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In the Path of the Flood: Exploring Carbon-Intensive Employment and Coastal Geography as Motivators of U.S. Climate Change Denial

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Abstract

This thesis uses multivariate regressions of the ANES 2016 Dataset to test whether working in a carbon-intensive industry affects belief in climate change. It also uses the same dataset to test whether living in an area that would see increased flooding and displacement under a climate change scenario can affect the same attitudes. Additionally, it presents crosstabulations of climate skeptics and non-skeptics by party preference, education, and turnout habits. I find that working in a carbon-intensive industry does not reduce a respondent's likelihood to report belief in climate science. Similarly, living in a coastal area that is likely to see significant disruption in even an optimistic climate change scenario does not affect belief in climate change. Instead, the control variables of partisanship, education, and income are highly significant predictors of climate skepticism. Lastly, I find through the use of a survey mode variable that conducting the survey online rather than in-person produces a significant increase in climate-skeptic responses, providing evidence that climate skepticism elicits a kind of Bradley Effect in individuals.

Keywords

climate change denial, climate skepticism, climate change, global warming, public opinion, occupation, carbon, emissions, ANES, climate attitudes, partisan motivated reasoning, motivated reasoning, egotropism, sociotropism, opinion formation, Political Science, Social Sciences, Marc Meredith, Meredith, Marc

Disciplines

American Politics | Environmental Policy | Models and Methods | Other Political Science | Other Public Affairs, Public Policy and Public Administration | Social Policy

In the Path of the Flood:
Exploring Carbon-Intensive Employment and Coastal Geography as Motivators of U.S.
Climate Change Denial

By

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Advisor: Dr. Marc Meredith

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Abstract

This thesis uses multivariate regressions of the ANES 2016 Dataset to test whether working in a carbon-intensive industry affects belief in climate change. It also uses the same dataset to test whether living in an area that would see increased flooding and displacement under a climate change scenario can affect the same attitudes. Additionally, it presents crosstabulations of climate skeptics and non-skeptics by party preference, education, and turnout habits. I find that working in a carbon-intensive industry does not reduce a respondent's likelihood to report belief in climate science. Similarly, living in a coastal area that is likely to see significant disruption in even an optimistic climate change scenario does not affect belief in climate change. Instead, the control variables of partisanship, education, and income are highly significant predictors of climate skepticism. Lastly, I find through the use of a survey mode variable that conducting the survey online rather than in-person produces a significant increase in climate-skeptic responses, providing evidence that climate skepticism elicits a kind of Bradley Effect in individuals.

1 – Introduction & Research Questions

The existence of climate change is not a controversial question. The vast majority of governments around the world acceded to the 2015 Paris Climate Accords and made the reduction of carbon emissions an explicit national policy priority.¹ A diverse set of nations, like Iceland and Costa Rica, have met nearly 100% of their energy demands using renewable sources. Some more industrialized countries, like Germany and Denmark, are not far behind.² All of these countries are democracies and are pushing for carbon-neutrality and renewable energy with robust public support. Correspondingly, the electorates of these nations are widely accepting of climate science.³ In a 2017 Flash Eurobarometer survey, 92% of EU citizens responded that climate change is at least a “serious problem,” with 90% saying they had personally taken action to mitigate it. Even in the United Kingdom, a country often seen as Europe’s skeptical stepchild, 93% of the population believes climate change is occurring.⁴

The picture in the United States is different. Only 73% of Americans agree that climate change is a serious problem. Thus, Americans are three-and-a-half times more likely to engage in climate denial than their peers. A much larger proportion of U.S. citizens,

¹ “Paris Climate Agreement Becomes International Law.” ABC News. Archived from the original on 4 November 2016. Retrieved 4 November 2016.

² Camioto de Castro, Flávia, Enzo Barberio Mariano, Naja Brandão Santana, Bruno Dantas Yamashita, and Daisy Aparecida do Nascimento Rebelatto. “Renewable and sustainable energy efficiency: An analysis of Latin American countries.” *Environmental Progress & Sustainable Energy* 37, no. 6 (2018): 2116-2123.

³ “Special Eurobarometer 459”, Directorate General for Communication of the European Union. Published September 2017, Accessed March 2020.

https://ec.europa.eu/clima/sites/clima/files/support/docs/report_2017_en.pdf.

