior values are likely important to their evaluations of different frames, and divergent attitudinal responses. This value-based evaluative process may lead expert farmers to generate favorable or negative thoughts toward the framed policy issues, and thus positive or negative attitudes, that between-group comparisons cannot account for. I examine the impact of different issue frames and farmers’ corresponding environmental values on their tillage attitudes using a pre-test/post-test experimental design. Results suggest that experts use their values to evaluate some frames more than others, responding more strongly to issue frames that are less common in the field such as a frame stressing the importance of protecting local communities. These results provide important support for my second hypothesis that “value-consistent” frames will lead to positive framing effects among expert farmers, while “value-inconsistent” frames will generate negative framing effects.
CHAPTER 2. ISSUE FRAMES, VALUES, AND EXPERT REASONING

As individuals with extensive knowledge, practice, and experience in a specific issue area, experts offer policy solutions and provide essential information across many issue areas, particularly in areas of environmental policy. As a result, policy scholars devote increasing levels of attention to how domain experts—that is, authorities within specific policy fields—influence the policy process. Yet, experts are also the target of policy and policy entrepreneurs, as their behaviors and choices have substantial impacts on policy outcomes across myriad issue areas. Although a sizable literature examines how experts influence policy and politics (see Crow and Stevens 2012; Klucharev, Smidts, and Fernández 2008; Wagner and Petty 2011), we know remarkably little concerning how the political environment shapes experts’ attitudes and behaviors.

This chapter uses theories of issue framing to address this gap in the literature. Drawing on work in expert-reasoning, I argue that issue frames can influence experts’ attitudes toward policies within their area of expertise, if in a limited way. These effects are largely dependent on experts’ assessment of the values emphasized by an issue frame.

The first part of this chapter discusses how issue frames influence citizens’ attitudes. The second section explores the similarities and differences between expert and politically knowledgeable populations. Here, I bridge literatures on the role of political knowledge in the framing process with those on expert reasoning to generate expectations.
concerning the impact of issue frames among domain experts. I build on these expectations in the third section, examining the moderating influence of values in the framing process and generate additional expectations concerning how values shape the quality of experts’ attitudinal responses to issue frames. The chapter concludes with some summary remarks.

2.1 Framing and the Information Environment

The foundation for a functioning democracy is political information; with political information come the tools to form opinions and fully participate in politics. Yet, in general the average citizen remains politically under-informed (Delli Carpini and Keeter 1993; Jennings 1996; Kuklinski et al. 2000). These individuals are, however, willing to become marginally informed through political discourse and deliberation, even if they do not seek information on their own. This willingness to rely on others to collect and vet political information protects the validity of democratic governance (Huckfeldt 2007), but at the same time raises questions concerning the quality of this information.

Americans primarily depend on information disseminated via the political elite—that is, “persons who devote themselves full time to some aspects of politics or public affairs,” (Zaller 1992, 6), such as policy entrepreneurs, the media, and politically active experts. These actors absorb the cost of becoming politically informed by gathering, generating, sorting, and synthesizing knowledge. The political elite subsequently share this information with the mass public using a variety of mediums, such as magazine or news articles, public service announcements, and billboard images (see Bullock 2011; Druckman 2005, 2006).
Importantly, the political elite seldom provide the public with lists of “facts” or objective information, but rather embed information in issue frames: verbal or visual cues that define the scope of an issue, what is at stake, and what considerations are most important in an issue’s evaluation (Entman 1993; Gamson and Modigliani 1987, 1989). Issue frames establish narratives that focus audience members’ attention on particular facets of a policy issue. For instance, an issue frame may highlight a positive association between conventional agricultural tillage and crop yield, while another may emphasize a negative association between conventional tillage and ambient air quality. Though both frames address the same issue, tillage choice, each frame encourages audience members to concentrate on different dimensions of the issue. By promoting specific issue frames, the political elite provide a structure that individuals can use to make sense of policy issues.

Issue frames provide guidance as individuals consider policy problems; individuals tend to avoid surveying everything they know and instead rely on heuristics and a sample of considerations, such as those embodied by issue frames, to form policy attitudes (Chong and Druckman 2007a; Iyengar and Kinder 1987; Kahneman and Tversky 1984). When individuals use issue frames as such a guide a framing effect may occur. These effects emerge when “different presentations of [the] issue generate different reactions” (Jacoby 2000, 751) toward a single policy issue. For instance, frames describing a KKK rally as a “freedom of speech” issue lead to more favorable attitudes than those that describe the rally as an issue of “public order” (Chong and Druckman 2007b; Nelson, Clawson, and Oxley 1997).
By choosing what information to include and exclude, as well as what interpretation to provide, the political elite do not merely use issue frames to provide information to an under-informed public but rather to structure political debate. As a result, framed information is necessarily incomplete and represents the biases of frame creators (Bullock 2011; Chong and Druckman 2007a; Druckman, Peterson, and Slothuus 2013). The political elite infuse issue frames with perspectives that will advance their cause. They engage in “a war of frames, because they know if their frame becomes the dominant way of thinking about a particular problem, then the battle for public opinion has been won” (Nelson and Kinder 1996, 1058).

2.1.1 Models of Framing Effects

Scholars have developed several models to explain how individuals process and respond to issue frames, as well as why framing effects occur. Framing effects may emerge when two conditions are met: individuals store the considerations emphasized by an issue frame in their memory (i.e. the considerations are cognitively available); and, individuals have the ability to retrieve those considerations from their memory (i.e. they are cognitively accessible) (Chong and Druckman 2007b). There are three main theories of the framing process that describe how this may happen: the learning, accessibility, and belief-importance model.

First, the learning model poses that frames influence audience attitudes by providing new information about a policy problem (Graber 1994; Slothuus 2008). For instance, an individual may not know that using conventional tillage on farmland can negatively affect air quality. An issue frame that uses visual cues to depict the role of
conventional tillage in creating the 1930s Dust Bowl, then, provides the individual with new information about the relationship between agriculture and air quality. This may lead the audience member to oppose tillage practices that stimulate soil erosion.

The learning model maintains that issue frames, such as images connecting the Dust Bowl to farmers’ plows, alter the content of considerations stored in individuals’ memory—that is, the availability of considerations. These newly available considerations lead individuals to recognize new relationships or to alter their existing perceptions of relationships between particular attributes and a policy issue (Chong and Druckman 2007b; Slothuus 2008; Zaller 1992, Chap. 2). Distinct from other models, the learning model describes how issue frames influence the availability of considerations and assumes that cognitively available considerations are also cognitively accessible.

A second model of the framing process, the *accessibility model*, suggests that frequent exposure to an issue frame leads individuals to practice referencing considerations the frame highlights, thus making those factors more cognitively accessible to audience members (see Kinder and Sanders 1996; Zaller 1992, chap. 2). Individuals use the considerations referenced most often to form policy attitudes. Frequent exposure to an issue frame places those considerations at the top-of-the-head, thereby guiding individuals’ attitudes (Chong and Druckman 2007b; Domke, Shah, and Wackman 1998, 2000). Though it accounts for individuals’ ability to both remember and use framed considerations, a number of scholars criticize the accessibility model for disregarding individuals’ ability to think critically about issue frames (Brewer 2001; Chong and Druckman 2007b; Nelson, Clawson, and Oxley 1997).
A third model of the framing process, the widely supported belief-importance model, contrasts with the accessibility model by suggesting a more active form of information processing. Here, issue frames identify particular considerations as especially relevant for evaluating framed policy issues. This increases the importance of those considerations as individuals form an opinion toward the framed policy issue (Nelson, Clawson, and Oxley 1997; Nelson, Oxley, and Clawson 1997). Issue frames do not merely add new considerations or make certain considerations more available, but instead afford the connection between certain considerations and the framed policy issue with a greater level of significance. For example, Nelson, Clawson, and Oxley (1997) show that individuals exposed to a frame presenting a KKK rally as a free speech issue are likely to rate the importance of civil liberties higher than those exposed to a public order frame. The authors argue that the issue frames do not merely make certain considerations more accessible, but rather alter the salience of considerations with relation to a political issue.

Importantly, individuals reference the considerations they view as most important when forming policy attitudes. The belief-importance model suggests that issue frames increase the salience of a particular set of considerations relative to those that individuals reference prior to frame exposure. Yet, individuals may still perceive existing considerations as equally or even more important than those promoted by an issue frame. As a result, issue frames may increase the importance of particular considerations but still not lead to a direct change in audience members’ attitudes (Nelson, Clawson, and Oxley 1997; Nelson, Oxley, and Clawson 1997).
2.2 Framing Effects among Expert Populations

Although virtually everyone encounters issue frames and has the potential to experience framing effects (Chong and Druckman 2007b; Iyengar and Kinder 1987; Shen 2004) it is an overgeneralization to suggest that everyone evaluates issue frames in the same way. Individuals differ in their familiarity with policy issues, their desire to evaluate particular framed policy issues, as well as a host of other individual-level characteristics, or predispositions, that may affect how they process and respond to issue frames. Despite early framing research implying that audience members employ similar cognitive processes when responding to issue frames, the belief-importance model accounts for differences in individuals’ critical information processing. By suggesting that individual-level characteristics play a vital role in the framing process, this widely accepted model has fueled studies of how disparate audiences evaluate issue frames and the conditions under which framing effects will likely occur. For this reason, the BIM model is especially relevant to the research questions regarding differences in framing effects among distinct populations, such as the issue experts who are the focus of this research.

Although framing scholarship has largely overlooked the role of domain expertise in the framing process, a substantial body of work has examined the influence of at least one important dimension of political expertise: greater political knowledge. Although this work provides valuable insights, my ability to derive expectations about the influence of domain expertise on framing is limited due to key differences between domain expertise and political knowledge. I outline these differences and similarities between political knowledge and domain expertise in this section as I summarize literature on the role of
political knowledge in the framing process. In doing so, I ground my first hypothesis on scholarship concerned with the relationship between knowledge and issue framing as well as cognitive psychological research on expert reasoning and decision-making.

2.2.1 Expertise vs. Political Knowledge

As I draw on studies of political knowledge in the framing process, it is important to address the key conceptual issues that differentiate how domain experts and politically knowledgeable individuals are likely to process and respond to domain-relevant issue frames. To begin with, it is important to distinguish precisely the concept of knowledge from that of expertise. In a general sense, knowledge refers to the accumulation of information. Similarly, public opinion and political psychology research defines political knowledge, more specifically, as “the range of factual political information within memory” (Delli Carpini and Keeter 1996, 10). The concept means to account for the extent of political information available in individuals’ memory, with those identified as politically knowledgeable having a larger range of available information.

Expertise, by contrast, is a more complex structure that involves a variety of dimensions, with knowledge being only one of these defining characteristics. To be identified as experts, individuals must have accumulated and memorized extensive domain-specific information that they have also organized into well-structured and usable structures (Hoffman 1998). Emerging from considerable experience and practice in a particular field (Chi 2006; Fiske, Lau, and Smith 1990; Hoffman 1998), such expert knowledge and knowledge structures facilitate an “articulated, conceptual and principled understanding” (Hoffman 1998, 84-5) of domain-relevant information and situations. The
organization of domain-relevant knowledge and an ability to use this knowledge
distinguishes experts more than the content of their knowledge. Thus, the following
characteristics distinguish experts:

1. Excellence in a limited domain (area of expertise)
2. Perceiving large meaningful patterns
3. Providing a solution with speed
4. Having a superior short and long term memory
5. Seeing and representing a problem at a deeper level than novices
6. Spending considerable time quantitatively analyzing a problem, especially the first time it is encountered
7. Having very strong self-monitoring skills

(quoted from Nuthall 2012, 69)

Public opinion research suggests that measures of political knowledge may also
capture these additional aspects of expertise (Federico 2004; Goren 2000; Yaniv et al. 2002). For example, Fiske, Lau, and Smith (1990) identified political knowledge as the best indicator of efficient and accurate information processing relative to other dimensions of political expertise, such as political activity, media use, and political self-schema. Scholars have also found that these additional dimensions of political expertise (measured as political interest, internal efficacy, political participation and media use) are all endogenously related to political learning (Delli Carpini and Keeter 1996, chap. 5). As a result, many public opinion scholars consider the inclusion of additional variables are largely unnecessary in accounting for political expertise (Eveland et al. 2005; Fraile 2013; Galston 2001).

From a cognitive psychological standpoint, however, it is unclear that measures of knowledge account for the cognitive elements that lead to superior expert performance. Consolidation of domain-relevant knowledge into well-structured, complex, and highly
organized clusters reduces the effort experts require to process pertinent information (Federico 2004; Friestad and Wright 1994; Lau and Redlawsk 2001; Roberts 2007). This allows experts to interpret, store, and apply information to situations and stimuli within their field more efficiently and effectively than non-experts. Reduced cognitive demands also make experts more apt to consider the dynamic and interactive relationships between relevant factors, including seemingly unrelated factors, and issues related to their field of expertise (Fiske and Taylor 1991; Kahneman 2011; Mercier 2011; Nuthall 2001). This leads experts to consider interdependent relationships among varied factors within their domain of interest and to evaluate the implications of information and behaviors across systems (Cellier, Eyrolle, and Marine 1997; Hinds, Patterson, and Pfeffer 2001).

Experts’ knowledge structures, thus, facilitate the abstract thinking and theory-based reasoning that fuels “expert intuition”—that is, experts’ ability to understand and draw accurate inferences almost immediately (Dane and Pratt 2007; Kahneman 2011; Nuthall 2012). Although extensive domain-specific knowledge is required, it is not sufficient for the development of these structures that facilitate superior reasoning. As a result, research grounded on examinations of how high levels of (political) knowledge influence the framing process do not fully account for the characteristics that distinguish expert reasoning processes.

This leads to a more general idea: expertise necessitates domain specificity. Experts’ highly organized and extensive domain-relevant knowledge provides the context necessary to judge the validity, reliability, and implications of domain-relevant information, such as issue frames, and to make superior decisions. These cognitive structures, however, do not translate across fields of expertise and provide little assistance
when experts confront policy issues outside of their area of specialization (Cellier, Eyrolle, and Marine 1997; Wiley 1998). Experts only display superior reasoning processes when presented with issues and information that are relevant to their area of expertise. Otherwise, they tend to employ less efficient and effective cognitive processes—that is, they resemble non-experts.

For instance, the extent and organization of an expert neurologist’s knowledge is indispensable in evaluating the implications of chemical dependency for human brain development, but it is of little value in evaluating framed information regarding policies to prevent soil erosion. As a result, they cannot necessarily use their expert knowledge to form exceptional judgments in an area beyond their own field. We cannot assume that individuals who are expert in one area will have a comparable level of expertise and knowledge in another (Necka and Kubik 2012; Wiley 1998). Studies that focus on the role of general political knowledge, however, seem to equate general political knowledge and that which is specific to a particular policy area—implying, for instance, that knowledge of the US electoral system serves individuals evaluating alternative energy frames the same as mechanical and engineering knowledge. To develop a clear understanding of how expertise influences the framing process, then, we must move beyond examinations of political knowledge and account for experts’ distinct characteristics.

2.2.2 Political Knowledge as a Moderator of Issue Frame Effects

Still, studies focusing on the role of political knowledge provide a useful foundation to develop our understanding of the framing process among expert
populations, even if they cannot fully account for domain-expertise. As we know, expertise necessitates extensive and well-organized domain-specific knowledge. Although examinations of the role of political knowledge do not account for the organization or specificity of individuals’ knowledge, they do provide insights concerning how the *extent* of individuals’ knowledge influences the framing process. This work, then, accounts for a key feature of expertise that I am able to build on to develop a theory of domain expertise and the framing process.

2.2.2.1 Political Knowledge Weakens Frame Effects

Some scholars argue that politically knowledgeable individuals are less susceptible to framing effects because they do not require the cognitive assistance that issue frames provide (see Chong and Druckman 2007b; Haider-Markel and Joslyn 2001; Kinder and Sanders 1990). Scholars making this argument claim that the politically informed possess a high level of political information, and have exposed themselves to a comparatively wide array of issue frames. This high level of exposure, these scholars argue, leads to two effects. First, it reduces the probability that issue frames will present the politically informed with new perspectives or information (Haider-Markel and Joslyn 2001; Lecheler and De Vreese 2013; Slothuus 2008). Second, greater exposure provides the politically informed with more arguments and considerations they can draw on to construct their policy attitudes, diluting the impact of any individual consideration on their attitude. Haider-Markel and Joslyn (2001), for instance, argue that “extensive information reserves” afforded the politically knowledgeable a higher level of opinion
stability and made them less susceptible to gun control frames in the wake of the 1999 shootings at Columbine High School than the politically less informed.

Moreover, the politically informed do not need the guidance issue frames provide to understand and construct attitudes toward complex political issues. The politically knowledgeable are critically aware of issues within society and are trained to think about political issues before they are framed by the political elite (Rhee 1997). When confronted with policy issues, the politically informed use existing considerations to create their own “frames-in-thought” (Chong and Druckman 2007b), which they use as a point of reference as they form policy opinions. In other words, the politically informed do not require the cognitive assistance that issue frames provide because of their experience considering political issues. As a result, these scholars argue that it is unlikely that the politically knowledgeable will exhibit framing effects (Kinder and Sanders 1990; Zaller 1992).

Other scholars go a step farther, arguing that practiced political deliberation affords politically knowledgeable individuals the ability to critically analyze and evaluate the content of issue frames (De Vreese 2005; Jackson 2011; Valentino, Beckmann, and Buhr 2001). From this perspective, the politically knowledgeable actively judge the validity and strength of issue frames and may disregard or even counter-argue—that is, refute—framed information or arguments as a result (Slothuus and De Vreese 2010; Taber and Lodge 2006). Kinder and Sanders (1990) argue that this may be why those with low levels of political knowledge experience framing effects and cite frame considerations when articulating their attitudes toward affirmative action, whereas the politically informed do not. The politically knowledgeable, on this account, are unlikely
to experience framing effects because they have the ability to refute the claims made by issue frames and do not require the cognitive assistance issue frames provide.

2.2.2.2 Political Knowledge Strengthens Framing Effects

Other scholars argue that political knowledge intensifies framing effects. Framing models implicitly assume that audience members are able to “receive”—that is, detect the verbal or visual cues employed and understand the content of—issue frames (Chong and Druckman 2007b, 2007c). Returning to an earlier example, issue frames employing images of the 1930s Dust Bowl rely on individuals’ ability to recognize agricultural land as a source of topsoil and their ability to connect this idea to images of topsoil clouds sweeping over a town. Issue frames can provide interpretations and highlight the connections between different facets of policy issues, but if individuals cannot recognize or understand these connections, framing effects cannot occur. Scholars argue that the politically knowledgeable, more than other segments of the population, have the cognitive tools and foundation needed to recognize and understand issue frames (Barker 2005; Nelson, Oxley, and Clawson 1997; Slothuus 2008). Increased political knowledge, then, strengthens framing effects by cultivating individuals’ ability to recognize and incorporate framed information into their memory.

A minimum level of political knowledge may actually be necessary to observe framing effects (see Barker 2005; Miller and Krosnick 2000; Nelson, Clawson, and Oxley 1997). Nelson, Oxley, and Clawson (1997) argue that individuals without prior knowledge of, and familiarity with, the content of issue frames experience persuasion effects—that is, changes in attitude that result from learning new information—as
opposed to framing effects. In fact, evidence suggests that issue frames alter the content of considerations used to form policy opinions among the politically uninformed, whereas they alter the relative importance of considerations among those with high levels of political knowledge (Slothuus 2008).¹

Importantly, alternative factors may also influence framing effects among the politically knowledgeable. For instance, the politically knowledgeable are likely to have vetted information sources, and to be particularly susceptible to issue frames promoted by “proven” sources (Miller and Krosnick 2000).² Thus, perceived source legitimacy will likely amplify framing effects among the politically knowledgeable. Conversely, individuals who have a high need to evaluate, a distinct cognitive feature from political knowledge, may have strong prior attitudes toward framed policy issues. This may diminish framing effects, even among politically knowledgeable audiences (Druckman and Nelson 2003). Evidence thus suggests that while other factors can influence responses to issue frames, political knowledge amplifies and even is required in some cases for the presence of framing effects.

2.2.3 Expertise and Framing Effects

Given what we know about the role of political knowledge in the framing process, what should we expect among expert populations? We know that experts are

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¹ Slothuus (2008) also finds that individuals with moderate levels of political knowledge experience framing effects due to changes in both the content of considerations and the importance of considerations used to construct a policy attitude.

² More specifically, these authors find that politically knowledgeable individuals that trust the source of issue frames concerning drugs, immigration, pollution, crime, and unemployment are more susceptible to framing effects than the less informed as well as politically informed individuals who do not trust frame sources.
highly interested in topics relevant to their domain of expertise, and consistently collect and evaluate domain-relevant information using their extensive and organized knowledge structures (Feltovich, Prietula, and Ericsson 2006; Shanteau and Stewart 1992; Wiley 1998). As a source of information, issue frames must compete with the knowledge experts have already accumulated through prolonged experience and exposure to information in their field of expertise. This would seem to suggest that domain-experts do not require the cognitive assistance that issue frames provide, and that it is unlikely they will alter their attitudes or behaviors due to frame exposure.

We know, however, that experts efficiently evaluate and incorporate domain-relevant information into their extensive knowledge structures, which inform their domain-relevant attitudes and behaviors (Fiske and Taylor 1991; Nuthall 2012; Roberts 2007). Through practice and experience, experts consistently learn which considerations are most important in seeking specified outcomes and use this knowledge to make decisions (Clarke and Mackaness 2001; Dane and Pratt 2007; Mercier 2011; Necka and Kubik 2012; Zeithamova, Schlichting, and Preston 2012). Experts’ knowledge structures are not static. Information can lead experts to question how they apply knowledge to a stimulus or situation, particularly evidence that their beliefs or behaviors are contrary to desired outcomes (Dane and Pratt 2007; Fiske and Taylor 1991; Morton 2011; Nolan, Kenefick, and Schultz 2011; Nuthall 2012) and cause them update their decision-making strategies in response (Hoffman 1998; Johnson 1988).

Thus, experts constantly seek to improve their performance and remain expert within their field by incorporating information, and altering their behaviors and attitudes in response. Although many studies on political knowledge suggests the extent and
organization of experts’ knowledge should negate framing effects (see Haider-Markel and Joslyn 2001; Rhee 1997) a deeper understanding of expert reasoning suggests that these domain experts are actually likely to demonstrate framing effects. Echoing authors who argue that political knowledge strengthens framing effects (see Barker 2005; Nelson, Clawson, and Oxley 1997), domain experts have a greater capacity to understand the message of issue frames, as well as the implicit and explicit connections they make between considerations and framed policy issues, and to incorporate issue frames into their decision-making. In such a way, issue frames may influence which consequences of policy issues and actions experts evaluate, leading to a framing effect.

This leads me to my first hypothesis:

\[ H_1: \text{Issue frames will influence domain experts’ attitudes toward policy issues that are relevant to their area of expertise.} \]

2.3 Values and Framing Effects

In *The Nature and Origins of Mass Opinion*, Zaller wrote that every attitude is "a marriage of information and predisposition: information to form a mental picture of the given issue, and predisposition\(^3\) to motivate some conclusion about it" (1992, 6). What this quote suggests is that individuals need to have both policy knowledge as well as the motivation to use that knowledge to form and subsequently change their opinions toward policy issues. Individuals’ predispositions, such as ideology (Zaller 1992), the need for closure (Petty, Brinol, and Tormala 2002), personality traits (Gerber et al. 2011), and group attachment (Clawson, Kegler, and Waltenburg 2003), stimulate information

\(^3\) Predispositions are defined as “stable, individual-level traits that regulate the acceptance or non-acceptance of the political communications” (Zaller 1992, 22) that people receive.
evaluation and shape how individuals use framed considerations to develop their policy attitudes.

To this point, I have remained focused on the informational component of individuals’ policy opinions, considering framing effects in terms of political knowledge and the implications for experts within framed policy areas. Yet, to truly understand framing effects we must also understand how predispositions, such as values, influence individuals’ evaluations of framed policy issues. Therefore, for the remainder of the chapter I will consider the role of prior values—that is, general or abstract beliefs “that a specific mode of conduct or end-state of existence is personally or socially preferable” (Rokeach 1973, 5)—in the framing process.

As with other investigations of framing effects, scholarship examining the role of values in the framing process tend to overlook the implications for expert populations. Many proponents of the belief-importance model, however, suggest that values are especially important in the framing process, as they define individuals’ goals and perceptions of what is acceptable behavior (see Barker 2005; Brewer and Gross 2005; Nelson, Clawson, and Oxley 1997). It is thus, likely that prior values are particularly relevant to my examination of issue framing among expert populations.

Whereas political knowledge may influence individuals’ ability to evaluate issue frames, prior values motivate individuals’ evaluations of issue frames and shape how they form policy attitudes. When individuals confront information or policy problems, they use relevant values as a standard to evaluate policies, candidates, or actions against (Feldman 1988b, 2003). For example, an individual may maintain the values of individualism and egalitarianism. He or she may weigh the value of egalitarianism
heavily when evaluating environmental policies and, at the same time, base evaluations of welfare policies on the value of individualism. Values thus act as a guide to help individuals to navigate and interpret the information environment, providing a foundation for individuals’ judgments and attitudes.

2.3.1 Explanations of the Role of Values in Issue Framing

Two general models emerge from the framing literature to explain the role of values, as well as other predispositions, in the framing process. First, Zaller’s (1992) Receive-Accept-Sample (RAS) model suggests that predispositions, such as individuals’ prior values, condition the influence of issue frames. By this account, individuals use established sets of predispositions to evaluate issue frames. When these predispositions support an issue frame individuals will accept the frame, making framed considerations cognitively available. Alternatively, audiences will reject and effectively disregard issue frames that their predispositions do not support (Chong and Druckman 2007b; Schemer, Wirth, and Matthes 2012; Zaller 1992, 44 & 121).

In the RAS model, individuals base frame responses on a set of predetermined values or predispositions, such as political ideology. Individuals then use “the totality of the [accepted] communications” (Zaller 1992, 22) to construct their policy attitude. To illustrate, voters tend to evaluate frames on the basis of ideology. As a result, liberals

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4 The term issue frame may be equated to Zaller’s conception of political messages. He notes that political messages contain persuasive messages (i.e. reasons for adopting a position toward a policy issue, also known as considerations) and/or cueing messages (i.e. “contextual information’ about the ideological or the partisan implications of a persuasive message”(Zaller 1992, 42)). My purpose, here, is not to differentiate between these types of political messages but to consider the general impact of issue frames. I thus consider his work with reference to the broader notion of political messaging, which reflects scholars’ conceptualization of issue frames.
accept issue frames, and become more favorable to policies, that promote social welfare whereas conservatives dismiss these frames. The RAS model, then, maintains that individuals’ use established predispositions, in this case political ideology, to establish the worth of issue frames and determine whether framed arguments become cognitively available.

A second account of values in the framing process, in contrast, suggests that individuals do not necessarily use predetermined values to evaluate issue frames, but rather that issue frames determine what values individuals reference when evaluating framed policy problems (Nelson, Clawson, and Oxley 1997; Nelson, Oxley, and Clawson 1997). According to the belief-importance model outlined above, issue frames influence individuals’ policy evaluations by determining which values they use from their values system. Individuals accept, or agree with, myriad values that comprise their value systems. The collection of values individuals maintain within these value systems remains relatively stable, providing consistency and structure to individuals’ behaviors and attitudes (Feldman 2003). The relative importance of individual values within these systems, however, may change (Feldman 1988b; Rokeach 1973; Tetlock 1986).

