**Title:** A more complete picture: Rural residents' relative support for seven forms of natural resource related economic development

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**Abstract:** Understanding rural resident support for various forms of natural resource related economic development has been a common research topic in rural sociology. However, the vast majority of research has only evaluated support for one form of natural resource use at a time. The little research that has explored support for a wide variety of uses has found that residents are likely to support many of the suggested forms of development. We assessed rural resident support for seven forms of natural resource development: commercial logging, natural gas, mining, real estate, wind energy, tourism, and outdoor recreation. Using social exchange theory, this study examines the influence of perceived impacts of development, industry trust, and perceived industry power on general support for the seven forms of natural resource-related economic development using a fixed effects generalized linear model among a sample of residents of rural Pennsylvania communities. Additionally, we use mixed logit discreet choice modeling to evaluate the drivers of relative support, meaning a stated preference for one form of development over other possible options. The drivers of general support and relative support were similar, with trust in industry and impacts to quality of life emerging as the primary drivers of both.

**Key words:** Environment and Natural Resources; Recreation, Leisure, Tourism; Quantitative Methods

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## Introduction

Economic development in rural communities is a contentious issue and on-going topic of inquiry. Many rural economies have historically relied on the extraction of natural resources as their dominant form of industry (Krannich, Gentry, Luloff, & Robertson, 2014). The volatility of this industry in the U.S. has created a legacy of booms and busts, leaving a large portion of rural America economically depressed (Krannich et al., 2014; Perdue & Pavela, 2012). When attempting to address the lack of economic opportunity in rural areas, strategies for economic development often include various forms of natural resource development. These strategies range from extractive uses such as mining and logging, to non-extractive uses such as tourism and outdoor recreation (Green, 2017). In this paper we investigate sources of support for multiple forms of natural resource development in relation to one another. We term this *relative* support, wherein support for one form of development is considered alongside other competing development options, and a preference is stated. The ultimate purpose of this study was to use social exchange theory to evaluate and compare the levels, and drivers, of both general and relative support for seven of the most common forms of natural resource-related economic development: commercial logging, natural gas, mining, real estate, wind energy, tourism, and outdoor recreation.

In this paper we first review the empirical research and theoretical frameworks used to assess support for natural resource development both generally and to the extent it exists, relative to each other in rural communities. We then develop and test models of the drivers of both types of support using a sample of rural Pennsylvanians. We conclude with implications for future research on support for rural economic development options.

**Background Research**

Prior research argues that when considering the various forms of natural resource-related economic development policy makers could encourage in rural areas, it is important to consider local community support and buy-in (Gordon & Barton, 2015; Park, Nunkoo, & Yoon, 2015; Roseland, 2000). If local communities are resistant to strategies aimed at revitalizing their economies, economic development efforts may prove contentious, or even impossible. When officials make decisions based on assumptions about the public interest, it can negatively affect public support and cooperation (Gordon & Barton, 2015). It has been noted, in the case of both extractive and non-extractive forms of development, that understanding and assessing community support and interest is essential for sustainable and successful development (Gordon & Barton, 2015; Nunkoo, Smith, & Ramkissoon, 2013).

The importance of community support stands juxtaposed with traditional policy-making, which seldom takes into account resident interests, often assuming resident desires based on dominant political narratives. It is in the best interest of both policy makers and academics to be aware of the broad landscape of resident perceptions if the desired outcome is successful economic development. Because of this connection between resident support and successful implementation, there is a rich body of literature on the topic of rural resident support for various forms of natural resource-related economic development. Issues such as tourism, natural gas, wind energy, and real estate development have all received significant attention. However, much of the previous research has focused solely on one form of natural resource extraction at a time, leaving researchers with only a partial picture of resident perceptions.

Research on support for multiple forms of natural resource related economic development within the same sample remains scarce. Jacquet and Stedman (2013) explored

resident attitudes toward wind energy and natural gas and found that the type of perceived impacts between the two were similar, but the magnitude of both the negative and positive impacts was greater for natural gas. In a different context, Green, Marcouiller, Deller, Erkkila, and Sumathi (1996) evaluated long-term and seasonal resident attitudes toward multiple forms of development and found that seasonal and long-term residents differed in their assessment of the various economic activities. Long-term residents were more supportive of growth activities, and less supportive of land-use planning (Green et al., 1996).

Allen, Harry, Long, and Perdue (1993) evaluated rural Coloradan resident attitudes toward outdoor recreation and tourism development. Results indicated that tourism attitudes were influenced by the current level of tourism and the level of economic activity. Residents in areas of high economic activity and high tourism development, or low economic activity and low tourism development were more supportive of tourism. Additionally, attitudes toward outdoor recreation were influenced by economic activity but not the level of tourism (Allen et al., 1993). Notably, Stout-Weigand, Smith, and Jallow (1985) conducted one of the few published studies examining attitudes toward a wide variety of development options. Their research examined attitudes of men and women toward a multitude of natural resource uses and found that women tended to be less supportive of every form of development. Further, their research indicated that, in economically depressed areas, residents are likely to support most suggested forms of economic development. This highlights the importance of considering the level of **relative** support for natural resource-related development in comparison to other alternative forms, and not simply the general level of support for the resource use in question.

To address this issue, this paper introduces the concept of relative support as a relational construct rooted in stated preference. We view relative support as an individual's stated

preference for one form of development over other possible options. Given that previous research has shown perceived impacts to be key drivers of support in the case of both energy development (Boudet, Bugden, Zanocco & Maibach, 2016; Jacquet & Stedman, 2013) and tourism (Gursoy, Jurowski, & Uysal, 2002), we explore the relationship between perceived impacts and relative support.

## Theoretical Orientation

The theoretical basis for this paper is nested within both social exchange theory, as well as previous research on perceived impacts of natural resource use. As this study assessed support for seven different forms of natural resource related economic development, we draw on literature from two deep pools, community support for tourism (Nunkoo et al., 2013), as well as the energy impact and support literature.

**Social exchange theory.** Social exchange theory posits that exchange is a primary driver of human behavior (Emerson, 1976). In the case of support for a given form of development, this means that if an individual perceives the benefits of development to be greater than the costs, they will support it (Nunkoo, 2016). In this case, one member of the exchange is either the individual or their community, and the other member is the industry in question. It is important to note that although much of the language surrounding social exchange theory is akin to that used in economics, it differs in several important ways from traditional economic theory. Social exchange theory, as applied here, does not assume any degree of rationality. Exchange in this sense is not made based upon a calculated decision derived from weighing costs and benefits beforehand, but is rather informed by "prior conditioning in longitudinal exchange relationships" (Emerson, 1976, p. 341). Therefore, rationality is possible, but not an assumption, and

perceptions are shaped by prior exchange. In the present study, we are interested in the relationship between perceptions and support, or willingness to enter into an exchange. Importantly, we are not directly assessing what is driving resident perceptions. We adopt the perspective that these perceptions have been shaped over time by this prior conditioning described by Emerson (1976), and that this conditioning is likely due to many structural and individual forces, as well as processes of socialization. However, this conditioning is not directly being tested in this analysis.

