Reassessing the Economy-Environment Tradeoff: Do Industry Sectors, Green Jobs Opportunities, and Regulatory Threats Affect Environmental Concerns?

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Abstract

Economic effects on environmental concerns assess macroeconomic pressures or microeconomic status differences but overlook environmental and labor scholarly attention to industry contexts. I test whether employed industry, green jobs opportunities, and regulatory threats influence five environmental concern indexes using cross-sectional U.S. General Social Surveys from 2000, 2010, and 2021 and federal administrative data. Findings indicate individuals employed in resource extraction, construction, and manufacturing express less environmental concerns than service sector individuals but vary across dimensions. Resource extraction individuals express less concern for environmental protections and pollution harms. Manufacturing, construction, and utilities individuals are less willing to sacrifice for the environment. Green jobs sub-industry employment is positively associated with more willingness to sacrifice and empowerment to act for the environment. Surprisingly, employment in Environmental Protection Agency regulated sub-industries is positively associated with more willingness to sacrifice for the environment. Findings underscore future research on how industry-based economic contexts shape environmental concerns.

Keywords: environmental concern, industry sector, green jobs, environmental regulations, economy-environment tradeoff

Introduction

Public opinion plays an important role in shaping environmental policies. Public support for environmentalism bolsters environmental movements (McCright and Dunlap 2008) and directs policy makers to legislative environmental protectionism while managing economic growth (Agnone 2007). Scholars typically assess how economic circumstances impact environmental concerns using recessionary pressures or objective individual economic differences, but findings generate an empirical puzzle between macro and micro measures. Recessions and high unemployment periods dampen individual concern for environmental issues and willingness to pay (Conroy and Emerson 2014; Scruggs and Benegal 2012), but individual differences in social class measures have inconsistent impacts on environmental concerns (Gifford and Nilsson 2014; Jones and Dunlap 1992; Mildenberger and Leiserowitz 2017).

Drawing upon environmental and labor scholarships, I identify and test whether industry contexts shape environmental concerns. Scholarship on economy-environment tradeoffs underscores how productive industries generate political-economic coalitions that promote economic growth at the cost of environmental degradation (Gould, Pellow, and Schnaiberg 2004; Schnaiberg 1980). Similarly, qualitative studies find that individuals rely on their industry work experiences to mediate between economic and environmental priorities (Allan and Robinson 2022; Bell et al. 2023; Cha et al. 2021; Sicotte, Joyce, and Hesse 2022). Perceiving economic threats, individuals employed in extractive and production-heavy sectors frequently oppose environmental protections in defense of economic growth and job security (Feng 2020; Kazis and Grossman 1991; Schnaiberg 1980; Vachon 2023). Prevailing theories put forward industry sector differences, economic opportunities, and regulatory risks as important economic factors that shape environmental concerns.

To assess these relationships, I employ OLS regressions on a novel dataset combining U.S. federal administrative data and pooled cross-sectional representative samples of U.S. individuals from the General Social Survey (GSS). Informed by innovative multiple imputation methods, prior theories, and exploratory factor analyses, I operationalize twenty environmental items into five indexes that capture affective, conative, and behavioral environmental concern dimensions (Dunlap and Jones 2002). While most scholars qualitatively explore how industry contexts shape environmental concerns (Allan and Robinson 2022; Feng 2020; Sicotte et al. 2022; Pichler et al. 2021), my study is among few quantitative analyses that test for statistical significance in representative surveys (Jones and Dunlap 1992; Ringqvist 2022).

Findings indicate that compared to individuals employed in professional, management, and administrative services, those in resource extraction (agriculture, forestry, and mining), construction and utilities, and manufacturing express less concern for the environment, but along different dimensions. Individuals in resource extraction tend to be less concerned about protecting the environment and harm from pollution. They are also less likely to participate in environmental activism. Those in construction and utilities and manufacturing are less willing to sacrifice for the environment. Individuals employed in sub-industries with high potential for green jobs opportunities feel more willing to sacrifice and more empowered to act for the environment. Against expectations, individuals employed in sub-industries regulated by U.S. Environmental Protection Agency's (EPA) Toxic Release Inventory Program are more willing to sacrifice for the environment. Findings underscore the need for future studies on economy-environment tradeoffs to account for industry contexts as economic threats to environmentalism.

Economic Explanations for Environmental Concerns

Scholars conceptualize environmental concerns through multiple dimensions. Dunlap and Jones (2002) typologize affective, conative (willingness to act), and behavioral dimensions.[1] An affective dimension refers to evaluation of environmental harms from human progress or economic growth (Dietz, Stern, and Guagnano 1998) and from pollution (Hunter 2000; Mohai and Bryant 1998). A conative dimension refers to willingness to protect the environment, which scholars typically measure through willingness to pay (Alibeli and White 2011; Franzen and Meyer 2010) or intention to engage in environmentally responsible behaviors (Dietz et al. 1998; Hunter 2000). A behavioral dimension refers to self-reported actions to protect the environment including activism or donations (Barkan 2004). While having more environmental knowledge, priority for environmental issues, and willingness to act shapes behavior (Mobley, Vagias, and DeWard 2010), the relationship is not deterministic (Dunlap and Jones 2002). Building on prior scholarship, I incorporate how economic factors influence environmental concerns among multiple dimensions.

Scholars purport that economic circumstances influence environmental concerns and willingness to act along an economy-environment tradeoff, yet expectations produce an empirical puzzle. Macroeconomic downturns typically weaken public support and commitment to environmentalism (Chen 2017; Conroy and Emerson 2014; Kenny 2020; Scruggs and Benegal 2012), but individual objective economic measures often fail as robust predictors of environmental concerns (Gifford and Nilsson 2014; Jones and Dunlap 1992). Building on environmental and labor scholarships focusing on industry contexts, I argue that industry contexts represent new operationalizations to reconcile inconsistency between macro and micro economic circumstances. Industry contexts capture perceptions of economic threats to targeted industries that are not operationalized by macroeconomic trends or social class differences

(Bluestone and Harrison 1982; Foster 1993; Kazis and Grossman 1991). Therefore, exploring effects of industry contexts may offer answers to contradictory findings.