The belief-importance model suggests that issue frames can alter the perceived relationship between policy issues and individuals’ values. Recall, this model maintains that issue frames emphasize different facets of a political issue, thereby increasing the importance of those considerations in audience members’ minds. Individuals’ policy evaluations then reflect those facets of a policy issue they consider most important (Nelson, Clawson, and Oxley 1997; Nelson, Oxley, and Clawson 1997). To maximize the perceived salience, issue frames often portray policy issues in terms of individuals’
deeply held values, thereby linking an individual’s policy attitude to his or her “sense of self” (Marietta 2008). To return to a classic example, individuals will likely anchor their opinion of a KKK rally more strongly in the value of “freedom” when presented with a “free speech” frame, whereas those who receive a “public order” frame will anchor their opinion more strongly in the value of “safety.” Issue frames link particular values to policy issues, and thus influence the values individuals use to form policy evaluations without altering the content of their underlying value structures.

Simply, the belief-importance and RAS models differ in term of the point at which individuals’ values, or other predispositions, influence the framing process as well as the depth of their evaluations. The RAS model starts with predispositions, which individuals do not use to discriminate between distinct messages within issue frames, but to evaluate and to accept or reject issue frames in their entirety. In contrast, the belief-importance model suggests that issue frames initiate the evaluative process, and determine which values provide individuals with a standard to judge individual frame arguments. Here, issue frames also increase the relative importance of considerations within individuals’ cognition, the most salient of which individuals use to construct their policy attitudes. Alternatively, the RAS model assumes that all considerations from accepted frames become cognitively available and given equal weight in attitude formation, and so precludes the critique and discrimination of distinct messages within issue frames. Thus, the belief-importance model overcomes assumptions made by the RAS model concerning the simplicity of audience members’ information processing by allowing for more active and in-depth critique frame arguments and framed policy issues.
2.3.2 Values and the Nature of a Frame’s Effect

If issue frames lead individuals to use certain values to evaluate the validity and strength of framed arguments, it stands to reason that these values may influence whether individuals experience a positive, negative, or no change in their policy attitudes due to frame exposure. Political persuasion scholars suggest that individuals generate favorable thoughts toward framed issues when they consider the arguments strong, whereas negative thoughts and counter-arguments emerge if they consider arguments weak (Petty and Cacioppo 1981, 1984; Petty et al. 1988; Sagarin et al. 2002). As individuals incorporate these thoughts into their policy attitudes, then, values determine their attitudinal response to issue frames.

Building on the belief-importance model, the values that issue frames emphasize may determine whether individuals develop positive or negative thoughts, and thus responses, toward framed policy issues. Slothuus and De Vreese (2010), for instance find that issue frames tend to elicit negative attitudes (or “contrast effects”) when they emphasize values associated with political parties that individuals oppose. Alternatively, individuals who support the associated political party tend to experience positive framing effects. As such, individuals accept, reject, or oppose the messages issue frames promote based on the perceived consistency with their predispositions (Nelson, Clawson, and Oxley 1997).

The belief-importance model suggests that issue frames focus audience members’ attention on particular values that individuals will then weigh more heavily while evaluating frames and updating their policy attitudes. Individuals consider whether framed arguments, and ultimately framed policy issues, support or undermine their vision
of what the world should be—that is, their values. As a result, the thoughts that emerge from this evaluative process to inform attitudes reflect audience members’ interpretations of the values issue frames emphasize (Dardis et al. 2008; Slothuus and De Vreese 2010).

To illustrate, Brewer (2002) finds that experimental subjects tend to reference the values emphasized in framing treatments to justify both their favorable and unfavorable opinions about gay-rights. He suggests that while issue frames lead individuals to weigh the importance of particular values more heavily, individuals may disagree with the values or value interpretations issue frames offer. In other words, individuals may use the same values evoked by a frame to evaluate policy issues, but express a different attitude.

The attitudes individuals express after frame exposure, then, reflect evaluations of the relationship between the values an issue frame highlights and the policy problem it addresses. Ceteris paribus, individuals exposed to frames that are “value consistent” (i.e., emphasize values that they support) will recognize the harmony between their values and framed policy issues. As a result, they will perceive value consistent frames as promoting desirable outcomes, and generate favorable thoughts that they then use to update their attitude toward the framed policy issue in response (Dardis et al. 2008; Nelson and Garst 2005; Petersen, Slothuus, and Togeby 2010).

By contrast, when exposed to issue frames that evoke values that are inconsistent (i.e. emphasize values that audience members do not support), audience members will recognize the dissonance between their values and framed policy issues. When this occurs, individuals will develop negative thoughts and counter-arguments—that is, negative thoughts that refute the content of issue frames—to defend their values, which provide structure and, in many ways, define an individual’s sense of self (see Marietta
2008). The dissonance between individuals’ values and issue frames shapes their attitudes toward framed policy issues as they use these negative-thoughts to update their policy attitudes. In this sense, a frame may lead individuals to experience a “contrast effect”—that is, a change in attitude that maximizes the discord between their policy positions and those promoted by issue frames (Chong and Druckman 2007a; Sniderman, Brody, and Tetlock 1993).

Alternative frames that circumvent the apparent conflict between individuals’ values and framed policy issues, however, may avoid such contrast effects. When issue frames link policy problems to values that individuals oppose, they challenge audience members’ stable and deeply held value systems, which leads individuals to react negatively to the frame. Repeated exposure to these frames entrenches and reinforces individuals’ negative attitudes on the issue (Dardis et al. 2008; Marietta 2008). Dardis and his co-authors (2008) have termed such frames that continually focus audience members’ attention on the conflict between their values and framed messages as “conflict-reinforcing.”

Contrast effects that emerge from conflict-reinforcing frames, however, may be overcome by “conflict-displacing” frames. These frames present policy issues in a new light, by emphasizing values not previously referenced. This avoids cognitive dissonance by making alternative values more salient than those emphasized by conflict-reinforcing frames (Dardis et al. 2008). The authors support this argument by identifying capital punishment frames based on potential innocence as conflict-displacing, relative to traditional morality frames (the conflict-reinforcing frame). Experimental results indicate
that regardless of their prior attitudes, the conflict-displacing frame leads individuals to oppose to capital punishment (Dardis et al. 2008).\textsuperscript{5}

To summarize, values influence whether individuals will generate positive or negative thoughts in response to an issue frame, subsequently leading to positive or negative attitude change. Whether individuals experience a contrast or a framing effect, then, is largely dependent on the values individuals use to evaluate framed policy issues. Accounting for the role of values in the framing process, therefore, clarifies the type and magnitude of framing effects in many cases.

2.3.3 Conditional Influence of Values and Knowledge

Importantly, however, not all individuals will reference their values when evaluating issue frames (Brewer 2003; Shah, Domke, and Wackman 1996, 1997). The belief-importance model maintains that those who actively process and evaluate framed information may use their values in the framing process, yet we know that much of the public lacks the motivation and ability to use their values in this manner. Instead, these individuals tend to use simple heuristics, or decision-making rules, when responding to framed information (Petersen et al. 2011; Petersen, Slothuus, and Togeby 2010; Slothuus 2008). For instance, discussions of welfare policy tend to trigger images of black welfare recipients for many white Americans, whom they categorically view as lazy and not deserving of welfare assistance, which leads them to oppose welfare programs without reflecting upon their more deeply held values (Gilens 2009).

\textsuperscript{5} Dardis and his coauthors (2008) also find that greater levels of political interest amplify this effect. These results suggest that conflicting evidence surrounding the role of political knowledge in the framing process, as outlined above, result from the omission of important factors that may moderate the effect of political knowledge on individuals’ frame responses.
The use of heuristics has led some scholars to promote a “dual process” model of issue framing (see Mayer and Tormala 2010; Shah, Domke, and Wackman 1996; Slothuus 2008) that is largely based on the Elaboration Likelihood Model (ELM) of information processing. Here, there are two routes to information processing: the peripheral and central. In the peripheral route, “non-issue relevant considerations” (Petty and Cacioppo 1981, 262)—that is, heuristics, such as source cues or social standing—provide the foundation for individuals’ attitudes. In contrast, when individuals follow the central route to information processing they consider the content of persuasive communication and evaluate the validity and strength of the arguments within.

Whereas the peripheral route encourages the use of heuristics in ELM, the central route encourages the active deliberation necessary for values to influence the framing process. In this process of evaluation, individuals generate favorable or unfavorable thoughts toward framed policy issues that they subsequently incorporate into their attitude. The central route to information processing is thus comprised of a sequence of events: attention, comprehension, elaboration, integration, and enduring attitude change (Petty and Cacioppo 1981, 1984; Petty et al. 1988; Sagarin et al. 2002). Scholars maintain that which route—the central or peripheral—individuals follow when presented with a persuasive communication rests on whether they have the ability and motivation to devote cognitive resources to the task (Petty and Cacioppo 1981, 1984; Petty et al. 1988). Thus, many framing scholars suggest that individuals will use heuristics when responding to issue frames unless they have the ability and motivation to engage in active deliberation (Nelson and Garst 2005; Slothuus 2008; Wagner and Petty 2011).
What, then, does it mean for experts if the role of values in the framing process is dependent on audiences’ ability and motivation to engage in active deliberation? Here, again, I am able to draw on research surrounding the role of political knowledge in the framing process, which suggests that the politically knowledgeable are more likely to use their values as they actively process and respond to issue frames. Although variation does exist among the politically informed, these individuals tend to have characteristics that contribute to the ability and motivation needed to follow the central route to information processing, characteristics that are amplified among domain experts.

2.3.3.1 Ability

As outlined above, the politically knowledgeable and domain experts both have the ability to understand, process, and evaluate the content of issue frames (Nelson, Clawson, and Oxley 1997; Nelson, Oxley, and Clawson 1997). Beyond having the ability to engage in active deliberation, research also suggests that the politically informed have a greater ability to use their values in the framing process. From one perspective, scholars argue that this is the case because the act of becoming politically informed helps individuals develop and become more aware of their value systems. Engagement with politics and political information challenges individuals to consider and reference their values. This leads the politically informed to cultivate their value systems and become more introspective as well as aware of their core values (Kam 2005; Sniderman, Brody, and Tetlock 1993). Lower levels of cognitive engagement among the politically uninformed (see Basinger and Lavine 2005; Delli Carpini and Keeter 1996), however, reduce the need to think about values, or develop deeper value systems. Thus, the
politically informed have a greater ability to use their values in the framing process because they have developed value systems that they are more aware of and can readily use to evaluate and respond to issue frames.

A second perspective suggests that the politically knowledgeable have a greater ability to use their values in the framing process because they have the cognitive resources needed to understand and develop connections between framed policy issues and their existing values, whereas the less knowledgeable do not (Zaller 1992, chap. 3). The ability to recognize the relationship between policy issues and prior values is essential for values to influence frame evaluations (Alvarez and Brehm 2002; Basinger and Lavine 2005; Sniderman, Brody, and Tetlock 1993). For example, Barker (2005) finds that politically knowledgeable individuals were able to recognize individualism cues in frames promoting John McCain’s preliminary bid, but less knowledgeable individuals were unable to do so. As a result, knowledgeable individuals relied on their preference for the value of liberty/equity when responding to framing treatments whereas the less knowledgeable did not.

2.3.3.2 Motivation

Importantly an ability to use values in the framing process does not imply that politically knowledgeable individuals will actively evaluate issue frames: they must also have the motivation to do so (Federico 2007; Sagarin et al. 2002) Scholarship also observes a positive correlation between political knowledge and political motivation. Whether it stems from a genuine interest in politics, sense of civic responsibility, or even a fear of ignorance, political motivation leads individuals to seek information and engage
in political learning (Delli Carpini and Keeter 1996). Because individuals who have and act upon political motivation become politically informed whereas those without this motivation tend to remain uninformed, measures of political knowledge may indirectly account for political motivation (see Delli Carpini and Keeter 1996, chap. 5; Eveland et al. 2005; Fraile 2013). An increased motivation to actively process political information, then, distinguishes the politically knowledgeable from the less knowledgeable, such that the politically informed are more motivated than the less informed to actively process political information, such as issue frames, and to use their values while doing so.

The general political motivation that leads to political knowledge, however, does not always result in the active evaluation of framed information. Petersen and his co-authors (2011), for instance, find that issue frames may activate strong heuristics, and thus lead the politically informed to evaluate issue frames on the basis of the heuristic as opposed to their prior values. This suggests contextual factors or frame characteristics may overcome the political motivation generally held by the politically informed.

Although some contextual factors and personal characteristics may diminish motivation to actively process a frame, other factors and personal characteristics may increase such motivation. For instance, scholars note that the personal “need for cognition” varies among the politically knowledgeable: some people “like to think” and critically evaluate information as well as policy issues more than others. Those with a high need to evaluate have a greater cognitive motivation to actively process and evaluate the consistency between a frame and an elevated value because they find the task fulfilling (Arceneaux and Vander Wielen 2013; Kam 2005). Likewise, individuals will attend to information or consider policy issues that impact them directly or indirectly
(Chong, Citrin, and Conley 2001; Lecheler, De Vreese, and Slothuus 2009) or are of personal interest (Delli Carpini and Keeter 1996, chaps. 4, 5; Sniderman, Brody, and Tetlock 1993). In these cases, individuals consider the cognitive effort expended to actively evaluate and link values to an issue as personally beneficial. The personal relevance and importance of a framed policy issue is particularly pertinent for issue frames that activate group attachment, or a sense of common interest and belonging (Aroopala 2012; Clawson and Waltenburg 2003).

In the end, individuals with motivation and ability are most likely to use their values in the framing process. It is unlikely the politically uninformed will base frame evaluations on their prior values, as they lack these necessary qualities. Yet, even though the intensity of motivation may vary among the politically knowledgeable, they retain both a high level of motivation and ability and, thus, are likely to base frame responses on their prior values.

2.3.4 Experts, Values, and Issue Frames

Building on this research, I expect that domain experts, much like the politically knowledgeable, have the ability to engage in active deliberation and to evaluate issue frames on the basis of their values. More than that, however, I expect that domain experts have a heightened level of motivation to actively evaluate information, such as issue frames, that is pertinent to their area of specialization. Domain experts have extensive knowledge structures they can use to effectively and efficiently process and interpret domain-relevant information (Fiske and Taylor 1991; Nuthall 2012; Roberts 2007). This means that the active deliberation needed for values to influence the framing process
requires less cognitive energy among experts within framed policy fields than other segments of the population. Moreover, experts are necessarily involved with, and have a personal stake in, their area of expertise, which cultivates a “perceived identity as the sort of person who knows and cares about the area” (Fiske, Lau, and Smith 1990, 32). Work in political psychology, then, suggests that domain experts are especially likely to actively evaluate domain-relevant issue frames, as these frames pertain to issues that directly or indirectly impact their lives and are of personal interest (see discussion above).

Due to this heightened level of ability and motivation, I expect that issue frames will lead experts to use particular values to evaluate framed arguments and update their attitudes toward domain-relevant policy issues. This will lead experts to consider the implications of framed arguments, as well as their existing knowledge and behaviors, in relation to the standards and objectives these values suggest. This may, however, lead to either positive or negative evaluations (Feldman 2003). Experts’ assessment of the values emphasized by issue frames, then, leads to positive and/or negative thoughts that they use to update, and possibly change, their policy attitude. In other words, issue frames condition which values experts use to evaluate policy issues within their field of expertise and, ultimately, the nature of experts’ attitudinal response. This leads to the second general hypothesis of my study:

H2: The values emphasized by domain-relevant issue frames condition framing effects among expert populations

This second hypothesis implies two additional expectations. First, experts will recognize the agreement between their value systems and the behaviors or policy positions that issue frames promote when they emphasize values that experts support.
Their frame evaluations will likely reflect this harmony, as they use their prior knowledge and experiences to evaluate the implications of issue frames and framed issues in terms of ultimate objectives promoted by the values emphasized. This, in turn, leads the expert to generate favorable thoughts toward the framed policy issue and ultimately a positive attitude change. Thus, my first sub-hypothesis:

\[ H_{2a}: \text{Domain-relevant issue frames that emphasize values domain experts accept will lead to positive attitude change, i.e., a framing effect.} \]

Alternatively, experts will likely react against issue frames that emphasize values they do not agree with, or have rejected, in an effort to defend their own value systems. More specifically, experts pay attention to issue frames that imply objectives or standards of behavior (i.e. values) that they perceive will harm society or lead to undesirable outcomes. This will lead experts to evaluate how the arguments within issue frames as well as their prior knowledge and experiences will lead to suboptimal domain-relevant policy outcomes, and generate negative thoughts as a result. Ultimately, this will lead experts update their attitude in a manner that highlights the discord between the issue frames and their values, as they adopt attitudes that defend the values and associated outcomes that they perceive as beneficial. Thus, my second sub-hypothesis:

\[ H_{2b}: \text{Domain-relevant issue frames that emphasize values domain experts reject will lead to negative attitude change, i.e., a contrast effect.} \]

2.4 Summary

This chapter establishes the theoretical basis for my examination of issue framing among expert populations. Drawing on literatures surrounding the role of political knowledge in the framing process, and those on expert reasoning, it is unclear whether
we should expect issue frames to have an independent influence on experts’ attitudes toward domain-relevant policy issues. Despite this ambiguity, I argue that we can expect experts to reference their values to actively evaluate issue frames pertinent to their field of specialization. Here, issue frames influence which values experts use as a standard to evaluate the strength and validity of framed arguments and, ultimately, their attitudes toward domain-relevant policy issues. Chapter 3 outlines the case that I will use to examine the general research questions presented above, as well as the representation of the relevant variables I use in the remainder of the study.
CHAPTER 3. CASE SELECTION: FARMERS AND AGRICULTURAL TILLAGE

The present study focuses on the impact of issue frames and prior values on experts’ attitudes toward domain-relevant policy issues. In the preceding chapter, I established the theoretical foundation and outlined hypotheses that govern my study. In the present chapter, I justify and provide background information on the empirical case I am using to test these theoretical expectations. Here, I establish agricultural tillage among farmers as the case for my empirical investigation, and discuss the two facets of case selection; the identification of an expert population and the identification of a domain-relevant policy issue.

The chapter proceeds in three parts. Initially I focus on the first dimension of case selection, identifying farmers as managerial experts. I also explain how experienced farmers demonstrate the unique cognitive features that make them a good example of an expert population, as defined in the previous chapter. The subsequent section addresses the second dimension of my case, presenting agricultural tillage as the policy issue of concern. Here, I provide a brief explanation of the environmental implications of the issue as well as the benefits and disadvantages of the three types of tillage practices I reference throughout the study. In the third section, I discuss the theoretical and practical policy implications of the case in expanding our understanding of issue frames and expert populations.
3.1 Farmers: An Expert Population

Each of the examinations presented in the following chapters centers on row-crop farmers as a population of agricultural experts. Traditionally, however, scholarship has been hesitant to apply the notion of expertise to farmers, instead using the term “agricultural expert” to describe individuals with high levels of formal agricultural education such as agricultural researchers, extension agents, and policy entrepreneurs (see Cerf, Papy, and Angevin 1998; Pyysiainen and Vesala 2013; Rios-Gonzalez, Jansen, and Sanchez-Perez 2013; Scholl and Binder 2009).

Although farmers may also retain a high degree of formal education, they acquire much of their expertise through experience, practice, and refinement. Research and practical approaches to agricultural management tends to diminish the relative importance of such “lay knowledge,” emphasizing the transfer of technical knowledge from scientist to farmer (Mauro, Mclachlan, and Van Acker 2009; Van Paassen, De Ridder, and Stroosnijder 2011). Effectively, the scientist identifies how the farmer “ought to make decisions” because, ultimately, the scientist knows best (Morton 2011). Such an orientation, however, presumes formal education and research supersedes the knowledge that farmers gain through consistent experience and application. In other words, scholars assume the content and quality of knowledge farmers’ generate is inferior, and thus reserve the term “agricultural expert” for those engaged in agricultural research or with a high level of formal agricultural education.

The identification of agricultural expertise according to formal educational attainment, however, does not necessarily account for experts’ unique characteristics. Recall, in the preceding chapter I define experts as individuals who develop well-
organized and extensive knowledge through considerable practice and experience within a specific domain (Chi 2006; Fiske, Lau, and Smith 1990; Hoffman 1998). Due to the organization of this domain-relevant knowledge, experts are characterized by:

1. Excellence in a limited domain (area of expertise)
2. Perceiving large meaningful patterns
3. Providing a solution with speed
4. Having a superior short and long term memory
5. Seeing and representing a problem at a deeper level than novices
6. Spending considerable time quantitatively analyzing a problem, especially the first time it is encountered
7. Having very strong self monitoring skills

(quoted from Nuthall 2012, 69)

Expertise implies the existence of both the extensive knowledge and the ability to use this knowledge, not how one acquires the requisite knowledge and ability. In other words, both farmers and the traditionally identified “experts” may demonstrate agricultural expertise.

Recent scholarship supports this idea of expertise based on experience, rather than formal education. Cerf, Papy, and Angevin (1998), for instance, find that experienced farmers use the same criteria as agricultural researchers to distinguish soil conditions and choose optimal dates to engage in tillage operations. Interestingly, although farmers and other agricultural experts referenced the same criteria, the relative importance of each criterion used to pass judgment varied across the two groups as well as among individual farmers. The authors speculate this variation is a product of farmers’ differing levels of expertise, and imply that agricultural experts and expert farmers will maintain uniform decision-making strategies.
Other scholars suggest the sort of variation in decision-making strategies observed by Cerf, Papy, and Angevin (1998) is a product, or representative, of farmers’ managerial expertise. Generally, farmers are willing to try new practices and, over time, may acquire expertise through trial-and-error and the continual collection of information. This leads farmers to develop the systems knowledge used to structure management decisions, and update these decision-making strategies to incorporate information and optimize farm performance (Morton 2011; Nuthall 2012). Technical specialists, by contrast, tend to generalize knowledge and apply uniform solutions, often developed in a controlled setting, to problems and scenarios that are necessarily unique (Morton 2011). As a result, the decision-making strategies of technical specialists do not reflect, or account for, the dynamics of reality to the same extent as managerial experts, such as farmers.

Technical specialists’ commitment to specified practices across varied conditions contributes to a perception of inflexibility, and an inability to adapt to variable environments and conditions (Morton 2011). Nuthall (2012) thus argues that while agricultural specialists and farmers may base choices on similar decision-making criteria, the importance experienced farmers assign to each criterion is based on an intimate knowledge of local conditions and their prior experience. Variation in the allocation of importance, then, represents the flexibility, adaptation, and development of expert decision making-strategies. In essence, experienced farmers retain the requisite systems-knowledge to engage in abstract thinking, incorporate negative feedback, and improve performance in the manner suggested by scholars of expert reasoning (Mauro, Mclachlan, and Van Acker 2009; Nuthall 2009, 2012).
It is important to note that while some research suggests that farmers may qualify as agricultural experts, only those farmers engaged in managerial decision-making are likely to exhibit the adaptive decision-making described here. Simply, not all individuals who personally identify as a farmer are “expert.” To illustrate, it is not required or even expected for individuals who operate field cultivators or a vertical tiller to retain a comprehensive understanding of the mutually dependent components within a farm operation the equivalent as experienced farmers who are responsible for general operations. Thus, while these operators may be skilled laborers who have a detailed understanding of specific components, such as machinery use or implement application, they are not agricultural experts. Similarly, the systems-based knowledge and intuition that accompanies expertise may evade hobby farmers—that is, individuals for whom farming is not their primary occupation, but rather own and manage farming operations “on the side”—who do not necessarily have the motivation to develop and maintain farming expertise.

I thus restrict my sample to individuals who are responsible for making management decisions on farms with 250 or more acres of cultivated land. This limits my samples to individuals who have a thorough knowledge of the varied factors that influence agricultural management decisions, how these factors interact with one another, and, ultimately affect farm performance. Additionally, by focusing on farms with greater than 250 acres I am limiting my samples to those individuals for whom farming is their primary occupation and are, thus, likely to have a strong identity and interest in farm management practices and decisions; that is, experts.
3.2 Agricultural Tillage: The Domain-Relevant Issue

For the domain-relevant policy problem, I selected the issue of agricultural tillage. Tillage and soil conservation in general, emerged as a public policy issue in the 1930s in the wake of the Dust Bowl, a period of severe dust storms that resulted from intensive tillage practices and drought that created extensive economic and environmental damage as well as public health issues across the United States. Though soil conservation techniques have improved over the past century, the selection of tillage methods remains a somewhat contentious agricultural issue with substantial impacts beyond agricultural production.

Tillage choice, in terms of both specific techniques and frequency, is an important component of farming operations throughout the United States.Simply speaking, tillage refers to the act of turning over soil after harvest and before planting to incorporate the roughage from the previous year’s crop (Cerf, Papy, and Angevin 1998; Ingram 2010). Tillage choices have important farm management implications, influencing a variety of factors such as soil drainage, soil warmth, and soil tilth, as well as labor, input, and machinery requirements. Importantly, the method and frequency of tillage operations represent a choice that farmers face at least twice a year, after harvest and before planting. Although there are a variety of methods a farmer may choose, ultimately, the differentiation between tillage systems is a question of degree, with conventional tillage on one end of a spectrum and no-till on the other.
3.2.1 Conventional Tillage

Farmers have traditionally employed conventional tillage systems on their farms. Within this system, 30% or less of the residue from the previous year’s crop remains on the soil surface. Farmers who use conventional tillage practices argue that tillage warms and aerates the soil and increases soil drainage, leading to an improved seedbed and plant emergence. These farmers also argue that tillage leads to fewer problems with weeds and unwanted trees while also providing an earlier planting window (Ingram 2010). Though disturbance of topsoil leads to a relatively high level of soil erosion, some farmers note that conventionally tilled fields also require fewer herbicides and pesticides. As a result, those that engage in organic farming tend to employ conventional tillage techniques (Knutson et al. 2011; Morton 2011).

3.2.2 No-Till

In contrast to conventional tillage, an alternative crop management system, no-till, emerged in the 1960s. Here, farmland is left undisturbed between harvest and planting, or in the case of closely related strip-till, seeds are planted in a narrow seedbed, or slot, created by disk openers. Proponents of no-till techniques argue the plant residue acts as a protective layer. In doing so, no-till improves water retention, protects plant root systems from the sun, and reduces soil erosion and agricultural runoff, while also increasing soil organic matter (Baveye et al. 2011; Coalition on Agricultural Greenhouse Gasses 2010, hereafter CAGG; Paustian et al. 1997; So et al. 2001; Uri, Atwood, and Sanabria 1999).

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6 This refers to the period of time within which farmers can plant seed, where it is late enough into spring where the soil is warm enough to allow seed to germinate but still early enough that plants will have the opportunity to grow and still produce a harvest in the fall.
Many farmers who use no-till systems on their land also observe an increase in earthworm activity, which reduces soil compaction and improves soil drainage and tilth (Horowitz, Ebel, and Ueda 2010; Lankoski, Ollikainen, and Uusitalo 2006). Although no-till systems tend to require the use of chemical inputs, the costs associated with implementing these systems tend to be relatively low due to few trips across the field with heavy tillage equipment, particularly in terms of machinery maintenance, time, labor, and fuel costs. No-till also helps to prevent soil erosion and the accompanying loss of top soil as well as the pollution of waterways from soil runoff.

### 3.2.3 Conservation Tillage

Whereas conventional tillage and no-till represent opposing approaches to crop management, tillage methods classified as “conservation tillage” offer a compromise. Effectively, conservation tillage constitutes practices that leave more than 30% the previous year’s crop residue on the soil surface, and leads to similar, if diminished, benefits as no-till in terms of reduced operation costs and soil erosion. Conservation tillage, however, includes a wide range of methods, from limited disturbance of the entire field (i.e. minimum-till) to tilling soil into ridges along a seedbed row (Hall 2003; Knutson et al. 2011; Lal, Reicosky, and Hanson 2007). The number of trips across fields with tillage machinery and the amount of plant residue left on the soil surface, then, fluctuates according to the type of conservation tillage techniques used. As a result, cost and soil savings vary substantially across conservation tillage techniques. Farmers argue, however, that conservation tillage practices also allow them to harness the advantages of

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7 Although no-till is technically a sub-type of conservation tillage, as no-till leaves more than 30% of crop residue on the soil surface, no-till is largely distinguished from other types of conservation tillage practices.
conventional tillage methods, in terms of improved seedbed conditions, planting window, and drainage.