According to Emerson (1976) the ideal unit of analysis is the social exchange relation, not the individual. In this case it means that we are interested in the effect of perceived impacts on support, but not whether or not an individual has weighed all the trade-offs and rationally stated their position. Additionally, there is no assumption of perfect information in social exchange theory, thus social exchanges involve uncertainty and are based on best-knowledge and long-term fairness as opposed to perfect information and short-term returns (Konovsky & Pugh, 1994). Finally, unlike economic exchanges, social exchange theory directly integrates elements of trust and power into the exchange process, both of which are assessed in this study (Nunkoo, 2016).

The study of resident support for various forms of development has often been atheoretical, especially in the case of tourism (Nunkoo et al., 2013). Given this, scholars have called for the application of social exchange theory to understand what drives resident support, or opposition to development in the case of both tourism (Nunkoo et al., 2013) and wind energy (Groth and Vogt, 2014). Social exchange theory has been utilized and evaluated in the case of resident support for tourism many times (Nunkoo et al., 2013). Gursoy et al. (2002) modeled support for tourism and found that host community support was influenced by ecocentric values,

perceived costs and benefits, the level of concern, and utilization of the tourism resource. Similarly, Wang and Pfister (2008) tested a model of support using social exchange theory and found that perceived personal benefit, meaning economic and social benefits, were the strongest predictors of support. Further, Nunkoo and Ramkissoon (2012) modeled power and trust alongside perceived impacts in the case of tourism support. Their results indicated that residents' perceived power to influence tourism was positively related to trust in government actors and tourism impact perceptions, and that trust in government actors and perceived benefits were related to tourism support.

When considering the research related to other forms of development beyond tourism, we believe the connection to social exchange theory has been pervasive, even if it has not been explicitly invoked. Although other theories have been mentioned at times, multiple studies have assessed the relationship between perceived impacts and general support for both wind (Mulvaney, Woodson, & Prokopy, 2013; Olson-Hazboun, Krannich, & Robertson, 2016) and natural gas (Evensen & Stedman, 2016; Jacquet & Stedman, 2013) which we would argue is ultimately relying on an overarching theory of social exchange, even if implicitly. If researchers expect perceived impacts to influence support, or opposition, then there is ultimately a foundational belief in social exchange.

**Perceived impacts.** Of particular interest to this paper are the perceived impacts of various forms of natural resource-related development, and their effects on support, specifically the impacts identified by Jacquet & Stedman (2013). In their factor analysis, Jacquet and Stedman (2013) identified four main dimensions of perceived impacts: environmental, community, personal, and economic. They also identified an item that did not load on any factor, quality of life. As this study assessed five more forms of development than Jacquet and Stedman

(2013), we could not directly use their 24 item impact scale. However, we modeled our perceived impact items on their factors and assessed perceived community level impacts on employment, the economy, the environment, and quality of life.

All perceived impacts assessed in this study were at the level of the community, not the individual. This is in line with the work of Boudet et al. (2016) and Freudenburg and Davidson (2007), which argued that, particularly in rural areas, the community level impacts of development may be more relevant than individual level effects. In sum, this study integrates previous research on the relationship between perceived impacts of natural resource related economic development with social exchange theory to assess rural resident support for increased levels of seven different forms of natural resource-related economic development. Additionally, social exchange theory was used to assess resident stated preference for one form of development over the other six options. It is important to note that while this study assesses the potential for a number of exchanges and resident preferences for those to occur, we did not present respondents with hypothetical information about each development type, or ask them to choose between vignettes, as is often performed in discreet choice research (e.g. choice experiments). Rather, respondents were asked to state their level of support for each form of development, as well as their top preference for future development. Following this, we collected information on their perceptions regarding the perceived impacts, trust in industry, and perceived industry power for all types of development in question. We then used their responses to assess their relative support based on their individual exchange relationship with each industry. By doing this, we avoid many of the assumptions of rationality and choice inherent in many exchange studies, while still grounding our research in a strong theoretical and analytical framework.

**Trust and power.** Previous researchers assessing support for natural resource related development have rarely incorporated power and trust within their models, especially in the case of tourism (Nunkoo, 2016). When considering trust and power as dimensions of social exchange, they represent the internalization of societal power structures at the individual level. Both trust and power are likely to influence support, as has been demonstrated within tourism literature (Nunkoo & Ramkissoon, 2012) and energy development, in the case of the social license to operate literature (Moffat, Lacey, Leipold, 2016). Although often unmeasured, power and trust are likely to be key variables in understanding residents' willingness to enter into an exchange (Nunkoo & Gursoy, 2016). When considering social exchange, it is important to consider the actors whose power and trust matters to the specific exchange in question. We view the relationship between power and trust similarly to Ireland and Webb (2007), in that power and trust are often opposing components leading to support for an exchange, but that they can also be complementary. For example, when trust is not strong and the power differential is high between participants in an exchange, a participant may still be willing to support the exchange if trust in other, external entities (e.g. governments) is high. In this case, perceptions of power and trust function as factors likely to have competing and interrelated impacts on support for development. In the case of increased rural development, residents are likely to be at a power disadvantage relative to industry (Nunkoo & Ramkissoon, 2012) and industry trust will be inextricably tied to this position. Although previous research has positioned power as an antecedent of industry trust (Nunkoo & Ramkissoon, 2012), we have positioned them alongside one another in our analysis due to their theoretical complexity.

### Statement of Problem

Given the theoretical framework and context presented above, we evaluated both general and relative support among rural residents for seven forms of natural resource-related economic development: commercial logging, natural gas, mining, real estate, wind energy, tourism, and outdoor recreation. These seven forms of development have all received varying amounts of attention from researchers, with tourism, wind, and natural gas having significant bodies of research, and real estate, commercial logging, mining, and outdoor recreation having a relatively smaller body of work. We assessed general support and relative support for these forms of development through three research questions.

1. What is the relationship between perceived impacts, trust in industry, perceived industry power and general support for these seven forms of natural resource related economic development?
2. What is the relationship between perceived impacts, trust in industry, perceived industry power and relative support, modeled here as stated preference, for one of these seven forms of development, over the other options?
3. How do the drivers of general support, vary from the drivers of relative support?