Scholars have extensively assessed macroeconomic impacts on environmental concerns using an economy-environment tradeoff. Environmental concerns represent "luxury goods" in which demand increases during economic prosperity (Abou-Chadi and Kayser 2017). Consistent with this tradeoff, individuals in countries with greater economic development (Diekmann and Franzen 1999; Franzen and Meyer 2010) and high economic growth (Kemmelmeier, Król, and Kim 2002) express more environmental concerns. Inglehart (1990) also attributes increasing environmental concerns since WWII to economic prosperity in Western countries. Conversely, economic downturns can supplant environmental protectionism with economic needs. Publics typically perceive environmental protections as economically costly (Bakaki and Bernauer 2017; Diamond and Zhou 2022) and political and media elites during economic stagnations or downturns prioritize economic issues in public discourse (Carmichael and Brulle 2017). Consistent with economy-environment tradeoff expectations, cross-country studies find environmental concerns and willingness to pay for the environment decreases during recessions and high unemployment (Chen 2017; Conroy and Emerson 2014; Kenny 2020; Scruggs and Benegal 2012). Scholars also underscore that the 2008 Great Recession distanced U.S. public concerns from environmental issues (Carmichael and Brulle 2017; Kenny 2020; Scruggs and Benegal 2012). Prevailing studies find environmental concerns wax and wane depending on macroeconomic contexts.

Nonetheless, economy-environment tradeoff expectations fail to extend to microlevel differences in social class.[2] Although scholars similarly purport that individuals with lesser economic means are less concerned about the environment because economic needs are more

immediate (Maslow 1970), empirical studies produce mixed findings. Although some find higher income individuals express greater concern and willingness to act for the environment (Fairbrother 2013; Pampel 2014), findings are not robust across studies (Jones and Dunlap 1992; Kenny 2020; Liu, Vedlitz, and Shi 2014; Van Liere and Dunlap 1980). Similarly, occupational differences and prestige do not affect environmental concerns (Jones and Dunlap 1992; Van Liere and Dunlap 1980). Although education tends to be associated with environmental concerns, educational differences may capture cognitive knowledge or cultural values rather than economic precarity (Gifford and Nilsson 2014; Mobley et al. 2010). Individuals with college degrees and more formal schooling years tend to express greater environmental concerns (Barkan 2004; Jones and Dunlap 1992; Kenny 2020; Pampel 2014), although this is not reproduced in all studies (Franzen and Meyer 2010; Liu et al. 2014). In contrast to macroeconomic effects, social class measures are inconsistent with economy-environment tradeoff expectations.

Industry Sector Influences on Environmental Concerns

While prevailing studies offer important insights, industry contexts highlight economy-environment tradeoffs not captured by macroeconomic or microeconomic measures. Whereas macroeconomic indicators capture national booms and busts, they mask industry-specific trends of economic stagnation and declining job prospects. Similarly, inconsistent findings along social class differences cast doubt on whether objective economic conditions shape environmental concerns (Mildenberger and Leiserowitz 2017). Classical environmental scholars center production-oriented industries as promoting public support for economic growth despite environmental degradation (Gould et al. 2004; Schnaiberg 1980). Qualitative studies underscore that workers rely on their employed industry sector as a reference to assess competing economic

and environmental priorities (Allan and Robinson 2022; Bell et al. 2023; Cha et al. 2021; Sicotte et al. 2022). Perceptions that employed industries are under economic threat often generates individual opposition to environmentalism due to concerns that environmental protectionism would lead to job losses (Bell and York 2010; Feng 2020; Kazis and Grossman 1991). Scholarly and public attention highlight and explore worker resistance to environmental measures in U.S. mining, forestry, and manufacturing (Allan and Robinson 2022; Cha et al. 2021; Feng 2020; Foster 1993)—all industries that faced economic declines in the latter 20th century due to technological automation, declining unionization, and labor outsourcing (Bluestone and Harrison 1982; Loomis 2015; Montrie 2018). Environmental and labor scholarships underscore that industry-specific perceptions of economic threats shape environmental concerns.

Qualitative studies purport employment across different industries shape concern and willingness to act for the environment. Vachon's (2023) U.S. labor-climate spectrum ranks the following industries from most skeptical to most supportive for environmentalism: resource extraction; construction and utilities; manufacturing; and public employees and services. Prior studies corroborate this framework. Individuals in mining and forestry express well-established skepticism towards environmental protections (Feng 2020; Foster 1993). Construction and utility sector union members are concerned whether renewable energy sector wages are comparable to those in fossil fuels (Sicotte et al. 2022). Manufacturing union members are also skeptical of environmental protections for job loss fears (Allan and Robinson 2022; Pichler et al. 2021). Although quantitative studies identify environmental concern differences across industries (Jones and Dunlap 1992; Ringvist 2022), they neither center industries as key predictors nor assess multiple dimensions of environmental concerns. Based on prior qualitative and quantitative studies, my first hypothesis is that *individuals employed in manufacturing, construction and*

utilities, and resource-extractive sectors express less environmental concerns compared to those in service sectors.

Policy makers and activists put forward "green jobs" platforms to promote sustainable economic development as a solution to environmental crises (Hess 2012). Consistent with ecological modernization theories purporting state-guided ecologically sustainable development (Spaargaren and Mol 1992), green jobs platforms build coalitions of workers, businesses, and environmentalists to overcome the "jobs versus environment" narrative (Hess 2012; Kouri and Clarke 2014). Empirical studies demonstrate that framing economic growth as a solution to environmental problems tends to garner more public support (Diamond and Zhou 2022). Qualitative studies corroborate this finding: Sicotte et al. (2022) identify among construction and utility union members support for an "all of the above" energy strategy that supports renewable energy alongside fossil fuels. Interviews of auto-manufacturing union members underscore their conditional preference for energy efficient and electrical vehicles to secure their economic livelihood (Allan and Robinson 2022; Pichler et al. 2021). Previous research suggests that green jobs opportunities enable individuals to become more supportive of environmental issues. Based on these considerations, my second hypothesis is that *individuals employed in sub-industries with significant green jobs economic potential express greater environmental concerns.*