3.3 Farmers and Tillage beyond Agriculture: A Policy Justification

Thus far, I have justified my case selection in terms of the theoretical implications for my examination of expertise and the framing process, establishing farmers as a population of experts and tillage as a salient domain-relevant issue. Yet, the policy implications of farmers’ tillage choice make this case especially compelling. Agriculture represents one of, if not the most powerful political lobbies in the United States (Gilbert and Oladi 2012; Miljkovic 2004) and has a strong influence on policies and outcomes related myriad policy fields, such as the environment (Hornstein 2010; Rolfe and Windle 2011), poverty (Zimmerer 2007), health (Orozco et al. 2011), and trade (Dabrowski et al. 2009). Understanding how to communicate with farmers and how to frame agricultural issues that affect society at-large is thus key to the development, implementation, and success of policies across issue areas.

History shows us that farmers’ tillage choices, in particular, have tremendous consequences for society that extend well beyond agricultural production. These choices can harm the environment (Stoate et al. 2001; Uri 2001), public health (Robson and Schneider 2001), and the general economy (So et al. 2001) as croplands fail to contain the consequences of soil erosion, agricultural runoff, herbicide use, and myriad other artifacts. It is largely due to these spillover effects that the question of tillage choice become somewhat contentious and garnered the attention of policy practitioners.
3.3.1 Tillage and Water Quality

The issue of farmers’ tillage choice has been particularly relevant in areas of water policy. As discussed above more intensive tillage systems, like conventional till, make extensive use of heavy machinery to disrupt the top layers of soil. This both destroys the root systems of previous crops that provided nutrient barriers, and expose nutrient-rich topsoil to the elements, leading to wind and water erosion. As a result, farmland becomes a non-point source of pollution—that is, we know farmland pollutes but we cannot know the contribution of each field. Much of this runoff pollutes ground and surface waters. Less intensive forms of agriculture, such as no-till, and the use of cover crops can mitigate this problem both by reestablishing protective barriers and by absorbing excess nutrients (Kladivko et al. 2014; Naramngam and Tong 2013).

No-till and other forms of conservation tillage have been widely promoted to mitigate the effects of agriculture on water quality. In contemporary policy circles, this has become increasingly important for two main reasons. First, there have been more frequent and extensive periods of drought in the United States. No-till not only reduces the need for extensive irrigation by keeping fields cool and moist, but it also reduces the pollution of waterways from sediment and agricultural runoff. As a result, conservation tillage and no-till systems are able to help alleviate or to mitigate the burdens that are imposed on water-stressed environments (Knutson et al. 2011; Obalum et al. 2011).

Perhaps most importantly, however, are the implications of nutrient runoff and tillage use for aquatic systems. Agricultural inputs, namely nitrogen, often travel to lakes and streams, where they serve as a food source for algae blooms. These blooms effectively dissolve oxygen that resides under the waters’ surface. The development of
vast colonies of these algae lead create “dead zones”; the algae leach so much oxygen that the water can no longer support aquatic life. This phenomenon, known as hypoxia, is a chief concern for ecosystems in the Gulf of Mexico, though the problem does not originate in areas proximate to the Gulf. Nutrient runoff from farms in the Midwest travel through ground water and surface waters into tributaries that lead to the Mississippi River and pollute the Gulf of Mexico (Kladivko et al. 2014; Lemke et al. 2010). This has led to increasing pressures to the environment as well as the economy, harming both fishing and tourism industries. Thus, policy practitioners have sought to encourage no-till and other conservation techniques across the country to reduce the environmental and economic consequences of nutrient runoff that farmers do not necessarily see.

3.3.2 Tillage and Climate Change

Policy practitioners’ attention to tillage issues has also increased in recent years due to a growing pressure in the United States to address climate change and implications of tillage choice for this issue (CAGG 2010; Rousse 2008; Uri, Atwood, and Sanabria 1999). Briefly stated, climate change refers to extended shifts in global weather patterns. Climate change can result from changes in the natural environment, such as volcanic eruptions and solar radiation. It is more common, however, to use the term to describe anthropogenic (i.e. human induced) climate change—where industrial and agricultural production as well as land-use changes lead to an oversaturation of greenhouse gasses (GHGs) in the Earth’s atmosphere. GHGs such as carbon dioxide (CO₂) effectively prevent heat from escaping the atmosphere and are, thus, largely responsible for Earth’s warm climate and ability to sustain life. Excessive concentrations of GHGs, however,
lead to shifts in the global climate regions that can lead to volatile weather patterns, drought, flooding, and myriad other issues across a range of policy areas including the environment, economy, and security.

Agricultural tillage influences climate change in two general ways. First, as mentioned above, tillage activities require the use of heavy machinery that passes over agricultural fields sometimes multiple times a year. Doing so requires the use of powerful tractors that burn diesel fuel. In other words, conventional tillage activities require more energy consumption (Knutson et al. 2011; Paustian et al. 1997), which means a decrease in the frequency and intensity of tillage decreases the amount of fossil fuels used by a farming operation. In this way, farmers using conservation tillage or no-till are able to decrease their GHG emissions from burning fossil fuels (CAGG 2010; Rousse 2008; Uri, Atwood, and Sanabria 1999).

The second, and more substantial, impact tillage choices have on climate change is through the storage of soil organic carbon. Vegetation, including agricultural crops, absorbs the GHG carbon dioxide in the atmosphere and expels oxygen. In this process, carbon is stored within the plant mass and released when the plant dies and decays. Exposure to oxygen in the air converts the carbon released from decaying plant matter back into carbon dioxide. Conventional and most variants of conservation tillage necessarily turn soil over, exposing decaying plant matter, and carbon, to the air. This effectively makes agricultural land a net carbon source for the atmosphere. If, however, cropland land is left largely undisturbed new plant residue provides a barrier for the decaying plant matter, causing the soil to absorb and retain carbon on balance. Undisturbed agricultural land, in other words, represents a net carbon sink (World Bank
2012), reducing the levels of CO₂ and other gases in the atmosphere responsible for anthropogenic climate change.

Scholars and farmers commonly cite both decreased machinery use and the retention of soil organic carbon as benefits of no-till and conservation tillage systems. Assuredly, these systems exhibit a reduced “carbon footprint” in comparison to conventional tillage systems. Importantly, however, conservation tillage and no-till systems are not equivalent, particularly from a climate change perspective. Although conservation tillage practices do leave at least 30% of the previous year’s crop residue on the soil surface, they do not protect stored carbon in the soil nearly as effectively as a strict no-till approach. In other words, the contribution of conservation tillage systems to climate change is still notably higher than a no-till system (Paustian et al. 1997; So et al. 2001; Weersink et al. 2005). The question for proponents of climate change mitigation, then, becomes how to encourage farmers to choose no-till in particular.

The case that I have selected for my investigation, then, is especially relevant for contemporary environmental policy outlets interested in climate change mitigation. A number of initiatives have attempted to take advantage of agricultural producers’ impact on climate change, and politics, making them an integral part of carbon-offset markets. Here, farmers receive per-acre payments for sequestering carbon through the implementation of no-till or strip-till systems, thereby “offsetting” others’ GHG emissions (Pendell et al. 2007; Stephan and Paterson 2012). One such program was proposed in the 2009 Waxman-Markey bill, considered the climate change legislation closest to receiving federal approval to date. Yet, agricultural communities vehemently opposed this legislation, despite the potential of receiving tangible payment (Ferreira,
Ferreira, and Vigevani 2012; Gramig 2010; Hornstein 2010; Vormedal 2011). A significant portion of the farming community continues to resist no-till and remains committed to conventional tillage or more moderate conservation tillage systems, even though many farmers have already adopted such offset eligible tillage methods (Andrews et al. 2013). By investigating the impact of issue frames on farmers’ tillage attitudes, then, my study informs policy practitioners seeking to include agricultural producers in strategies for climate change mitigation.

3.4 Summary

In this chapter, I introduced the case for my investigation of issue framing among experts in a policy field. I identified row-crop farmers as a politically and theoretically important population of managerial experts. The policy issue chosen, agricultural tillage, is of fundamental importance to a farming operation. The issue is also of interest across a wide array of policy fields, including environmental, health, and economic arenas. The selected case is particularly beneficial for the present investigation given farmers’ exhibition of expert characteristics, the dynamic nature of the selected policy issue, as well as the contemporary importance of tillage choice to the development of climate change mitigation strategies.
CHAPTER 4. FRAMES, FARMERS, AND CONSERVATION TILL

The preceding chapter establishes tillage choice among row-crop farmers as the case for my investigation of issue framing among expert populations. This chapter builds upon the previous, exploring various factors that motivate farmers’ decision-making. The aim is to identify the frames used to discuss tillage systems within agricultural discourse and to identify the criteria that farmers use to evaluate and choose between agricultural management practices. In doing so, I establish the foundation for the experimental designs to test my main research hypotheses in chapters 5 and 6.

In the sections that follow, I first summarize research on farmer adoption of best management practices (BMPs), including conservation tillage or no-till, with particular attention to how farmers’ perceptions, beliefs, and economic incentives influence their adoption decisions. I then describe the research design for completing more than 25 interviews with farmers and crop advisors to identify prominent frames related to no-till adoption, followed by a discussion of the results of those interviews. In the fourth section, I conclude the chapter with a summary of my findings.

4.1 Farmers’ Management Choices

Research discussed in Chapter 2 suggests that, as a population of experts, farmers use their values and existing knowledge structures to evaluate agricultural practices, such
as tillage techniques, and base adoption choices on this evaluative process. As we know from Chapter 2, individuals retain a variety of values that motivate how they evaluate information, behaviors, and policy issues alike. Traditionally, however, research in farmer decision-making tends to focus more on egocentric values, attributing behavioral choices to economic rationality over other possible motivations. Many scholars maintain that widespread adoption of BMPs relies on the development of extensive economic incentive programs that offer farmers tangible monetary payments for using these practices on their farmland (see Cooper and Keim 1996; Greiner, Patterson, and Miller 2009; Kurkalova, Kling, and Zhao 2006).

Recently, however, some scholars have moved beyond economic incentives to explore the influence of other personal beliefs on farmers’ BMP adoption (e.g. Brook, Zint, and De Young 2003; Erickson and De Young 1994; Jackson-Smith, Kreuter, and Krannich 2005; Langpap 2004). Prokopy and her co-authors’ (2008) meta-analysis of scholarship concerning BMP adoption, for instance, indicated that a positive attitude toward BMPs was the factor most frequently associated with farmer adoption. Interestingly, the authors also found that farmers who accepted economic incentives for implementing BMPs in the past were less likely to participate in similar conservation programs in the future. Whereas the success of economic incentive programs is short-lived, positive attitudes toward BMPs lead to more enduring behavioral change.

Other identified beliefs contributing to BMP adoption, however, remain grounded in economic motivations. Reimer, Weinkauf, and Prokopy (2012), for instance, find that farmers evaluate the compatibility of new practices with those that are already implemented, dismissing practices that will require substantial management changes. At
the same time, farmers are more likely to adopt BMPs with a tangible and observed benefit and those that they can test on part of their land prior to full implementation. These concerns are part of a cost benefit analysis, where farmers evaluate the perceived advantages against the perceived costs and risks associated with behavioral change (Reimer, Weinkauf, and Prokopy 2012). Similarly, Pannell and his colleagues (2006) identified both perceived profitability as well as an ability to test practices prior to farm-wide implementation as the two most important factors in BMP adoption.

Scholarship examining farmer adoption of conservation and no-till systems, in particular, also suggests that farmers tend to focus on the influence of pragmatic factors in their decision-making. For instance, (Davey and Furtan 2008) developed a decision model focusing on economic, physical, and technological factors that accurately predicted conservation tillage adoption 80% of the time. Additional evidence suggests that even those farmers who are, perhaps, more environmentally conscious and largely employ no-till systems will engage in strategic tillage to optimize both economic and environmental outcomes (Kirkegaard et al. 2014).

More recent research, however, suggests that targeted efforts to promote conservation tillage may also play a role in their decision-making. More specifically, in examining adoption decisions among Iowa farmers, Arbuckle (2013) finds that farmers tend to respond positively to conservation programs that have a clear focus on promoting specific technologies or outcomes, though concerns surrounding government intervention may dampen this effect. Similarly, while D’emden, Llewellyn, and Burton (2008) find that economic considerations remain salient factors in farmers’ adoption decisions, they also find that farmers are more likely to adopt no-till systems when they retain
agricultural consultants or tend to remain active and attend agricultural extension activities. This seems to suggest that while farmers do develop organized decision-making strategies, they may also be susceptible to framing effects in their interactions with other farmers and agricultural experts.

Although scholarship on farmer decision-making has made progress, particularly with the emerging focus on beliefs and attitudes, this literature leaves a number of questions for my analysis unanswered. First, the studies outlined above provide little insight concerning the process by which farmers evaluate persuasive information, or how they generate and structure their attitudes toward a particular BMP. Second, scholars remain focused on how egocentric considerations, such as profit and economic payments, influence farmers’ management choices. Based on this literature, the extent to which issue frames that highlight other considerations, such as environmental or community concerns, or invoke alternative values might influence farmer’s behaviors is unclear. For the remainder of the chapter, then, I remain focused on two research questions:

RQ1: What factors influence farmers’ tillage choices?

RQ2: What frames are used in agricultural discourse to promote conservation and no-till practices?

4.2 Research Design

To continue my investigation of how farmers, as a population of domain-experts, process and respond to domain-relevant issue frames I use a series of confidential interviews to examine factors that contribute to farmers’ adoption of conservation and no-till agricultural systems. In the fall of 2010 I conducted a series of interviews with row-crop farmers, certified crop advisors (CCAs), and conservation specialists across the state
of Indiana. Using a semi-structured instrument, I recorded and transcribed interviews designed to identify the factors farmers consider when making tillage choices, and the issue frames that are most persuasive, and commonly used to discuss conservation and no-till agricultural systems (see Appendix A for interview instruments).

4.2.1 Participant Selection

The interview sample consisted of eighteen farmers, six certified crop advisors (CCAs), and two conservation specialists in Indiana. Initially, I generated a list of 13 potential CCAs and conservation specialists to interview by networking with agricultural and policy experts at Purdue University and in the Greater Lafayette area. I made initial contact with potential subjects by phone in October 2010, and sent one additional follow-up email to subjects who did not schedule an interview in the initial contact, which led to a response rate of 61.5%. The six CCAs I recruited for my study responded to cold-calls based on information provided through the American Society of Agronomy’s public Certification Directory. The two conservation specialists were recommended by faculty of the Department of Political Science and the Department of Agricultural Economics at Purdue University.

I subsequently generated a list of potential farmers to interview, using a snowball sample of individuals recommended by the CCAs I interviewed and faculty members in the Department of Agricultural Economics at Purdue University. Farmer subjects also referred me to other farmers during interviews, leading to a list of 23 potential subjects with a response rate of 78%. I made initial contact with farmers either by phone (10
farmers) or through emails (13 farmers) noting the individual who originally suggested their participation in the study.

4.2.2 Instrumentation

Interviews were semi-structured, relying on both open-ended and more structured questions about experience, information sources, and justifications for different tillage techniques. At the beginning of each interview I informed subjects that I was working in partnership with the Conservation Technology Information Center (CTIC) on a U.S. Department of Agriculture (USDA) funded research project that examines why farmers do or do not adopt conservation tillage practices. I described interviews as an effort to understand the perspectives of those individuals working with the issue. I then asked subjects questions designed to capture the variety of frames that farmers encounter and use to discuss tillage issues, as well as their evaluations of those frames. Although each interview was recorded, I largely approached interviews as a conversation, as the main motivation behind the use of interviews is to identify the importance of factors that the subjects themselves may not realize are shaping their decisions.

Two separate instruments structured interviews: one that was used with CCAs and conservation specialists, and a second that guided my conversations with farmers. The instrument designed for CCAs and conservation specialists first asked about the subjects’ relationship with farmers and means of communication. These agricultural experts were then asked about their perceptions of the relative importance different considerations have in farmers’ evaluations of tillage systems as well as what they perceive as the strongest barriers to no-till adoption. A second instrument designed for farmers asked
subjects to describe their current tillage practices and the most important reasons they use those methods. Additionally, farmers discussed how specific ideas might affect their tillage decisions and, how they value information about tillage practices from varied sources. Finally, subjects were prompted to identify the independent importance of a list of factors, generated from literatures outlined above, that farmers may use to evaluate and choose between tillage techniques.

4.2.3 Data Collection

Seven interviews were conducted in-person and nineteen over the telephone that lasted from 13 to 58 minutes in length (see Table 4-1 for descriptive statistics for the sample). I recorded and transcribed each interview for later coding and analysis. Interview coding identified the presence or absence of various considerations offered in open-ended questions, the relative importance of criteria provided to interview subjects, and the relative importance of information sources. I analyzed these data, by identifying common patterns in question response and underlying themes in farmer and advisor discussions of tillage systems.

<table>
<thead>
<tr>
<th>Table 4-1 Descriptive Statistics for Interview Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Farmers</strong></td>
</tr>
<tr>
<td>% Male Subjects</td>
</tr>
<tr>
<td>% Conducted over Telephone</td>
</tr>
<tr>
<td>Length of Interview (mins)</td>
</tr>
<tr>
<td><strong>Advisors</strong></td>
</tr>
<tr>
<td>% Male Subjects</td>
</tr>
<tr>
<td>% Conducted over Telephone</td>
</tr>
<tr>
<td>Length of Interview (mins)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>% Male Subjects</td>
</tr>
<tr>
<td>% Conducted over Telephone</td>
</tr>
<tr>
<td>Length of Interview (mins)</td>
</tr>
</tbody>
</table>
4.3 RQ1: Considerations Driving Tillage Choice

I first sought to examine the factors that motivate farmers’ tillage decisions by analyzing interview data to identify the considerations farmers’ most commonly referenced as important to their tillage choices. To do so, I examined responses to open-ended questions, detecting the frequency with which farmers identified different considerations as a reason why they chose to try conservation tillage techniques (see Figure 4-1). Here, data appear to support literature on BMP adoption, as farmers cited the reduction of soil erosion for the purpose of maintaining high yields, saving on labor costs, and saving fuel costs as the three most important factors in deciding to adopt conservation tillage. Although no farmers mentioned concerns about climate change, they did cite water quality and the environmental impact of soil erosion as contributing factors in their tillage choices, if less frequently than economic concerns.

![Figure 4-1 Farmer Reasons to Use Conservation Tillage (open-ended) responses](image)

4.4 RQ2: Identifying Tillage Frames

Largely based on the data presented in Figure 4-1, I am able to identify themes in the factors that farmers use to explain or to justify their tillage choices. These themes
represent the array of issue frames that farmers and other agricultural experts use to
discuss conservation and no-till systems. I present each of these frames below, and offer
additional data from the interviews to support each.

4.4.1 The Importance of Profit

As displayed in Figure 4-1, the dominant theme emerging from interview data is
the importance of farm profits to farmers’ tillage choice. Farmer interview subjects
referenced economic considerations, such as the potential reductions in costs due to labor,
fuel, and machinery maintenance savings, more frequently than most other decision
criteria. Further, when discussing the problem of soil erosion farmers frequently
emphasized negative impact on yields, as most of the nutrients necessary for a healthy
crop are contained in topsoil. Similarly, I found the economic theme in interview
subjects’ responses to a list of factors suggested by the interviewer that might influence
tillage choices (see Table 4-2). Here, many of the farmers interviewed confirmed the
potential for higher profits, due to lower input costs, and worries over soil erosion
encouraged them to use conservation tillage.
Table 4-2 Importance of Prompted Considerations to Farmers’ Tillage Choice

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Very Important</th>
<th>Important</th>
<th>Neutral</th>
<th>Not Important</th>
<th>Not at all Important</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pro-Conservation Tillage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Input and Fuel Costs</td>
<td>13</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Soil Erosion and Soil Loss</td>
<td>12</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Improved Water Quality</td>
<td>5</td>
<td>10</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Success of Other Farmers in your Area</td>
<td>5</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Climate Change and Carbon Storage</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Interest In Carbon Offset Payments</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td><strong>Anti- Conservation Tillage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Yields</td>
<td>5</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Economic Costs of Conversion</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Appearance of your Fields</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>9</td>
</tr>
</tbody>
</table>

Question Wording: To what degree would the following ideas be important in your decision to adopt or not adopt conservation tillage? Total N: 18

The prevalence of economic arguments supports scholarship outlined above that highlights the importance of farm profits. Farmers appear to base decisions, like the adoption of conservation tillage, on their perception of the economic advantage offered by the practice. This idea is summarized by one farmer who noted “… profit’s probably the number one in all things, because you’re not going to [farm] at a loss and continue to do it.” Likewise, concern over a decrease in yield was the most commonly cited reason for not adopting conservation tillage practices; as one CCA noted, “Yield is king.” Advisors thus recognize the importance of farm profits to management decisions, as one conservation specialist said, “Farming is a business. These are business people, and they are thinking strategically about how to make a profit.” Advisors commonly noted that conservation behaviors promoted to farmers must have a primary focus on the potential to increase farm profits to retain farmers’ attention. This suggests that policy practitioners use profit oriented frames to promote no-till most frequently, and that profit frames are likely to have the greatest impact on farmers’ attitudes toward conservation and no-till.
4.4.2 Stewards of the Land

Despite the dominance of economic concerns, interview data revealed a secondary theme as an important factor in farmers’ decision-making: Stewardship. Although farmers tended to gravitate toward economic arguments in open-ended questions, as outlined in Figure 4-1, most farmers identified environmental concerns such as water quality (see Table 4-2) as either important or very important to their tillage choices when they were asked about the importance of specific considerations. A detailed analysis of interview data reveals that while farmers and advisors less frequently reference environmental considerations, both groups agree that the ideals of good stewardship are particularly salient within the agricultural community. Several interviewees suggested that farmers retain a social identity as the guardians of the earth, and recognize the impact of land management on both present and future populations. According to one advisor, farmers identify as “the first stewards of the land, and that ever since they began, they’ve been in charge of the soil and the land that they work. So that is a sense of pride for farmers, to uphold that title.”

Farmers, too, commonly referenced this notion of stewardship, even in presenting economic based arguments for adopting no-till. For instance, when explaining his continued use of conservation tillage methods one farmer stated, “It’s a good practice as far as stewardship and water quality and soil structure, and we’re getting as good a crop or better as what the conventional people are doing. So we’re actually, actually doing better than we did than when we practiced conventional tillage, as far as yields and everything else.” In fact, many farmers offered the sentiment “it’s just being a good
steward” as a supporting justification for using no-till and other conservation tillage methods.

Although commonly referenced as a secondary motivation, it is possible that farmers’ identity as “stewards of the land” plays a subconscious role in their decision-making. When offering his justification for converting to no-till a farmer recalled, “You know, it wasn’t the fact that I had the environmental ethic that I do now or the environmental conscience that I do now. It was more like: wow, you know what there’s a lot of soil leaving, and that can’t be good.” He continued to explain that over time he has become more environmentally aware and now recognizes the importance of environmental concerns to his decisions to convert to no-till that he was not aware of at the time. Now, when referencing the observation of others’ use of conventional tillage practices he went so far as to state “those guys aren’t in it for the long pull. They are in it… for what they can bottom line out of that piece of land… some people should have a license to farm, some people shouldn’t be allowed to treat our land the way they do.” This suggests that a stewardship frame may also resonate with farmers. Moreover, while farmers may not attribute their management choices to environmental considerations, these elements may operate on a subconscious level as a motivating factor.

4.4.3 Exogenous Pressures and Community Responsibility

The presence of social pressures is a third, though less prevalent, theme identified in these interviews by both farmers and technical specialists. For some this pressure is manifest in an idea of tradition. The idea of tradition captures both social pressure (e.g. this is how my granddad did it, this is how my dad did it, so this is how I’ll do it), as well
as profit concerns, as a break from conventional till and tradition is "a little more risky" since newer conservation methods are not “tried and true.” One farmer noted that, “The difficulty [of giving up conventional tillage] is you’re giving up what you’ve known; you know the way you’ve done things for your life. You know, the things that’ve been handed down for you, for crop production. . . .” For most, however, this exogenous pressure seems to originate from the perceptions of the agricultural and surrounding communities. One farmer emphasized the importance of what “the agricultural community views as the proper way of doing things”, arguing that many people may not convert to no-till because a “messy field” may give off the impression that the farmer is “lazy” and not doing their job.

Others note that farmers choose to convert to no-till farming due to the support of the local agricultural community, as well as observations of other farmers’ success using new tillage techniques though trial-and-error. This suggests that farmers are somewhat susceptible to social pressure not just in terms of their identity as a ‘steward of the land’ but as a member of the agricultural community. Such a susceptibility may translate to other arenas. More specifically, interview data reveals that farmers are concerned about the impact of their decisions on neighboring communities. A particular concern for one farmer is that his agricultural runoff drains into the “watershed where the Indianapolis Water pulls their drinking water,” which makes him quite conscious of “what goes down the drain, what comes out of farm tiles, what comes off as surface drainage.” Others also noted that water quality is of particular concern for those who are farming next to a river or a stream due to the possible impact of agricultural runoff on surface and ground waters.
Community oriented arguments, however, do not seem to have penetrated the mindsets of CCAs and conservation specialists. A conservation specialist identified the link between no-till and “healthier lakes and streams” and “more recreation” noting these ideas as probably being “a very weak message for farmers… You know, that’s kind of the fluff in the message…” It is unclear whether this last comment is based on experience with such a community oriented frame, or due to assumptions the specialist derived from farmer interactions. Although farmers may cite tangible economic or stewardship criteria as most important it is possible that broader notions of community responsibility also play an important role in farmer decision-making.

4.4.4 Climate Change and Tillage Frames

Despite the almost complete absence of concern about climate change in farmers' responses to why they adopted conservation tillage, I found an interest in payments for practices that can contribute to climate mitigation. Initially, the dominance of economic arguments in tillage discussions makes this finding unsurprising. As discussed above, however, scholarship suggests that economic incentive programs tend to be less effective than many in the policy community tend to think (Prokopy et al. 2008). What makes this finding especially surprising is that farmers remained quite interested in these sorts of incentive programs even when I mentioned requirements of maintaining fields in continuous no-till for up to 10 years, a stipulation that many perceive as limiting participation in agricultural offset programs in the past.

This finding is especially interesting given the strong opinions held by many of the farmers about issues of climate change and carbon storage. A continuous no-tiller
said, “Climate change is a bunch of baloney… Carbon storage I think is a catch phrase that is nothing more than what we’ve known forever. Humus in the soil has always been good, and organic matter has always been an improvement to soil condition and subsequent yield and that’s nothing new.” When asked about the importance of climate change and carbon storage in farmers’ tillage choices an advisor exclaimed “No! Oh geeze, don’t even say that to a farmer... They associate that with Democrats! Right, wrong, or indifferent, I’m just telling you that I don’t even talk about environmental stuff like that.” A few others had a different view, noting that farmers will complain about the erratic weather conditions and in the next sentence deny there is climate change. One farmer said, “Climate change is the biggest threat to American agriculture right now.” Others remained agnostic on the issue, with one saying, “If it is something from a policy standpoint that we are going to pursue… we can increase some no-till but we are going to want to get compensated for that.” Regardless of farmers’ acceptance or skepticism about climate change, the prospect of an economic incentive has the potential to alter existing tillage practices.