## Methods

### Data Collection

This study assessed relative support for natural resource related development in fourteen Pennsylvania counties outside of core-base statistical areas as defined by the United States Office of Management and Budget. These counties were chosen due to their status as the least urbanized counties in Pennsylvania. Pennsylvania represents an appropriate case for this study

due to its rich history of multiple forms of natural resource-related development as well as large swathes of rural areas throughout the state. Data were collected in February and March of 2018 using a stratified online sample purchased from an online survey sample provider, Qualtrics. This method was chosen due to its relatively low cost and ability to capture the opinions and attitudes of individuals in multiple locations.

The survey was distributed via a quota sampling approach. The desired sample was 800 Pennsylvanians from the selected counties, half male and half female, with non-binary respondents filling either quota. Due to the low number of people living in the selected counties, no further stratifications were made. While not a pure probability sample, this type of approach has been shown to be effective in providing a broad cross-section of the population (Landers & Behrend, 2015; Roulin, 2015). However, it should be noted that this sample may not be completely representative of the population (Smith, Roster, Golden, Albaum, 2016). Although there has been an increase in smartphone and internet access in rural areas, the fact that some rural residents may not have internet access, does place a limitation on this sample's representativeness (FCC, 2018). As of 2018 the FCC concluded that only 82.74% of rural Pennsylvanians have access to high speed internet and mobile LTE coverage. Therefore, this sample should be considered as Pennsylvanians from the 14 selected counties with internet access.



## Variable Measurement

### Independent Variables

**Relative support.** We operationalized relative support as stated preference for one form of development in direct consideration of other possible options. Stated preference was assessed

by asking respondents to rank the seven forms of development from most desirable to least desirable in their community. Respondents were presented with the following prompt, 'Regardless of how realistic you think it may be, please drag and drop the following options into your order of preference for these forms of development to increase in the area where you live.' This language was crafted in order to increase the comparability of responses from different communities. The response options were ordered randomly for each respondent. If an individual did not drag at least one option, then they were not recorded and were treated as missing. For the purposes of analysis, this variable was collapsed into a single 'top preference' variable.

**General support.** General support was assessed by asking respondents to rate their degree of support for an increased level of each of the seven types of natural resource related economic development. Each type of development was rated on a seven-point scale ranging from one – extremely opposed – to seven – extremely supportive. Specifically, respondents were asked, 'Regardless of how realistic you think it may be, how supportive or opposed would you be of the following activities occurring where you live?'

**Perceived impacts.** Perceived impacts of the seven different forms of natural resource related economic development were measured in the form of a systematic battery of items related to increased development. Each respondent was presented with a battery for each type of development. All statements within the batteries were the same, except for the type of natural resource use, which was changed for each battery. The batteries were designed using elements of social exchange theory (Nunkoo, 2016), and were created in a manner to capture the dimensions of perceived impacts outlined by Jacquet and Stedman (2013). The dimensions this battery was meant to capture included environmental, community, and economic and quality of life impacts as described by Jacquet and Stedman (2013). Specifically, the four items assessed perceived

impacts related to employment, the environment, the local economy, and life quality. Each item was framed around the geographic scale of 'my area'. This was done to allow for individual interpretation of place while still constraining the questions to a localized scale, which is important for both context and explaining overall support (Evensen & Stedman, 2016). Respondents were asked to rate each statement from 1 – strongly disagree to 7 – strongly agree. The battery contained four items:

- Increased [type of resource use] would increase employment in my area.
- Increased [type of resource use] in my area would lead to minimal negative environmental impacts.
- Increased [type of resource use] in my area would improve the local economy.
- Increased [type of resource use] in my area would increase the quality of life in my area.

**Power and trust.** As previously discussed, Nunkoo and Gursoy (2016) described two key dimensions often absent from studies using social exchange theory to assess support for tourism: power and trust. Therefore, this study also measured perceived power and trust as they relate to natural resource related industries. In a similar manner to the perceived impacts, power and trust were assessed using a systematic battery for each type of use. The statement remained the same, with the exception of the industry in question being substituted for each of the seven types of natural resource related development. There was one item for power and one for trust. Respondents were asked to rate each statement from one – strongly disagree to seven – strongly agree.

- It does not matter how I feel, if the [type of resource use] industry wants to increase development in my area, they will.

- I trust the [type of resource use] industry to do the right thing.

**Development Type Specific Control Variables**

**Industry work history.** Work history in natural resource related industries has been shown to influence support and was included as a control (Boudet et al., 2016; Trent & Stout-Wiegand, 1985). In terms of social exchange theory, it is possible that work history would influence the individual's perceptions of the longitudinal exchange relationship, possibly making it either more favorable, or less so. This was assessed at the family and personal level. Respondents were asked if they either currently worked, or had ever worked, in the industry for each of the development types in question. Similarly, they were asked if a member of their family currently worked, or had ever worked, in the industry for each of the development types in question. Two work history dummy variables were created, one for family and one for personal, with (1) having a personal/family work history with the industry or (0) no personal/family work history with the industry.

**Property activity.** Respondents were asked to report if any of the natural resource uses in question occurred on their or their family's property. Similar to work history, we felt it was likely that property activity may color an individual's perspective on an exchange with industry, and is a necessary control. Therefore, this was included to control for the possible effect of direct economic incentives on increased support.

**Non-Development Type Specific Control Variables**

We include a number of control variables that do not vary by development type. These variables were drawn from prior literature (Jacquet & Stedman, 2013) and were included in our mixed logit model of relative support, as that form of model does not control for the individual in the same manner as our fixed effects model of general support.

**Gender.** Gender was asked as male, female, or other. For this analysis the item was recoded as either Female, or not-Female. Gender was included based upon previous research showing it as an important factor in support for different forms of development (Stout-Weigand et al., 1985), as well as a control in similar analyses (Jacquet & Stedman, 2013).

**Educational attainment.** Education was included due to its demonstrated effect on various forms of support (McLeod, Woirhaye, & Menkhaus, 1999; Payne & Schaemlfeffel, 2008; Trent & Stout-Wiegand, 1985). Educational attainment was assessed by asking respondents to report their highest level of formal education. Respondents were presented with six options: Some high school, high school graduate or GED; Some college, business, or trade school; college, business, or trade school; some graduate school, or master's, doctoral, or professional degree. Due reduce model complexity, this variable was dummy coded as either have a bachelor's degree or above (1) or not (0).

**Length of residence and age.** Similar to Jacquet and Stedman (2013) length of residence and age were included as controls. Respondents were simply asked to report the years they had lived in their area and the year they were born. The year a respondent was born was then turned into an age variable by subtracting the answer from 2018, the year the data were collected.