On the other hand, state-directed environmental regulations may represent potential economic threats that negatively influence environmental concerns. Regulatory perceptions build upon well-established treadmill-of-production and metabolic rift theories that underscore hegemonic commitments to economic growth at the cost of ecological devastation in advanced capitalist societies (Clark and York 2005; Gould, Pellow, and Schnaiberg 2004; Schnaiberg 1980). Although environmental regulations minimally impact job losses (Morgenstern, Pizer,

and Shih 2002), individuals tend to perceive environmental regulations as imposing additional costs on business and hurting job prospects in their industries (Allan and Robinson 2022; Bakaki and Bernauer 2017; Diamond and Zhou 2022; Feng 2020). Environmental regulations frequently generate worker opposition as economic threats in extractive and productive industries (Bell and York 2010; Feng 2020; Kazis and Grossman 1991). Moreover, laissez-faire economic ideologies such as skepticism of regulations tend to coincide with less concern for ecological harm (Longo and Baker 2014). Lay perceptions of environmental regulations also tend to underscore its purported zero-sum relationship with economic growth, as evidenced in public polling (Saad 2021). Based on prior theoretical and empirical expectations that environmental regulations dampen environmental concerns, my third hypothesis is that *individuals employed in sub-industries that are subject to environmental regulations express less environmental concerns.*

Methods and Data

Using OLS regression[3] on environmental concern measures with multiple imputation to overcome missing data, I test whether industry contexts shape environmental concerns. I construct a novel dataset by combining U.S. administrative data with the GSS, a well-validated representative survey of Americans' characteristics and opinions. I assess industry effects on five environmental indexes from twenty GSS items among pooled cross-sections of individuals (N = 8,353) from 2000, 2010, and 2021,[4] when most items are available through International Social Survey Program's (ISSP) environment module. I therefore encounter a tradeoff of more detailed survey items over fewer years compared to more contiguous years using fewer items. Since my main contribution is to test a new economic mechanism of industry contexts rather than assess temporal changes, I select the former option. While this precludes me from longitudinal analyses as in previous studies (Chen 2017; Driscoll 2019; Jones and Dunlap 1992), access to more

detailed measures affords me more granular analyses on the impacts of industry contexts on varying environmental concern dimensions. While findings reflect U.S. populations, they may also be generalizable to affluent Western countries (Fairbrother 2010; Franzen and Meyer 2010; Ringvist 2022). Moreover, U.S. public opinion carries disproportionate influence on international environmental policies (DeSombre 2000). Table 1 displays descriptive statistics of environmental indexes, industry sectors, and sociodemographic characteristics of surveyed individuals.

[Insert Table 1: Descriptive Statistics of Variables]

Dependent Variables

Conceptualizing and Operationalizing Five Environmental Concern Indexes

I construct five environmental indexes informed by prior theories and exploratory factor analyses. Following prior studies (Alibeli and White 2011; Dietz et al. 1998; Fairbrother 2013; Hunter 2000), I select potential survey items that account for affective, conative, and behavioral environmental dimensions (Dunlap and Jones 2002). After standardizing item scales, I fit five factors in exploratory factor analysis using maximum likelihood estimator and promax rotation. I select five factors based on minimization of eigenvalues with Cattell's scree test (D'agostino and Russell 2014), maximization of Cronbach's inter-scale reliability alpha scores, and theoretical consistency of factor loadings with environmental dimensions. A four-factor fitted model is inconsistent with prior theoretical distinctions of environmental dimensions since it collapses affective and conative items in the same factor.[5] A six-factor fitted model generates a factor that captures concern about genetically modified crops and nuclear power, which is not traditionally operationalized in previous scholarship. I follow best practices (Matsunaga 2010) to re-run exploratory factor analyses until only items remain when factor loadings are greater than 0.4 and

when cross-loading differences (i.e. when items load significantly onto multiple factors) are greater than 0.3. I iteratively remove items that fail to meet these criteria.[6] I calculate for each index an aggregated sum of environmental items to avoid extraneous transformations without theoretical justification. I standardize items along a five-point scale (i.e. a minimum of zero and maximum of four) and reverse scales such that ascending order indicates increasing environmental concern. Table 2 displays environmental indexes with Cronbach's alpha scores, multiply imputed descriptive statistics, and survey item descriptions. *Prioritize environment* (alpha = 0.78) and *concern of pollution* (alpha = 0.78) indexes capture affective dimensions of environmental concerns; *willingness to sacrifice* (alpha = 0.85) and *empowered to act* (alpha = 0.64) indexes capture conative dimensions; and *participate in activism* (alpha = 0.65) index captures behavioral dimensions.

[Table 2: Environmental Index Measures, Factor Loadings, and Descriptive Statistics]

Although no scholarly consensus exists on measuring environmental concerns (Dietz et al. 1998; Dunlap and Jones 2002) my indexes are largely consistent with prior scholars' operationalizations.[7] *Prioritize environment* (scale 0-16) constitutes four items that capture whether individuals feel concerned about environmental protections against economic growth or in abstract. Two questions prompt general concern for environmental issues and threats. Two questions prompt concern for environmental protections against economic growth in reference to spending, prices, or jobs. Items are similarly operationalized in Hunter (2000) and Dietz et al.'s (1998) "Progress versus Environment" scales.

Concern of pollution (scale 0-24) constitutes six items that capture individual harm assessments of pollution, products, and industries. Respondents rank from "extremely dangerous" to "not dangerous at all" industrial air pollution; pesticides in agriculture; nuclear

power; pollution in rivers; genetically modified crops; and car emissions. Pollution concern items are similarly operationalized in Alibeli and White's (2011) egoistic environmentalism, Hunter's (2000) environmental concern scale, and Dietz et al.'s (1998) awareness of consequences scale.

Willingness to sacrifice (scale 0-12) constitutes three items that capture individual willingness to sacrifice or pay financially for the environment. Items indicate willingness to pay "higher prices" or "higher taxes" and to "accept cuts to your standard of living" for environmental protections. Scholars have similarly operationalized these items in previous studies (Alibeli and White 2011; Dietz et al. 1998; Franzen and Meyer 2010; Hunter 2000).

Empowered to act (scale 0-12) constitutes three items that capture if individuals feel they can protect the environment. Three conative items posit different challenges to assess the degree individuals perceive if their personal actions can impact the environment (e.g. "difficult for someone like me to do much," "no point in doing what I can…unless others do the same," and "I find it hard to know whether the way I live..."). While previous researchers have operationalized items as affective concerns (Franzen and Meyer 2010), exploratory factor analyses and theories of empowerment in developmental studies (Pradhan 2003) suggest that feeling empowered to act is analytically distinct from other indexes.