To summarize, interview data draw attention to three overarching themes that may produce strong issue frames surrounding tillage choice. More specifically, the ideas of profit, stewardship, and community responsibility are potentially strong factors to motivate farmers’ judgments and adoption of agricultural management practices. Although farmers do not appear to consider the relationship between climate change and carbon storage, which is of particular concern for contemporary policy practitioners, the extent to which discussions of climate change influence farmer attitudes, positively or negatively, toward tillage techniques.
4.4.5 Framing Skepticism

Interview data suggests some skepticism concerning the potential impact of issue frames on farmers’ attitudes toward agricultural tillage systems. A conservation specialist acknowledged that farmers are always looking to improve their performance so “many of them are open to new ideas. So presenting a ‘new economic opportunity’ is a good way to present it. If you can present the old message in a new and exciting way. You know, ‘rebranding’ no-till is a good way to do it.” On the other hand, another advisor was more pessimistic saying, “we can tell them, ‘you don’t need to work this ground like this.’ Or whatever, but they aren’t going to do it until they get burned by their own choices, or someone they trust a whole, whole lot tells them something a dozen times, in a dozen different ways.” Conversations with CCAs and conservation specialists indicate tillage choice is one that farmers make on their own, and is rooted in farmers’ experience and “mindset.”

It is possible, however, that developing a different message, or frame, may be more successful than re-packaging the old message in myriad ways, and could influence farmers’ perceptions of tillage and tillage choices before they “get burned.” Interview data suggest technical specialists grant primacy to farmers’ material motivations and interests, deemphasizing normative arguments that link tillage issues to farmers’ identities. Farmers’ beliefs, however, emerge as important factors when considering tillage issues. It is possible, then, that issue frames concerned with these alternative, more normative, motivations may reorient farmers’ perception of agricultural tillage and influence their attitudes toward specified tillage systems. If this is the case, then they may
serve as viable as conflict-displacing frames (see Chapter 2) in the event that existing appeals become stagnant or even off-putting.

4.5 Summary

In this chapter, I explored a variety of factors and frames expected to influence farmers’ perceptions and adoptions of different tillage systems. Although scholarship examining the adoption of BMPs traditionally focuses on economic motivations, recent scholarship supports my study by suggesting the importance of farmer beliefs and perceptions in the adoption of best management practices. I build on this research by exploring the criteria farmers use to judge tillage systems and the frames used to discuss tillage practices. In doing so, I identified profit, stewardship, and community impact as issue frames that may influence farmers’ attitudes toward tillage practices. I use this information as the foundation for the experimental designs outlined in chapters 5 and 6.
CHAPTER 5. FARMERS, FRAMES, AND CONSERVATION TILLAGE: A NATIONAL SURVEY EXPERIMENT

Do issue frames influence the attitudes of experts? I introduced this central question to my study in Chapter 2. There, I suggested that domain experts should, in fact, experience framing effects, drawing on literatures in expert reasoning and the role of political knowledge to substantiate my hypothesis. In the present chapter, I explore this hypothesis in the context of farmers’ attitudes toward agricultural tillage practices by presenting one of the experiments at the heart of my investigation.

In the sections that follow I first specify H1 in terms of my empirical case, drawing on research concerning farmer BMP adoption (see Chapter 4). I then outline my experimental design in the second section, describing my data and methods of analysis. I present an analysis and discussion of experimental results in the third section and discussion of policy implications in the fourth. The chapter concludes with a brief summary of my findings.

5.1 Hypotheses Tested

In Chapter 2, I outlined how experts have accumulated and cognitively organized vast stores of domain-specific knowledge into usable and well-structured knowledge

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clusters. Though they may provide a source of resistance to framing effects, these knowledge clusters also allow experts to efficiently and effectively incorporate relevant information (see Fiske and Taylor 1991; Nuthall 2012; Roberts 2007). Moreover, experts are consistently looking to expand their knowledge and update their decision-making strategies to achieve superior performance (Cellier, Eyrolle, and Marine 1997; Dane and Pratt 2007). Taken together, this led me to my first hypothesis:

**H1:** Issue frames will influence domain experts' attitudes toward policy issues relevant to their area of expertise.

In this chapter, I test this hypothesis by examining the possible influence of issue frames on expert farmers' attitudes toward conservation tillage practices. Interview data and literatures discussed in Chapter 4 identify perceived profitability as one of, if not the most, important factor in farmers’ adoption of best management practices (BMPs), such as no-till and other types of conservation tillage (Reimer and Prokopy 2012). It is likely, then, that farmers will respond positively to issue frames that highlight how conservation tillage systems increase farm profits by reducing operating costs. I, therefore, re-specify my first hypothesis as:

**H1a:** Expert farmers will respond more favorably toward conservation tillage when they receive issue frames that highlight the profitability of the practice than they will toward a control frame.

The importance of "profit" also seems to suggest that farmers would respond positively to issue frames that discuss tillage practices as a component of incentive-based conservation programs. Certainly, the widespread use of incentive programs to influence the behavior of farmers and other expert populations (Brook, Zint, and De Young 2003; Galatowitsch 2009; Gasteyer 2008; Lane 2012) implies a belief among policy
practitioners that the suggestion of economic incentives will lead experts to a positive attitude, and a subsequent behavioral, change, despite evidence to the contrary (see Prokopy et al. 2008). Importantly, interview data described in Chapter 4 indicate that some CCAs and conservation specialists are skeptical as to whether farmers will respond positively if incentives are presented in the form of carbon offset payments, or are linked in any other way to the issue of climate change. Other interview subjects, however, felt that any discussion of economic incentives will have a positive effect. I thus articulate two additional tests of H1:

\[ H_{1b}: \text{Expert farmers will respond more favorably to issue frames that discuss the possibility of receiving a carbon-offset payment for using conservation tillage, than to those that do not discuss incentive programs.} \]

\[ H_{1c}: \text{Expert farmers will respond more favorably to issue frames that discuss the possibility of receiving a payment for ecosystem services when they use conservation tillage, than those that do not discuss incentive programs.} \]

5.2 Research Design

5.2.1 Experimental Design

To test my hypotheses I conducted a national survey experiment, exposing farmers to a variety of issue frames promoting conservation tillage practices. The treatment groups are presented in a 2x3 matrix in Table 5-1. Initially, the experiment randomly assigned subjects to two groups: those receiving the control frame versus those who received the control in addition to a profit frame. The control frame presented basic information describing conservation tillage and its positive effects on soil conditions, whereas the profit frame added a description of how conservation tillage could enhance a
farmer’s profits by lowering labor, fuel, and machinery costs and highlighted the potential for equal or higher crop yields.

Table 5-1 Treatment Matrix

<table>
<thead>
<tr>
<th>No Incentive</th>
<th>Carbon Offset</th>
<th>Ecosystem Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Profit</td>
<td>Control Frame only</td>
<td>Control + ES Frames</td>
</tr>
<tr>
<td>Profit</td>
<td>Control + Profit Frames</td>
<td>Control + Profit + ES Frames</td>
</tr>
</tbody>
</table>

Exposure to additional treatments promoting conservation tillage with the potential for economic incentives was also determined through random assignment. One group received no mention of payments. The second group was exposed to a frame introducing the possibility of a modest carbon-offset payment for using certain types of conservation tillage. The treatment in the third group introduced the same payment idea in terms of providing environmental benefits (see Appendix B for treatment language).

5.2.1.1 Participant Selection

The framing experiment centered on a written instrument sent by U.S. Mail to 6,000 farmers across the 48 contiguous United States in the spring of 2011. The sample of farmers was randomly selected from the mailing list of subscribers to *Farm Journal*, a popular national publication typical of the kinds of agricultural trade magazines whose subscriber lists have regularly been used as sample frames for national farmer surveys. Each subject was randomly assigned to one of six treatment groups, resulting in approximately 1,000 subjects in each group.

Given my focus on expert farmers, I limited the sample to subscribers who make farm management decisions for row-crop (corn, soybean, and wheat) farms that are larger
than 250 acres. This focuses my sample on professional farmers whose tillage choices are particularly significant in the cultivation of their crops. An introductory letter as well as the survey instrument instructed recipients who leased their farmland to another farmer to provide the instrument to the active farm manager. The sample, thus, represents individuals who have a thorough knowledge of the varied factors that influence agricultural management decisions as well as how these factors interact with one another and, ultimately, impact farm performance—in a word, experts.

5.2.1.2 Instrumentation

Framing treatments were presented in a text-box on the first page of the four page instrument. Subjects were asked to read the information in the box and then to answer a question about their degree of interest in conservation tillage using a seven-point Likert-scale (see Appendix C for experimental instrument). Additionally, subjects were asked if they would like to receive additional, detailed information concerning conservation tillage techniques by mail. Those who responded “yes” received a follow-up mailing from the Conservation Technology Information Center (CTIC) with a referral to local conservation specialists as well as more detailed information on conservation tillage techniques appropriate to their region. As discussed below, I use responses to the first of these questions as my measurement for farmers’ post-test attitude toward conservation tillage, comparing interest across treatment groups as a test of framing effects.

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9 The option for additional information was included on the experimental instrument to capture subjects’ behavioral intent. Given my interest in the influence of issue frames on experts’ attitudes, as opposed to their behaviors, I have excluded this analysis from the present study. Andrews and her co-authors (2013) provide an analysis of these data.
Subsequent questions asked subjects about their farming operations, some public policy issues, and basic demographic characteristics. Subjects reported their tillage practices by completing the grid in Figure 5-1, and then indicated the importance of different considerations in making those tillage choices. By allowing me to measure adoption patterns across different types of farmers as well as the self-reported influence of different considerations in their decision-making, the survey instrument served two important functions. First, it allows me to use the farm decision-maker as the unit of analysis as opposed to land area.  

Second, the data collected allows me to account for various characteristics of the expert farmers as I analyze results from the experimental portion of the instrument.

5.2.1.3 Data Collection

Data collection began with pilot tests using a focus group of five farmers in west-central Indiana as well as 36 Agricultural Economics students at Purdue University, which led to subsequent modifications of the experimental treatments and survey instrument. The final surveys, which included logos from Purdue University as well as partners in the project (CTIC), were administered to experimental subjects via U.S. Mail generally following Dillman’s (2007) method. Subjects received up to a total of five mailings: an introductory letter in January 2011, followed by an initial printed survey, a reminder postcard, and two more print versions of the instrument. To limit overlap with spring planting all mailings concluded by mid-April 2011, with data collection concluding in May 2011. Upon completion, subjects returned the survey in a postage-paid business reply envelope.

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10 Many “windshield” surveys and other studies focuses on aggregate conservation tillage adoption remain focused on land area, and do not consider the adoption patterns or choices of individuals.
No-till or Strip-till
Leaving the soil undisturbed from harvest to planting, or for strip-till disturbing less than 30% of the row width. Planting or drilling is in a narrow seedbed or slot created by disk openers.

Other Conservation Tillage
Leaving more than 30% residue on soil surface after planting using full-width tillage.

Conventional Tillage
Leaving less than 30% residue on soil surface after planting. Includes moldboard plow, chisel plow, or rippers, followed by multiple secondary tillage trips.

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th></th>
<th></th>
<th>2010</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Corn</td>
<td>Soybeans</td>
<td>Wheat</td>
<td>Corn</td>
<td>Soybeans</td>
<td>Wheat</td>
</tr>
</tbody>
</table>

Question Wording: Please write the number of acres in your farming operation that were in each tillage category by crop type and year as defined below. This should include all land for which you actively made farm management decisions, including land you own and land you lease from others.

Figure 5-1 Tillage Grid
The national mail survey generated a response rate of 26.4%, with 1,537 farmers returning their instrument out of 5,818 valid addresses in our sample. There was a relatively even distribution of responses among the six treatment conditions, with the lowest number returned being from the control with no payment frame (n=230 in cell [1,1] of Table 5-2) and the highest being the profit frame plus payments for environmental services (n=281 in cell [3,3] of Table 5-2). Comparisons of demographic characteristics and farm size patterns indicate that non-response did not influence the random assignment of subjects across treatment groups.

Table 5-2 Experimental Treatment Groups

<table>
<thead>
<tr>
<th></th>
<th>No Incentive</th>
<th>Carbon Offset</th>
<th>Ecosystem Services</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Profit</td>
<td>230</td>
<td>244</td>
<td>277</td>
<td>751</td>
</tr>
<tr>
<td>Profit</td>
<td>254</td>
<td>251</td>
<td>281</td>
<td>786</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>484</strong></td>
<td><strong>495</strong></td>
<td><strong>558</strong></td>
<td></td>
</tr>
</tbody>
</table>

Low response rate does raise concerns, however, about the generalizability of the findings. In addressing this issue it is important to first note that this response rate is comparable to other studies of farmers, a population that tends to have lower response rates to surveys than the general population. Still, I compare the demographic data of respondents to the full sample population acquired from *Farm Journal*, as well as national information available from the Census of Agriculture (National Agricultural Statistics Service 2007) to detect the risk of non-response bias (see Table 5-3).
Overall, respondents are representative of the national average in terms of the sample population in terms of age and farm size, although the Lake States and the Corn Belt are over-represented among survey respondents compared to the full Farm Journal sample. The reputation and influence of Purdue University across these Midwestern states may account for this discrepancy. Respondents also appear similar to the national farmer population represented in the USDA National Agricultural Statistics Service (NASS) data in terms of age, gender, and farm receipts.

One exception is that the average farm size, measured in terms of acreage, is larger among respondents than the national population (1,350 vs. 881 acres). This is not surprising given the sampling procedure, which excluded farms less than 250 acres so as
to focus on professional farmers with the greatest experience and knowledge in terms of farm management. In sum, subjects appear similar to both national farmer demographics and demographics of the sample population, lessening concerns about non-response bias affecting the generalizability of my findings.

5.2.2 Variables

The purpose of the survey experiment outlined above was to collect data concerning the impact of issue frames among expert farmers. I use statistical modeling throughout my analysis to test the causal relationship between issue frames and farmers’ attitudes toward domain-relevant issues, in this case the promotion of conservation tillage. In doing so, I take advantage of the experimental and survey data outlined above. To clarify the parameters of my tests it is worth reiterating the key variables and exploring how I use them in the study.

5.2.2.1 Dependent Variable

Recall, the central focus of my study is the extent to which issue frames influence experts’ attitudes toward domain-relevant issues. Thus, I examine differences in farmers’ self-reported interest in conservation tillage techniques to test the expectations outlined above. As I previously noted, subjects answered the question, “Some farmers are quite interested in conservation tillage techniques, while others are not as interested. What about you?” immediately following exposure to treatment frames. Subjects responded to this question using a seven-point Likert scale, where “1” represented “Not Interested” and “7” represented “Very Interested.” I use these responses as a measure of farmers’ post-test attitudes toward conservation tillage techniques.
The experiment outlined above represents a post-test only with control group design (see Campbell and Stanley 1963). Therefore, as with many framing experiments, my analyses revolve around between-group comparisons in which I use control groups as a baseline for comparison. Although this choice in experimental design prevents me from making direct statements about individual-level attitude change, it does allow me to identify differences in aggregate patterns of attitude expression, a common technique for measuring framing effects in the literature.

5.2.2.2 Experimental Treatments

The treatment matrix in Table 5-1 illustrates the issue frames promoting conservation tillage that serve as the foundation for my analysis. As noted, subjects were randomly assigned to one of six treatment groups that are divided along two dimensions: profit and payment. All subjects received a basic control frame that discusses the basic rationale of conservation tillage. Half of the sample received an additional “profit” frame that describes how conservation tillage increases farm profits by reducing operating costs. The second half of the sample, which did not receive the profit frame, serves as the baseline for comparison along this first dimension of the treatment matrix. I use the variable “Profit” to account for this dimension of the experimental treatment in each model, which is coded “1” if subjects received the profit frame and “0” otherwise.

Subjects were further divided into three groups along the second, “payment” dimension of the treatment matrix. Here, the first group received a framed message that describes the prospect of receiving a payment for using conservation tillage techniques using the language of carbon offsets. The framed message presented to the second group,
by contrast, described prospective payments for adopting conservation tillage for providing ecosystem services. The third group received no information on the possibility of receiving payment for using conservation tillage, and thus serves as the baseline for comparison along the payments dimension. Taken together, the variables “Carbon Offset” and “Ecosystem Services”, coded as “1” if subjects received the frame and “0” if they did not, represent the payments dimension of the experimental treatment in statistical models.\footnote{Those who did not receive the profit frame, and those who did not receive an economic incentive frame represent reference categories and are, therefore, functionally excluded from statistical models.}

5.2.2.3 Control variables

I include a number of control variables in statistical tests of my hypotheses, despite statistical confirmation of random assignment. Though random assignment theoretically accounts for variation across treatment groups, some experimental researchers argue that random assignment in post-test control group only designs cannot account for the impact of individual-level characteristics on reasoning processes at the same level as pre-test/post-test designs (Campbell and Stanley 1963). As a result, studies focused on individual-level processes that employ a post-test only design may benefit from the inclusion of control variables. I therefore include variables to account for the influence of two possible confounding factors: prior adoption of tillage systems, and variation in farmers’ level of expertise.

First, research discussed in Chapter 2 suggests that individuals' prior attitudes toward framed policy issues may condition the influence of issue frames (Druckman and Nelson 2003). We also know that expert populations have extensive and highly organized
knowledge structures that they use to process information and make decisions that will lead to superior performance (Dane and Pratt 2007; Johnson 1988). In other words, experts will tend to engage in behaviors that they believe will lead to success; that is, have a positive attitude toward. Moreover, Prokopy and her co-authors (2008) identified positive attitudes toward BMPs as the factor most frequently associated with farmer adoption. This suggests that by accounting for subjects' prior tillage behaviors I am able to account for their prior attitudes, if indirectly. I thus include the percent of subjects' cultivated land under no-till and conventional tillage systems,\(^{12}\) respectively, as a proxy measure of their prior attitudes.\(^{13}\)

Second, although sampling procedures sought to recruit only experienced, professional farmers as experimental subjects, I further account for variation in farmers’ expertise by including measures for subjects’ formal education, age, gross receipts from sales, and the number of acres farmed. Though they cannot account for expert farmers’ extensive and complex knowledge structures individually, there is a strong correlation between each of these measures and the development of expertise (Hoffman 1998; Jones and Read 2005; Nuthall 2001). Thus, by including education, age, receipts and farm size as a block of controls in statistical models, I account for the joint influence of these variables and further fortify sampling procedures focused on expert farmers. Table 5-4 summarizes descriptive statistics for these proxy measurements, as well as those for subjects’ prior tillage choices and the dependent variable outlined above.

\(^{12}\) Variables represent the arithmetic mean of the percent of acres cultivated in 2009 and 2010 for each tillage category.

\(^{13}\) The percent of land in alternative conservation tillage systems provides a baseline of comparison throughout my analysis, and is thus excluded from statistical models.
### Table 5-4 Description of Sample Characteristics

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Mean</th>
<th>s.d.</th>
<th>Min</th>
<th>Max</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest in No-Till</td>
<td>5.577</td>
<td>1.45</td>
<td>1</td>
<td>7</td>
<td>1,508</td>
</tr>
</tbody>
</table>

### Tillage Choices

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% Acres in No-Till</td>
<td>42.1</td>
<td>41.1</td>
<td>0</td>
<td>1</td>
<td>1,483</td>
</tr>
<tr>
<td>% Acres in Conservation Till</td>
<td>30.5</td>
<td>38.1</td>
<td>0</td>
<td>1</td>
<td>1,483</td>
</tr>
<tr>
<td>% Acres in Conventional Till</td>
<td>27.4</td>
<td>37.8</td>
<td>0</td>
<td>1</td>
<td>1,483</td>
</tr>
</tbody>
</table>

### Expertise

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>s.d.</th>
<th>Min</th>
<th>Max</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>57.07</td>
<td>12.28</td>
<td>22</td>
<td>92</td>
<td>1,492</td>
</tr>
<tr>
<td>Education(^1)</td>
<td>3.057</td>
<td>0.872</td>
<td>1</td>
<td>4</td>
<td>1,504</td>
</tr>
<tr>
<td>Gross Receipts(^2)</td>
<td>3.152</td>
<td>0.899</td>
<td>1</td>
<td>4</td>
<td>1,452</td>
</tr>
<tr>
<td>Acres Farmed</td>
<td>1,368.4</td>
<td>1,511.0</td>
<td>12</td>
<td>16,672</td>
<td>1,483</td>
</tr>
</tbody>
</table>

\(^1\) Based on a four-point scale where 1= “Some high school or less,” 2= “High school degree,” 3= “Some college,” and 4= “College or advanced degree.”

\(^2\) Based on a four-point scale where 1= “$0-100,000” 2= “$100,001-249,999” 3= “$250,000-499,999” and 4= “$500,000+”

### 5.2.3 Model Specification

Social science studies based on Likert-scale dependent variables traditionally employ analysis of variance (ANOVA) or ordinary least squares (OLS) to statistically analyze experimental data. Statistical theory, however, recommends the use of maximum likelihood estimators with these ordinal variables to overcome violations in the assumptions associated with ANOVA and OLS. Based on statistical theory and a series of likelihood ratio tests of model specification, I use ordered logistic models throughout my statistical tests:

\[
\begin{align*}
Pr(\text{Interest}=1) &= \Lambda(\tau_1 - (y*)) \\
Pr(\text{Interest}=2) &= \Lambda(\tau_2 - (y*)) - \Lambda(\tau_1 - (y*)) \\
Pr(\text{Interest}=3) &= \Lambda(\tau_3 - (y*)) - \Lambda(\tau_2 - (y*)) \\
Pr(\text{Interest}=4) &= \Lambda(\tau_4 - (y*)) - \Lambda(\tau_3 - (y*)) \\
Pr(\text{Interest}=5) &= \Lambda(\tau_5 - (y*)) - \Lambda(\tau_4 - (y*)) \\
Pr(\text{Interest}=6) &= \Lambda(\tau_6 - (y*)) - \Lambda(\tau_5 - (y*)) \\
Pr(\text{Interest}=7) &= 1 - \Lambda(\tau_6 - (y*))
\end{align*}
\]

where

\[ y^* = \beta_0 + \beta_1 \text{Profit} + \beta_2 \text{Carbon Offset} + \beta_3 \text{Ecosystem Services} + \beta_5 (\text{Profit} \times \text{Carbon Offset}) + \beta_6 (\text{Profit} \times \text{Ecosystem Services}) + \varepsilon \]

The ordered logistic model effectively estimates a latent variable \( y^* \) that underlies the ordered dependent variable, and identifies the thresholds at which changes in explanatory variables lead to a change in the dependent variable. This allows me to base my analysis on a description of the latent variable that represents subjects’ interest in conservation tillage (i.e. linear prediction of the latent \( y^* \)), or the probability that subjects will express a specific level of interest (i.e. predicted probabilities) due to frame exposure (Long 1997, chap. 5). As my hypotheses are concerned with the general pattern of relationships as opposed to specific levels of interest in conservation tillage, I have chosen to base my interpretations on linear predictions.

Importantly, the three hypotheses articulated above represent expectations concerning the independent influence of treatment frames on experienced farmers’ interest in conservation tillage systems. The differentiation of treatment groups along two dimensions, however, embeds an interactive relationship within the experimental design: subjects’ frame responses result from simultaneous exposure to both the profit and payment dimensions of the treatment matrix. As a result, I cannot attribute subjects’ post-test attitudes toward conservation tillage to the independent influence of either the profit or economic incentive dimension. Because traditional additive regression models discard the variance shared by the two treatment dimensions I must reintroduce this shared variance by including an interaction term.

To illustrate, consider the following two models:
\[ Y = \beta_0 + \beta_x X + \beta_z Z + \varepsilon \]
\[ Y = \beta_0 + \beta_x X + \beta_z Z + \beta_{xz} XZ + \varepsilon \]

Within the first linear-additive model, the marginal effects\(^{14}\) of \( X \) are \( \frac{\partial Y}{\partial X} = \beta_x \); a unit change in \( X \) produces a \( \beta_x \) change in \( Y \). This is not the case within the latter model, however, which includes a multiplicative interaction. Here, the marginal effects of \( X \) are \( \frac{\partial Y}{\partial X} = \beta_x + \beta_{xz} Z \); the effects of \( X \) on \( Y \) are dependent on the value of \( Z \) (Brambor, Clark, and Golder 2006). In other words, the inclusion of a multiplicative interaction term accounts for the joint effect of the profit and economic incentive dimensions within my statistical models. The dummy variables “Profit x Carbon Offset” and “Profit x Ecosystem Services” account for whether subjects received the described combination of treatment frames and thus represent this interaction in statistical models.

To test my hypotheses, therefore, for the independent influence of the profit, carbon offset, and ecosystem services frames I examine the marginal effects of each frame. Effectively, I calculate the arithmetic mean of \( X \) at each value of \( Z \) and subsequently calculate the arithmetic mean of these effects, whereby

\[ \frac{\partial Y}{\partial X} \Delta E[|X, Z|] = \frac{1}{N} \sum_{\xi=1}^{\xi} \beta_x + \beta_{xz} \xi. \]

Alternatively, however, the magnitude of a frame’s effect may vary based on the interaction between the profit and economic incentives treatment. With this in mind, I also calculate the simple marginal effects for each treatment. Here, I calculate the marginal effects of \( X \) for each value of \( Z \). I am thus able to interpret the

\(^{14}\) Marginal effects represent the ratio of a change in \( y^* \) given a change in an independent variables, represented by a partial derivative when the explanatory variable is continuous and the discrete difference when it is a factor variable.
marginal effects of X at each level of Z and conduct pairwise comparisons to test for the difference in marginal effects across levels of Z.

5.3 Results

According to my hypotheses, issue frames that promote conservation tillage in terms of farm profits and the potential for economic incentives should motivate a favorable response to conservation tillage practices. As a result, empirical tests will support H1a, H1b, and H1c if the marginal effects of the profit, carbon offset, and ecosystem services frame, respectively, are positive and significant.