## Data Analysis

Data were analyzed using both SPSS 25.0 and Stata/MP 15. Given the small amount of overall missing data (<1.5% of values), we elected to handle missing data using listwise deletion. First, a fixed effects generalized linear model was performed using the xtreg function in Stata to assess general support. The use of an individual level fixed effects model is ideal for understanding general support, as it allows us to understand support for multiple forms of development at once while controlling for individual-level characteristics. The dependent variable in this model was

general support for a given form of development. In terms of data structure, this means that each individual was represented as seven rows in our dataset, one for each form of development (e.g. longform). The use of individual level fixed effects allowed us to treat individuals as their own control, thus looking exclusively at within-subject variation, and remove the necessity of individual level controls that would not change by development type, such as education and gender (McCaffrey, Lockwood, Mihaly, & Sass, 2012). Additionally, the standard errors in our model were clustered around the individual, to ensure conservative tests of significance. We included a fixed effect for the type of development in the model, in the form of dummy variables with wind as the reference group. This inclusion essentially allowed each form of development to have a unique intercept within the model. The independent variables in the model were the perceived impacts, industry trust, and perceived industry power variables, as well as industry work history, and development occurring on property. The use of a fixed effects model is ideal for answering our research question because it allows us to evaluate the social exchange related drivers of multiple types of development at once, while also controlling for individual level characteristics. Although this model assesses support for multiple forms of development, we still view this model as a model of general support because the dependent variable of support was ranked while considering only one form of development at a time, not in relation to other options.

To analyze our second research question, we estimated a discrete choice mixed logit model using the mixlogit module for Stata (Hole, 2007). The dependent variable was a respondent's top preference of development type for their community. The independent variables were perceived impacts, industry trust, perceived industry power, industry work history, and development occurring on property. As the dependent variable was a stated choice in relation to

the other options, and not an independent level of support as in the case of the fixed effects model, the use of dummy terms for development type similar to those used in our fixed effects model would not be appropriate in this model. Given that this model does not control for the individual in the same way as the fixed effects model used for general support, we introduce a number of controls used in previous literature. Specifically, we include control variables drawn from Jacquet and Stedman (2013). These include gender, education, length of residence, and age. As variables with no within-subject variation are not allowed in mixed logit models, each control variable was interacted with development type before inclusion in the model. This resulted in the inclusion of 24 interaction terms as demographic controls.

The use of the mixed logit model allows for the estimation of random effects (Revelt & Train, 1998). In this context, this means that the relationships between independent and dependent variables are allowed to vary at the individual level. This relaxes two assumptions present in traditional choice models unlikely to hold in actual decision making: the independence from irrelevant alternatives assumption – the assumption that the probability of choosing an alternative does not depend on the addition or removal of other, unselected options, and the assumption that the influence of independent variables on choice is fixed across survey respondents (e.g. preference homogeneity; Christiadi & Cushing, 2007; Dahlberg & Eklöf, 2003).

These assumptions are handled using residual correlations across alternatives and random effects, respectively (Revelt & Train, 1998). The use of random effects allows for preference heterogeneity, meaning that the model does not assume that the evaluation of options is the same for each individual in the sample, thus allowing for preferences to have varying effects on choice between individuals (Revelt & Train, 1998). This variation means that the random coefficients

presented using this type of model are the average coefficient, and its standard deviation, across the sample (Hole, 2007). For our analysis we included all social exchange independent variables as random effects. Although a number of these items later had coefficient standard deviations not significantly different from zero, meaning one could argue they could have been moved to fixed effects within the model, we elected to keep them as random effects due to our theoretical orientation regarding preference heterogeneity as well is to avoid model over-modification. We estimated the mixed logit model using robust standard errors and 500 Halton draws to ensure conservative and precise estimates (Hole, 2007).

## Results

### Sample Characteristics

The sample contained a total of 810 responses. The overall sample demographics are presented in Table 1. The sample was spread out among the 14 counties. The most represented county was Jefferson County, with 224 (27.7%) respondents. The least represented county was Forest County with only 4 (0.5%) respondents. Given that Forest County is the least populous county in the state and dominated by the Allegheny National Forest, this is not surprising. The average age of this sample was 44 and the median age was 43. A substantial portion of this sample was retired, with 114 (14.6%) of this sample reporting retired as their current employment status. The sample was dominated by White individuals with 686 (85.1%) respondents reporting themselves as White. A total of 85 (10.5%) respondents reported their race as Black or African American, which is only 0.5% less than Pennsylvania as a whole (U.S. Census, 2018) and is over-representative of Black populations within these counties. According to the American Community Survey (ACS) 2012-2016 estimates, the population of the fourteen counties was 95.9% White (U.S. Census Bureau, 2018).

[Table 1 here]

**Industry Affiliation**

In terms of industry affiliation, respondents had the highest level of work affiliation with the outdoor recreation industry (10.3%) and the lowest with wind energy (2.2%; Table 2). This sample reported the highest level of family work affiliation with commercial logging (12.4%), outdoor recreation (12.3%), and natural gas (11.6%). The development type occurring most often on either respondents', or respondents' family's, property was natural gas (12.2%), which was followed by outdoor recreation (10.7%). The development type occurring the least often on respondents' properties was tourism (3.0%).

**Stated Preference**

A total of 789 of the respondents participated in ranking development types (Table 2). The most frequent top choice for development was wind energy (33.0%), followed by outdoor recreation (26.7%). The types of development chosen the least often were mining (4.4%), commercial logging (5.7%), and real estate (8.4%). In terms of mean rank, the items with the most preferential mean rank were wind energy (2.95), outdoor recreation (3.76), and tourism (3.76), where 1 is the most preferred as 7 is the least

[Table 2 here]

**General Support**

General support for the seven forms of natural resource related economic development is presented in Table 2. On the seven-point scale ranging from opposition to support, respondents were, on average, the most supportive of increased outdoor recreation development (5.44) and wind energy development (5.39). Respondents were the least supportive of increased commercial logging (3.79) and mining (3.92), with both items averaging on the oppositional side of the scale.

**Perceived Impacts, Trust, and Power**

Due to the volume of information collected, we describe the descriptive results for the perceived impacts, trust, and power items in terms of extractive uses (commercial logging, natural gas, and mining) and non-extractive uses (wind, tourism and outdoor recreation). Full descriptives, including individual means for perceived impacts, power, and trust can be found in Table 3. In general, respondents felt that non-extractive uses would lead to fewer negative environmental impacts, greater economic impacts, and a higher quality of life than extractive uses, with real estate development falling in between these two groups. The perceived employment impacts were similar across the different types of uses, while industry trust appeared lower for extractive uses versus non-extractive uses. On average, respondents appeared to perceive limited power for every form of development.