⁴ *Climate Change: Social Divisions in Beliefs and Behavior*, in *British Social Attitudes* 35, pp. 35.

https://www.bsa.natcen.ac.uk/media/39251/bsa35_climate_change.pdf

then, are denying a phenomenon that is a verifiable scientific fact and has been identified by innumerable public and private institutions as an existential global threat.^{5,6,7}

Climate denial represents a failure of the “marketplace of ideas,” and is an example of a thorough scientific consensus failing to motivate changes in public policy.⁸ The mechanisms and motivations of climate change denial should therefore be studied to uncover what social and political forces are causing reason and rationality to be sidelined in this important policy debate. Given that the climate consensus is as thorough as any scientific consensus can ever be, this is as if millions of Americans walked out of their homes, pointed at the sky, and all proclaimed that it was red and not blue. We must work to understand whatever is happening in American society that is giving rise to such widespread skepticism. In other words, climate change denial must be studied because its persistence belies the existence of deeper imbalances in society writ large.

Understanding climate skepticism is also critical if the United States is to be brought into the fold on the effort to stop global warming. In 2017, the U.S. was responsible for 13.7% of global emissions, generating 15.81 Tons per capita.^{9,10} While it is true that total U.S. Greenhouse Gas (GHG) emissions and U.S. per capita power consumption are down

⁵ Coral Davenport, "Pentagon signals security risks of climate change." *New York Times* 13, no. 2014 (2014): A14.

⁶ Michael Hawker, "Climate change and the global insurance industry." *The Geneva Papers on Risk and Insurance-Issues and Practice* 32, no. 1 (2007): 22-28.

⁷ *Report on Effects of a Changing Climate to the Department of Defense*, United States Department of Defense Website, 1/10/2019 <https://media.defense.gov/2019/Jan/29/2002084200/-1/-1/1/CLIMATE-CHANGE-REPORT-2019.PDF>.

⁸ John Stuart Mill, *The basic writings of John Stuart Mill: On liberty, the subjection of women and utilitarianism*. Modern Library, 2010.

⁹ "United States of America CO2 Emissions per Capita, 1970-2019." Knoema. Accessed March 20, 2020. <https://knoema.com/atlas/United-States-of-America/CO2-emissions-per-capita>.

¹⁰ "Each Country's Share of CO2 Emissions." *Union of Concerned Scientists*, www.ucsusa.org/resources/each-country-share-co2-emissions.

from their all-time peaks, the United States is still well behind the emissions targets set by e.g. the United Nations, which has called for reducing emissions to 45% of 2010 levels by 2030 just to limit warming to 1.5 degrees Celsius.¹¹ No plan to control the accumulation of GHGs and stop the warming of the planet can succeed if it does not include the United States.

Conversely, mitigating American climate change denial could change the U.S. from a drag on decarbonization to an important ally in those efforts. The United States' workforce, natural resources, and under-utilized manufacturing capacity could be instrumental in supplying the solar panels and wind turbines that can decarbonize the rest of the world. The U.S. might even use its global leadership and economic leverage to pressure other countries into complying with global emissions standards. French President Emmanuel Macron set an example for this kind of maneuver in August 2019, when he announced that France would be blocking Brazil's pending trade deals with the European Union until Brazil changed its approach to the wildfires in the Amazon.¹² Similarly, the United States could predicate access to the world's largest consumer market on trading partners meeting certain renewable energy and decarbonization goals. All of this is to say nothing of the authority and "soft power" that the climate cause would enjoy in forums like the U.N. and the G-20 Summits if the United States came into the fold. Yet as it stands, U.S. climate change denial obstructs the path toward these very necessary changes. The globalized

¹¹ "Global Warming of 1.5 °C". Accessed March 17, 2020. <https://www.ipcc.ch/sr15/>.

¹² Jon Stone, *Emmanuel Macron says he will block EU trade deal with Brazil over Amazon forest fires*, The Independent, published August 23, 2019. <https://www.independent.co.uk/news/world/europe/macron-amazon-forest-fires-veto-mercosur-eu-trade-deal-brazil-a9076181.html>, Accessed December 14, 2019.

nature of the climate change issue makes this a problem not just for Americans, but for everyone on earth.