Participate in activism (scale 0-4) constitutes four binary behavioral measures of political actions. These ask respondents for membership in environmental organizations and whether they signed petitions, donated, or protested for environmental causes. Respondents indicated affirmative or negative to each prompt. Although some scholars distinguish protesting as a higher risk behavior from other activities (Barkan 2004), I combine all four for parsimony.

Multiple Imputation of Missing Data on Environmental Indexes

To account for missing data, I multiply impute using predictive mean matching in R's *mice* package twenty-seven environmental items before index construction and conduct pooled analyses of imputed data using Rubin's rules. Multiple imputation methods enable parameter estimates to remain unbiased to nonresponse errors under missing at random conditions (Allison 2001; Rubin 1987). Multiple imputation generates less bias in coefficient estimates and standard errors compared to listwise deletion (Madley-Dowd et al. 2019; Lee and Huber 2021). Following best methodological practices (Allison 2001; Madley-Dowd et al. 2019; White et al. 2011), I carefully specify model parameters on large missing data, ranging from 49.8% to 65.2% on environmental items, to account for potential nonresponse bias (Lee and Huber 2021). I run multiple imputation with 49 total explanatory and auxiliary variables that are well-established predictors or impact nonresponse (Madley-Dowd et al. 2019; White et al. 2011). These include political ideology, religious beliefs, education, gender, race, among others discussed in prior scholarship (Driscoll 2019; Gifford and Nilsson 2014) and variables that shape nonresponse including sampling weights, survey years, and ballot forms. Following best practices (Allison 2001), I specify 65 imputations to match approximate percentages of incomplete cases. Appendix A in the online supplement lists all variables and proportion of missing cases.

Independent Variables

Industry Sector Characteristics

Industry categories derive from the 2007 U.S. Census Industry code (CI).[8] CI is frequently cross-referenced with the North American Industry Classification System (NAICS). I construct six industry categories based on CI classifications and theoretical significance (Vachon 2023): resource extraction (agriculture, forestry, and mining); construction and utilities; manufacturing; transportation and warehousing; wholesale, retail, and recreational services; and

professional, management, and administrative services. I select professional, management, and administrative services as my reference group[9] because previous research suggests service workers are least susceptible to "jobs versus environment" frames (Vachon 2023). Professional, management, and administrative services represent individuals employed in information, technology, finance, business, healthcare, and public institutions. Those in wholesale, retail, and recreational services are often involved in inventory sales of goods and services. A full list of industries for each category are in the online supplement's Appendix H.

To identify sub-industry sectors with green jobs opportunities or environmental regulations, I employ three industry lists from the Bureau of Labor Statistics (BLS) Green Goods and Services Program, the EPA Toxic Release Inventory Program, and the Small Business Administration (SBA) 504 Loan Program. I cross-reference GSS respondents' 2007 CI with 2007 3-digit NAICS sub-industry codes. BLS indicates sub-industries that are key growth areas for green jobs[10] that conserve natural resources or promote energy-efficient production (Sommers 2013). EPA mandates that businesses in designated sub-industries report annual management of toxic chemicals. SBA identifies "environmentally sensitive" sub-industries that conduct environmental reviews for loan financing. I construct binary measures for all three variables. If greater than a quarter of sub-industries in a 3-digit NAICS sub-sector code are included on each BLS, EPA, or SBA industry list, I code each respondent's sub-industry as 1. Otherwise, they are coded as 0. A code of 1 indicates the presence of green jobs opportunities or environmental regulations in respondents' sub-industry. Alternative coding of any or half sub-industry do not affect major findings.

Sociodemographic Control Variables

I employ as control variables well-established sociodemographic measures that shape environmental concerns (Bord and O'Connor 1997; Dunlap and Jones 1992; Gifford and Nilsson 2014; Mohai and Bryant 1998). I include age, educational degree, income, political ideology, gender, race, Christian religion, religiosity, survey year, union membership, and self-employment. Age is a continuous variable of respondent age during surveys. Educational degree is coded 1 if respondents obtained a college or advanced degree and 0 otherwise. Income is a logged measure of self-reported household income adjusted in 1986 dollars. Political ideology is a seven-point Likert scale of increasing conservatism (1 = extremely liberal; 7 = extremely conservative). Gender is coded 1 if respondents self-report female and 0 otherwise. Race is a categorical variable consisting of White, Black, and Other racial groups. I code respondents 1 if they self-report any Christian denomination and 0 otherwise. Religiosity is a nine-point Likert scale variable of increasing service attendance. Union membership[11] is coded 1 if respondents are union members and 0 otherwise. Self-employment is coded 1 if respondents are self-employed and 0 otherwise. Accounting for unobserved heterogeneity from time-variant factors, I follow Woolridge's (2015) guidance in cross-sectional surveys to regress years as categorical variables referenced to year 2000. Temporal effects are likely limited because the U.S. had already undergone economic restructuring from manufacturing to servicing (Bluestone and Harrison 1982) and political polarization around environmentalism (Driscoll 2019).

Results

Do employed industries and sub-industry presence of green jobs opportunities and federal environmental regulations influence environmental concerns? Table 3 displays pooled OLS regression analysis of multiply imputed data using Rubin's rules on five environmental indexes that include and exclude controls, totaling ten enumerated models. Individuals in resource

extraction, construction and utilities, and manufacturing compared to those in professional services express less environmental concerns across different dimensions. Those in resource extraction tend to express less concern along affective and behavioral dimensions while those in manufacturing and construction and utilities express less concern along conative dimensions. Individuals in sub-industries with green jobs opportunities express more environmental concern along conative dimensions. Finally, individuals in sub-industries with federal environmental regulations, against expectations, express more environmental concern along conative dimensions.