5.3.1 The Impact of Profit and Economic Incentive Frames

Table 5-5 presents the main regression models. I use four models to explicate the impact of issue frames among expert farmers, each including a different set of control variables. Model A provides the foundation for empirical tests, consisting of measures for the profit and economic incentives treatment groups, with the “no profit” and “no economic incentive frame” (hereafter; control and no frame, respectively) groups excluded and used as reference categories. Model B builds on Model A, including measures for the percentage of cultivated land within conventional tillage and no-till system as a proxy for subjects’ prior attitudes toward conservation tillage techniques. Model C, by contrast, builds on Model A through the inclusion of variables selected to control for expertise, namely education, age, farm sales, and number of cultivated acres. All control measures are included in Model D.
<table>
<thead>
<tr>
<th>Framing Treatments</th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
<th>Model D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit</td>
<td>0.158</td>
<td>0.079</td>
<td>0.045</td>
<td>-0.010</td>
</tr>
<tr>
<td></td>
<td>(0.165)</td>
<td>(0.172)</td>
<td>(0.174)</td>
<td>(0.178)</td>
</tr>
<tr>
<td>Carbon Offset</td>
<td>0.172</td>
<td>0.209</td>
<td>0.132</td>
<td>0.216</td>
</tr>
<tr>
<td></td>
<td>(0.165)</td>
<td>(0.174)</td>
<td>(0.172)</td>
<td>(0.179)</td>
</tr>
<tr>
<td>Ecosystem Services</td>
<td>0.278\textsuperscript{+}</td>
<td>0.115</td>
<td>0.212</td>
<td>0.112</td>
</tr>
<tr>
<td></td>
<td>(0.160)</td>
<td>(0.171)</td>
<td>(0.168)</td>
<td>(0.176)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tillage Choices</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% Acres in No-Till</td>
<td>2.029\textsuperscript{***}</td>
<td>2.059\textsuperscript{***}</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.151)</td>
<td>(0.157)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Acres in Conventional Till</td>
<td>-1.585\textsuperscript{***}</td>
<td>-1.566\textsuperscript{***}</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.156)</td>
<td>(0.162)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expertise</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>0.196\textsuperscript{***}</td>
<td>0.203\textsuperscript{***}</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.058)</td>
<td>(0.060)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.006</td>
<td>0.003</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.004)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Receipts</td>
<td>0.021</td>
<td>0.062</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.069)</td>
<td>(0.072)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log of Acres Farmed</td>
<td>0.124\textsuperscript{+}</td>
<td>0.035</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.073)</td>
<td>(0.076)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interaction Terms</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit x Carbon Offset</td>
<td>-0.099</td>
<td>-0.197</td>
<td>-0.019</td>
<td>-0.114</td>
</tr>
<tr>
<td></td>
<td>(0.233)</td>
<td>(0.244)</td>
<td>(0.244)</td>
<td>(0.252)</td>
</tr>
<tr>
<td>Profit x Ecosystem Services</td>
<td>-0.286</td>
<td>-0.200</td>
<td>-0.101</td>
<td>-0.075</td>
</tr>
<tr>
<td></td>
<td>(0.224)</td>
<td>(0.237)</td>
<td>(0.236)</td>
<td>(0.245)</td>
</tr>
<tr>
<td>cut1</td>
<td>-3.605\textsuperscript{***}</td>
<td>-4.216\textsuperscript{***}</td>
<td>-2.070\textsuperscript{***}</td>
<td>-3.044\textsuperscript{***}</td>
</tr>
<tr>
<td>cut2</td>
<td>-3.109\textsuperscript{***}</td>
<td>-3.611\textsuperscript{***}</td>
<td>-1.521\textsuperscript{**}</td>
<td>-2.477\textsuperscript{***}</td>
</tr>
<tr>
<td>cut3</td>
<td>-2.329\textsuperscript{***}</td>
<td>-2.713\textsuperscript{***}</td>
<td>-0.649</td>
<td>-1.542\textsuperscript{**}</td>
</tr>
<tr>
<td>cut4</td>
<td>-1.019\textsuperscript{***}</td>
<td>-1.106\textsuperscript{***}</td>
<td>0.708</td>
<td>0.063</td>
</tr>
<tr>
<td>cut5</td>
<td>-0.229\textsuperscript{+}</td>
<td>-0.029</td>
<td>1.537\textsuperscript{**}</td>
<td>1.163\textsuperscript{*}</td>
</tr>
<tr>
<td>cut6</td>
<td>0.797\textsuperscript{***}</td>
<td>1.383\textsuperscript{***}</td>
<td>2.615\textsuperscript{***}</td>
<td>2.613\textsuperscript{***}</td>
</tr>
</tbody>
</table>

| Pseudo R-squared   | 0.001   | 0.121   | 0.005   | 0.125   |
| Log likelihood     | -2378.090 | -2006.864 | -2136.195 | -1878.794 |
| LR chi2            | 3.374   | 553.501  | 21.114  | 535.917  |
| N                 | 1508    | 1462     | 1381    | 1381     |

Standard errors in parentheses, Results from Ordered Logit regression, \( + p<0.10, * p<0.05, ** p<0.01, *** p<0.001 \)
5.3.1.1 **H1a: The Impact of Profit**

My first hypothesis (H1a) is that farmers receiving the “profit” frame will have a greater level of interest in conservation tillage than those who are only presented the basic rationale for the technique. Examining the average marginal effects of the profit frame for each model of Table 5-5 provides no support for this hypothesis (see Table 5-6). Instead, the difference in subjects’ attitudes between those who did and those who did not receive the profit frame are quite small across the entire sample (see the first row of Table 5-6). Similar comparisons within each treatment condition of the payment dimension also indicate that the profit frame had a negligible and statistically insignificant impact, and therefore are unable to offer support to H1a.

<table>
<thead>
<tr>
<th></th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
<th>Model D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit vs. No Profit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Subjects</td>
<td>0.023</td>
<td>-0.057</td>
<td>0.002</td>
<td>-0.074</td>
</tr>
<tr>
<td></td>
<td>(0.092)</td>
<td>(0.098)</td>
<td>(0.097)</td>
<td>(0.101)</td>
</tr>
<tr>
<td>No Payment</td>
<td>0.158</td>
<td>0.079</td>
<td>0.045</td>
<td>-0.010</td>
</tr>
<tr>
<td></td>
<td>(0.165)</td>
<td>(0.172)</td>
<td>(0.174)</td>
<td>(0.178)</td>
</tr>
<tr>
<td>Carbon Offset</td>
<td>0.059</td>
<td>-0.118</td>
<td>0.027</td>
<td>-0.124</td>
</tr>
<tr>
<td></td>
<td>(0.165)</td>
<td>(0.173)</td>
<td>(0.172)</td>
<td>(0.178)</td>
</tr>
<tr>
<td>Ecosystem Services</td>
<td>-0.128</td>
<td>-0.121</td>
<td>-0.056</td>
<td>-0.085</td>
</tr>
<tr>
<td></td>
<td>(0.152)</td>
<td>(0.162)</td>
<td>(0.159)</td>
<td>(0.168)</td>
</tr>
</tbody>
</table>

*Standard errors in parentheses, Results from Ordered Logit regression,* p<0.05, **p<0.01, ***p<0.001

It is important to note, however, that the minimal differences that do exist between those who did and did not receive the profit frame are not consistent across models. I find that the profit frame is associated with lower levels of interest in conservation tillage when I control for farmers’ prior attitudes toward conservation tillage. By contrast, when I do not control for subjects’ prior tillage attitudes in Model A and Model C those who received the profit frame were marginally more interested in
conservation tillage than the control group. But again, these differences are neither statistically nor substantively remarkable. Still, this suggests that while the profit frame may not have an independent influence on expert farmers’ attitudes, there may be individual-level factors confounding the analysis that warrant further investigation.

5.3.1.2  H1b: The Impact of Carbon Offset Payments

The second hypothesis outlined above (H1b) presents the expectation that farmers will express a greater level of interest in conservation tillage when they receive a frame that discusses the possibility of receiving carbon offset payments for using the practice in comparison to those who receive no mention of an economic incentive. The expectation is that farmers will respond positively to tangible financial benefits regardless of skepticism concerning the motivation of a payment program. Yet, as we can see from row 1 of Table 5-7, the although the marginal effects of the carbon-offset frame on subjects’ interest in conservation tillage are positive, they are statistically insignificant across all models. Further examinations of the interaction with the profit dimension of the treatment matrix are also unable to lend support for H1b, although these tests do indicate that exposure to the profit frame does dampen the positive influence of the carbon-offset frame (see row 3 of Table 5-7). Again, however, this difference is not statistically significant across any of the models outlined above.
| Table 5-7 Marginal Effects of Carbon Offset Frame on Farmer Interest |
|------------------------|----------------|----------------|----------------|----------------|
| Carbon Offset vs. No Payment | Model A | Model B | Model C | Model D |
| All Subjects | 0.122 (0.117) | 0.108 (0.122) | 0.123 (0.122) | 0.158 (0.126) |
| No Profit | 0.172 (0.165) | 0.209 (0.174) | 0.132 (0.172) | 0.216 (0.179) |
| Profit | 0.073 (0.164) | 0.012 (0.171) | 0.114 (0.173) | 0.102 (0.177) |

Standard errors in parentheses, Results from Ordered Logit regression, * p<0.05, ** p<0.01, *** p<0.001

5.3.1.3 H1c: The Impact of Payments for Ecosystem Services

Similar to H1b, my third hypothesis (H1c) articulates the expectation that economic incentives will have a positive impact on expert farmers’ attitudes toward conservation tillage practices. Specifically, I expect that discussions of payments for ecosystem services will lead to a greater level of interest in conservation tillage techniques than treatments that do not highlight the potential to receive an economic incentive. Again, although the pattern of relationships illustrated in Table 5-8 seems to support H1c, the positive influence of the ecosystem services frame does not reach conventional levels of statistical significance.

| Table 5-8 Marginal Effects of Ecosystem Services Frame on Farmer Interest |
|------------------------|----------------|----------------|----------------|----------------|
| Ecosystem Services vs. No Incentive | Model A | Model B | Model C | Model D |
| All Subjects | 0.132 (0.112) | 0.012 (0.118) | 0.161 (0.118) | 0.074 (0.123) |
| No Profit | 0.278+ (0.160) | 0.115 (0.171) | 0.212 (0.168) | 0.112 (0.176) |
| Profit | -0.009 (0.157) | -0.085 (0.163) | 0.111 (0.166) | 0.037 (0.170) |

Standard errors in parentheses, Results from Ordered Logit regression, * p<0.10, * p<0.05, ** p<0.01

Much like the results outlined above for H1b, examinations of the interaction term (see rows 2 and 3 of Table 5-8) indicate that the ecosystem services frame consistently
increases subjects’ interest in conservation tillage, provided they are not also presented with the profit frame (significant at p<0.10 for Model A). Interestingly, exposure to the profit frame dampens influence of the payment for ecosystem services frame, but this effect does not reach conventional levels of statistical significance. Results from Model A and Model B of Table 5-8 also indicate that exposure to the ecosystem services frame led to lower levels of interest in conservation tillage among those who also received the profit frame. Marginal effects of the payment for ecosystem services frame, however, remain positive among those who did and did not receive the profit frame in models that control for facets of expertise (Model C and Model D). These findings present similar issues to those discussed with regard to H1a, in that the quality of framing effects appears to vary based on the inclusion of control variables within statistical models. Thus, though a lack of statistical significance provides little support for my hypothesis, tests of H1c, again highlight the potential importance of individual-level characteristics to experts’ reception and evaluation of domain-relevant issue frames.

In sum, although results point to a generally positive influence of issue frames among my sample of expert farmers, the tests presented above offer little support for H1a, H1b, and H1c. Apparent inconsistencies in the marginal effects of the profit and ecosystem services frames, however, highlight the importance of individual-level factors to the framing process. The use, and verification of, random assignment suggests that the quality of between-group treatment effects (e.g. positive or negative change), as observed in Table 5-6 and Table 5-8, should not alter based on the inclusion of additional control variables. As Campbell and Stanley (1963) note, however, between-subject experimental designs cannot account for variance in individual level processes and the factors that
moderate individuals’ cognitive processes. Thus, in the section that follows I account for the moderating influence of these individual-level characteristics in the framing process.

5.3.2 The Moderating Influence of Prior Tillage Choices on Framing Effects

In Chapter 2, I discussed how individual-level characteristics, and strong prior attitudes in particular, may amplify or diminish framing effects even among the politically knowledgeable. This motivated the inclusion of subjects’ prior levels of tillage adoption in statistical tests of framing effects as a proxy measure for subjects’ prior tillage attitudes. Model B and Model D of Table 5-5 indicate that these prior adoption choices significantly influence farmers’ interest in conservation tillage techniques. Unsurprisingly, higher levels of prior conventional tillage adoption are associated with lower levels of interest, whereas greater levels of prior use of no-till are associated with greater levels of interest in conservation tillage practices. Coupled with the results outlined above, it appears as though the influence of both profit and payment frames may be dependent in part on expert farmers’ prior tillage attitudes.

Thus, in the analyses that follow I also include the interaction between prior conventional tillage adoption and all treatment conditions in testing my original hypotheses. I addition, I expect that those who have already adopted conservation and no-till methods already retain positive attitudes toward conservation tillage, and, therefore, are less sensitive to additional positive frames for the technique. As a result, I add the expectation that profit and payment frames are likely to have a stronger impact on interest in conservation tillage as the percentage of a farmer’s acres under conventional tillage increases.
The calculation of marginal effects presented below are based on ordered logit regression models presented in Table 5-9. In each of the models I include a three-way interaction between the profit treatment, payment treatment and the percent of land in conventional tillage, the associated constitutive terms, as well as a control for no-till adoption. In Model F, I also include controls for additional facets of expertise.\textsuperscript{15}

5.3.2.1 The Moderated Impact of the Profit Frame

To test the effect of the profit frame, as conditioned by prior tillage choices, I calculated the average marginal effects of the profit frame allowing the percent of a subject’s land in conventional tillage to vary. Figure 5-2 presents a depiction of these results based on Model F of Table 5-9. Although I do find that the profit frame significantly (p<0.05) influences subjects’ attitudes when their percentage of acres in conventional tillage is greater than 55%, the quality of this effect is contrary to that articulated in H\textsubscript{1a}. Interestingly, expert farmers who received the profit frame were led to be less interested in conservation tillage by this frame than those in the control group. In other words, Figure 5-2 suggests that the probability of experiencing a contrast effect in response to the profit frame increases with greater rates of conventional tillage adoption.

\textsuperscript{15} I also conducted an analysis excluding no-till adoption, which allowed for a more direct comparison of the effects conventional and conservation tillage (of which no-till is a variant) adoption have on subjects’ frame evaluations. These analyses support the findings outlined below and, therefore, have been left unreported.
## Table 5-9 Ordered Logit Results: Frame Interaction with Prior Adoption

<table>
<thead>
<tr>
<th>Framing Treatments</th>
<th>Model E</th>
<th>Model F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Profit</strong></td>
<td>0.298</td>
<td>0.199</td>
</tr>
<tr>
<td></td>
<td>(0.221)</td>
<td>(0.228)</td>
</tr>
<tr>
<td><strong>Carbon Offset</strong></td>
<td>0.227</td>
<td>0.231</td>
</tr>
<tr>
<td></td>
<td>(0.224)</td>
<td>(0.231)</td>
</tr>
<tr>
<td><strong>Ecosystem Services</strong></td>
<td>-0.029</td>
<td>-0.057</td>
</tr>
<tr>
<td></td>
<td>(0.214)</td>
<td>(0.220)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tillage Choice</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Framing Treatments</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tillage Choice</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Acres in Conventional Till</td>
<td>-1.404***</td>
<td>-1.432***</td>
</tr>
<tr>
<td></td>
<td>(0.331)</td>
<td>(0.348)</td>
</tr>
<tr>
<td>% Acres in No-Till</td>
<td>2.043***</td>
<td>2.077***</td>
</tr>
<tr>
<td></td>
<td>(0.151)</td>
<td>(0.157)</td>
</tr>
<tr>
<td><strong>Expertise</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>0.203***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.060)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td></td>
</tr>
<tr>
<td>Gross Receipts</td>
<td>0.057</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.072)</td>
<td></td>
</tr>
<tr>
<td>Log of Acres Farmed</td>
<td>0.043</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.076)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interaction Terms</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Framing Treatments</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tillage Choice</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profit x Carbon Offset</td>
<td>-0.186</td>
<td>-0.116</td>
</tr>
<tr>
<td></td>
<td>(0.313)</td>
<td>(0.324)</td>
</tr>
<tr>
<td>Profit x Ecosystem Services</td>
<td>-0.237</td>
<td>-0.110</td>
</tr>
<tr>
<td></td>
<td>(0.298)</td>
<td>(0.307)</td>
</tr>
<tr>
<td>Profit x Percent Conventional Till</td>
<td>-0.708</td>
<td>-0.681</td>
</tr>
<tr>
<td></td>
<td>(0.439)</td>
<td>(0.458)</td>
</tr>
<tr>
<td>Carbon Offset x Percent Conventional Till</td>
<td>-0.051</td>
<td>-0.050</td>
</tr>
<tr>
<td></td>
<td>(0.450)</td>
<td>(0.465)</td>
</tr>
<tr>
<td>Ecosystem Services x Percent</td>
<td>0.572</td>
<td>0.653</td>
</tr>
<tr>
<td>Conventional Till</td>
<td>(0.443)</td>
<td>(0.462)</td>
</tr>
<tr>
<td>Profit x Carbon Offset x Percent</td>
<td>-0.079</td>
<td>-0.021</td>
</tr>
<tr>
<td>Conventional Till</td>
<td>(0.632)</td>
<td>(0.651)</td>
</tr>
<tr>
<td>Profit x Ecosystem Services x Percent</td>
<td>0.025</td>
<td>0.027</td>
</tr>
<tr>
<td>Conventional Till</td>
<td>(0.620)</td>
<td>(0.645)</td>
</tr>
<tr>
<td>cut1</td>
<td>-4.187***</td>
<td>-2.991***</td>
</tr>
<tr>
<td>cut2</td>
<td>-3.580***</td>
<td>-2.422***</td>
</tr>
<tr>
<td>cut3</td>
<td>-2.676***</td>
<td>-1.480*</td>
</tr>
<tr>
<td>cut4</td>
<td>-1.048***</td>
<td>0.148</td>
</tr>
<tr>
<td>cut5</td>
<td>0.036</td>
<td>1.256*</td>
</tr>
<tr>
<td>cut6</td>
<td>1.452***</td>
<td>2.709***</td>
</tr>
<tr>
<td>Pseudo R-squared</td>
<td>0.124</td>
<td>0.128</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-2,000.082</td>
<td>-1,872.293</td>
</tr>
<tr>
<td>LR chi2</td>
<td>567.065</td>
<td>548.919</td>
</tr>
<tr>
<td>N</td>
<td>1,462.000</td>
<td>1,381.000</td>
</tr>
</tbody>
</table>

Standard errors in parentheses, Results from Ordered Logit regression, * p<0.05, ** p<0.01, *** p<0.001
5.3.2.2 The Moderated Impact of the Carbon Offset Frame

Unlike H1a, the carbon-offset frame still appears to have neither a positive nor a negative effect on farmers’ attitudes toward conservation tillage, even after accounting for the interaction between framing treatments and farmers’ prior tillage attitudes (H1b). Not only do the marginal effects of the carbon-offset frame fail to reach conventional levels of statistical significance, as illustrated in Figure 5-3, but the magnitude of differences in these marginal effects are also negligible. Moreover, what little variation in marginal effects does exist suggests the presence of contrast effects similar to the profit frame, though to a lesser degree. The impact of the carbon-offset frame diminishes among individuals with greater proportions of their land in conventional tillage systems.

![Figure 5-2 Marginal Effects of Profit on Interest across % Conventional Till](image)
5.3.2.3 The Moderated Impact of Payment for Ecosystem Services

Contrary to my findings concerning the impact of either profit or carbon-offset frames, an examination of the average marginal effect of ecosystem services frames across conventional-tillage adoption uncovers some support for H1c (see Figure 5-4). Here, I find that expert farmers exposed to issue frames that discuss incentives for ecosystem services are likely to express greater levels of interest in conservation tillage than those who receive no incentive frames, particularly those with high rates of conventional tillage adoption. Specifically, I find that the positive influence of the ecosystem services frame is significant among those individuals who use conventional tillage practices on 70% or more of their cultivated land (p<0.05).
In sum, these findings suggest that economic motivations do not have a uniform influence on experienced farmers’ tillage attitudes. Instead, these agricultural experts appear to use their prior attitudes and knowledge to guide their evaluation of relevant information and, ultimately, their revised attitudes toward agricultural conservation techniques. This leads subjects to evaluate discussions of potential profits and tangible economic incentives differently: the suggestion of additional profit or even new payments is not sufficient to influence most expert farmers’ attitudes toward conservation tillage. Indeed, for farmers who appear to have already rejected conservation tillage, a profit frame makes them significantly less interested in the technique, although the potential for a payment for providing ecosystem services increases their interest. In this sense, expert farmers appear to evaluate the strength and validity of framed arguments and update their attitude toward the framed issue in response to those personal assessments.
5.4 Policy Implications

Beyond their theoretical implications, these results have important consequences for policies to promote environmental conservation practices among expert farmers. Perhaps the most significant of these relate to the impact of the profit frame on farmers who use high levels of conventional tillage in their operation. Recall from Chapter 4, evidence consistently indicated that farmers are more apt to respond favorably toward BMPs that will lead to increased profits. This was a consistent theme both within literatures on BMP adoption as well as interviews with professional farmers and other agricultural experts.

The message, particularly from interviews, was clear: you must discuss profitability for farmers to respond favorably toward framed messages. The findings presented above, however, starkly contrast with this idea. Instead, these results suggest that the more farmers rely on conventional tillage, the more negatively they respond to frames oriented around the profitability of conservation tillage. The frame most actively promoted to support conservation tillage, in other words, may be generating greater resistance to the technique among the frame's primary target audience of non-adopters. This suggests that, perhaps, the profit frame has run its course and is now what Dardis and his co-authors (2008) would call a conflict-reinforcing frame, highlighting the negative associations that non-adopters already have with the framed issue. If this is the case, then policy practitioners may need to abandon the profit frame and develop an alternative, conflict-displacing frame for this remaining group conventional tillers.

In addition to the profit frame, my findings indicate that policy practitioners seeking to encourage the use of conservation tillage should also avoid discussing the
potential of receiving carbon-offset payments. Although this issue frame did not lead to a contrast effect or exhibit the same conflict-reinforcing qualities of the profit frame, it did not appear to have any influence on farmers’ attitudes. The diminished effect of the carbon-offset frame is unsurprising, particularly among expert farmers with high levels of conventional tillage adoption. As discussed in Chapter 4, interviews with farmers and other agricultural experts support conventional wisdom, suggesting opposition, among farmers, to the idea of climate change and the use of agricultural land for purposes of climate change mitigation. Moreover, some authors find that these sorts of payment programs are less appealing to farmers than policy entrepreneurs and government officials tend to recognize (Prokopy et al. 2008). The diminished influence of the carbon-offset frame, then, may be a product of both resistance to the notion of climate change as well as a general resistance to economic incentive programs.

Results do, however, seem to suggest one possible conflict-displacing frame: frames that center on payments for ecosystem services. It is apparent that farmers distinguish between economic considerations: the same population that responded negatively to discussions of profits based on cost reductions responded favorably to discussions of tangible payments for conservation tillage use. This does not indicate, however, that the payments for ecosystem services frame represents a viable alternative to the dominant profit frame. Some scholars have found that while farmers may initially respond favorably to an incentive program and adopt a BMP, this does not lead to a lasting attitudinal or behavioral change. Farmers who have enrolled in these programs, using defined management practices for a per-acre payment, will view similar programs negatively (see Prokopy et al. 2008). This suggests that farmers are unlikely to reenroll
land into an incentive program, and are likely to revert their behaviors once a contract expires and payments end. Moreover, a number of incentive programs have already offered incentive payments for conservation tillage use (see discussion in Chapter 3), yet farmers remain resistant to the practice. To have a lasting impact, a conflict-displacing frame must be anchored to motivations that transcend short-term gains. This raises a vital policy question: What frame might be more effective at changing the attitudes of these remaining conventional tillers?

5.5 Summary

In this chapter I sought to test the first hypothesis presented in Chapter 2—Issue frames will influence domain experts’ attitudes toward issues relevant to their area of expertise—in the context of expert farmers’ attitudes toward conservation tillage practices. I expected that issue frames highlighting the potential for increased profits and economic payments would lead expert farmers to express greater interest in conservation tillage. A national survey experiment with a sample of experienced row-crop farmers, however, provided little support for this general hypothesis.

Drawing on research concerned with the moderating influence of predispositions, such as prior attitudes, in the framing process, I then examined the simultaneous influence of prior tillage choices and framing treatments on subjects’ attitudes. Here, I did find that as subjects’ rates of conventional tillage adoption increased, they responded more positively to frames discussing economic incentives in terms of payments for ecosystem services, but not carbon-offset credits, than those who received no payment frame. Interestingly, whereas the ecosystem services frame led to a positive effect among
conventional tillers, a key target population for policymakers, the profit frame elicited a contrast effect among the same population. In other words, the profit frame led to lower levels of interest in conservation tillage as subjects’ rate of conventional tillage adoption increased.

The latter of these findings is in conflict with some research on BMP adoption as well as evidence from the pre-experimental interviews discussed in Chapter 4. This conflict may be attributed to an overgeneralization of the importance of stressing the increased profitability of conservation tillage to expert farmers, especially among the remaining farmers who have not adopted conservation tillage and may likely have considered, and rejected, this profitability frame—making it more of a conflict reinforcing frame for these individuals of the type described by Dardis and his co-authors (2008). This raises important theoretical and policy questions regarding what frame might be likely to work for different groups of farmers, especially those who have not yet adopted conservation tillage—questions I consider in the next chapter in conjunction with the different environmental values held by different farmers.
CHAPTER 6. FRAMES, VALUES AND FARMERS’ ATTITUDES TOWARD NO-TILL: A FIELD EXPERIMENT

The findings in Chapter 5 suggest that issue frames can influence domain experts’ attitudes toward policy issues within their area of expertise, yet experts’ predispositions may determine the extent and quality of that influence. These findings largely emerged from an analysis of how farmers' prior attitudes toward conservation tillage (as represented by their prior adoption of the technique) influenced their apparent response to various conservation tillage frames. It is important to remember, however, that individuals' values shape their attitudes and behaviors by providing standards that individuals use to evaluate information and, as a result, can influence both the magnitude and the nature of framing effects. Thus, as expressed in the second hypothesis presented in Chapter 2, variation in framing effects among expert farmers may also be attributed to variation in the values used to evaluate and respond to domain-relevant issue frames, rather than simply their prior attitudes.

In the present chapter, I continue my investigation of the framing process and expert populations by examining the second hypothesis presented in Chapter 2—H2: The values emphasized by domain-relevant issue frames condition framing effects among expert populations. In the sections that follow, I first draw on work in environmental psychology to further specify my hypotheses in terms of particular values likely to influence farmers’ evaluation of tillage frames. In the second section, I outline the
experiment, data, and methods used for empirical testing of my hypotheses. This is followed by an analysis and discussion of results in the fourth section and then a discussion of policy implications. The chapter concludes with a brief summary of my findings.

6.1 Hypotheses Tested

Individuals’ values provide structure to individuals’ behaviors and attitudes, as well as guidance as they evaluate information (Feldman 1988a; Rokeach 1973). Actively evaluating issue frames on the basis of prior values, however, requires a high level of cognitive effort that many individuals are either unable or unwilling to expend in the framing process. Yet, as discussed in Chapter 2, domain experts’ personal stake in the outcomes of issues in their area of expertise as well as their engagement with those issues, affords them the required motivation to actively deliberate and respond to domain-relevant issue frames. At the same time, their extensive and organized knowledge structures afford experts the ability to actively evaluate framed information efficiently and with reduced cognitive effort. Building on the belief-importance model, I contend that issue frames elevate the importance of specific values, which experts then use to anchor their subsequent evaluations of framed policy issues. This leads me to two specific hypotheses regarding the relationship of frames and values to be explored in this chapter:

H2a: Domain-relevant issue frames that emphasize values domain experts accept will lead to positive attitude change, i.e., a framing effect.

H2b: Domain-relevant issue frames that emphasize values domain experts reject will lead to negative attitude change, i.e., a contrast effect.
Which values might be important in influencing a farmer’s evaluation of tillage frames? Environmental psychology suggests that three environmental values—environmental egoism, environmental altruism, and environmental biospherism—shape individuals’ conservation behaviors and attitudes toward the environment by helping them to identify preferences and the actions most reflective of their environmental objectives (Schultz 2001; see also Stern and Dietz 1994; Stern et al. 1995).16 According to this work, environmental egoists are concerned about the environment in terms of its potential impact on themselves and their future, whereas environmental altruists are concerned about the impact of the environment on other individuals. Environmental biospherists, finally, favor environmental protection for the sake of other species and ecosystems (Dietz, Stern, and Guagnano 1998; Schultz 2001; Stern and Dietz 1994; Stern et al. 1995).

Taken together, then, I posit that expert farmers will evaluate the strength and validity of framed messages, and ultimately of tillage systems, based on their interpretation of the environmental values emphasized by an issue frame. I expect this evaluation of a frame to produce positive and/or negative thoughts that they then incorporate into their attitude toward no-till, and thus determine the quality of attitude change (see Petty and Cacioppo 1981; Petty and Cacioppo 1984). Thus, my hypotheses may be rearticulated for this case as follows:

H2a: No-till frames that emphasize environmental values that expert farmers accept will lead to a positive attitude change, i.e. a framing effect.

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16 All three of these values coexist in individuals’ cognitions, such that interpretations of each value are independent of one another (Schultz 2001).
H2b: No-till frames that emphasize environmental values that expert farmers reject will lead to a negative attitude change, i.e. a contrast effect.