This thesis theorizes that fears of economic insecurity, unemployment, and potential displacement have become cognitive motivators and are driving climate denial among select populations. It is conceivable that people like coal miners and fracking workers, faced with the prospect of being made permanently unemployable, find the implications of climate science so distressing that they choose not to prioritize rationality and empiricism. Instead, they may bury their heads in the sand and ignore the need to decarbonize. To put it bluntly, Maslow's pyramid of needs puts employment, food, and shelter well before internalization of scientific consensus and a transition to carbon-free living.¹³ When section C of the Green New Deal resolution calls for "meeting 100 percent of the power demand in the United States through clean, renewable, and zero-emission energy sources," some individuals are bound to hear only a threat to their jobs.¹⁴

Confirming economic insecurity as a cause of climate denial would explain its peculiar success in the United States. Of all nations in the developed world, only the United States does not guarantee healthcare to all of its citizens.¹⁵ Only in America, then, does unemployment mean not just deprivation of wages and food, but also vulnerability to treatable illnesses. The United States also ranks relatively low on other measures of social welfare, be it food stamps or access to affordable higher education, itself an important

¹³Saul McLeod, "Maslow's hierarchy of needs." *Simply psychology* 1 (2007): 1-24

¹⁴U.S. Congress, House H. Res 109, *Recognizing the duty of the Federal Government to create a Green New Deal*. <https://www.congress.gov/bill/116th-congress/house-resolution/109/text>, Accessed December 15, 2019

¹⁵ Stephen Lendman, "America the Only Developed Country Without Universal Healthcare," *Global Research*, July 9, 2017, <https://www.globalresearch.ca/america-the-only-developed-country-without-universal-healthcare/5598311>)

foothold on the socioeconomic ladder.¹⁶ These holes in the social safety net can be expected to amplify the effects of any economic anxiety as a cognitive motivator and would explain why climate skepticism has prospered in the United States.

To empirically test my theory, I first examine whether working in a carbon-intensive industry affects climate denial. The theory for this mechanism is that the anxiety arising from the prospect of unemployment and its concomitant material insecurity can form a kind of “cognitive motivator” among the people who would lose the most if climate change were true.

I also examine whether holding property at a high risk of destruction affects belief in climate science. Individuals living in areas that will be disrupted by recurrent flooding and rising sea levels are identified and tested for the same climate attitudes. The theory for this second test is that anxiety arising from the possibilities of destruction of property and displacement increases resistance to the scientific consensus that implies those possibilities.

Before moving directly to testing these theories, this paper considers several literatures that provide context for the questions explored herein. The goal of the literature review is threefold. First, it seeks to identify theoretical frameworks that have overlap with the question at hand and might be productively applied to the climate skepticism problem. Second, it is designed to internalize the lessons of and draw inspiration from past work for the purposes of experimental design and control variable selection. Lastly, the literature

¹⁶ Rebecca A. Van Voorhis, "Different Types of Welfare States-A Methodological Deconstruction of Comparative Research." *J. Soc. & Soc. Welfare* 29 (2002): 12.

review is used to identify areas of scholarship that this research can contribute to in a meaningful way.

After the literature review, the first results section is devoted to identifying and describing the skeptical population. That is, the research ventures to first *find* the skeptics. Who denies climate change? What are the unifying demographic and ideological descriptors? Answering these questions does not reveal how or why climate skepticism takes hold, but nevertheless comprises a rich “climate skepticism at-a-glance” exercise. This approach also lends itself well to a discussion of the electoral significance of this group. This part of the analysis is not structured as testable hypotheses, but as crosstabulations.

After the *who* of it, this paper moves on to test the theories of denial described above through multivariate regression analyses of the American National Election Studies (ANES) 2016 dataset. The forecasted (i.e. dependent) variable in these models is a binary measure of belief in climate science, while the independent and control variables include a variety of demographic factors like education, income, carbon-intensive employment, and coastal geography. These models are guided by past research and are designed to test the theories of material insecurity and anxiety as predictors of climate skepticism while also controlling for known and suspected confounds.

2 – Literature Review

In asking why some individuals deny climate change, this paper broaches the more fundamental question of how beliefs are formed. I consider the vast scholarship on attitude formation and the variables that may affect it. This survey of past work draws on several

subfields of Political Science, Political Economy, and Political Psychology. Together, these disciplines provide guidance as to what factors may be driving climate denial.

