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Motivations for rule compliance in support of forest health: Replication and extension

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ABSTRACT

This study replicates and extends research conducted in 2008. Based on a random sample of 800 campers who used Wisconsin state parks and forests in 2010, it confirms that calculated, normative, and social motivations are all important determinants of firewood movement rule compliance, a context where regulatees have primarily sporadic short-term interests, and where costs of compliance and non-compliance are both low. The study uses bi-variate statistical tests and recursive partitioning (standard and conditional permutation random forests) for analysis, and discusses findings from the perspective of a natural resources regulator of activities in multiple domains (e.g., business and recreational uses of forests in both rural and urban settings). It demonstrates how knowledge of motivations for compliance can inform two integrative research and analysis frameworks – motivational postures and social marketing, and discusses how affect and social norms may be utilized to improve regulator effectiveness.

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1. Introduction

1.1. Overview

Understanding motivations for environmental behavior is essential to the design of regulations. Researchers have employed a variety of analytical frameworks to explain why consumers may be environmentally knowledgeable and aware, yet fail to adopt pro-environment behaviors or comply with environmental rules. Motivations have been investigated, but primarily in contexts where behaviors are ongoing or long-term in nature, and where costs of compliance and non-compliance may be high – for example, farming (Atari et al., 2009; Winter and May, 2001), building construction (Burby and Paterson, 1993), commercial fishing (Hatcher et al., 2000), and coastal resource management (Pomeroy et al., 1997).

This study extends research on these motivations to contexts where consumers have primarily short-term or sporadic interests, and where costs of compliance and non-compliance are both low. The behavior of interest is the movement of firewood for camping and consequent dispersal of an invasive insect, the emerald ash borer (*Agrilus planipennis* – EAB). This insect has killed tens of millions of ash trees in Michigan and neighboring states, and in Ontario and Quebec (USDA Forest Service, 2011). It has laid waste to forests, ruined neighborhood aesthetics in cities and towns, and imposed significant cost burdens for tree removal on state and local governments. Citizens are well aware of this, yet many continue to ignore quarantines and other regulations and bring firewood along on their camping trips.

This study replicates and improves upon a preceding study that produced encouraging but somewhat mixed results (Peterson and Diss-Torrance, 2012). It implements a survey instrument that

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more accurately captures social motivation, refines criteria for compliance, examines stated reasons for non-compliance for the total population of respondents, not just a subset, and incorporates a direct comparison of proxies for three motivation types. It employs bi-variate statistical tests and two types of recursive partitioning for analysis (standard and conditional permutation random forests), thus avoiding the data distribution issues that complicated our previous study's analysis. It then demonstrates how findings can be incorporated in two integrative analysis frameworks (motivational postures and social marketing) and discusses how two extensions (affect and social norms) may improve regulator effectiveness.

1.2. Conceptual foundation

The basis for effective regulation depends on the willingness and ability of the regulated to comply. The literature on environmental regulation suggests three general motivations for compliance: calculated, normative, and social (Burby and Paterson, 1993; Levi, 1989; Tyler, 2006). This literature also addresses ability to comply – specifically, in terms of knowledge of rules and capacity to obey them (Winter and May, 2001). Regulatory context also influences compliance, as demonstrated in comparative analyses of agro-environmental regulations in Denmark, water quality rules in California, and building codes in Washington (May, 2005). Most of the studies conducted on environmental rule compliance have focused on contexts where behaviors are ongoing or long-term in nature, and where costs of compliance and non-compliance may both be high. The situation addressed in this research is radically different: outdoor recreation pursued sporadically on public lands, where costs of compliance and non-compliance are generally low. Questions therefore follow as to which motivation types are influential in this context.