[Insert Table 3: Pooled OLS Regression Analysis of Multiply Imputed Environmental Concerns]

Theoretical expectations and empirical studies purport that employment in resource extractive, construction and utilities, and manufacturing industries shapes individual perceptions of the environment (Allan and Robinson 2022; Ringvist 2022; Vachon 2023). Consistent with prior research, I find that individuals in resource extraction, construction and utilities, and manufacturing express distinct varieties of less environmental concern compared to those in professional services. In model 2, individuals in resource extraction compared to the reference group are less likely to prioritize the environment over economic growth ($\hat{\beta}$ = -1.26; $p<0.01$), express less concern about pollution ($\hat{\beta}$ = -1.25; $p<0.05$), and are less likely to participate in environmental activism ($\hat{\beta}$ = -0.16; $p<0.05$) after controls. Negative statistical significance around conative dimensions like willingness to sacrifice or empowered to act for the environment disappears after controls. Resource extraction individuals express less concern around affective dimensions and behavioral political activities.

In contrast, individuals employed in construction and utilities and manufacturing, compared to the reference group, tend to be less environmentally concerned along conative

dimensions. In model 6, construction and utilities ($\hat{\beta}$ = -0.54; p<0.05) and manufacturing ($\hat{\beta}$ = -1.04; p<0.01) individuals are less willing to sacrifice for the environment after controls. Although manufacturing individuals partially feel less empowered to act for the environment, introducing controls in model 8 weakens statistical significance ($\hat{\beta}$ = -0.64; p<0.1). Across all other models, differences in affective and behavioral measures are not statistically significant. Moreover, I do not find statistically significant differences across other servicing, warehousing, and transportation industries. Overall, the findings support my first hypothesis.

Since prior studies suggest promoting economic opportunities popularizes environmental protectionism (Diamond and Zhou 2022), I test whether employment in a sub-industry with high potential for green jobs influences individual environmental concerns. Consistent with expectations, individuals employed in these sub-industries express more environmental concerns along conative dimensions. Models 6 and 8 respectively indicate that individuals employed in a high green jobs sub-industry are more willing to sacrifice for the environment ($\hat{\beta}$ = 0.29; p<0.05) and feel more empowered to act for the environment ($\hat{\beta}$ = 0.23; p<0.05) after controls. Despite some evidence for greater concern for prioritizing the environment and likelihood for political activism, coefficients are only statistically significant at p<0.1 in models 2 and 10, respectively. No statistically significant differences are present around the concern of pollution. Overall, findings support the second hypothesis.

Individuals may also express less environmental concerns when environmental regulations are present due to increased cost perceptions and damaging job prospects (Bakaki and Bernauer 2017; Kazis and Grossman 1991). I test whether environmental concerns vary between individuals employed and not employed in SBA and EPA regulated sub-industries. Results indicate no differences across SBA environmentally regulated sub-industries.

Unexpectedly, I find that individuals employed in EPA regulated sub-industries express more willingness to sacrifice for the environment ($\hat{\beta}$ = 0.76; p<0.01) in model 6. Individuals also feel more empowered to act for the environment, but coefficients are only statistically significant at p<0.1 in model 8. Individuals employed in sub-industries with federal environmental regulations are not significantly less environmentally concerned, thereby undermining the third hypothesis.

Finally, I conduct additional robustness checks to address potential temporal and nonresponse bias. To assess whether industry effects are period specific, I present interaction effects of survey years with hypothesized variables located in the online supplement's Appendices C and D. To address the possibility that results are biased from missing data, I compare complete cases analyses with multiple imputation in Appendices E and F. While extended discussion is in the online supplement, robustness checks largely indicate that main results are robust to temporal and nonresponse biases.

Discussion

Scholars have extensively assessed economic effects on environmental concerns along economy-environment tradeoffs, but studies are challenged by inconsistent evidence across macroeconomic and microeconomic measures. Informed by environmental and labor scholarships, I find evidence that industry contexts shape environmental concerns. Findings underscore distinct industry effects on affective, conative, and behavioral dimensions (Dietz et al. 1998; Dunlap and Jones 2002), thereby suggesting more complex explanations beyond zero-sum tradeoffs. Compared to those in professional services, individuals in resource extraction express less environmental concerns along affective and behavioral dimensions while those in manufacturing and construction and utilities express less concerns along conative dimensions. Previous environmental and labor scholarships offer several interpretations. For individuals in

manufacturing, findings may suggest social costs of de-industrialization whereby workers prioritize economic security over environmental protections (Bluestone and Harrison 1982; Kazis and Grossman 1991; Montrie 2018). Among resource extraction individuals, skepticism of environmental problems and pollution harms suggests the prevalence of a "jobs versus environment" dilemma (Bell and York 2010; Vachon 2023). However, non-significance along conative dimensions suggests that individuals in resource extraction may also harbor commitments for local environmental preservation identified in previous literature (Feng 2020; Loomis 2015). Finally, environmental concerns among construction and utilities individuals, who are disproportionately older, White, and men, are driven largely by sociodemographic background rather than industry-specific risk perceptions from environmental protections or energy transition. This is consistent with "all of the above" energy preferences among these workers discussed in prior research (Sicotte et al. 2022; Vachon 2023). Findings underscore that exploring industry contexts may offer answers to inconsistent evidence of macroeconomic and microeconomic effects on environmental concerns.

Results carry theoretical and empirical implications to assess how economic circumstances influence environmental concerns. Scholars assessing macroeconomic pressures have largely theorized a universal dampening effect of economic downturns on environmental priorities (Conroy and Emerson 2014; Kenny 2020; Scruggs and Benegal 2012), yet recessionary impacts vary across industries (Bailey and Chapain 2012). Macroeconomic impacts on environmental concerns may be conditional to the degree some industries are harder hit than others. Employment in industry sectors that are recession robust or minimally impacted may moderate shifting priorities against environmental protectionism, like how higher individual income provides a protective effect from macroeconomic pressures (Conroy and Emerson 2014).

Conversely, measures of national economic prosperity can opaque industry-specific economic stagnation and declining job prospects. Scholars also overlook how industry-specific technological innovations like automation, which historically restructured U.S. mining, forestry, and manufacturing (Bluestone and Harrison 1982; Loomis 2015; Montrie 2018), factor into economy-environment tradeoff expectations. Assessing shifting industry contexts offers more granular and generative operationalizations for economic effects on environmental concerns.