6.2 Research Design

6.2.1 Experimental Design

As opposed to continuing my examination of general conventional tillage frames from Chapter 5, I test my hypotheses by examining the impact of issue frames on farmers’ attitudes toward no-till, the strongest form of conservation tillage (see Chapter 3). Here, I used a field experiment using random assignment to expose professional farmers to one of three different treatments describing the benefits of no-till farming. Each treatment included an issue frame designed to invoke one of the three specific environmental values discussed in section 6.2 above (see Table 6-1). Using a pre-/post-test design, I estimated whether frame exposure led to an increase, decrease, or no change in subjects’ attitudes toward no-till. To test the first hypothesis, I expected subjects who agreed more strongly with the value emphasized by each frame to experience a positive attitude change toward no-till. For the second hypothesis, I expected subjects who disagreed more strongly with the value emphasized by each frame to experience negative attitude change.
Table 6-1: Frames and Associated Values

<table>
<thead>
<tr>
<th>Frame</th>
<th>Argument</th>
<th>Relevant Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit</td>
<td>No-till is able to increase farms’ profits by decreasing production costs, such as labor, fuel, and machinery costs.</td>
<td>Environmental Egoism</td>
</tr>
<tr>
<td>Community</td>
<td>No-till reduces soil erosion and agricultural runoff, thereby increasing water and ambient air quality. This has a positive impact on the health of community members.</td>
<td>Environmental Altruism</td>
</tr>
<tr>
<td>Stewardship</td>
<td>No-till increases and maintains the long-term productivity of the land, ensuring the viability of use for future generations while also increasing biodiversity.</td>
<td>Biospherism</td>
</tr>
</tbody>
</table>

6.2.1.1 Participant Selection

Experimental subjects were recruited from a population of experienced row-crop farmers attending the annual Fort Wayne Farm Show in January 2012 (N=174). Subjects were provided $20 cash for participating in the experiment, and all responses were anonymous. Because of my focus on domain experts, potential subjects were pre-screened and only accepted if farming was their primary occupation and they were either the sole or one of the major decision-makers pertaining to farm management practices.

Additionally, given the findings in Chapter 5, I also sought to recruit subjects with greater rates of conventional tillage adoption\textsuperscript{17} and lower rates of no-till adoption\textsuperscript{18}.

6.2.1.2 Instrumentation

The experiment began with an initial instrument offering subjects a series of questions pertaining to their interest in no-till and their farming operations, information sources, and environmental values. On the first page of the instrument, subjects were

\textsuperscript{17} On average, farmers in my sample used conventional tillage on 55.7\% of their land, no-till on 28\%, and other types of conservation tillage on 16\%.

\textsuperscript{18} The focus on farmers who used low levels of no-till was noted on all recruitment materials. Additionally, subjects were informally asked about their tillage behaviors during screening, with a number of farmers being denied entrance in the study due to their extensive use of no-till. Throughout the recruitment period the maximum threshold for no-till use was adjusted to increase the sample size. Research protocol prevented this from influencing random assignment, however, as confirmed by t-tests.
asked about their degree of interest in no-till using a seven-point Likert-scale (see Appendix E for experimental instrument). This question was asked again immediately following the administration of the framing treatment in order to assess attitude change. This initial instrument also asked subjects to indicate how strongly they agreed or disagreed with statements designed to indicate their support for each of the three environmental values listed in Table 6-1, using a five-point Likert-scale (following Schultz 2001).

Once subjects completed the pre-test, they returned that section and received the second portion of the experiment. In this second part, subjects were asked to read a randomly assigned framing treatment presenting one of the frames designed to evoke a particular environmental value summarized in Table 6-1. The framing treatment was administered on a separate page stapled to the second half of the experimental instrument. Subjects were told the article was written for a leading farm magazine. The article was printed in color, and formatted to resemble an article from Farm Journal, a well-respected national farm magazine (see Appendix D for treatment language). After reading the experimental treatment, subjects were asked a series of questions pertaining to their attitudes on no-till farming, including a post-test measure of interest, as well as some general demographic questions.

6.2.1.3 Data Collection

After pilot tests on 8 Agricultural Economics students at Purdue University, the final instruments were administered to experimental subjects at the booth for the Purdue Agricultural Extension Office at the 2012 Fort Wayne Farm Show, in Fort Wayne, IN. To
improve recruitment, an initial solicitation for experimental subjects was included in literature distributed by the Purdue Agricultural Extension Office prior to the Farm Show, and Purdue logos were included on the initial instrument. Additionally, announcers advertised for the experiment on the intercom periodically over the three days of data collection.

These efforts generated 174 subjects for the experiment. There was a relatively even distribution of responses across the three treatment conditions, with 59 subjects in the treatment groups receiving the profit or the community frame and 56 subjects in the treatment group receiving the stewardship frame. T-tests confirmed random assignment to treatment groups for other key variables—education, acres farmed, years farming, age, gross receipts from crop sales, race, and gender.

6.2.2 Variables

The purpose of the field experiment outlined above was to collect data concerning the influence of issue frames and environmental values on expert farmers’ attitudes toward no-till agricultural techniques. I use statistical modeling to test this relationship and, in doing so, I make use of the experimental and survey data discussed above. I clarify the parameters of my tests below, examining they key variables more closely as well as how they are used in the study.

6.2.2.1 Dependent Variable

The hypotheses for this experiment focus on how issue frames and values change experts’ policy attitudes. Thus, to capture this change I make use of the pre-test/post-test
experimental design. The key dependent variable assessed attitudes toward no-till, asking subjects “Some farmers are quite interested in no-till techniques, while others are not as interested. What about you?” both prior to and after treatment exposure. Subjects were asked to respond according to a 7-point Likert-scale in which “1” represented not interested and “7” represented very interested. To capture the change in interest I subtracted the subject’s pre-test level of interest from the post-test level of interest to establish an attitude change measurement.

Given my interest in the direction, as opposed to the magnitude, of change as well as the small sample size, I collapsed this measurement. Thus, subjects were coded as experiencing no attitude change (0) if they expressed the same level of interest before and after treatment exposure. Individuals whose post-test levels of interest were higher than their pre-test levels were coded as having ‘increased’ interest in no-till (1) (i.e. a positive attitude change), while those who expressed lower levels of interest post-test were coded as having ‘decreased’ interest (-1) (i.e. a contrast effect). I use this general measure of attitude change as the dependent variable throughout the statistical analyses.

6.2.2.2 Environmental Values

As discussed above, subjects responded to a series of seven statements, indicating how strongly they agreed and disagreed with each statement on a five-point Likert-scale where “1” represented strongly disagree and “5” represented strongly agree. Each statement started with the phrase: “I am concerned about environmental problems because of the consequences for ______.” Following the work of Schultz (2001), subjects were then presented with phrases that corresponded to the values of
environmental egoism, environmental altruism, or biospherism at the conclusion of each statement (see Table 6-2).

<table>
<thead>
<tr>
<th>Environmental Egoism</th>
<th>Environmental Altruism</th>
<th>Biospherism</th>
</tr>
</thead>
<tbody>
<tr>
<td>my future</td>
<td>all people</td>
<td>wildlife</td>
</tr>
<tr>
<td>my health</td>
<td>future generations</td>
<td>ecosystems</td>
</tr>
<tr>
<td>people in my community</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To measure subjects’ overall support for each value, I created a mean index of subject responses for the statements corresponding to each environmental value, by averaging responses to the two or three questions for each value. Thus, in each statistical model I include independent measures for environmental egoism, environmental altruism, and biospherism. Each variable ranges from “1”, indicating low support or a rejection of the value, to “5”, representing strong support and acceptance of the value.

I conducted a principle component factor analysis to confirm that the composite questions were capturing three distinct environmental values. Initially each of these questions loaded heavily onto one factor, with an eigenvalue of 4.05. These initial results were likely a product of my small sample size. Upon application of an oblique rotation, it was apparent these variables loaded on three separate environmental values, as expected. Questions relating to environmental altruism loaded heavily onto the first factor (loadings > .5), similarly environmental egoism and biospherism loaded onto the second and third factors respectively (variable loadings >.5).
6.2.2.3  Framing Treatments

Table 6-1 above illustrates the main ideas of the three framing treatments that serve as the foundation for my analysis as well as the association of each frame with the relevant environmental value. Each framing treatment included language that was consistent across all three experimental conditions as well as language that was unique to each frame. The consistent language included a two-paragraph presentation of the basic rationale of no-till farming. The framing treatment was presented in subsequent paragraphs as well as the article header.

The first experimental treatment discussed the benefits of no-till in terms of farm profits. As in Chapter 5, the profit frame highlighted the ability of no-till farming to reduce farmers operating costs in terms of time, labor, and reduced wear on machinery. This frame promoted no-till by presenting the farmer as the ultimate beneficiary of the conservation practice, thereby appealing to the value of environmental egoism.

A second frame emphasized the benefits of no-till for neighboring communities, and is grounded in research on organizational behavior and the use of social pressure and responsibility in influencing human behavior (Scherbaum, Popovich, and Finlinson 2008; Vigoda-Gadot 2006), as well as interviews described in Chapter 4. Some individuals engage in voluntary and altruistic behaviors that benefit for an organization or community as a whole, despite being a potential burden for themselves (Vigoda-Gadot 2006). These discretionary actions do not lead to formal benefits or rewards, but rather to the betterment of the organization or community and informal acknowledgments of their efforts. Thus, this frame emphasized environmental altruism by stressing no-till’s benefits.
in terms of improved swimming and fishing in local waterways due to reduced soil erosion, and improving the health of local community members.

The final frame outlined how no-till agriculture promotes good stewardship. This frame also emerged from interviews discussed in Chapter 4, where farmers and other agricultural experts identified stewardship as a deeply embedded and salient idea within agricultural communities, and as a definitive part of farming culture. The stewardship frame centered on how no-till helps farmers to be better “keepers of the earth” by helping to promote biodiversity and protect the environment for future generations, thereby invoking the value of environmental biospherism.

6.2.2.4 Control Variables

Despite the use of a pre-test/post-test design, and confirmation of random assignment, I include two controls in each statistical model. First, although efforts focused on the recruitment of expert farmers, using similar standards as those discussed in Chapter 5, the recruitment setting made confirmation of farmer characteristics more difficult. I thus include a control for the length (in years) of subjects’ farming career, to account for the process of knowledge accumulation and the practice of knowledge application that is the foundation for the development of expertise.

Additionally, scholarship discussed in Chapter 2 suggests that the degree to which politically knowledgeable individuals’ trust the source of an issue frame influences the framing process. Due to the presentation of framing treatments, particularly the statement that “the following article was written for a leading farm magazine,” I also include a control for subjects’ trust in trade journals and magazines. In the pre-test portion of the
experiment, subjects reported their level of trust in a number of different information
sources, of which trade journal and magazines were one, using a four-point Likert scale,
where “1” represented “Not at all” and “4” indicated “A lot” of trust. Table 6-3
summarizes the descriptive statistics for the variables outlined above as well as other
important characteristics of the sample.

<table>
<thead>
<tr>
<th>Table 6-3: Descriptive Statistics</th>
<th>mean</th>
<th>s.d.</th>
<th>min</th>
<th>max</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interest in No-Till</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test Level of Interest</td>
<td>4.32</td>
<td>1.49</td>
<td>1</td>
<td>7</td>
<td>171</td>
</tr>
<tr>
<td>Post-test Level of Interest</td>
<td>4.74</td>
<td>1.37</td>
<td>1</td>
<td>7</td>
<td>171</td>
</tr>
<tr>
<td><strong>Environmental Values</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Index of Environmental Egoism</td>
<td>3.89</td>
<td>0.76</td>
<td>2</td>
<td>5</td>
<td>170</td>
</tr>
<tr>
<td>Mean Index of Environmental Altruism</td>
<td>3.98</td>
<td>0.63</td>
<td>1.67</td>
<td>5</td>
<td>171</td>
</tr>
<tr>
<td>Mean Index of Biospherism</td>
<td>3.7</td>
<td>0.86</td>
<td>1</td>
<td>5</td>
<td>171</td>
</tr>
<tr>
<td><strong>Control Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years Farming(^1)</td>
<td>25.38</td>
<td>14.26</td>
<td>1.5</td>
<td>65</td>
<td>164</td>
</tr>
<tr>
<td>Trust in Trade Journals</td>
<td>3.07</td>
<td>0.75</td>
<td>1</td>
<td>4</td>
<td>168</td>
</tr>
<tr>
<td><strong>Farmer Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest Degree Earned(^2)</td>
<td>3.03</td>
<td>1.07</td>
<td>1</td>
<td>5</td>
<td>152</td>
</tr>
<tr>
<td>Average Acres Farmed</td>
<td>960.8</td>
<td>1,053.0</td>
<td>20</td>
<td>8,012.5</td>
<td>152</td>
</tr>
<tr>
<td>Age</td>
<td>45.45</td>
<td>15.13</td>
<td>18</td>
<td>78</td>
<td>152</td>
</tr>
<tr>
<td>Gross Receipts(^3)</td>
<td>2.13</td>
<td>1.58</td>
<td>1</td>
<td>7</td>
<td>152</td>
</tr>
<tr>
<td>Gender Male</td>
<td>0.99</td>
<td>0.08</td>
<td></td>
<td></td>
<td>152</td>
</tr>
</tbody>
</table>

\(^1\) Represented as the log of years farming in statistical models
\(^2\) 5 point scale, where 1= “Grade School or less” 2= “High School” 3= “Some College” 4= “College Degree” and 5= “Advanced Degree”
\(^3\) 7 point scale, where 1= “Less than $500,000” 2= “$500,001- $999,999” 3= “$1,000,000-$1,499,999” 4= “$1,500,000-$1,999,999” 5= “$2,000,000-$2,499,999” 6= “$2,500,000-$2,999,999” and 7= “$3,000,000 or More”

6.2.3 Hypothesis tests

Due to my theoretical interest in either positive, negative, or no change in
attitudes, I use ordered logit for statistical tests of my hypotheses (for a more detailed
discussion of ordered logit see Chapter 5). This allows me to isolate and calculate the
predicted probability of experiencing a positive change, no change, or a negative change
in interest due to frame exposure. By testing the effects of frames and values on each
outcome of the dependent variable, I am functionally able to use the same statistical model to test both H2a as well as H2b.

To confirm or reject my hypotheses, I examine the effects of the interactions between frames and values on interest in no-till. I am particularly interested in the relationship between exposure to a given frame and degree of support for that frame’s relevant value in predicting a positive or negative attitude change. Thus, I find support for my hypotheses if an increase in support for the value emphasized by an issue frame leads to a greater predicted probability of increased interest in no-till, or a positive framing effect (H2a). Similarly, I find support for the second hypothesis if a decrease in support for the value emphasized by an issue frame is associated with a greater predicted probability of decreased interest in no-till (H2b), or a negative framing effect. For instance, I will find support for H2a if higher levels of environmental egoism lead to a statistically significant increase in the predicted probability of an increased level of interest when exposed to the profit frame. By contrast, I will find support for H2b if lower (higher) levels of environmental egoism lead to a statistically significant increase in the probability of experiencing a decreased (increased) level of interest when exposed to the profit frame. Because I have no expectations concerning the observation of no change in interest, which is the third level of the dependent variable, those results remain unreported.
6.3 Results

6.3.1 Main Effect of Issue Frames on Expert Attitudes

Before turning to the empirical tests of my hypotheses, I first consider the independent impact of issue frames on subjects’ interest in no-till (see Model A in Table 6-4). Overall, issue frames did not directly influence subjects’ attitudes toward no-till. Likelihood ratio tests indicate that the joint impact of issue frames has little to no influence on farmers’ attitudes. Additionally, Model A does not reach conventional levels of overall significance. However, the statistical significance of the first cut point in Model A warrants a more detailed examination of predicted probabilities.

Table 6-4: The Effect of Issue Frames and Environmental Values on Farmers' Interest in No-Till

<table>
<thead>
<tr>
<th></th>
<th>Model A</th>
<th>Model B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Framing Treatments</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stewardship Frame</td>
<td>-0.298</td>
<td>5.126</td>
</tr>
<tr>
<td></td>
<td>(0.412)</td>
<td>(3.441)</td>
</tr>
<tr>
<td>Community Frame</td>
<td>0.311</td>
<td>3.146</td>
</tr>
<tr>
<td></td>
<td>(0.370)</td>
<td>(3.488)</td>
</tr>
<tr>
<td><strong>Environmental Values</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Egoism Value</td>
<td>-0.420</td>
<td>0.417</td>
</tr>
<tr>
<td></td>
<td>(0.262)</td>
<td>(0.545)</td>
</tr>
<tr>
<td>Environmental Altruism Value</td>
<td>-0.026</td>
<td>0.040</td>
</tr>
<tr>
<td></td>
<td>(0.425)</td>
<td>(0.933)</td>
</tr>
<tr>
<td>Biospherism Value</td>
<td>0.422*</td>
<td>0.332</td>
</tr>
<tr>
<td></td>
<td>(0.249)</td>
<td>(0.468)</td>
</tr>
<tr>
<td><strong>Control Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log of Years Farming</td>
<td>-0.124</td>
<td>-0.195</td>
</tr>
<tr>
<td></td>
<td>(0.212)</td>
<td>(0.225)</td>
</tr>
<tr>
<td>Trust in Trade Journals</td>
<td>-0.232</td>
<td>-0.247</td>
</tr>
<tr>
<td></td>
<td>(0.186)</td>
<td>(0.203)</td>
</tr>
<tr>
<td><strong>Interaction Terms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stewardship Frame x Env. Egoism</td>
<td>-0.777</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.669)</td>
<td></td>
</tr>
<tr>
<td>Community Frame x Env. Egoism</td>
<td>-2.361**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.748)</td>
<td></td>
</tr>
<tr>
<td>Stewardship Frame x Env. Altruism</td>
<td>-0.962</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.149)</td>
<td></td>
</tr>
</tbody>
</table>
Table 6-5 suggests that the community frame is most likely to increase interest in no-till among my sample of farmers. Tests of pairwise comparison indicate that individuals are less likely to experience no framing effect (p<0.10) in response to the community frame than the stewardship frame, and more likely to experience a positive framing effect (p<0.10). Differences between the expected effects of the community and profit frames reflect a similar pattern, although they do not reach conventional levels of statistical significance.

Table 6-5: Predicted Probability of Attitude Change by Issue Frame

<table>
<thead>
<tr>
<th>Issue Frame</th>
<th>Profit</th>
<th>Community</th>
<th>Stewardship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Δ (positive framing effect)</td>
<td>0.395</td>
<td>0.469*</td>
<td>0.328*</td>
</tr>
<tr>
<td>No Δ</td>
<td>0.467</td>
<td>0.425*</td>
<td>0.495*</td>
</tr>
<tr>
<td>Negative Δ (contrast effect)</td>
<td>0.138</td>
<td>0.106</td>
<td>0.177</td>
</tr>
</tbody>
</table>

Results from Model A ordered logit regression, * p<0.10
Significance levels are based on pairwise comparisons between treatment groups

6.3.2 The Conditional Relationship between Issue Frames, Values, and Expert Attitudes

My research hypotheses relate to the interaction of frames with their targeted values. As noted in the research design, testing these hypotheses requires the inclusion of multiplicative interaction terms within statistical models. Although each frame was
designed to activate a different environmental value (see Table 6-1), I allow for the possibility that an individual frame could activate more than one environmental value by including interactions of each framing treatment with all three environmental values in Model B of Table 6-4, with profit as the omitted category. Likelihood ratio tests examining the joint influence of the interaction terms included in Model B relative to Model A suggest that accounting for these interactive relationships significantly improves my ability to explain the impact of issue frames on experts’ attitudes, consistent with my overall hypothesis that farmers’ values condition the impact of frames.

Due to the use of interactions and ordered logit, to statistically test my hypotheses I calculate the marginal effects of frames and values on the predicted probability of experiencing attitude change. I expect that greater agreement with the value emphasized by an issue frame will lead to a higher probability of a positive attitude change (H2a), whereas greater disagreement with the emphasized value will lead to higher probability of a negative attitude change, or a contrast effect (H2b). These hypotheses effectively present expectations concerning two of the three levels of the dependent variable. Tests of both hypotheses are dependent on the marginal effect of specific environmental values for each frame (see Table 6-1) and level of the dependent variable. I calculated the marginal effect of subjects’ environmental values—that is, the average impact of a one-unit increase in subjects’ acceptance of each value—for each frame and type of attitude change (see Table 6-6).
Table 6-6: Marginal Effect of Environmental Values on Interest in No-Till

<table>
<thead>
<tr>
<th></th>
<th>Profit</th>
<th>Community</th>
<th>Stewardship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Δ (framing effect):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Egoism</td>
<td>0.092</td>
<td>-0.397***</td>
<td>-0.072</td>
</tr>
<tr>
<td>Altruism</td>
<td>0.009</td>
<td>0.361**</td>
<td>-0.185</td>
</tr>
<tr>
<td>Biospherism</td>
<td>0.074</td>
<td>0.050</td>
<td>0.142</td>
</tr>
<tr>
<td>No Δ:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Egoism</td>
<td>-0.046</td>
<td>0.227***</td>
<td>0.022</td>
</tr>
<tr>
<td>Altruism</td>
<td>-0.004</td>
<td>-0.206**</td>
<td>0.055</td>
</tr>
<tr>
<td>Biospherism</td>
<td>-0.036</td>
<td>-0.029</td>
<td>-0.042</td>
</tr>
<tr>
<td>Negative Δ (contrast effect):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Egoism</td>
<td>-0.047</td>
<td>0.171***</td>
<td>0.051</td>
</tr>
<tr>
<td>Altruism</td>
<td>-0.005</td>
<td>-0.155*</td>
<td>0.129</td>
</tr>
<tr>
<td>Biospherism</td>
<td>-0.037</td>
<td>-0.022</td>
<td>-0.099</td>
</tr>
</tbody>
</table>

Results from Model B: ordered logit regression, * p<0.05, ** p<0.01, *** p<0.001
Shading indicates specific frame-value interactions hypothesized to be significant.

6.3.2.1 H2a: Value Acceptance and Positive Framing Effects

H2a predicts that the marginal effect of an increase in the environmental value designed to be activated by a given frame should have a positive and significant effect on the predicted probability of experiencing a positive attitude change (see the first three rows of Table 6-6). I do not find support for this hypothesis in the interactions of environmental egoism with the profit frame, or with biospherism and the stewardship frame, neither of which reaches conventional levels of statistical significance.

I do find support for H2a, however, in the significant and positive interaction between environmental altruism and the community frame (p<0.01) (see Figure 6-1). Here, I find that the probability of becoming more interested in no-till in response to the community frame dramatically increases among farmers with greater affinity toward environmental altruism. In fact, there is an 80% probability that farmers with the greatest acceptance of environmental altruism (5 out of 5 on the Likert scale) will express greater interest in no-till when presented with the community frame. Conversely, the probability
of those with the least support for the value (1 out of 5 on the Likert Scale) experiencing a positive attitude change in response to the community frame is less than 1%.

6.3.2.2 H2b: Value Rejection and Contrast Effects

Similar to tests for H2a, I examine the marginal effect of specific environmental values on the probability of experiencing a lower level of interest in no-till as a result of frame exposure to test my hypothesis (H2b) regarding contrast effects (see the last three rows of Table 6-6). As the marginal effect represents the average change in the predicted probability given a unit increase in an environmental value, a negative marginal effect indicates that those who disagree with or have rejected a value are more likely to experience a negative attitude change when exposed to the frame than those who accept the value. Thus, if the marginal effect of activated values is negative and significant, I will have found support for H2b.
As with tests of H2a, I find no evidence of environmental egoism or biospherism increasing the probability of a contrast effect among subjects exposed to the relevant frames. I do, however, find support for H2b when considering the interaction between environmental altruism and the community frame ($p<0.05$). On average, a one-unit increase in farmers’ agreement with environmental altruism leads to a substantial decrease in the probability they will respond negatively to the community frame. Figure 6-2 illustrates the strength of the relationship. Here, individuals who are least supportive of environmental altruism (i.e., those with a score of 1 on the scale) have a 90% probability of experiencing a contrast effect when presented with the community frame, while it is extremely unlikely (less than 10% probability) that those with the highest levels of environmental altruism will experience a contrast effect. These results indicate, then, that the community frame not only fails to resonate among those who have rejected environmental altruism, but also leads many of these individuals to express greater opposition to the practice of no-till.
To summarize, the data offer mixed support for both H_{2a} and H_{2b}. The direction of the marginal effects of support for environmental egoism and biospherism on attitudes toward no-till when exposed to the associated frame is consistent with my hypotheses, but fails to achieve conventional levels of statistical significance. More importantly, support for environmental altruism has a significant and substantial effect on the probability of both positive and negative attitude change on subjects exposed to the associated community frame. These results suggest that there is something unique about the community frame, relative to the profit and stewardship frames. More specifically, farmers appear to use their values more strongly when processing the community frame compared to the profit or stewardship frames.
6.3.2.3 Interactions between the Community Frame and Other Environmental Values

Table 6-6 also indicates that this frame interacted significantly with other environmental values besides the expected value of environmental altruism. Specifically, I find that support for environmental egoism also has a significant \( (p<0.001) \) influence on the impact of the community frame on all three possible types of attitude change. Unlike support for environmental altruism, however, support for egoism significantly reduces the probability that farmers will experience a positive framing effect in response to the community frame.

Panel A of Figure 6-3 illustrates this relationship in more detail. Here, one can see that the probability of experiencing a positive attitude change for subjects exposed to the community frame is only 15% for those with high levels of environmental egoism compared to approximately 99% for those with the lowest level of acceptance of that value. Table 6-6 also indicates that greater levels of environmental egoism significantly \( (p<0.001) \) increase the probability that farmers will respond negatively to the community frame. Panel B of Figure 6-3 illustrates that as farmers’ support for environmental egoism rises, so does the probability of experiencing a contrast effect in response to the community frame. For example, an increase from 4 to 5 on the environmental egoism scale leads to approximately a 30 percentage point increase in the likelihood of responding negatively to the frame.
Thus, environmental egoism appears to have an effect on the predicted probability of responding either positively or negatively to the community frame at a level comparable to the effects of support for environmental altruism. Although it is tempting to attribute this result to environmental egoism and altruism being in opposition, it is important to remember that research in environmental psychology identifies environmental egoism and environmental altruism as distinctive values rather than two ends of the same value construct. In other words, individuals may support both values at the same time. The significant and clashing impact of environmental altruism and environmental egoism, then, raises the question of how individuals reconcile these competing values when responding to the community frame.

I explore this relationship through Model C in Table 6-7, which builds on Model B of Table 6-4 by including a three-way interaction between issue frames, environmental egoism, and environmental altruism. I tested the statistical significance of the relationship by calculating the marginal effect of a change in environmental altruism while holding
the treatment variable constant for the community frame and allowing environmental egoism to vary. Results presented in Figure 6-4 indicate that environmental egoism moderates the impact of environmental altruism. Here, environmental altruism significantly (p<0.05) influences the probability of experiencing both a positive framing effect and a contrast effect in response to the community frame across most of the environmental egoism scale (between 1.4 and 4.8, and between 1 and 4.2 respectively).

Figure 6-4 Significance Test of the Interaction between Environmental Egoism and Environmental Altruism holding the Community Frame Constant
### Table 6-7: Frame, Environmental Egoism, and Environmental Altruism Three-way Interaction

<table>
<thead>
<tr>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Framing Treatments</strong></td>
</tr>
<tr>
<td>Stewardship Frame</td>
</tr>
<tr>
<td>Community Frame</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Environmental Values</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Egoism Value</td>
</tr>
<tr>
<td>Environmental Altruism Value</td>
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<td>Biospherism Value</td>
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<th><strong>Control Variables</strong></th>
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<td>Trust in Trade Journals</td>
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<th><strong>Interaction Terms</strong></th>
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<td>Stewardship Frame x Env. Egoism</td>
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<td>Community Frame x Env. Egoism</td>
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<td>Stewardship Frame x Env. Egoism x Env. Altruism</td>
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<td>Community Frame x Env. Egoism x Env. Altruism</td>
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| cut1 | 5.628 |
| cut2 | 3.133 |

| LR X2 | 33.200 |
| Prob > X2 | 0.007 |
| N | 162 |

Robust standard errors in parentheses; Results from ordered logit regression.
+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001
Panel A of Figure 6-5 shows that greater levels of agreement with environmental altruism increases the probability farmers will experience a positive framing effect when presented with the community frame across a wide range of support for environmental egoism. Although this effect is stronger among those with low levels of environmental egoism, even those with high levels of egoism still demonstrate a positive relationship between their support for altruism and the probability of a positive attitude response to the community frame.