[Table 3 here]

**Fixed Effects Model of General Support**

The overall fixed effects model was significant ($F(69,802)= 160.72^{***}$) and explained 46% of the variance in general support (Table 4). The type of development had a significant and negative effect on support for all development types except for outdoor recreation, relative to wind. This makes sense given wind's level of general support presented in Table 2. When considering the repeated battery of perceived impacts, trust, and power, all of the six items had a significant effect on support at $p<.05$. The strongest predictor of general support was trust in the industry. Due to the use of individual fixed effects, the model shows that as individuals agreed one-point more strongly that they trust an industry to do the right thing, their general support for that form of development increased by 0.215 on a seven-point scale, on average. The second strongest predictor variable was perceived impacts to quality of life (B = 0.197), which was followed by

environmental (B = 0.143), employment (B = 0.083), local economic impacts (B = 0.091), and perceived industry power (B = -.082), respectively. Personal history with the industry, family history with the industry, and development on property were positively associated with support. Of the personal history items, the most influential item was development on property. On average, having a given form of development on either the respondent or respondent's family's property increased their support by 0.183 on a seven-point scale.

[Table 4 here]

**Mixed Logit Model of Relative Support**

All of the repeated battery items had a significant effect on relative support, modeled as stated preference for future development (Table 5). The three variables assessing existing industry relationships did not have a significant impact on relative support and had high coefficient standard deviations that were not significantly different from zero. This suggests that the estimated coefficients for the three dummy coded variables may be unstable, likely due to the relatively low number of respondents stating they had a history with the industries, or had development occurring on their property. Although these variables did not have a significant impact, the wide variation in impact may warrant further investigation.

In terms of items from the repeated battery, all perceived impacts, trust, and power had significant effects on relative support for future development. The largest change in odds was due to trust in industry (odds ratio = 1.49), followed by perceived impacts to quality of life (odds ratio = 1.48), local economic impacts (odds ratio = 1.44), and environmental impacts (odds ratio = 1.28). The only variable which significantly decreased the odds of choosing an option was perceived industry power (odds ratio = 0.83). This means that as a respondent rated themselves as feeling more powerless in relation to a given industry, they were significantly less likely to choose the associated form of development as their top preference.

Although all social exchange related independent variables were entered as random coefficients, it should be noted that only three of the coefficients had standard deviations significantly different form zero at $p<.05$. Trust in industry, economic impacts, and employment impacts all had standard deviations that were significantly different from zero. This suggests that the majority of the effects in the model are stable across people, with the exceptions of trust, economic impacts, and employment impacts. The only control variables to demonstrate a significant effect were those related to age. Age had a negative and significant effect on all forms of development (Table 5). To preserve clarity, only significant controls are reported in Table 5, the full model is reported in the Appendix.

[Table 5 here]

**Comparison of the Drivers of General and Relative Support**

While the coefficients of the mixed logit model and the fixed effects model are not directly comparable, we can assess the significance and relative effect size of independent variables in each model. The order of independent variable effect sizes showed little variation between the two models. Industry trust, followed by impacts to quality of life, were the primary drivers of both general and relative support, having both the largest model coefficients in both models. Where the models varied was in the case of local economic impacts and personal history with the industry. While perceived local economic impacts demonstrated the second smallest coefficient in the general support model, local economic impacts were the third most impactful variable in the case of relative support. Additionally, no personal history variables were significant in the relative support model, contrasted with all having significant impacts in the general support model. It appears that economic impacts have a slightly more important role in determining relative support, while personal history plays a less impactful role.

## Discussion

This study analyzed the effect of perceived impacts of various forms of natural resource related development, trust of natural resource related industries, and perceived power of those industries on both general and relative support for increased development. The concept of relative support was introduced, and a robust way of operationalizing and modeling the concept was demonstrated. The findings of this analysis have implications for both researchers and policy makers. Four primary implications will be discussed here.

First, similar to Stout-Wiegand et al. (1985), we found support for the majority of the suggested forms of development. This sample was, on average, supportive of increased tourism, outdoor recreation, wind energy development, natural gas development, and real estate development. The only types of development this sample did not support on average were mining and commercial logging, however, their averages were very close to the neutral point between support and opposition. This finding adds further credibility to the notion that researchers should avoid investigating support for only one form of development. Even if there is only one proposal on the table, if researchers and policy makers have nothing to contrast resident support against they will be missing important elements of the residents' perspectives.

Second, while the goal of our analysis was to model relative support, we also feel that our model of general support represents a significant increase in analytical rigor in the field of resident support for natural-resource related economic development. By using a fixed effects model, we were able to assess the drivers of general support while controlling for the individual and considering seven different forms of development at the same time. If the interest of researchers is to assess general support for multiple forms of development within a population, we encourage future researchers to continue using similar techniques. It should be noted, that

while this form of modeling allows researchers to control for development type invariant characteristics, if those characteristics are the object of the research question (e.g. race, education), a fixed effects model such as this may be less appropriate.

Third, our analysis found that the perceived economic impact was only the third strongest predictor of relative support, and the fifth strongest predictor of general support. This is somewhat out of step with the findings reported by a number of studies concerning wind farms (Olson-Hazboun et al., 2016; Mulvaney et al., 2013; Bidwell, 2013; Slattery et al., 2012) and shale gas development (Jacquet & Stedman, 2013) which found economic impacts to be the most important variable. When we consider the results of our models, we can see that this somewhat consistent finding in the literature may be missing part of the story. When we considered multiple forms of development at once, either generally or relatively, the primary drivers of support are trust in the industry and quality of life impacts. As Nunkoo (2016) intimated, further investigation into the dimensions of power and trust appears warranted. The importance of industry trust, perceived impacts to quality of life, perceived environmental impacts, as opposed to purely economic considerations, suggests rural residents in this sample do not view economic and employment improvements as synonymous with quality of life improvements. Further investigation to what quality of life means to rural residents will improve our understanding of this dimension.

Our findings suggest that while perceived economic benefits may result in a higher likelihood of general support for all forms of development, it may not be the primary driver in relative support between different options. If policy makers or planners attempt to engender support for a form of development based on the supposition that they should focus on highlighting economic benefits, they may ultimately fail to raise support for that form of

development over other options. If the goal is to engender support relative to other possible options, the elements of life quality and trust may be more effective in this case.

Slattery et al. (2012) found that the key drivers of support for wind energy in Iowa and Texas were perceived employment and economic benefits. They went on to suggest that appeals to the environment and carbon footprints would be less effective than simply advocating for its employment and economic benefits. When looking across all forms of development, our research supports their finding for relative support, but not general support. However, in both models trust and life quality impacts were more important, suggesting that focusing exclusively on economic and employment impacts may be less effective than previously argued. Wind farms in particular have faced a gap between broad public support and significant siting difficulties due to localized opposition (Larson & Krannich, 2016). Policy makers and planners may see greater success by focusing on building trust and demonstrating the future quality of life impacts that may come from future development, rather than simply focusing on economic, or environmental, outcomes.