2.1 Economic Voting & Egotropism vs. Sociotropism

One area of scholarship that influences my research is the theory of economic voting. In 1971, Gerald Kramer of Yale University conducted an analysis of elections in the U.S. House of Representatives from the late 19th to mid-20th centuries. This statistical experiment, entitled *Short-Term Fluctuations in U.S. Voting Behavior, 1896-1964*, used economic conditions as an explanatory variable for election results. The main finding was that the fate of incumbent parties is determined by economic realities more than anything else. Voters reliably “punish” incumbent administrations for poorly performing economies and tend to reward them for increases in real per-capita and household income.¹⁷

Kramer’s work is seminal for several reasons. First, it introduced a model of voting behavior as a function of economic and political factors, now known as the V function. More importantly, it established the idea that material well-being is a very strong predictor of political preferences, essentially enshrining Bill Clinton’s favorite aphorism of “it’s the economy, stupid,” as a tenet of Political Science.¹⁸ Turning to the question at hand, it follows that if what Kramer termed “economic prospects” determine voting preferences, they can also influence other forms of opinion that deal with material security more broadly. In the case of citizens working in industries that would be harmed by comprehensive plans to reduce emissions, there are clear dimensions of economic self-

¹⁷ Gerald H. Kramer, "Short-term fluctuations in US voting behavior, 1896–1964." *American Political Science Review* 65, no. 1 (1971): 131-143.

¹⁸ While this quip was made famous Bill Clinton, it was actually written by his political strategist, James Carville.

interest that may influence their beliefs. These anxieties might then be directed not at an incumbent party, but rather at policy initiatives like the Green New Deal, which call for downsizing the industry they work in. It is therefore important to take note of Kramer's work because the notion that future economic prospects can determine citizens' current attitudes could conceivably be motivating climate denial among individuals for whom carbon emissions and economic prosperity are intertwined.¹⁹

Kramer's work spawned an immense body of literature numbering in the hundreds of articles, evidenced by the multitude of standalone literature reviews in the area. These include *The VP-function: A survey of the literature on vote and popularity functions after 25 years* by Nannestad & Paldam and *The VP-function revisited: a survey of the literature on vote and popularity functions after over 40 years* by Lewis-Beck & Stegmaier.^{20,21} In addition to testing the theory of economic voting many times over, this subfield generated an internal dialogue known as the egotropic-sociotropic debate. The question of concern here is: granted that voters derive their political preferences from their economic preferences, do voters act to maximize their own economic results, or the economic results of the larger society in which they live? Either "the voter consults his [own] pocketbook before voting," or they try "to steer the whole economy, not the economy of anyone."²² Fundamentally, this question asks whether citizens look out for themselves or for the broader society in which they live. The term *Egotropic* refers to the individual, self-centered (or at least household-

¹⁹ Kramer, George H, "Short-term fluctuations in US voting behavior, 1896-1964," 131-143.

²⁰ Peter Nannestad and Martin Paldam. "The VP-function: A survey of the literature on vote and popularity functions after 25 years." *Public Choice* 79, no. 3-4 (1994): 213-245.

²¹ Michael S. Lewis-Beck and Mary Stegmaier. "The VP-function revisited: a survey of the literature on vote and popularity functions after over 40 years." *Public Choice* 157, no. 3-4 (2013): 367-385.

²² Nannestad and Paldam, "The VP-Function," 224.

centered) mode of decision-making, while *Sociotropic* refers to decision making that considers the consequences for society overall, not just the individual. Applied to expectations of material loss and climate denial, this framework produces two possibilities. If individuals with carbon-intensive employment internalize the fact that the realities of climate change require that their industries be seriously disrupted, but still “choose” to believe climate science, it would belie sociotropic belief formation. However, if it is found that individuals whose livelihoods generate disproportionate volumes of GHGs deny climate science at a significantly higher rate, it would signal that egotropic reasoning might be driving climate change denial.

In the context of a voter-driven society, the egotropic-sociotropic question becomes a crucial one; do people vote solely for themselves, or for everyone? How self-centered are voters when forming policy preferences? In actuality, the economic voting literature has arrived at a kind of consensus. Returning to the same two literature reviews mentioned above, one finds that Nannestad & Paldam wrote in 1994 that “in all but one studies, the sociotropic hypothesis works better than the egotropic one.”²³ Lewis-Beck and Stegmaier come to the same conclusion in 2013, but also note that as of yet, it is unclear whether sociotropic behavior is a function of altruism on the part of voters or whether it is actually a manifestation of self-interest.²⁴ This “selflessness” dimension and the fact that it remains unresolved is relevant, as climate change is in many ways the ultimate global collective action problem. If sociotropism dominates political decision-making, does it extend beyond the borders of one’s state, region, or country?