Calculated motivations have been studied most, especially those related to cost of compliance, likelihood of detection, and likelihood of fine. For example, Becker (1968) maintained that regulatees comply with a regulation when they calculate that the benefits of compliance, including avoidance of fines or other sanctions, exceed the costs of compliance (see also Ehrlich, 1972; Stigler, 1970). These considerations are usually utility based, and presumably lead to the choice, for compliance or not, that has the higher net return. We demonstrated, in our previous study, that compliance with firewood movement rules decreases with increasing sensitivity to compliance costs, where cost dimensions include firewood price, quality, convenience, and reliability of supply (Peterson and Diss-Torrance, 2012).

A second general motivation for compliance derives from a combined sense of moral duty and agreement with regulation importance. Following Burby and Paterson (1993), this motivation is labeled normative commitment, although it has also been referred to as moral or ideological compliance (Levi, 1997, 1989; McGraw and Scholz, 1991), commitment based on civic duty (Scholz and Lubell, 1998; Scholz and Pinney, 1995), and perceived obligation to comply (Tyler, 2006). For firewood movement restrictions, this sense of duty and regulation importance derives from civic appeals made by state and local governments struggling with EAB infestations in both urban and rural contexts. Our previous study showed that these motivations have a demonstrable effect on decisions to comply with Wisconsin's Firewood Movement Rule.[2]

A third general motivation for compliance is the desire of regulatees to earn the approval and respect of significant "others" (Cochran et al., 1999; Grasmick and Bursik Jr., 1990) or, at least, to behave in ways that they advocate. This desire may have a socializing effect over time that leads to normative commitment, but its social component differs in the sense that the regulatee will comply to earn the approval of others, even though those values may not have been internalized to the extent of commitment. Significant others may include family and friends, but may also include coworkers, advocacy groups, and others. Our previous study failed to adequately measure this motivation construct, and results obtained were therefore ambiguous. We improved upon these measures for this research.

2. Material and methods

2.1. Data

Analysis relied on data obtained from a three-wave mail survey administered in December 2010 by the Wisconsin Department of Natural Resources (Wisconsin DNR). ReserveAmerica, the state's campground reservation agent, provided a comprehensive list of campers who had reserved one or more sites at a Wisconsin state park or forest during the calendar year. We randomly selected 800 names from this list, and received 524 usable returns by the cut-off date. This computes to a response rate of 69% of questionnaires successfully delivered.[3]

2.1.1. Motivations

Rather than ask campers questions about their motivations to comply with firewood movement rules, we focused on proxies for these motivations and their associations with compliance. This approach avoids the challenges of measuring intervening variables and psychological constructs, as well as inaccuracies due to temporal discrepancies; its downside is that it is ex post facto, not experimental by design. We also omitted questions about most respondent demographics due to ambiguities in decision processes and settings; that is, firewood movement decisions can be made at home in advance of a trip or en route, by one person or several, and may be influenced by previous decisions to obtain firewood in bulk, or to use supplies left over from previous trips. A respondent's role and influence in these decisions may also vary, so measuring these variables may not provide reliable insights, and may also increase the likelihood of survey non-response.[4]

Calculated motivation was measured through camper sensitivity to compliance costs. Importance ratings for five features associated with firewood and the places where campers get it were used as proxies for this sensitivity. Campers were asked "How important are the following factors related to *purchasing* firewood inside or near a state park or forest? Allocate 100 points among the following factors. Give more points to the factors that are more important. Give fewer points (or none) to factors you think are less important. Please be sure that the points total to 100." The factors were specified as follows (exact wording is shown; variables used

[2] This rule states that firewood cannot be moved more than 25 miles to a state park or forest, from a quarantine area (if the park is not in the quarantine), or from out of state.

[3] We used this same sampling frame and approach for our surveys in 2006 and 2008. Late returns allowed us to substitute for questionnaires that were deleted due to errors and outlier data; hence, the number of surveys available for analysis was also 524.

[4] There was also no way of ensuring that the person who completed the questionnaire would have participated in deciding the firewood purchase. In fact, respondents frequently offered comments and provided email addresses for follow-up, and in many cases these persons were *not* the individual to whom the questionnaire had been addressed. In cases such as these, the demographic data gathered could mislead and weaken analysis results.

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