The fourth main implication of this analysis concerns the primary drivers of relative support, modeled here as stated preference. Notably, these entail perceptions of impacts on quality of life and trust. When considering the theoretical orientation of our analysis, we feel that the strong impact of quality of life perceptions highlights the importance of viewing rural economic development as a social exchange, and not just an economic transaction. Given that rural communities' relationships with these forms of development are longitudinal exchange relationships – informed by both personal and community knowledge and experience (Emerson, 1976) – it appears that quality of life is a key determinate in whether or not an individual will support a form of development over other possible options.

Additionally, previous research has demonstrated the importance of trust in perceived natural gas impacts (Mayer, 2016), and Nunkoo (2016) called for its integration into understanding resident support for tourism. It appears that relative trust is a dominant factor in both general and relative support, as it was the strongest predictor in each model. The findings of this analysis appear in line with our theoretical orientation. The importance of trust may indicate the impact of "prior conditioning in longitudinal exchange relationships" (Emerson, 1976, p. 341). Industries commonly associated with the boom and bust cycles in rural America, such as mining, natural gas, and commercial logging, were less trusted by this sample and it appears that this difference in trust is one of the drivers of this sample's preference for alternative forms of development. When exploring the social exchange between natural resource related industries and rural residents in this sample, the important trade-offs appear to center around trust, life-quality, and the environment.

It should be noted that our findings related to trust are supportive of the framework of social license to operate (Moffat & Zhang, 2014). Social license to operate represents community acceptance of an industry's presence and operation (Moffat et al., 2016). In the framework of social license to operate, trust in an industry has been placed as the key mediating variable in determining industry acceptance. The framework of social exchange, as applied here, incorporates the importance of trust demonstrated in the social license to operate literature, while also incorporating the known importance of perceived impacts (Jacquet & Stedman, 2013). In doing this we feel that we have produced a model of relative support which incorporates elements of both research traditions under the umbrella of social exchange theory.

**Future Research and Conclusion**

Results from this study suggest a number of avenues for future research. This study presented a focused model of both general and relative support. Future constructs which have been explored in other general support studies may play a significant role in determining relative support. Concepts such as place attachment, place meanings, social identity, political ideology, and environmental value orientations may be important for future investigation. Additionally, we elected to model relative support as a respondent's top preference for future development. This choice was made to demonstrate and model the concept of relative support, while avoiding undue model complexity. While this method was appropriate for our research questions, future research should take full advantage of the ranked nature of this form of data. Future models predicting the relative rank of a form of development compared to other forms, while analytically complex, will continue to increase our understanding of relative support.

Future research should attempt this type of analysis using alternative methods of sampling. Our sample was over representative of racial minorities and required internet access for inclusion. Studies using more traditional sampling methods – or mixed sampling methods – will be necessary for further developing our theoretical understanding of relative support. Similarly, assessing relative support at a broader geographic scale and with attention to characteristics of the communities such as poverty levels and economic base appears warranted. Each rural area has unique relationships with industries; research assessing the dimensions of relative support should expand to other regions. Additionally, comparative analyses may prove helpful in understanding the political landscape of rural resident support.

This study attempted to assess the general and relative support through the social exchange process. While we feel we appropriately demonstrated factors influencing respondent's

willingness to enter into an exchange, we believe future research should attempt to evaluate the longitudinal exchange relationships within communities more explicitly. Researchers should link longitudinal exchange relationships to present day attitudes by using longitudinal secondary data and cross-sectional primary data. This type of modeling will help researchers more fully understand rural community social exchange with dominant industries and provide a broader understanding of the focus of social exchange theory, the exchange itself (Emerson, 1976).

Regarding our measurement of power, while relative power perceptions had a significant effect on relative support, the relationship was weaker than some other variables. We feel that this may be due to respondents perceiving themselves as, on average, powerless against every industry presented. Given this, our measurement of power may have been insufficient in capturing small relative distinctions between industries. Future research should investigate this dimension of powerlessness and how it impacts relative support.

In conclusion, this study has introduced and measured the concept of relative support using the framework of social exchange. We believe that this concept will help researchers understand the distinctions rural populations make between various forms of development. While presented in the case of natural resource use, this concept has implications well beyond this topic. For example, understanding rural residents' relative support for natural resource related development, as opposed to technology investment or small business development, may be an important avenue for future research. Making policy decisions that are in line with the desires and needs of residents is essential for sustainable and successful community development. Moving our understanding beyond general support and toward relative support will be important for the future of rural community development.

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**Tables**

| Table 1. Demographics of Sample | | |
|---|---|---|
| Category | N | % |
| **Gender** | | |
| Male | 401 | 49.5 |
| Female | 405 | 50.0 |
| Other | 4 | 0.5 |
| **Ethnicity** | | |
| Hispanic, Latino, or Spanish Origin | 38 | 4.7 |
| Not of Hispanic, Latino, or Spanish Origin | 764 | 95.3 |
| **Race** | | |
| White | 686 | 85.1 |
| Black or African American | 85 | 10.5 |
| Asian | 4 | 0.5 |
| American Indian or Alaska Native | 11 | 1.4 |
| Native Hawaiian or Pacific Islander | 1 | 0.1 |
| Multiple Races/Ethnicities | 12 | 1.5 |
| Other | 4 | 0.9 |
| **Education** | | |
| Some high school/High school graduate or GED | 293 | 36.5 |
| Some college | 208 | 25.9 |
| College, business, or trade school degree | 213 | 26.6 |
| Some graduate school/Master's, doctoral, or professional degree | 88 | 11.0 |
| **Income** | | |
| Under $25,000 | 195 | 25.7 |
| $25,000 - $49,999 | 242 | 31.9 |
| $50,000 - $74,999 | 172 | 22.7 |
| $75,000 - $99,999 | 90 | 11.1 |
| $100,000 - $149,999 | 60 | 7.4 |
| **Employment Status** | | |
| Working – Full time | 334 | 42.8 |
| Working – Part time | 122 | 15.6 |
| Retired | 114 | 14.6 |
| Disabled | 79 | 10.1 |
| Not working | 131 | 16.8 |
| **Student** | | |
| Yes – Full time | 60 | 7.5 |
| Yes – Part time | 39 | 4.8 |
| No | 706 | 87.7 |