²³ Ibid. 229

²⁴ Lewis-Beck and Stegmaier, “The VP Function revisited,” 369

This sociotropic-egotropic question will be adjusted and borrowed from the economic voting literature as a potential mechanism for opinion formation and an area for further study. While the economic voting field has mostly agreed that the sociotropic explanation appears to dominate *voting* behavior, it is yet unclear if the theory's explanatory power carries over into the broader realm of opinion formation, belief formation, and survey response. The authors in the economic voting field have been mostly agnostic on these questions, and in most cases have not addressed it at all.²⁵ Additionally, the question investigated here is one of *belief*, not of opinion or policy preference. Exploring whether beliefs on climate change are affected by socioeconomic anxieties helps delineate the areas of public engagement wherein the egotropic-sociotropic framework can be productively applied.

There are a handful of other salient examples of the egotropic-sociotropic framework from outside the economic voting field, namely in the areas of trade and immigration attitudes. Here too, the sociotropic explanation appears to be more correct. Consider the study of attitudes towards immigration. In an egotropic paradigm, one would expect that individuals that would be in direct competition with immigrants over employment would be more hostile to relaxed immigration policies. Most of the experiments and opinion studies in this field, however, have found that this "labor competition" effect does not actually determine immigration preferences. Surveying the literature in *Public Attitudes Toward Immigration (2014)*, Hainmueller & Hopkins found that in actuality the "labor market competition hypothesis has repeatedly failed to find

²⁵ Ibid.

empirical support” and is “something of a zombie theory.”²⁶ Instead, theoretical approaches that consider the socialized cultural or fiscal effects are much more successful.²⁷ This would be an example of sociotropic opinion formation overriding any self-centered economic calculus in respondents.

The literature on free trade attitudes shares a similar debate, although it has seen mixed results, and it is less clear there which model has more explanatory power. The egotropic explanation in this case would be that those with something to lose from trade liberalization would be most likely to oppose it. Yet in practice, authors have struggled to refine the populations and trade situations in which egotropism can consistently be observed, with additional challenges brought by “disentangling” things like vulnerability to trade liberalization from factors like education levels and foreign policy preferences.²⁸ As of yet, the most refined measure of exposure to labor market changes have been the proxies of education and skill level, as opposed to e.g. working in a specific industry that can be expected to see substantial layoffs after trade liberalization.²⁹ In this subfield, then, it is still unclear how well understood an issue must be or how salient an economic reality must appear before it elicits either egotropic or sociotropic behavior in a population. In

²⁶ Jens Hainmueller and Daniel J. Hopkins. "Public attitudes toward immigration." *Annual Review of Political Science* 17 (2014): 241.

²⁷ *Ibid.* 225-249

²⁸ Eddie Hearn, "Disentangling the relationship between sociotropic and egotropic trade attitudes: A survey experiment in Japan." *Japanese Journal of Political Science* (2019): 1-12.

²⁹ Lena M. Schaffer and Gabriele Spilker, "Ego-vs. Sociotropic: Using Survey Experiments to Understand Individuals' Trade Preferences." In *APSA 2014 Annual Meeting Paper*. 2014.

fact, authors have trouble picking one framework over the other even when using identical datasets.^{30,31,32}

These literatures provide three inspirations to ongoing work. First is that economic interests determine voting preferences to a large extent; it is therefore reasonable to expect that the household economics of decarbonization will have strong political implications. Second, that sociotropic decision-making appears to dominate the formation of political preferences, at least to a point. Third, that while the above points are true of *voting* preferences, they have not been tested as thoroughly in the realm of public opinion and survey response. Applied to the question at hand, any evidence that e.g. carbon-intensive employment predicts climate skepticism would bolster the egotropic hypothesis. Results showing no such effect would point to sociotropic reasoning on the part of those individuals.

2.2 Economic Insecurity & Public Opinion

Putting aside economic voting and the egotropic-sociotropic question, other authors have found that general deterioration in economic conditions can produce less obvious but still important effects in democracies. The findings in this subfield are somewhat of a mixed bag compared to the economic voting literature but are still noteworthy.

³⁰Edward D. Mansfield and Diana C. Mutz. "Support for free trade: Self-interest, sociotropic politics, and out-group anxiety." *International Organization* 63, no. 3 (2009): 425-457.