Similarly, scholars assessing how microeconomic precarity indicators influence environmental concerns would benefit by analyzing industry contexts. Although scholars derive individual economy-environment tradeoff arguments from Maslow's hierarchy of needs (Maslow 1970), empirical evidence of objective economic circumstances using income, occupation, and educational differences is inconsistent with these expectations (Gifford and Nilsson 2014; Jones and Dunlap 1992; Mildenberger and Leiserowitz 2017). Scholars have alternatively turned towards sociopolitical explanations including media coverage, elite cues, and political polarization (Carmichael and Brulle 2017; Driscoll 2019). Along similar lines, my findings offer the possibility that industry-specific economic threat perceptions influence environmental concerns. These may arise from firsthand intersubjective workers' experiences from industry restructuring or from narratives constructed by media, political, and corporate actors (Bell and York 2010; Kazis and Grossman 1991). While my study alongside others finds environmental concerns vary by industry (Jones and Dunlap 1992; Ringqvist 2022), future research should test competing mechanisms to assess how meso-level economic contexts shape environmental concerns.

Moreover, my results suggest that green economic opportunities may partially overcome economy-environment tradeoff expectations. In line with previous research on the popularity of

tying economic growth with environmental protectionism (Diamond and Zhou 2022), I find that individuals in high potential green jobs sub-industries express greater environmental concerns along affective and conative dimensions. Despite qualitative evidence suggesting mixed worker reception to "green jobs" (Allan and Robinson 2022; Cha et al. 2021), the presence of green jobs opportunities may foster greater environmental concerns. Findings corroborate ecological modernization theories around sustainable economic growth (Sparrer and Mol 1992). Results suggest that green jobs opportunities factor into building public support for environmentalism.

Non-significant findings of federal environmental regulations on environmental concerns underscore the need for scholars to reassess regulatory perceptions. While my findings run counter to scholarly and lay expectations that individuals perceive environmental regulations as economically costly and detrimental to jobs (Bakaki and Bernauer 2017; Kazis and Grossman 1991), Chen (2017) similarly finds that the presence of environmental regulations in highly polluting industries does not impact environmental spending preferences. Non-significance may be because environmental regulations do not factor into daily work experiences. Additionally, the positive association between EPA toxic chemical regulations and conative environmental concerns may exist because workers experience pollutants firsthand as workplace hazards, and therefore feel more willing to bear economic costs to promote worker safety. This is consistent with previous scholars' findings that worker safety frames have served to bridge environmental and labor causes (Mayer 2009; Obach 2004). Future research should examine whether such occupational health and worker safety frames moderate perceptions of environmental regulations as economically costly.

Conclusion

Do industry sector contexts influence environmental concerns? By analyzing a novel dataset combining U.S. representative surveys and federal administrative data, I find that industry sector employment, green jobs opportunities, and environmental regulatory presence shape individual environmental concerns. Compared to those in professional services, individuals employed in resource extraction, manufacturing, and construction and utilities express less environmental concerns, but across different dimensions. Individuals in resource extractive industries tend to prioritize economic growth over environmental protectionism, are less concerned about pollution harms, and are less likely to participate in environmental activism. Those in manufacturing and construction and utilities tend to express less willingness to sacrifice for the environment. Individuals employed in sub-industries with high potential for green jobs opportunities are more willing to sacrifice and feel more empowered to act for the environment. Unexpectedly, individuals employed in sub-industries with EPA toxic chemical regulations are more willing to sacrifice for the environment. Collectively, findings support new operationalizations to assess economic effects on varying dimensions of environmental concerns.

Scholars should consider in future research how industry contexts operate in prevailing studies of economy-environment tradeoffs. Longitudinal analyses would enable scholars to assess whether employment in recession-robust industries moderates macroeconomic effects on environmental concerns. Scholars should also assess whether industry-specific economic downturns or upswings shape environmental concerns beyond this study's period. Although I find significant associations in cross-sectional analyses, future research should test for directionality, within-subject changes, and competing mechanisms. Qualitative and historical studies suggest environmental concerns are shaped by perceived economic threats to employed industries (Kazis and Grossman 1991; Montrie 2018), but quantitative findings may also indicate

environmentally concerned individuals seek employment in service sector or green industries. Fixed effects panel studies can test with greater precision causal mechanisms of industry variables. Building on quantitative analyses of American and European samples (Jones and Dunlap 1992; Ringqvist 2022), future research should also assess findings' cross-country generalizability. My findings also underscore the need for environmental opinion surveys to include employed industries. Finally, given varied effects of industry contexts across measures, future studies should account for environmental concerns' multi-dimensionality. Future scholars should assess empowerment to act for the environment, which has not been previously examined (Dunlap and Jones 2002).

Policy makers, environmentalists, and labor unions have turned towards green growth to convince the public to tackle environmental and climate degradation. However, efforts are stymied by organized corporate and political efforts to frame regulations and protectionism as economically costly and disastrous to workers in impacted industries. U.S. environmental movements face the political paradox that many labor union leaders in manufacturing, utilities, and construction opposed the Green New Deal, despite these industries receiving unprecedented U.S. federal climate-related investments. Centering environmental concerns of workers and their perceptions of economic opportunities and threats amidst de-carbonization are necessary to align environmental and labor movements towards an equitable and clean energy economy.

[1] A cognitive dimension, which I do not explore due to lack of survey questions, captures knowledge about environmental concerns.

[2] Scholars have long debated operationalizing social class (Wright 1998). I focus on measures studied by environmental scholars: income, occupation, and education.

[3] I utilize cluster-robust standard errors at the 2007 NAICS sub-industry level to address clustered errors (Cameron and Miller 2015). I run Poisson, ordinal logistic, and weighted least squares models with no significant differences.

[4] Out of 8893 respondents, I drop 6.1% because of missing industry or employment in military.

[5] For example, affective GRNEPROG "People worry too much about human progress harming the environment" is in the same factor as conative TOODIFME "It is just too difficult for someone like me to do much about the environment."

[6] While these criteria are more conservative, relaxing them to include items that have significant cross-loadings or items greater than 0.3 factor loadings do not change statistical significance of main results. Of twenty-seven items, twenty meet these criteria in a five-factor fitted model. Appendix B in the online supplement displays exploratory factor loadings of removed items.

[7] Slight variations are present because some questions are not repeated across surveys (e.g. "How often do you refuse to eat meat for moral or environmental reasons?").

[8] I analyze the GSS data file that employs 2007 CI. The GSS codebook mislabels industry sector as 2010 CI while the GSS website mislabels it 2007 NAICS.

[9] I distinguish this group from wholesale, retail, and recreational services because of qualitatively different work already categorized under CI. As indicated by Appendix G, combining categories in main analyses yields similar results.