Moreover, those who score equally high (score of 4) on support for environmental egoism and environmental altruism demonstrate a 50% probability of experiencing a positive framing effect in response to the community frame. This is a substantial finding given the use of a three-level dependent variable, implying that these individuals are more likely to experience a positive framing effect than no attitude change or a contrast effect. In terms of a positive attitude change, I again find support for H2a: individuals who maintain agreement toward the value emphasized by an issue frame are likely to
experience a positive framing effect even when they also support alternative values associated with a weaker response to the frame in question.

I find similar results concerning the impact of environmental altruism and the community frame on the probability of experiencing a contrast effect across a wide range of values for environmental egoism (see Panel B of Figure 6-5). Here, the probability that subjects with strong support for environmental egoism will experience a contrast effect steadily increases as levels of environmental altruism decrease. Although the pattern of relationship is consistent, this effect is delayed and more drastic among subjects who do not support environmental egoism. Moreover, it appears that the probability of experiencing a contrast effect across levels of support for environmental egoism converge at the lowest value of the environmental altruism scale—that, is rejection of environmental altruism. Thus, I find that the community frame will likely elicit a contrast effect among individuals who reject or have low support for the value of environmental altruism, across a wide range of support for environmental egoism.

Notably, the responses of farmers with low levels of environmental egoism to the community frame appear to be quite sensitive to variation in levels of environmental altruism. The impact of environmental altruism on the probability expert farmers will respond negatively toward the community frame, however, becomes almost linear with greater prior acceptance of environmental egoism. This supports previous findings concerning the stability of values and their importance to information processing. Individuals’ values provide structure and consistency to their cognitions. As a result, those who maintain a high affinity toward a particular value will not completely disregard
the value when presented with an issue frame that activates an alternative value. Instead, experts are likely to evaluate issue frames based on values they traditionally use in addition to those activated by an issue frame. The value activated by the issue frame, however, does appear to be more influential over the experts’ evaluations.

6.4 Policy Implications

Although neither the profit nor the stewardship frames lead farmers to reference the associated environmental values in the framing process sufficiently to affect their attitudes toward no-till, the community frame does appear to have such an effect. Moreover, it appears that the community frame is more likely to lead to increased interest in no-till than either of the other frames I examined. This is an important finding for those seeking an alternative to the dominant profit frame in trying to change the attitudes of farmers toward no-till.

That finding also raises the question: what makes the community frame different? As discussed in Chapter 4, profit and good stewardship are salient ideas in farming communities that policy practitioners commonly reference to promote new or different agricultural practices, whereas discussions of community impact are less prevalent, and even dismissed by some agricultural experts as “soft” messages. The novelty associated with the community frame may actually account for farmers’ greater use of their values when exposed to this frame, and, ultimately a higher probability of a change in attitude toward no-till. I have identified two possible explanations for why farmers may use their values more actively to evaluate the community frame than the profit or stewardship frames.
As discussed in Chapter 2, issue frames determine the values that individuals use to generate the favorable or unfavorable thoughts they use to update their policy attitudes when they actively evaluate issue frames. Subsequent exposure to the same issue frame, however, may lead individuals to generate fewer or less impactful thoughts, thus dampening the apparent influence of values in the framing process. Thus, as the profit and, to a lesser extent, stewardship frames have been widely used to promote no-till since the 1960s, farmers may follow this pattern of active deliberation yet fail to generate any new or striking thoughts in response to these frames. The same evaluative process may, then, lead farmers to generate more new and impactful thoughts when evaluating the community frame, because the novelty of the frame offers a fresh perspective and more opportunity for elaboration.

Alternatively, it is possible that farmers actually use different cognitive mechanisms to respond to familiar versus novel issue frames. We know that experts seek information and feedback to update their decision-making strategies and achieve superior performance (Hoffman 1998; Johnson 1988). Yet, although experts are able to efficiently and effectively process information, they do not have to expend the cognitive energy to evaluate and critically analyze all relevant information—experts may lose the motivation to actively evaluate particular issue frames. If experts continually receive the same frames, the information may begin to be disregarded for not offering additional insights to help them advance in their area of specialization. Experts, such as farmers, may then use cognitive shortcuts when responding to more common issue frames, bypassing their values and the process of idea generation. Conversely, novel issue frames offer the
diverse insights and perspectives that motivate experts to actively evaluate domain-relevant issue frames based on their values, and update their attitudes and decision-making strategies as a result.

Regardless of why the community frame may have led farmers to depend more on their values in the framing process, results indicate that this frame may serve as a valuable replacement for profit-based arguments, and other conflict-reinforcing frames, at least for some farmers. More generally, these findings suggest that persuading farmers to use conservation techniques may require policy entrepreneurs to expand their framing toolkit. In an interview, one conservation specialist noted that it is important to talk to farmers about no-till in terms of profit because they are businessmen and money is their motivation. For some advocates of no-till, there is no other effective way to approach the topic. Rather than taking a “one-size fits all” approach, however, conservationists and advisors should take the distinctive values of their target population into account. Advocates would do well to recognize that farmers have a variety of values they use to guide their attitudes and behaviors, and tailor their messages accordingly. By appealing to farmers’ diverse values and motivations, it may be possible to change the attitudes of some farmers who currently resist the adoption of no-till based on profit or stewardship messages, such as those discussed in Chapter 5.

6.5 Summary

The goal of this chapter was to expand on the findings of Chapter 5, by further exploring how experts’ individual-level characteristics, specifically their prior values, impact the framing process. I expected that different issue frames would highlight the
importance of particular values that experts would then use as standards to evaluate the content of framed messages and, ultimately, the framed policy issue. Experts would thus experience a positive framing effect when issue frames evoked values they accept and a contrast effect (i.e., negative attitude change) when the frames evoked values the expert rejected. I tested these expectations using data from a field experiment conducted in Fort Wayne, IN with a sample of experienced row-crop farmers.

Experimental results indicated that some, but not all, issue frames led experts to reference their values sufficiently to result in positive or negative attitude changes when exposed to these frames. More specifically, subjects did not appear to respond to either the profit or the stewardship frame to a significant degree based on their values of environmental egoism or biospherism, respectively. Subjects exposed to the community frame did, however, appear to base their frame responses on their levels of environmental altruism. Here, I find that the probability of experiencing a positive framing effect significantly increased with acceptance of environmental altruism, supporting H2a. At the same time the probability of experiencing a contrast effect significantly increased as subjects’ acceptance of environmental altruism decreased (indicating rejection of the value), thus supporting H2b. Those exposed to the community frame also appeared to use the value of “environmental egoism” in the framing process. Subsequent analyses indicated that while greater levels of environmental egoism value dampens, it does not erase the influence of environmental altruism on subjects’ responses to the community frame.
My findings raise questions as to why some frames lead experts to reference their values in the framing process and some do not. Here, I offer two suggestions: first, it is possible that although issue frames lead experts to use their values to evaluate the content of those frames, the number and impact of thoughts produced as a result of this process declines the more frequently experts are exposed to the same frame. Alternatively, experts’ familiarity with an issue frame may influence the cognitive mechanism they use to evaluate the frame, such that they use the peripheral route to evaluate common frames and the central route to evaluate novel issue frames. From either perspective, repeated exposure to an issue frame may lead to stagnation and for an issue frame to become conflict-reinforcing among those who did not respond positively to the frame initially (see Dardis et al. 2008). By getting individuals to think about issues in terms of a different value than those previously linked to the issue, however, novel frames may revitalize or reengage experts’ in the framing process and serve as conflict-displacing frames. In this sense, policymakers seeking to increase interest in no-till among farmers who have not responded to profit or stewardship frames might benefit from new frames activating other values like environmental altruism, as in the case of the relatively effective community frame in this experiment.
CHAPTER 7. CONCLUSION

As authorities within particular policy fields, domain experts have emerged as key actors in the policy process yet remain largely ignored within the framing literature. Though many studies examine the role of knowledge—one dimension of expertise—in the framing process, the persistent focus on the mass public discounts the cognitive characteristics that distinguish experts. Thus, while a sizable literature examines how experts influence policy and policymaking, we know remarkably little concerning how features of the political environment, such as issue frames, shape experts’ behaviors and choices.

Throughout this study, I sought to expand our understanding of how experts interact with the political environment by bridging framing theory with literatures in expert reasoning. I explored a seemingly simple question—do issue frames influence experts’ attitudes toward domain-relevant policy issues?—in the context of farmers’ tillage attitudes. In doing so, I sought to achieve three objectives: 1) to identify the extent to which issue frames influence experts’ attitudes, 2) to determine the role of experts’ prior values in the framing process, and 3) to illustrate the practical policy relevance of framing theory for the coordination of experts’ attitudes and behaviors.
7.1 Research Findings and Theoretical Implications

From these objectives emerged two research hypotheses that I investigated in this study. My findings suggest that while issue frames can influence experts’ attitudes, the process by which this occurs may be more intricate than previously thought. More specifically, experts’ prior experiences and knowledge appear to shape the process and extent to which issue frames influence their evaluations of framed policy issues. This section discusses the implications of my findings for each of my research hypotheses.

7.1.1 The Influence of Issue Frames

H1: Issue frames will influence domain experts’ attitudes toward policy issues that are relevant to their area of expertise.

The foundation for empirical tests of my first hypothesis was a national survey experiment examining the post-test tillage attitudes of 1,537 row-crop farmers across the continental United States. Here, I considered the impact of issue frames discussing: 1) the profitability of conservation tillage due to reduced operational costs or no profit frame, and 2) the potential of receiving either a carbon-offset payment or payment for ecosystem services for using conservation tillage techniques or no payment frame. Experimental results offer limited support for H1, suggesting that experts’ prior experiences and predispositions determine the extent to which issue frames influence experts’ attitudes toward domain-relevant policy issues.

Although I initially find that neither profit nor payment frames have an independent influence on farmers’ attitudes, evidence does suggest that these experts evaluate and incorporate issue frames as they strive to expand their knowledge and practice. Rather than relying on issue frames in attitude construction, however, it seems
that farmers’ grounded frame evaluations in their prior experiences and attitudes toward tillage systems. These predispositions conditioned the influence of tillage frames such that greater levels of prior conventional tillage use leads farmers to respond more favorably to frames discussing payments for ecosystem services. Thus, domain experts do not seek to defend their own knowledge or use some predetermined formula to judge issue frames, yet they also are not blank slates who passively accept or reject issue frames. Instead, experts appear to actively evaluate the strength and validity of framed messages with the high level of scrutiny their distinct characteristics facilitate.

Importantly, tests of my first hypothesis also suggested that the dominant frame used to promote conservation tillage (the profit frame) elicited increasingly negative reactions at higher levels of conventional tillage use—that is, among those farmers who were previously unconvinced by the frame. A possible explanation for this finding is that domain experts remain motivated to actively evaluate domain-relevant information, even when they confront issue frames that they disagree with. As a result, experts may generate additional negative thoughts each time they confront an issue frame they have identified as unconvincing or rejected thus breeding opposition to proposed policy solutions. Greater familiarity with an issue frame, then, may lead experts to further consolidate their frame evaluations.

Alternatively, the negative impact of the profit frame may suggest that experts experience latent framing effects (see Lecheler and De Vreese 2013). It is possible that experts do not fully evaluate issue frames and move past them instantaneously. Instead, experts may continue to analyze content and update decision-making strategies after initial exposure to an issue frame. Experts may then reference these latter evaluations
when responding to subsequent presentations of the frame, revealing a latent framing
effect. This suggests that experts will experience contrast effects when they confront
issue frames that they have already considered and oppose and positive framing effects
when they encounter frames that they have already considered and found convincing. By
this account, greater levels of familiarity with an issue frame may lead experts to more
fully develop their frame evaluations and perceptions of framed policy issues.

In either case, the negative impact of the profit frame suggests that experts remain
motivated to evaluate the content of domain-relevant issue frames after their initial
exposure. Greater familiarity with a frame, then, may lead experts to more fully develop
and consolidate their frame evaluations. Although this may facilitate positive framing
effects, it may also increase the likelihood that issue frames will evolve into conflict-
reinforcing frames (see Dardis et al. 2008), and lead to contrast effects (i.e. negative
attitude change).

7.1.2 The Role of Values

H2: The values emphasized by domain-relevant issue frames determine
the nature of framing effects among expert populations

Empirical tests of my second hypothesis were grounded in a field experiment
conducted at the Fort Wayne Farm Show with a sample of 174 Midwest row-crop
farmers. Here, I examined how farmers’ existing environmental values and three
frames—profit, stewardship, or community—led to a change in their attitudes toward no-
till. Similar to my tests of H1, results offer some support for both components of my
second hypothesis, in that greater support for environmental altruism leads to a greater
probability farmers will experience a positive framing effect when presented with the
community frame, whereas farmers are likely to experience a contrast effect when they reject the value. Yet, while experts’ interpretations of the values emphasized by the profit and stewardship frames do appear to exhibit the hypothesized pattern of relationship, these findings are both substantively and statistically insignificant. Thus, while some issue frames do condition the role of experts’ prior values in the framing process, thereby determining the nature of a frame’s effect, the influence is not uniform across issue frames.

Beyond the specific hypothesis tests of $H_2$ results also indicated that while farmers did use the expected value of environmental altruism to evaluate the community frame, they also appear to have used the value of environmental egoism (the value associated with the profit frame) in their evaluations. Upon further examination, my results showed that while greater levels of environmental egoism slightly dampen the influence of environmental altruism, the positive relationship between environmental altruism and the community frame remains both substantively and statistically significant. This suggests that while an issue frame may lead experts to use a new value in the process of evaluation, this does not supplant the values they have used to evaluate information and make domain-relevant choices in the past. In other words, while issue frames may cause the salience of certain values to increase this does not diminish the relative salience of other, even seemingly contradictory values.

What is particularly interesting about the empirical tests of $H_2$ is that pre-experimental interviews (see Chapter 4) revealed profit and stewardship frames as the two most dominant frames to discuss no-till, whereas community benefits tend to be avoided. In other words, whereas profit and stewardship are common issue frames with
high levels of exposure, the discussion of community benefits represents a novel frame. Yet, my findings suggest that farmers do not use the values emphasized by the more common profit and stewardship frames in the framing process, whereas they do evaluate no-till on the basis of the value emphasized by the more novel community frame.

There are two possible explanations as to why the novelty or familiarity of an issue frame may influence the role of values in the framing process. First, it is possible that experts use a less active form of deliberation to evaluate issue frames that they are familiar. Whereas experts may use their values as a basis for judgment to actively evaluate novel issue frames, over time they may find this type of evaluation unnecessary and rely on heuristics or other cognitive short-cuts as their familiarity with framed arguments increases. The negative impact of the profit frame in Chapter 5, however, challenges this explanation, implying that experts continue to evaluate the content of familiar issue frames.

Thus, a second explanation suggests that persistent evaluation and elaboration based on a particular value produces diminishing returns on experts’ attitudes. As outlined above, experts may continue to analyze the content of an issue frame after their initial exposure, which leads them to gradually alter their attitude and decision-making strategies. In the framing process, then, the values linked to more familiar frames may appear to have a weak, or nonexistent, influence, because these values already shape experts’ attitudes toward the framed policy issue. Conversely, novel issue frames may emphasize values that do not already inform experts’ attitudes. When experts use these “new” values to evaluate policy issues, then, the relative impact of these values in the framing process appears to increase. Rather than suggesting that experts do not use their
values when confronted with more common issue frames, findings in Chapter 6 may indicate that greater familiarity gradually increases and stabilizes the importance of emphasized values. This means that the influence of particular values in the framing process may change when experts confront novel issue frames, but not familiar frames.

If frame familiarity leads experts to consistently use the values embedded in common issue frames to evaluate a domain-relevant policy issue, why does the profit frame lead to a contrast effect in Chapter 5 but not in Chapter 6? As noted above, the apparent contrast effect could be a latent framing effect of the profit frame among farmers who use greater levels of conventional tillage. It is possible that these effects did not emerge in Chapter 6 due to my small sample size or, perhaps, due to unobserved differences between my sample of Midwest row-crop farmers and the national sample.

Alternatively, I may attribute the variable findings to differences in how the experimental designs employed in chapters 5 and 6 account for these latent effects and other cognitive artifacts. More specifically, the negative impact of the profit frame was conditional on farmers’ prior tillage choices, which are the product of pragmatic considerations as well as farmers’ knowledge, experiences, values, and myriad other predispositions. Although I was unable to isolate each of these factors to identify what might be driving the contrast effect among “conventional tillers” in Chapter 5 due to limitations in my experimental design, I was able to examine the specific impact of values in Chapter 6. The findings in Chapter 6, then, do not necessarily contradict those of Chapter 5. Instead, they suggest that familiar frames, such as the profit frame, may lead to contrast effects among expert populations because of some other predisposition, besides values, that influences expert behaviors.
Thus, when taken together my findings suggest that domain experts actively process, evaluate, and incorporate domain-relevant issue frames into their attitudes. This process of evaluation, however, may be more intricate than existing framing research, dominantly focused on the mass public and politically knowledgeable populations, seems to suggest. Simply speaking, existing research is unable to account for the efficiency and complexity of experts’ reasoning processes. My findings highlight these shortcomings and suggest possible points of deviation.

7.2 Beyond Theory: Policy Implications

In terms of the implications of my findings for policy, my study calls to question the efficiency and efficacy of existing efforts to promote variants of conservation tillage systems among expert farmers. Literatures on farmer decision-making and interviews with farmers and other agricultural experts consistently pointed to the importance of profit to farmers’ adoption of conservation tillage techniques and other best management practices (BMPs). It is unsurprising, then, that different tillage techniques are most commonly discussed using the language of “profit.” Yet results from Chapter 5 suggest that some farmers have a negative reaction to the profit frame, especially those with higher levels of conventional tillage use. In other words, the dominant approach to promoting conservation tillage may sometimes lead to greater opposition—that is, a contrast effect—among conservationists’ target audience.

Although the profit frame may have had a positive influence on farmers’ tillage choices in the past, it may be that farmers who would respond positively to this frame have already adopted conservation tillage practices. Thus, the value of the profit frame
may have diminished over time and evolved into what Dardis and his co-authors (2008) refer to as a conflict-reinforcing frame: one that highlights the negative associations individuals already have with the framed issue. If this is the case, the continued use of the profit frame may lead to greater opposition to conservation and no-till practices among populations that are already resistant to these practices. Policy practitioners may, then, need to abandon the profit frame and develop a conflict-displacing frame.

Interestingly, my findings suggest that discussions of the benefits agricultural practices bestow on neighboring communities may act as a conflict-displacing frame. Although CCAs and conservation specialists view arguments based on community impacts as “soft” (see Chapter 4), results from Chapter 6 indicate that farmers respond more positively to the novel community frame than the more common profit or stewardship frames. Moreover, it appears that a farmer’s agreement with environmental altruism, which the community frame highlights, determines the nature of the frame’s effect. This suggests that policymakers will be more successful if they are able to develop new frames, like the community frame, that draw connections between tillage choice and previously understated values that resonate with farmers, particularly among those who have been resistant to existing appeals.

Beyond the community frame, my findings also highlight the potential importance of issue frames that discuss potential payments for ecosystem services. More specifically, issue frames discussing potential payments for ecosystem services with no-till use had an increasingly positive effect among conventional tillers while those discussing potential carbon-offset credits had no effect. This suggests that not all economic incentives are equal: farmers may find an incentive program more or less appealing based on how they
perceive the ultimate goals and motivation of the program. Literatures and interviews discussed in Chapter 4 suggest skepticism concerning climate change in agricultural communities, yet a general affinity toward the notion of “good stewardship.” My findings concerning the framing of payment programs reflect these ideals. Moreover, they suggest that initiatives like the now defunct Chicago Climate Exchange, may be more successful if they emphasized the general environmental benefits of no-till and other agricultural practices and focused less on controversial issues, such as climate change.

Still, it is unlikely that issue frames discussing potential payments for ecosystem services can act as a strong conflict-displacing frame to supplant the dominant profit frame. More specifically, it is unclear whether the positive attitudes farmers instigated by these frames are sufficient to sway farmers to change their tillage behaviors. The widespread promotion of such a frame would require support in the form of a costly payment program. Even then, scholars have found that farmers who have enrolled in payment programs in the past are less likely to enroll in them in the future (see Prokopy et al. 2008). This suggests that farmers are unlikely to reenroll land into an incentive program, and may revert their behaviors once a contract expires and payments end. Thus, messages that link conservation tillage to farmers’ short-term and economic motivations may not serve as the most viable replacement for the profit frame in tillage discourse.

7.3 Directions for Future Research

Throughout this study, I have found that various forms of domain expertise, beyond political knowledge, challenge our existing understanding of cognition and framing effects. Work in framing theory would do well to expand on this work to further
consider the impact of issue frames on expert populations, as well as how experts’ distinct cognitive characteristics influence the framing process. There are, however, a number of limitations to my research that should be addressed as discussion continues through future research.

Notably, I focus empirical tests of my hypothesis on examinations of farmers’ attitudes toward tillage systems. This has two important implications. First, I remain focused on examining the impact of issue frames on the attitudes of domain experts, and do not allow for variation in subjects’ level of expertise. Due to this sampling choice, I am unable to make claims surrounding how experts process and respond to conservation tillage and no-till frames, relative to agriculturally informed or uninformed populations. This means that I am unable to examine the distinct differences in experts’ reasoning processes relative to other non-expert populations. Doing so would allow for a closer and more complete examination of what makes experts unique and provide further guidance for policy practitioners interested in identifying what kinds of appeals influence different types of populations. In essence, expanding my research to account for such variation would afford a more nuanced understanding of the role of expertise in the framing process.

Secondly, although I justify my choice of expert population and issue area in Chapter 3, my focus on farmers’ tillage attitudes limits my ability to generalize my findings to expert communities as a whole. One of my objectives in conducting this study was to establish the foundation for future research and discussion surrounding expertise and issue framing where one did not previously exist. By demonstrating the complexities of framing effects on this particular population of “experts,” I hope that other scholars
will engage in this discussion by examining the impacts and implications among experts across myriad issue areas that extend beyond agriculture.

Finally, an important implication of my research is that novel issue frames appear to influence the role of prior values, and thus the nature of framing effects, whereas more familiar frames do not. From one perspective, this may be because domain experts already use the values that more common frames highlight to evaluate domain-relevant information and construct their attitudes, thus diminishing the apparent influence of values on attitude change. Alternatively, experts may use different cognitive mechanisms to evaluate novel and common issue frames. More specifically, domain experts may use cognitive short-cuts to respond to common issue frames, whereas novel issue frames may compel them to expend the cognitive energy to use their values to actively evaluate the new arguments. Future research would do well to identify how novel frames influence the role of values in the framing process as well as why and at what level of saturation these differences emerge.

Beyond informing framing theory, determining how novel information influences the framing process among expert populations has important policy implications. If domain experts continue to actively evaluate more common issue frames, policy practitioners may be able to reorient these frames to emphasize alternative values, thus leading domain experts to generate new thoughts as they evaluate the implications of common issue frames for “new” values. For instance, linking the profit frame to environmental altruism by discussing aggregate economic implications. Alternatively, if domain experts use different cognitive mechanisms to evaluate novel versus common
issue frames, policy practitioners may need to abandon their traditional approaches and
develop entirely new frames to achieve higher levels of success.

Taken together, the results of this study suggest that experts do not simply
internalize and adopt framed arguments, but rather rely on more complex reasoning
processes that vary based on individual-level characteristics. To influence the attitudes
and behaviors of domain experts, then, policy entrepreneurs need to take into account the
attributes of these target populations. My findings indicate that “one-size-fits-all” appeals
and issue frames that focus on what we think motivates diverse audiences of domain
experts, such as farmers, are not necessarily successful. To be most persuasive and
expansive in their appeal, then, policy outlets may need to develop a number of frames
that take into account the diverse values, beliefs and experiences of their target audience.
It may be more efficient and effective in the end to sway an array of smaller audiences
with a number of frames than to try to use one frame to sway all experts in a given policy
domain.
REFERENCES
REFERENCES


APPENDICES
Appendix A. Interview Instruments

Purpose of the Study and Confidentiality Disclaimer (All Subjects)

Just to review what we are doing here:

We are working with our partners the Conservation Technology Information Center on a USDA-funded research project about why farmers adopt or do not adopt “conservation tillage” practices. We are hoping to talk to a small number of farmers and conservation officers/crop advisors in Indiana about this subject this fall to give us a better understanding of the perspective of those with experience working on this issue. Of course, participation is voluntary and interviewees may skip any questions you would prefer not to answer or end the interview at any time.

Although we will tape record interviews, all answers will be confidential and the digital recordings will be destroyed at the end of the project and kept on a password-protected computer at all times. Names will be omitted from any written transcripts created of the interviews, and no comments will be attributed by name in any publication from this research. If you have any questions or concerns about this process, you can contact the project PI, Leigh Raymond, or the Institutional Review Board at Purdue.

Any questions or concerns before we begin?

Advisor Interview Questions

General Information
1. How long have you worked with farmers regarding tillage issues?
2. What range of issues do you generally help farmers with?
3. How frequently do you tend to talk to individual farmers? How do you usually communicate with them (in person, phone, mailings, web info, etc)?

Conservation Tillage Choices
4. In your experience, what factors do you think are most important in shaping a farmer’s tillage choices?
5. What are the most convincing arguments, in your experience, for getting a farmer to move more toward conservation tillage (generally defined as leaving 30% or more residue on soil surface)?
6. What do you think are the biggest barriers to getting farmers to move toward conservation tillage?
7. To what degree do you think the following factors play a role in farmers’ decisions to adopt/not adopt conservation tillage in a given year (discuss each if they appear to be relevant, including relative importance)?
   a. Environmental considerations, including water quality
   b. Soil erosion/soil loss worries and affect on crop yields
   c. Concern about economic costs of conversion to no or strip till
   d. Concern about other economic factors, including lower fuel costs with less tilling
   e. Concern about climate change/carbon storage
   f. Interest in carbon offset opportunities/payments for no-till

8. Do you think that farmers tend to use certain tillage techniques more frequently for one type of crop than another? On some acres more than others? Can you briefly help us understand why?

9. To your knowledge, how many farmers in your area have tried conservation tillage? How many of the farmers you advise have switched over the years? Once they switch, how many stay in conservation tillage in your estimation, and how many switch back?

10. Have you heard of carbon offset opportunities for farmers?

11. Do you know of farmers currently enrolled in a carbon offset program?

12. Would you be likely to describe carbon offsetting to a farmer as another possible reason to adopt conservation tillage? Have you ever done so?

13. Is there anything else you think it is important for us to know about why farmers do or don’t adopt conservation tillage practices that you would like to add?

14. Who else would you recommend we talk with on this issue, especially farmers you know who have adopted or not adopted some of these techniques? May we mention your name if we follow up with some of these additional contacts?

Farmer Interview Questions

   General Farm Information
   1. How long have you farmed at this location?
   2. What crops do you typically grow, and in what rotation?
   3. How many acres do you own?
   4. How many acres do you farm yourself (own + lease)?
5. How many acres, if any, do you lease to others to farm?

6. Who makes the decisions about tillage techniques on land that you farm but don’t own? On land that you own but don’t farm?