³¹Schaffer and Spilker. "Ego-vs. Sociotropic: Using Survey Experiments to Understand Individuals' Trade Preferences."

³²Benjamin Fordham and Katja B. Kleinberg, "How can economic interests influence support for free trade?." *International Organization* 66, no. 2 (2012): 311-328.

Writing in 2012, Gordon F. Betchel tested whether economic anxiety had measurable effects on the “propensity to vote, political trust, societal satisfaction, and the quality life” of over 34,000 Europeans.³³ Using a combination of responses on savings drawdowns, how respondents manage with lower incomes, and how they *felt* about their income, this study found that economic anxiety negatively affects all of the dependent variables mentioned. These findings are consistent with Rudolph et al’s (2000) finding that “negative perceptions of the economy” have led to an overall trend of “declining public trust in government” in recent decades.³⁴ This effect on public trust is the single most important takeaway from the economic anxiety subfield. While it is hard to argue that science and public scientific consensus are concrete “institutions” akin to political bodies, one might nonetheless expect that they see deficits in trust when economic anxiety rises. In the case of climate skepticism, the cause of the anxiety may also be the target of the trust deficit; just as trust in government falls when it cannot deliver on promises of prosperity, “public science” may see similar effects when it threatens the long-term employability and stability of a given population.

Aside from reducing public trust, economic anxiety produces other troubling tendencies in constituencies. In white males at least, economic anxiety leads respondents to favor harsher prison sentences for criminals.^{35,36} Additionally, some European

³³ Gordon G. Bechtel, "The Societal Impact of Economic Anxiety." *Journal of Data Science* 10 (2012).

³⁴ Virginia A. Chanley, Thomas J. Rudolph, Wendy M. Rahn, The Origins and Consequences of Public Trust in Government: A Time Series Analysis, *Public Opinion Quarterly*, Volume 64, Issue 3, November 2000, Pages 239–256, <https://doi.org/10.1086/317987>

³⁵ Michael J. Hogan, Ted Chiricos, and Marc Gertz. "Economic insecurity, blame, and punitive attitudes." *Justice Quarterly* 22, no. 3 (2005): 392-412.

³⁶Devon Johnson, "Punitive attitudes on crime: Economic insecurity, racial prejudice, or both?" *Sociological Focus* 34, no. 1 (2001): 33-54.

scholarship has identified economic anxiety as a motivator of left-wing extremism as well as general Euroscepticism.³⁷ While these effects are hard to stitch together, they point to a tendency of citizens to “act out” when economic anxiety reaches a certain level of salience. If attitudes on public trust, criminals and European integration can be noticeably moved by economic anxiety, perhaps the same can be said of trust in science. This may be even more likely when those scientists bring warnings of displacement and deep economic change.

2.3 Motivated Reasoning

The literature in the area of motivated reasoning, sometimes called motivated cognition, provides another guide for the study of “irrational” opinion formation. Motivated reasoning refers to the idea that in certain cases, individuals that normally rely on objective and critical thinking instead “succumb to motivated reasoning aimed at enabling them to ‘believe what they want to believe.’”³⁸ This alone is not particularly surprising; the term “confirmation bias” will be familiar to anyone that has taken an introductory psychology course. What warrants attention is how strong this phenomenon is with regard to partisanship and political opinions in particular.

Partisanship is shown to consistently influence belief formation. One theory is that party cues activate heuristic processing patterns “that minimize cognitive effort on the part of the subject.”³⁹ Prominent examples of this partisanship effect include support of sugary

³⁷ Catherine E. De Vries and Erica E. Edwards. "Taking Europe to its extremes: Extremist parties and public Euroscepticism." *Party Politics* 15, no. 1 (2009): 5-28.

³⁸ Ulrike Hahn and Adam JL Harris. "What does it mean to be biased: Motivated reasoning and rationality." In *Psychology of learning and motivation*, vol. 61, pp. 41-102. Academic Press, 2014.