[10] While there is generally no consensus definition of what constitutes a "green job" (Kouri and Clarke 2014; Sommers 2013), administrative measures indicate economic opportunities.

[11] I multiply impute 33.7% missing union membership data due to non-responses and ballot restrictions.

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Declaration of Interest Statement

There are no competing interests for the author to declare.

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Table 1: Descriptive Statistics of GSS and Industry Variables

Variable	N (for categorical)	Mean	Std. Dev
Environmental Concerns (Imputed Means)			
Prioritize Environment Index (Scale 0-16)		9.9	3.7
Concern of Pollution Index (Scale 0-24)		15.5	3.9
Willingness to Sacrifice Index (Scale 0-12)		5.7	3.2
Empowered to Act Index (Scale 0-12)		7.0	2.4
Participate in Activism Index (Scale 0-4)		0.6	1.0
Census Industry Sector (2007)			
Professional, Management, and Administrative Services	4582 (54.9%)		
Agriculture, Forestry, and Mining Sector	134 (1.6%)		
Construction and Utilities	550 (6.6%)		
Manufacturing	1094 (13.1%)		
Transportation and Warehousing	373 (4.5%)		
Wholesale, Retail, and Recreational Services	1620 (19.4%)		
Industry Characteristics on 3-digit NAICS Sub-Industry Sector (2007)			
BLS Green Jobs Industry Sub-Sector	3280 (39.3%)		
SBA Environmentally Sensitive Industry Sub-Sector	1165 (13.9%)		
EPA Toxic Release Inventory Industry Sub-Sector	1861 (22.3%)		
Social-Demographic Characteristics			
Age		49.6	17.3
Political Conservatism (1-7 Scale)		4.0	1.5
Church Attendance (0-8 Scale)		3.2	2.8
Household Income Logged (Adjusted 1986 dollars, Imputed)		10.0	1.1
College Degree	3630 (43.5%)		
Christian Religion	6007 (71.9%)		
Race: White	6530 (78.2%)		
Race: Black	1097 (13.1%)		
Race: Other	682 (8.2%)		
Gender: Man	3673 (44.0%)		
Gender: Woman	4597 (55.0%)		
Union Membership (Imputed Mean)	897 (10.7%)		
Employment Status: Self-Employed	952 (11.4%)		
Employment Status: Employee	7346 (87.9%)		
Year: 2000	2656 (31.8%)		
Year: 2010	1905 (22.8%)		
Year: 2021	3792 (45.4%)		
N Obs	8353		

Table 2: Environmental Index Measures, Factor Loadings, and Descriptive Statistics

GSS Variables	Survey Prompt	Factor Loadings (Cronbach's Alpha Scores)	Mean (Imputed)	Std. Dev	Min	Max
Prioritize Environment Index (Scale 0-16)		**Alpha = 0.78**	**9.9**	**3.7**	**0**	**16**
NATENVIR (Rescaled and Reversed)	Are we spending too much, too little, or about the right amount on improving and protecting the environment?	0.54	3.1	1.3	0	4
GRNECON	We worry too much about the future of the environment, and not enough about prices and jobs today.	0.73	2.2	1.2	0	4
GRNPROG	People worry too much about human progress harming the environment.	0.71	2.3	1.1	0	4
GRNEXAGG	Many of the claims about environmental threats are exaggerated.	0.67	2.3	1.2	0	4
Concern of Pollution Index (Scale 0-24)		**Alpha = 0.78**	**15.5**	**3.9**	**0**	**24**
INDUSGEN (Reversed)	In general, do you think that air pollution caused by industry is…	0.77	2.9	0.9	0	4
CHEMGEN (Reversed)	And do you think that pesticides and chemicals used in farming are…	0.70	2.7	0.9	0	4
NUKEGEN (Reversed)	And do you think that nuclear power stations are…	0.51	2.4	1.1	0	4
WATERGEN (Reversed)	In general, do you think that pollution of America's rivers, lakes, and streams is…	0.62	3.0	0.9	0	4
GENEGEN (Reversed)	And do you think that modifying the genes of certain crops is…	0.47	2.1	1.0	0	4
CARSGEN (Reversed)	In general, do you think that air pollution caused by cars is…	0.68	2.5	0.9	0	4
Willingness to Sacrifice for Environment Index (Scale 0-12)		**Alpha = 0.85**	**5.7**	**3.2**	**0**	**12**
GRNPRICE (Reversed)	How willing would you be to pay much higher prices in order to protect the environment?	0.82	2.1	1.2	0	4
GRNTAXES (Reversed)	And how willing would you be to pay much higher taxes in order to protect the environment?	0.87	1.8	1.3	0	4
GRNSOL (Reversed)	And how willing would you be to accept cuts in your standard of living in order to protect the environment?	0.69	1.8	1.2	0	4
Empowered to Act for Environment Index (Scale 0-12)		**Alpha = 0.64**	**7.0**	**2.4**	**0**	**12**

TOODIFME	It is just too difficult for someone like me to do much about the environment.	0.70	2.3	1.1	0	4
OTHSSAME	There is no point in doing what I can for the environment unless others do the same.	0.61	2.5	1.1	0	4
HELPHARM	I find it hard to know whether the way I live is helpful or harmful to the environment.	0.46	2.2	1.0	0	4
Participate in Environmental Activism Index (Scale 0-4)		**Alpha = 0.65**	**0.6**	**1.0**	**0**	**4**
GRNGROUP (Reversed)	Are you a member of any group whose main aim is to preserve or protect the environment?	0.56	0.1	0.3	0	1
GRNSIGN (Reversed)	In the last five years, have you signed a petition about an environmental issue?	0.63	0.2	0.4	0	1
GRNMONEY (Reversed)	In the last five years, have you given money to an environmental group?	0.71	0.2	0.4	0	1
GRNDEMO (Reversed)	In the last five years, have you taken part in a protest or demonstration about an environmental issue?	0.40	0.0	0.2	0	1

Table 3: Pooled OLS Regression Analysis of Multiply Imputed Environmental Concerns