Table 2. General support, ranked preference, work history, and development on property

| | Mean Rank[a] | | Top Choice[b] | | General Support[c] | | Personal Work History[d] | | Family Work History | | Development on Property[e] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | Mean | SD | % | Freq | Mean | SD | % | Freq | % | Freq | % | Freq |
| Wind energy | 2.95 | 1.93 | 33.0 | 260 | 5.39 | 1.48 | 2.2 | 18 | 3.7 | 30 | 3.2 | 26 |
| Outdoor recreation | 2.79 | 1.69 | 26.7 | 211 | 5.44 | 1.40 | 10.3 | 84 | 12.3 | 100 | 10.7 | 87 |
| Tourism | 3.76 | 1.87 | 10.1 | 80 | 4.83 | 1.52 | 6.7 | 54 | 6.0 | 49 | 3.0 | 24 |
| Natural gas | 4.01 | 1.87 | 11.7 | 92 | 4.40 | 1.65 | 4.8 | 39 | 11.6 | 94 | 12.2 | 83 |
| Real estate | 4.26 | 1.75 | 8.4 | 66 | 4.35 | 1.55 | 6.7 | 54 | 8.9 | 72 | 5.9 | 48 |
| Commercial logging | 4.98 | 1.73 | 5.7 | 45 | 3.79 | 1.62 | 6.4 | 52 | 12.4 | 101 | 9.8 | 79 |
| Mining | 5.25 | 1.79 | 4.4 | 35 | 3.92 | 1.65 | 3.7 | 30 | 9.8 | 79 | 3.3 | 27 |

Items order from most preferable to least by mean rank

[a]Items ranked in order of preference in their community from 1 (Best) to 7 (Worst)

[b]Percent of sample who ranked the item as their top preference; N=789

[c]Items rated from 1 – 'extremely opposed' to 7 – 'extremely supportive'

[d]Coded as any work history or none, those with history in multiple industries are represented more than once; N=810

[e]Coded as development on property or not, those with development; N=810

Table 3. Perceived impacts, trust and power means and standard deviations

| Item | Commercial Logging | | Natural Gas | | Mining | | Real Estate | | Wind | | Tourism | | Outdoor Recreation | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Increased [type of resource use] would increase employment in my area | 4.4 | 1.6 | 4.8 | 1.5 | 4.6 | 1.7 | 4.6 | 1.6 | 4.9 | 1.5 | 5.0 | 1.5 | 5.1 | 1.4 |
| Increased [type of resource use] in my area would lead to minimal negative environmental impacts | 3.6 | 1.7 | 3.9 | 1.6 | 3.5 | 1.7 | 4.0 | 1.6 | 5.0 | 1.6 | 4.6 | 1.5 | 4.9 | 1.5 |
| Increased [type of resource use] in my area would improve the local economy | 4.4 | 1.5 | 4.8 | 1.5 | 4.5 | 1.6 | 4.6 | 1.5 | 5.0 | 1.4 | 5.3 | 1.4 | 5.2 | 1.3 |
| Increased [type of resource use] would increase the quality of life in my area | 3.7 | 1.6 | 4.1 | 1.6 | 3.8 | 1.6 | 4.2 | 1.6 | 4.8 | 1.5 | 4.7 | 1.5 | 5.1 | 1.4 |
| I trust the [type of resource use] industry to do the right thing | 3.9 | 1.6 | 4.0 | 1.7 | 3.7 | 1.7 | 4.0 | 1.6 | 4.8 | 1.5 | 4.5 | 1.5 | 4.8 | 1.4 |
| It does not matter how I feel, if the [type of resource use] industry wants to increase development in my area, they will | 4.9 | 1.5 | 5.0 | 1.5 | 4.8 | 1.6 | 4.9 | 1.6 | 4.9 | 1.5 | 4.9 | 1.4 | 4.9 | 1.5 |

Items rated from 1 – ‘strongly disagree’ to 7 – ‘strongly agree’

Table 4. Fixed effects model of general support

| Independent Variable | Unstandardized Coefficient | Robust Standard Error | 95% Conf. Int. |
|---|---|---|---|
| Trust in industry | 0.215 | 0.024*** | 0.169 - 0.262 |
| Quality of life impacts | 0.197 | 0.023*** | 0.151 - 0.243 |
| Environmental impacts | 0.143 | 0.021*** | 0.102 - 0.183 |
| Employment impacts | 0.083 | 0.019*** | 0.045 - 0.121 |
| Local economic impacts | 0.091 | 0.022*** | 0.049 - 0.134 |
| Perceived industry power | -0.082 | 0.019*** | -0.120 - -0.044 |
| Personal history with industry | 0.165 | 0.083* | 0.003 - 0.328 |
| Family history with industry | 0.139 | 0.068* | 0.006 - 0.273 |
| Development on property | 0.183 | 0.070** | 0.045 - 0.321 |
| Type of Development | | | |
| Wind | | | [Reference] |
| Gas | -0.525 | 0.054*** | -0.632 - -0.418 |
| Mining | -0.780 | 0.057*** | -0.892 - -0.667 |
| Commercial logging | -0.929 | 0.059*** | -1.045 - -0.813 |
| Real estate | -0.556 | 0.052*** | -0.658 - -0.454 |
| Tourism | -0.440 | 0.054*** | -0.546 - -0.334 |
| Outdoor Recreation | -0.050 | 0.050 | -0.148 - 0.048 |
| Constant | 2.215 | 0.140*** | 1.940 - 2.490 |
| $R^2$ (overall) | 0.460 | | |
| $F(69,802)$ | 160.72*** | | |
| Number of observations | 5,430 | | |
| Number of groups (cases) | 803 | | |