Conservation Tillage Choices

6. What conservation tillage techniques have you used, if any, in the past?

7. Probe: Have you ever heard of or used the following techniques?
   a. No-Till/Strip-Till
   b. Ridge-till (tilling 1/3 of the row width only and planting on those ridges)
   c. Mulch-till
   d. Reduced-till (15-30% residue)
   e. Cover Crops

8. Do you use certain tillage techniques more often for one type of crop than another? On some acres more often than others? Can you briefly help us understand why?

9. What were some important reasons you decided to try any of the conservation tillage techniques mentioned above? Which was most important (if more than 1)?

10. What are some important arguments, in your opinion, against trying conservation tillage? Which is most important, do you think?

11. Have you typically stayed with conservation tillage techniques that you have tried in the past, or have you sometimes decided to go back to regular tillage? What were the reasons you switched back, if you decided to do so?

12. To what degree would the following ideas be important in your decision to adopt/not adopt conservation tillage in the future (discuss each if they appear to be relevant, including relative importance)
   a. Environmental considerations, including water quality?
   b. Soil erosion/soil loss worries and affect on crop yields?
   c. Concern about economic costs of converting to no or strip till?
   d. Potential for higher profits due to lower input and fuel costs with conservation tillage?
   e. Concern about lower yields with conservation tillage?
   f. Concern about climate change/carbon storage?
   g. Interest in carbon offset payments for no-till?
   h. Noticing or hearing about success with conservation tillage by other farmers in the area
   i. Concern about the “appearance of your fields” with conservation tillage versus regular tillage?
13. To your knowledge, have many farmers in your area have tried conservation tillage? If any, roughly what percentage would you say?

14. Have you heard of carbon offset opportunities for farmers?

15. Do you know of farmers currently enrolled in a carbon offset program?

16. Would you be interested in a carbon offset program offering a small payment per acre for your adoption of conservation tillage on some or all of your crop? What if the program required you to keep the land on conservation tillage for an extended, continuous period of time (say 10+ years)?

17. If you have adopted conservation tillage, how important was information you received from any of the following in your decision?
   a. Crop advisor
   b. NRCS officer
   c. Extension agent/specialist
   d. Other farmers
   e. Equipment/Input Dealers
   f. Farm magazines / journals
   g. Other sources

18. Is there anything else you think it is important for us to know about why farmers do or don’t adopt conservation tillage practices that you would like to add?

19. Who else would you recommend we talk with on this issue, especially farmers you know who have adopted or not adopted some of these techniques? May we mention your name if we follow up with some of these additional contacts?
Appendix B. National Experiment Treatment Language

1) Control Frame (Basic rationale)

“Conservation tillage is a system of crop production that leaves a significant amount of residue from the previous crop on the field surface through the planting of the next crop. By limiting tillage operations and residue burial, organic matter in the soil may increase over time. Increasing organic matter improves soil tilth, and ultimately may increase soil productivity. Less soil disturbance may also reduce soil erosion and improve water quality. In contrast, multiple tillage trips leave little residue, decrease organic matter, and increase soil erosion potential.”

2) Economic Benefit Frame

Conservation tillage can save farmers money by reducing labor, equipment costs, and fuel use. Although some farmers experience a small initial drop in yield for certain crops, many achieve similar yields with conservation tillage as with conventional till over time and may even increase yields in drier years. Thus, by lowering costs while maintaining yields, conservation tillage can increase a farmer’s profits.

3) Carbon Offset Frame

“Depending on how little the soil is disturbed, conservation tillage stores additional carbon in the soil, helping to reduce the build-up of carbon dioxide in the atmosphere linked to the problem of climate change. In some cases, farmers are able to get paid for this stored carbon through market exchanges, just as they are paid for supplying any other commodity.”

4) Payment for Environmental Benefits Frame

“Conservation tillage provides numerous environmental benefits to society. In some cases, farmers are able to get paid for providing these environmental benefits through market exchanges, just as they are paid for supplying any other commodity.”
Appendix C. National Survey Instrument

Tillage Information and Questionnaire

We are writing to ask for your help with an important study being conducted by Purdue University and the Conservation Technology Information Center to understand farmers’ tillage choices. Because we understand how local factors influence tillage decisions, it is especially important for us to hear from farmers in each part of the United States, including your area. First, we will describe some basic information about tillage options as well as offer you an opportunity to request more detailed information tailored to your crops and local farm conditions. Then, we will ask you to complete a brief set of questions about your own tillage choices. Finally, we will ask you a few general questions about your farm operation and public policy views. We would be extremely grateful if you would review this information and return the completed survey to us in the enclosed self-addressed stamped envelope. All responses are strictly confidential, and we expect the survey should take no more than 15 minutes to complete. If you have any questions or concerns about the project, you may contact us at (765) 388-3301 or by email at raymond@purdue.edu.

First, please read the information on conservation tillage in the box below.

The framing treatment was presented within this text box on each survey instrument.

1) Some farmers are quite interested in conservation tillage techniques, while others are not as interested. What about you?

Not Interested 2 3 4 Somewhat Interested 5 6 7 Very Interested

2) As part of our project, the Conservation Technology Information Center (CTIC) can provide interested farmers with information about conservation tillage and related management practices that make conservation systems successful. Check here if you are interested in receiving a follow-up mailing from CTIC with information about the different tillage options suitable for your area and crops, including the name of a local tillage expert in your area. (We will not share your information with any other sources, and this will be the only additional mailing you will receive from the project.) Yes ☐ No ☐

If YES, please confirm your name and mailing address below so we may deliver this information to you.

Name __________________________ Address __________________________
NOW WE WOULD LIKE TO ASK YOU A FEW QUESTIONS ABOUT YOUR FARMING PRACTICES

3) Please write the number of acres in your farming operation that were in each tillage category by crop type and year as defined below. This should include all land for which you actively made farm management decisions, including land you own and land you lease from others.

<table>
<thead>
<tr>
<th>Tillage Method</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Corn</td>
<td>Soybeans</td>
</tr>
<tr>
<td>No Till or Strip-Till (Leaving the soil undisturbed from harvest to planting, except for strips of less than 30 percent of the row width. Planting or drilling is accomplished in a narrow seedbed or slot created by disk openers.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Conservation Tillage (Planting into a field while leaving significant amounts of residue on more than 30 percent of the row width.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional Tillage (Planting into a field that has had full-width tillage leaving significant residue on less than 30% of the row width. Includes moldboard plow, chisel plow, or rippers, followed by multiple secondary tillage trips.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PLEASE ANSWER QUESTION 4 ONLY FOR THE ACRES YOU LISTED AS BEING IN CONSERVATION OR NO-TILL IN 2009 OR 2010. IF YOU LISTED NO ACRES IN NO TILL OR CONSERVATION TILLAGE IN QUESTION 3, PLEASE SKIP QUESTION 4 AND GO TO QUESTION 5.

4) Please indicate how important the following considerations were in your decision to use No Till / Strip Till or Conservation Tillage in 2009 OR 2010 for any acres listed in question 3.

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Not Important</th>
<th>Somewhat Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concern about water quality</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Concern about soil erosion</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Concern about improving soil productivity</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Lower labor / fuel costs</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Lower equipment / capital costs</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Concern about carbon storage to address climate change</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Carbon offset payments for conservation tillage</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Hearing about other farmers’ success with conservation tillage</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Personal or family history of using conservation tillage</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
5) Please indicate how important the following considerations were in your decision to use Conventional Tillage on any acres listed in question 3.

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Not Important</th>
<th>Somewhat Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concern about higher yields</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Concern about soil compaction / drainage</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Concern about earlier planting window</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Concern about new or higher equipment costs for</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>conservation tillage on these acres</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concern about appearance of your fields</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Personal or family history of using conventional</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>tillage</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5) Please share any other important considerations that may have contributed to your tillage choices in the past.

NOW WE WOULD LIKE TO ASK YOU A FEW QUESTIONS ABOUT YOUR VIEWS ON PUBLIC POLICY.

6) In general, some people feel that the government in Washington should see to it that every person has a job and a good standard of living. Others think the government should just let each person get ahead on his own. Do you think that the government should see to it that every person has a job and a good standard of living or should it let each person get ahead on his own?

1 Provide job and good standard of living
2 Neutral
3 Get Ahead on Own

7) Should federal spending on environmental protection be increased, decreased, or kept about the same?

1 Decreased
2 Kept About the Same
3 Increased

8) In your view, is climate change a very serious problem, somewhat serious, not too serious, or not a problem?

1 Not a problem
2 Not too serious
3 Somewhat Serious
4 Very Serious
9) Please rate the following groups using a 10-point "feeling thermometer" scale. The higher the number, the warmer or more favorable you feel toward the group. The lower the number, the colder or less favorable you feel toward that group. You would give the group a "5" rating if you feel neither warm nor cold toward them.

<table>
<thead>
<tr>
<th>Group</th>
<th>Cold</th>
<th>Neutral</th>
<th>Warm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agri-Business</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>American Farm Bureau Federation</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>National Farmers' Union</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Environmentalists</td>
<td>9</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Federal Government in Washington</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>State and Local Government</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

FINALLY, WE'D LIKE A LITTLE INFORMATION ABOUT YOU. AGAIN, REMEMBER THAT THIS INFORMATION IS CONFIDENTIAL.

10) Some people are not interested in politics, while others are quite interested. How interested are you in politics?

<table>
<thead>
<tr>
<th>Interest Level</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Interested</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somewhat Interested</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very Interested</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11) Which point on this scale best describes your political views?

<table>
<thead>
<tr>
<th>Political View</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Liberal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extremely Conservative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12) Generally speaking, do you think of yourself as a Republican, a Democrat, or an Independent?

<table>
<thead>
<tr>
<th>Political Affiliation</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong Democrat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong Republican</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13) What is your year of birth? ____________

14) What is your gender? Female Male

15) What is your race? White Black Asian Hispanic Other: ________________

16) What is the highest degree that you have earned?

Grade school or less High school Some college College or advanced degree

17) To give us a sense of your farm size, what were your gross sales from farming for the last year?

$0 - 100,000 $100,000 - 249,999 $250,000 - 499,999 $500,000 +

Thank you for completing the survey! Please place your completed survey in the enclosed postage paid return envelope and put in the U.S. Mail.
Appendix D.  Field Experiment Treatments

Each treatment was printed in color on a separate page, at the top of which read: “Now we would like you to read the following article written for a leading farm magazine. After reading the article please proceed to the final part of the survey.”

Saving Money and Increasing Your Bottom Line: No-Tilling All the Way to the Bank

Increasingly, farmers in the United States are recognizing the financial benefits of using no-till farming techniques. Some farmers have been skeptical of the practice in the past, partially due to a small drop in yields in the first few years of using no-till. Yet many farmers have found that over time they achieve similar yields using no-till techniques as with conventional tillage, and have even increased yields in drier years. As a result, no-till methods are becoming more attractive for the average farmer.

No-till is a system of crop production that leaves the residue from the previous crop on the field surface through the planting of the next crop. By limiting tillage operations and residue burial, organic matter in the soil increases over time, ultimately improving soil productivity. Further, crop residue is able to protect top-soil from the elements, thus decreasing soil erosion.

The benefits of no-till extend beyond the effects on farmland. As business owners, farmers need to think about their operation in terms of the bottom line. Many farmers agree that using no-till increases their profits over the long run.

No-till farming decreases the number of trips over the land. By reducing the time spent on a tractor, farmers are able to decrease labor and fuel costs, as well as the substantial expenses associated with maintaining machinery.

In real terms, a 500-acre farm using continuous no-till is able to save as much as:
- 225 hours of labor a year
- 3.5 gallons of diesel fuel an acre, or 1,750 gallons a year
- $5 an acre on machinery wear and costs, or $2,500 a year

By reducing the costs of labor, fuel, and machinery, no-till farming is able to reduce major expenses faced by farmers. Further, in adopting a no-till system farmers are able to save considerable amounts of time, allowing for greater flexibility and scope in managing farming operations.

The impact on farm profits is substantial in any given year, and over time the operation’s bottom line is able to significantly increase. No-till can increase a farm’s profits.
Farming As a Steward: No-Tilling to Protect Your Soil, Water, and Air

Increasingly, farmers in the United States are recognizing the benefits of using no-till farming techniques to protect their land. Some farmers have been skeptical of the practice in the past, partially due to a small drop in yields in the first few years of using no-till. Yet many farmers have found that over time they achieve similar yields using no-till techniques as with conventional tillage, and have even increased yields in drier years. As a result, no-till methods are becoming more attractive for the average farmer.

No-till is a system of crop production that leaves the residue from the previous crop on the field surface through the planting of the next crop. By limiting tillage operations and residue burial, organic matter in the soil increases over time, ultimately improving soil productivity. Further, crop residue is able to protect top-soil from the elements, thus decreasing soil erosion. The benefits of no-till techniques extend beyond a farming operation. As stewards of our nation’s land, farmers pay close attention to protecting natural resources. Many farmers agree that using no-till is important in preserving the land.

By definition no-till minimizes the amount of soil disturbed and increases the amount of residue on the surface of farmland. This improves soil, water, and air quality, helping farmers be better stewards by:

- reducing soil erosion by up to 90%
- reducing runoff of soil, nutrients, and pesticides into surface water
- reducing fossil fuel emissions from machinery use

By improving soil, water, and air quality farmers are able to promote the improvement of soil structure, benefiting the long term fertility of the land. Further, by protecting and improving the land, farmers ensure that farmland will be valuable and productive for future generations.

The positive impact on the land is substantial in any given year, and over time no-till farming significantly protects natural resources. No-till can help farmers become better stewards of the land.
Farming for the Community: No-Tilling to Protect Our Soil, Water, and Air

Increasingly, farmers in the United States are recognizing the benefits of using no-till farming techniques for their communities. Some farmers have been skeptical of the practice in the past, partially due to a small drop in yields in the first few years of using no-till. Yet many farmers have found that over time they achieve similar yields using no-till techniques as with conventional tillage, and have even increased yields in drier years. As a result, no-till methods are becoming more attractive for the average farmer.

No-till is a system of crop production that leaves the residue from the previous crop on the field surface through the planting of the next crop. By limiting tillage operations and residue burial, organic matter in the soil increases over time, ultimately improving soil productivity. Further, crop residue is able to protect top-soil from the elements, thus decreasing soil erosion.

The benefits of no-till techniques extend beyond a farming operation. As the backbone of rural communities, farmers are concerned with how their farming practices affect their friends and neighbors. Many farmers agree that using no-till allows them to protect and “give back” to their communities.

By definition no-till minimizes the amount of soil disturbed and increases the amount of residue on the surface of farmland. This improves soil, water, and air quality for the entire community by:
- reducing soil erosion by up to 90%
- reducing runoff of soil, nutrients, and pesticides into surface water
- reducing fossil fuel emissions from machinery use

By improving soil, water, and air quality, farmers are able to reduce community exposure to agricultural inputs, which can negatively affect residents’ health. Further, less soil erosion and improved water quality means increased access to clean rivers and lakes. This provides a venue for recreational activity and community development.

The impact is substantial in any given year, and over time these techniques can significantly improve communities. No-till can help farmers protect and support their communities.
Appendix E. Field Experiment Instrument

Thank you for helping with this important study being conducted to understand farmers' tillage choices. In this first section, we will ask you a brief set of questions about your own farming practices, as well as your views on some community and environmental issues. When you are done with this part of the survey, please let one of the researchers know and he or she will bring you the second and final part of the survey. All responses are anonymous, and we expect the survey should take no more than 30 minutes to complete. If you have any questions, please do not hesitate to ask any of the Purdue researchers administering the study.

**FIRST, WE WOULD LIKE TO ASK YOU A FEW QUESTIONS ABOUT YOUR FARMING PRACTICES.**

1) Please write the number of acres in your farming operation that were in each tillage category by crop type and year as defined below. This should include all land for which you actively made farm management decisions, including land you own and land you lease from others.

| No Till (or Strip Till: Leaving the soil undisturbed from harvest to planting, or for strip-till disturbing less than 30% of the row width. Planting or drilling is in a narrow seedbed or slot created by disk openers.) |
|---|---|---|---|
| Other Conservation Tillage (Leaving more than 30% residue on soil surface after planting using full-width tillage.) |
| Conventional Tillage (Leaving less than 30% residue on soil surface after planting. Includes moldboard plow, chisel plow, or rippers, followed by multiple secondary tillage trips.) |

<table>
<thead>
<tr>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>Soybeans</td>
</tr>
</tbody>
</table>

2) Some farmers are quite interested in no-till techniques, while others are not as interested. What about you?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Interested</td>
<td>Somewhat Interested</td>
<td>Very Interested</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3) Thinking about some of the ways you get information about farming, how much, do you trust the information you get from each of the following sources?

<table>
<thead>
<tr>
<th>Source</th>
<th>Not at all</th>
<th>Not Much</th>
<th>Some</th>
<th>A Lot</th>
<th>I Don’t Use this Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop Advisors</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Extension Agents/NRCS Specialists</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Other Farmers/ Neighbors</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Farm Magazines/ Journals</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

*Please Turn to the Next Page*
4) There are a variety of factors that farmers might consider when making tillage decisions. Please indicate how important each of the following considerations is in making your tillage decisions.

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Not Important</th>
<th>Somewhat Important</th>
<th>Very Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limiting soil erosion</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Protecting or improving soil tilth</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Limiting soil compaction</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Being able to plant as early as possible</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Obtaining highest yields possible</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Maintaining access to government payments</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Minimizing labor / fuel costs</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Minimizing equipment / capital costs</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Protecting or improving water quality</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Protecting or improving air quality</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Storing carbon to limit climate change</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Minimizing risk associated with changing cropping system</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Continuing traditional tillage practices on the family farm</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

5) Please note any other important considerations influencing your tillage choices.

6) How many years have you, personally, been farming? ___________

7) How many years have you been farming in your current community? ___________

*Please Turn to the Next Page*
8) Please indicate how familiar you are with the following arguments regarding no-till farming.

<table>
<thead>
<tr>
<th>Argument</th>
<th>Not at all Familiar</th>
<th>Not Very Familiar</th>
<th>Somewhat Familiar</th>
<th>Very Familiar</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-till farming increases farmers' profits.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>No-till farming protects farmers' land for future generations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>No-till farming increases community health and development.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

9) Some people have opinions about almost everything; other people have opinions about just some things; and still other people have very few opinions. Would you say you have opinions about almost everything, many things, some things, or about very few things?

<table>
<thead>
<tr>
<th>Options</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Few Things</td>
<td>1</td>
</tr>
<tr>
<td>Some Things</td>
<td>2</td>
</tr>
<tr>
<td>Many Things</td>
<td>3</td>
</tr>
<tr>
<td>Almost Everything</td>
<td>4</td>
</tr>
</tbody>
</table>

10) Please indicate how strongly you agree or disagree with the next few statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is important to be a good member of the community.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The world would be a better place if each person was free to do what was best for him- or herself.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Part of being a good citizen is fulfilling social and civic responsibilities.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Part of being a good citizen is following your economic self-interest.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>What is in my self-interest is good for society.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I think about how my decisions will affect other people.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The best measure of right and wrong is what creates the greatest good for the greatest number of people.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I think it is important to be a good citizen.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Progress is the result of economic self-interest, not the result of social activist organizations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
11) Please indicate how strongly you agree or disagree with the next few statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am concerned about environmental problems because of the consequences</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>for all people.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I am concerned about environmental problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>because of the consequences for future generations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I am concerned about environmental problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>because of the consequences for people in my community.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I am concerned about environmental problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>because of the consequences for my future.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I am concerned about environmental problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>because of the consequences for my health.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I am concerned about environmental problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>because of the consequences for wildlife.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I am concerned about environmental problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>because of the consequences for ecosystems.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

*PLEASE SUBMIT THIS SECTION TO THE RESEARCHERS IN ORDER TO RECEIVE THE FINAL PART OF THE SURVEY.*
NOW THAT YOU HAVE READ THE ARTICLE WE WOULD LIKE YOU TO ANSWER A FEW QUESTIONS ABOUT TILLAGE PRACTICES.

12) Some farmers are quite interested in no-till techniques, while others are not as interested. What about you?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Interested</td>
<td>Somewhat Interested</td>
<td>Very Interested</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13) Some people think that no-till provides the most benefits for farmers. Others think that conventional tillage provides the most benefits. In your opinion, which of these techniques provides the most benefits for U.S. farmers?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-Till</td>
<td>Equal Benefit</td>
<td>Conventional Till</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14) What are the most important factors or arguments you consider when forming your opinion on no-till? Please list those factors below, listing only one in each box. Please use as many boxes as you need.


FINALLY, WE'D LIKE A LITTLE INFORMATION ABOUT YOU. AGAIN, REMEMBER THIS INFORMATION IS ANONYMOUS.

15) In what county and state is the majority of your farmland located?


16) What is your year of birth? __________

Please Turn to the Next Page
17) What is your gender?  Female  Male

18) What is your race?  White  Black  Asian  Hispanic  Other: ______________________

19) What is the highest degree that you have earned?

<table>
<thead>
<tr>
<th>Grade school or less</th>
<th>High school</th>
<th>Some college</th>
<th>College degree</th>
<th>Advanced degree</th>
</tr>
</thead>
</table>

20) To give us a sense of your farm size, what were your gross sales from farming for last year?

<table>
<thead>
<tr>
<th>Less than</th>
<th>$500,000</th>
<th>$999,999</th>
<th>$1,499,999</th>
<th>$1,599,999</th>
<th>$2,499,999</th>
<th>$2,999,999</th>
<th>or More</th>
</tr>
</thead>
</table>

THANK YOU FOR COMPLETING THE SURVEY!

PLEASE SUBMIT YOUR SURVEY TO ONE OF THE RESEARCHERS TO RECEIVE YOUR $20 PAYMENT.
VITA
VITA

Amelia C. Andrews

Purdue University, Department of Political Science
100 N. University Street, West Lafayette, IN 47907-2098
Office Phone: 765.588.1048 Fax: 765.494.0833 Email: andrewa@purdue.edu

EDUCATION

Ph.D., Political Science, Purdue University, August 2015
   Fields of Study: Public Policy (major), International Relations, Comparative Politics

M.A., Government and Politics; Certificate, International Law, St. John’s University,
   January 2009
   Fields of Study: International Relations (major), Public Administration (minor)

B.A., Political Science, and International Studies, Case Western Reserve University,
   May 2007

PUBLICATIONS

Peer-Reviewed Publications

Manuscripts under Review

Works in Progress
**RESEARCH EXPERIENCE**

**Research Assistantships**

Purdue University, Department of Political Science: Spring 2015, Summer 2015  
Faculty Supervisor: Leigh Raymond  

Purdue University (USDA Economic Research Service): 2010-2012, Fall 2013  
PI: Leigh Raymond, Rosalee A. Clawson  

Case Western Reserve University, Department of Family Medicine (NIH/NCI): 2005-2006  
PI: Kurt C. Stange  

**Invited Presentations**

"Frames, Values, and Expert Attitudes: The Case of No-Till Agriculture.” presented at the Purdue University Department of Political Science Recruitment Workshop, February 23, 2015. West Lafayette, IN.  

“Integrating Climate Science and Policy-Making.” Presented at Benjamin Franklin Transatlantic Fellows Summer Institute at Purdue University, July 17, 2013. West Lafayette, IN.  


**Conference Presentations**


Methodological Skills

Experimental and survey design

Quantitative Methods: multiplicative interaction models, maximum likelihood estimation, linear and generalized linear models, factor analysis

Qualitative Methods: content analysis, interviewing

GRANTS AND HONORS

Purdue Summer Research Grant (Purdue Research Foundation): 2013
Junior Scholars Travel Award (International Society for Political Psychology): 2013
ISPP-IDC Travel Grant (Lauder School of Government, IDC): 2013

TEACHING EXPERIENCE

Independent Instructor

On Campus
Introduction to Environmental Policy (Pol 223). Purdue University. Fall 2012, Spring 2013 and 2014

Distance Learning
Introduction to Environmental Policy (Pol 223Y). Purdue University. Summer 2014

Teaching Assistant
Introduction to Public Policy and Public Administration (Pol 120). Purdue University. Fall 2014
Pedagogical Training
Seminar on Teaching and Learning (Pol 695): Purdue University, Department of Political Science, Fall 2014
Case Teaching and Participant Learning in Political Science and Public Policy: APSA Short Course, Fall 2014
How to Engage Your Students without Losing Your Mind, Ruining Your Life, or Jeopardizing Your Job: APSA Short Course, Fall 2013
Teaching with Intention: Purdue University Department of Political Science and Political Science Graduate Student Association, Spring 2012
Center for Instructional Excellence Teaching Seminars (10 hours), Purdue University, Topics Included: Using Subjective Tests, Engaging Students in Discussion, Using Student Feedback, and Dealing with Cheating

Fields of Teaching and Research Interest
Public Policy Environmental Politics and Policy
Policy Analysis Civic Engagement and Government Outreach
Public Opinion Political Communication
Political Psychology Experimental, Quantitative, and Qualitative Methods

RELATED PROFESSIONAL EXPERIENCE
Professional Service
Conference panel discussant on “Power of Language and Rhetoric.” Midwest Political Science Association Annual Meeting, 2014, Chicago, IL.
Conference panel discussant and chair on “The Sources and Effects of Change in Leaders’ Personalities, Beliefs and Emotions.” International Society for Political Psychology Annual Meeting, 2013, Herzliya, Israel.

Departmental Service
Graduate Student Recruitment Committee, Graduate Host, Spring 2014 and 2015
Graduate Studies Committee, Graduate Student Representative, 2012-2014
Graduate Student Mentorship Program, Mentor, 2010-2012
Political Science Graduate Student Association, Member 2012-2014; Treasurer, Spring 2014
**Workshops and Additional Training**
Designing Multi-Method Research: APSA Short Course, Fall 2014
Best Practices for Creating Effective Posters: Purdue Graduate School, Spring 2011
Grant and Proposal Writing Workshop: Purdue Graduate School, Fall 2010
Collaborative Institutional Training Initiative (CITI) certification, Fall 2009

**Other Experience**
Intern, Congressman Tom Feeney: Field Office. Orlando, FL, Summer 2005

**Professional Affiliations**
International Society of Political Psychology (2012- present)
Association for Public Policy Analysis and Management (2011- present)
Midwest Political Science Association (2010- present)
Southern Political Science Association (2013-present)
American Political Science Association (2009- present)

**REFERENCES**

<table>
<thead>
<tr>
<th>Rosalee A. Clawson</th>
<th>Leigh Raymond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor, Department Head</td>
<td>Professor, Director of the Center for the Environment</td>
</tr>
<tr>
<td>Department of Political Science</td>
<td>Department of Political Science</td>
</tr>
<tr>
<td>Purdue University</td>
<td>Purdue University</td>
</tr>
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<td>Beering Hall of Liberal Arts and Education, Room 2216E</td>
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<td>100 N. University Street</td>
</tr>
<tr>
<td>West Lafayette, IN 47907</td>
<td>West Lafayette, IN 47907</td>
</tr>
<tr>
<td>Email: <a href="mailto:clawsonr@purdue.edu">clawsonr@purdue.edu</a></td>
<td>Email: <a href="mailto:lraymond@purdue.edu">lraymond@purdue.edu</a></td>
</tr>
<tr>
<td>Phone: 765.494.4162</td>
<td>Phone: 765.494.4182</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benjamin M. Gramig</th>
<th>Daniel P. Aldrich</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate Professor of Natural Resource and Environmental Economics</td>
<td>Professor, Director of Asian Studies</td>
</tr>
<tr>
<td>Department of Agricultural Economics</td>
<td>Department of Political Science</td>
</tr>
<tr>
<td>Purdue University</td>
<td>Purdue University</td>
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<td>Krannert Building, Room 564</td>
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<td>Phone: 765.464.4324</td>
<td>Phone: 765.494.4190</td>
</tr>
</tbody>
</table>