	DV: Prioritize Environment (0-16)		DV: Concern of Pollution (0-24)		DV: Willing to Sacrifice for Env. (0-12)		DV: Empowered to Act for Env. (0-12)		DV: Participate in Env. Activism (0-4)	
Explanatory Variables	W/o Controls (1)	W/ Controls (2)	W/o Controls (3)	W/ Controls (4)	W/o Controls (5)	W/ Controls (6)	W/o Controls (7)	W/ Controls (8)	W/o Controls (9)	W/ Controls (10)
Agriculture, Forestry, and Mining	-2.70***	-1.26**	-1.81**	-1.25*	-1.31***	-0.66+	-0.70*	-0.12	-0.37***	-0.16*
	(0.43)	(0.40)	(0.55)	(0.51)	(0.37)	(0.38)	(0.35)	(0.31)	(0.08)	(0.08)
Construction and Utilities	-1.00*	-0.07	-0.32	-0.20	-1.00***	-0.54*	-0.51*	-0.03	-0.25**	-0.07
	(0.44)	(0.36)	(0.49)	(0.42)	(0.28)	(0.26)	(0.25)	(0.24)	(0.08)	(0.07)
Manufacturing	-1.10	-0.40	-0.56	-0.75	-1.33***	-1.04**	-1.03*	-0.64+	-0.21+	-0.08
	(0.68)	(0.53)	(0.53)	(0.55)	(0.37)	(0.34)	(0.41)	(0.34)	(0.11)	(0.10)
Transportation and Warehousing	-0.94**	-0.38	-0.28	-0.03	-0.52	-0.22	-0.17	0.09	-0.09	0.01
	(0.33)	(0.26)	(0.39)	(0.37)	(0.33)	(0.30)	(0.21)	(0.18)	(0.07)	(0.06)
Wholesale, Retail, and Recreational Services	-0.11	0.01	0.13	-0.07	0.07	0.11	-0.24+	0.03	-0.06	0.01
	(0.16)	(0.13)	(0.20)	(0.16)	(0.16)	(0.15)	(0.14)	(0.11)	(0.04)	(0.04)
Sub-Industry Sector w/ BLS Green Jobs Potential	0.65***	0.21+	-0.14	0.03	0.61***	0.29*	0.49***	0.23*	0.18***	0.07+
	(0.17)	(0.11)	(0.17)	(0.15)	(0.13)	(0.12)	(0.11)	(0.09)	(0.04)	(0.04)
Sub-Industry Sector w/ EPA Toxic Release Inventory	0.23	0.16	0.10	0.31	0.74**	0.76**	0.47+	0.44+	0.10	0.10
	(0.46)	(0.38)	(0.46)	(0.41)	(0.28)	(0.27)	(0.26)	(0.23)	(0.08)	(0.07)
Sub-Industry Sector w/ SBA Environmental Category	-0.26	-0.15	-0.22	0.20	-0.09	-0.05	-0.14	-0.14	-0.05	-0.05
	(0.36)	(0.29)	(0.38)	(0.33)	(0.24)	(0.21)	(0.22)	(0.19)	(0.06)	(0.06)
Union Member		0.58**		0.26		0.33		0.60***		0.10+
		(0.19)		(0.28)		(0.20)		(0.17)		(0.06)
Age		-0.01***		-0.01*		-0.00		-0.01*		0.00
		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)
College Degree		0.75***		-0.25+		0.58***		0.70***		0.29***
		(0.11)		(0.14)		(0.11)		(0.08)		(0.03)
Political Ideology (Increasing Conservatism)		-0.95***		-0.56***		-0.61***		-0.09***		-0.12***
		(0.04)		(0.04)		(0.04)		(0.03)		(0.01)
Female		0.44***		1.24***		-0.08		0.20**		0.00
		(0.12)		(0.12)		(0.10)		(0.07)		(0.03)
Black/African American Race		-0.61***		1.12***		-0.39**		-0.65***		-0.19***
		(0.13)		(0.16)		(0.14)		(0.12)		(0.04)
Other Race		-0.39*		0.83***		0.40*		-0.59***		-0.15**
		(0.18)		(0.21)		(0.19)		(0.14)		(0.05)

	DV: Prioritize Environment (0-16)		DV: Concern of Pollution (0-24)		DV: Willing to Sacrifice for Env. (0-12)		DV: Empowered to Act for Env. (0-12)		DV: Participate in Env. Activism (0-4)	
Self-Employed		-0.14		-0.08		0.24^{+}		0.23^{*}		0.11^{*}
		(0.13)		(0.18)		(0.14)		(0.11)		(0.05)
Christian Religion		-0.65^{***}		-0.24^{+}		-0.82^{***}		-0.33^{***}		-0.17^{***}
		(0.12)		(0.14)		(0.13)		(0.08)		(0.04)
Increasing Church Attendance		-0.07^{***}		-0.02		0.05^{**}		0.03^{+}		-0.00
		(0.02)		(0.02)		(0.02)		(0.02)		(0.01)
Year 2010		-0.23^{+}		-0.13		-0.20^{+}		0.02		-0.14^{***}
		(0.12)		(0.16)		(0.12)		(0.11)		(0.03)
Year 2021		0.60^{***}		-0.08		-0.25^{+}		0.11		-0.09^{*}
		(0.13)		(0.20)		(0.13)		(0.12)		(0.04)
Household Income (Logged)		0.14^{**}		-0.36^{***}		0.02		0.21^{***}		0.03^{*}
		(0.05)		(0.06)		(0.05)		(0.03)		(0.01)
Constant	10.03^{***}	13.12^{***}	15.72^{***}	21.24^{***}	5.60^{***}	8.37^{***}	6.96^{***}	5.12^{***}	0.57^{***}	0.81^{***}
	(0.11)	(0.57)	(0.14)	(0.65)	(0.10)	(0.51)	(0.08)	(0.36)	(0.03)	(0.15)
R^2	0.03	0.26	0.01	0.12	0.02	0.14	0.02	0.10	0.01	0.10
N Observations	8353	8353	8353	8353	8353	8353	8353	8353	8353	8353

Note: Reference group works in Professional, Management, and Administrative Services, is an employee, is non-college educated, is Male, White, non-Christian religion, and year 2000. Analysis is pooled OLS regression on multiply imputed datasets of cross-sectional General Social Surveys for years 2000, 2010, and 2021. Standard errors are robust to 2007 NAICS 3-digit sub-industry clusters. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$; $^{+}p < 0.1$