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

Table 5. Mixed logit model of top preference for development

| Variables | Odds Ratio | Log Odds[a] | Robust Standard Error | 95% Confidence Interval |
|---|---|---|---|---|
| *Random Effects* | | | | |
| Trust in industry | 1.492 | 0.400 | 0.109*** | 0.187 - 0.613 |
| Life quality impacts | 1.477 | 0.390 | 0.076*** | 0.242 - 0.539 |
| Local economic impacts | 1.441 | 0.365 | 0.089*** | 0.190 - 0.541 |
| Environmental impacts | 1.278 | 0.245 | 0.074** | 0.099 - 0.390 |
| Employment impacts | 1.217 | 0.196 | 0.087* | 0.025 - 0.367 |
| Industry power | 0.829 | -0.187 | 0.069** | -0.321 - -0.052 |
| Family history with industry | 1.713 | 0.538 | 0.333 | -0.114 - 1.191 |
| Personal history with industry | 1.115 | 0.109 | 0.406 | -0.686 - 0.904 |
| Development on property | 1.271 | 0.240 | 0.367 | -0.480 - 0.959 |
| *Standard Deviation of Random Effects[b]* | | | | |
| Trust in industry | | 0.440 | 0.194* | 0.059 - 0.820 |
| Life quality impacts | | -0.000 | 0.033 | -0.066 - 0.065 |
| Economic impacts | | 0.398 | 0.141** | 0.121 - 0.675 |
| Environmental impacts | | 0.226 | 0.195 | -0.157 - 0.609 |
| Employment impacts | | 0.487 | 0.181** | 0.132 - 0.841 |
| Industry power | | 0.314 | 0.182 | -0.043 - 0.672 |
| Family history with industry | | 1.524 | 1.035 | -0.504 - 3.552 |
| Personal history with industry | | 1.766 | 1.084 | -0.360 - 3.891 |
| Development on property | | 1.442 | 0.994 | -0.506 - 3.390 |
| *Fixed Effects[c]* | | | | |
| Age by | | [Wind is reference] | | |
| Natural gas | 0.985 | -0.015 | 0.006* | -0.027 - -0.003 |
| Mining | 0.969 | -0.031 | 0.009*** | -0.048 - -0.013 |
| Commercial logging | 0.981 | -0.019 | 0.009* | -0.036 - -0.001 |
| Real estate | 0.984 | -0.016 | 0.007* | -0.029 - -0.003 |
| Tourism | 0.973 | -0.027 | 0.007*** | -0.040 - -0.014 |
| Outdoor Recreation | 0.987 | -0.013 | 0.005** | -0.023 - -0.003 |
| Number of observations | 5,147 | | | |
| Likelihood ratio $\chi^2$ | 204.94*** (df = 33) | | | |
| Log likelihood | -1060.774 | | | |

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

[a]When coefficients are allowed to vary at the individual level for random effects, coefficients presented for random effects are the average coefficients across the sample.

[b]Odds ratios for SD not presented

[c]To preserve space, only control variables significant at the $p<.05$ level are presented in this table, but all controls remain in the model. The full table can be seen in the appendix.

**Appendix**

Table 6. Mixed logit model of top preference for development - Full

| Variables | Odds Ratio | Log Odds[a] | Robust Standard Error | 95% Confidence Interval |
|---|---|---|---|---|
| *Random Effects* | | | | |
| Trust in industry | 1.492 | 0.400 | 0.109*** | 0.187 - 0.613 |
| Life quality impacts | 1.477 | 0.390 | 0.076*** | 0.242 - 0.539 |
| Local economic impacts | 1.441 | 0.365 | 0.089*** | 0.190 - 0.541 |
| Environmental impacts | 1.278 | 0.245 | 0.074** | 0.099 - 0.390 |
| Employment impacts | 1.217 | 0.196 | 0.087* | 0.025 - 0.367 |
| Industry power | 0.829 | -0.187 | 0.069** | -0.321 - -0.052 |
| Family history with industry | 1.713 | 0.538 | 0.333 | -0.114 - 1.191 |
| Personal history with industry | 1.115 | 0.109 | 0.406 | -0.686 - 0.904 |
| Development on property | 1.271 | 0.240 | 0.367 | -0.480 - 0.959 |
| *Standard Deviation of Random Effects[b]* | | | | |
| Trust in industry | | 0.440 | 0.194* | 0.059 - 0.820 |
| Life quality impacts | | -0.000 | 0.033 | -0.066 - 0.065 |
| Economic impacts | | 0.398 | 0.141** | 0.121 - 0.675 |
| Environmental impacts | | 0.226 | 0.195 | -0.157 - 0.609 |
| Employment impacts | | 0.487 | 0.181** | 0.132 - 0.841 |
| Industry power | | 0.314 | 0.182 | -0.043 - 0.672 |
| Family history with industry | | 1.524 | 1.035 | -0.504 - 3.552 |
| Personal history with industry | | 1.766 | 1.084 | -0.360 - 3.891 |
| Development on property | | 1.442 | 0.994 | -0.506 - 3.390 |
| *Fixed Effects* | | | | |
| Age by | | [Wind is reference] | | |
| Natural gas | 0.985 | -0.015 | 0.006* | -0.027 - -0.003 |
| Mining | 0.969 | -0.031 | 0.009*** | -0.048 - -0.013 |
| Commercial logging | 0.981 | -0.019 | 0.009* | -0.036 - -0.001 |
| Real estate | 0.984 | -0.016 | 0.007* | -0.029 - -0.003 |
| Tourism | 0.973 | -0.027 | 0.007*** | -0.040 - -0.014 |
| Outdoor Recreation | 0.987 | -0.013 | 0.005** | -0.023 - -0.003 |
| Gender[c] by | | [Wind is reference] | | |
| Natural gas | 0.882 | -0.125 | 0.284 | -0.682 - 0.432 |
| Mining | 0.765 | -0.268 | 0.382 | -1.016 - 0.481 |
| Commercial logging | 0.536 | -0.623 | 0.406 | -1.418 - 0.172 |
| Real estate | 1.073 | 0.070 | 0.327 | -0.572 - 0.711 |
| Tourism | 0.587 | -0.533 | 0.273 | -1.067 - 0.002 |
| Outdoor recreation | 1.037 | 0.036 | 0.236 | -0.426 - 0.498 |
| Education[d] | | [Wind is reference] | | |
| Natural gas | 1.442 | 0.366 | 0.321 | -0.263 - 0.995 |
| Mining | 1.100 | 0.095 | 0.473 | -0.832 - 1.022 |
| Commercial logging | 0.817 | -0.202 | 0.447 | -1.078 - 0.674 |
| Real estate | 0.647 | -0.435 | 0.390 | -1.199 - 0.330 |

| | | | | |
|---|---|---|---|---|
| Tourism | 1.590 | 0.464 | 0.290 | -0.105 - 1.033 |
| Outdoor recreation | 1.004 | 0.004 | 0.259 | -0.503 - 0.512 |
| Length of residence by | | [Wind is reference] | | |
| Natural gas | 0.998 | -0.002 | 0.010 | -0.023 - 0.018 |
| Mining | 0.990 | -0.010 | 0.015 | -0.039 - 0.019 |
| Commercial logging | 0.992 | -0.008 | 0.015 | -0.037 - 0.021 |
| Real estate | 0.987 | -0.013 | 0.012 | -0.037 - 0.011 |
| Tourism | 1.013 | 0.013 | 0.010 | -0.008 - 0.033 |
| Outdoor Recreation | 1.011 | 0.011 | 0.008 | -0.005 - 0.027 |
| | | | | |
| Number of observations | 5,147 | | | |
| Likelihood ratio $\chi^2$ | 204.94*** (df = 33) | | | |
| Log likelihood | -1060.773 | | | |

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

[a]As coefficients are allowed to vary at the individual level for random effects, coefficients presented for random effects are the average coefficients across the sample.

[b]Odds ratios for SD not presented

[c]Coded as 1 = Female, 0 = All else

[d]Coded as 1 = Bachelor's degree or above, 0 = All else