³⁹ Michael Bang Petersen, Martin Skov, Søren Serritzlew, and Thomas Ramsøy. "Motivated reasoning and political parties: Evidence for increased processing in the face of party cues." *Political Behavior* 35, no. 4 (2013): 831-832

beverage taxes, perceptions of the national economy and, incidentally, climate change.^{40,41}

A 2019 study found a partisan-motivated effect to be present regarding human activity and global warming, with liberals being more accepting of anthropogenic climate change than conservatives.⁴² Note, however, that the authors qualify this finding by stating it may in actuality be caused by partisan media streams.⁴³

Another intersection between motivated reasoning and climate change skepticism is found in *Cool dudes: The denial of climate change among conservative white males in the United States*.⁴⁴ The authors here theorize that opinion formation among the titular group is determined by a desire to defend the status quo systems of political and economic power from which they benefit. While the authors find ample statistical support for this claim, the external validity of the study is limited by how specific the population being studied is. Truly, it is hard to say what is learned by studying one of the most reliably conservative demographics and finding that they, too, want to “preserve the hierarchies” broadly associated with conservative thought.

While these results are interesting and spawned a host of replication exercises in Europe, they have not considered anything other than political identity as the true motivator. Rather than attribute the acknowledged left-right divide on climate science to a

⁴⁰ Sarah E. Gollust, Colleen L. Barry, and Jeff Niederdeppe. "Partisan responses to public health messages: motivated reasoning and sugary drink taxes." *Journal of health politics, policy and law* 42, no. 6 (2017): 1005-1037.

⁴¹ Matthew J. Lebo and Daniel Cassino, "The aggregated consequences of motivated reasoning and the dynamics of partisan presidential approval." *Political Psychology* 28, no. 6 (2007): 719-746.

⁴² James N. Druckman and Mary C. McGrath. "The evidence for motivated reasoning in climate change preference formation." *Nature Climate Change* 9, no. 2 (2019): 111-119.

⁴³ *Ibid.* 117.

⁴⁴ Aaron M. McCright and Riley E. Dunlap. "Cool dudes: The denial of climate change among conservative white males in the United States." *Global environmental change* 21, no. 4 (2011): 1163-1172.

broad party-driven culture war, this paper ventures to find other, more materially salient motivators. Lastly, note that the *cool dudes* theory is implicitly egotropic, as it posits that white males are attempting to preserve the power order that they themselves benefit from.⁴⁵

It is worth exploring whether there are cognitive motivators of climate change that do not arise solely from political identity. Recall that the broad theory underpinning *partisan*-motivated reasoning is that heuristics derived from party or ideological identity are used as “cognitive shortcuts” that minimize the mental effort of a given respondent. It is conceivable, then, that heuristics about how a given policy can affect a citizen’s personal economic situation exist and function in a similar way. Yet the literature on motivated reasoning with regard to household economics is practically nonexistent compared with the literature on motivated reasoning and partisanship. It remains to be seen whether respondents display a heuristic along the lines of “if something makes me more secure, I prefer it” that would parallel the “if my party prefers it, I prefer it” heuristic. For example, individuals working in carbon-intensive industries might be expected to have an implicit motivated reasoning conversation to the effect of: “if climate change were real, I would lose my job. Therefore, climate change cannot be real.” Similarly, those living in flood-prone areas might find the contemplation of a future wherein they are displaced to be cognitively taxing and instead resort to a heuristic of their own. There are no potential analogs in the research to date.

⁴⁵ Ibid.

To be sure, there is robust evidence for motivated reasoning when assessing broader economic conditions. Evans & Andersen (2006) found that retrospective assessments of the economy are heavily influenced by partisanship, finding that “sociotropic perceptions are strongly conditioned” by party preference.⁴⁶ Gerber & Huber (2010) had slightly different findings in *Partisanship, Political Control, and Economic Assessments*, claiming that this effect is actually strong enough to influence both sociotropic and egotropic (which they refer to as “pocketbook”) modes of opinion formation.⁴⁷ Lastly, Martin Bisgaard (2015) found that even when agreeing on an economic reality, partisans were still “eager to attribute responsibility selectively.”⁴⁸ If political concerns can affect sociotropic and egotropic perceptions of economic realities, then it is similarly worth exploring whether concerns over employment can affect perceptions of scientific realities. At the very least, the repeated confirmation of partisanship as a determinant of economic outlooks is justification for its inclusion as a control variable in this experiment.

Yet, even with these examples, it remains to be seen whether material security *itself* can be a cognitive motivator. Research addressing this nuance is more or less absent from existing scholarship, although the aforementioned discourse on egotropic trade attitudes attempted to answer some of the same questions. Nevertheless, by considering carbon-intensive employment and flooding risk as a factor in climate attitudes this work adds some empirical evidence on whether perceived threats to one’s employment and material

⁴⁶Geoffrey Evans and Robert Andersen. "The political conditioning of economic perceptions." *The Journal of Politics* 68, no. 1 (2006): 194-207.

⁴⁷Alan S. Gerber and Gregory A. Huber. "Partisanship, political control, and economic assessments." *American Journal of Political Science* 54, no. 1 (2010): 153-173.

⁴⁸ Martin Bisgaard, 2015. “Bias Will Find a Way: Economic Perceptions, Attributions of Blame, and Partisan-Motivated Reasoning During Crisis.” *Journal of Politics* 77, no. 3: 849–860.

security can lead respondents to use some of the heuristic shortcuts normally expected of partisans.

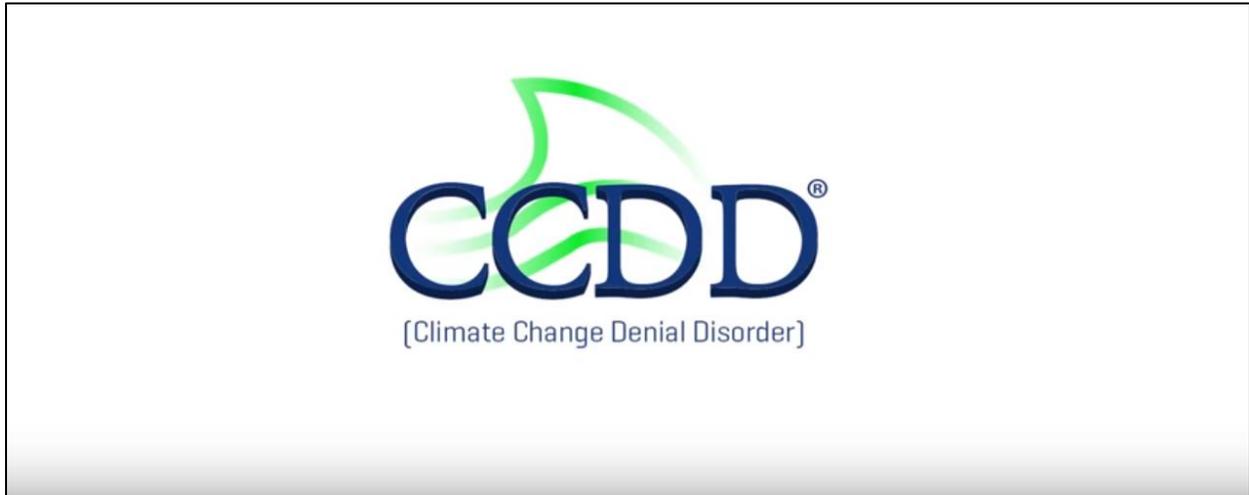
All told, the motivated reasoning literature lends a few useful elements to this study. Given that people tend to believe whatever requires the least cognitive effort, it would follow that they are more likely to deny climate change if it forces them to contemplate a reality without their jobs or homes. Additionally, because it is identified as a “motivator” capable of influencing policy views, my statistical analysis will control for partisanship.

2.4 The Bradley Effect & Survey Mode

Social stigma associated with holding certain opinions can influence survey responses. One prominent example of this is known as the Bradley effect, referring to Black Los Angeles Mayor Tom Bradley’s failure to win the California governorship in 1982 despite being well ahead in voter polls. To explain this loss, it was theorized that while “voters might tell pollsters that they intend to support the black candidate in an attempt to appear progressive, they often vote against the black candidate in the privacy of the election booth.”⁴⁹ This logic has since been generalized and applied to other minorities as well as to women candidates. The proposed mechanism is that when interacting with an interviewer, a desire for social acceptance and an aversion to being stigmatized will lead a significant number of respondents to change their answers on socially charged questions.

⁴⁹ Christopher Stout and Reuben Kline, "Ashamed not to vote for an African-American; ashamed to vote for a woman: An analysis of the Bradley effect from 1982-2006." (2008).

Figure 2.4.1



A still image from a FunnyOrDie clip entitled 'Climate Change Denial Disorder.' The comedic short compares climate denial to a mental disease and had over 150,000 views online as of March 2020.

Source: <https://www.funnyordie.com/2015/4/14/17730896/climate-change-denial-disorder-with-ed-begley-jr>

Denial of climate science is a situation in which I suspect there may be social desirability bias. While there is no public opinion data on how the general public perceives climate *deniers*, one can reasonably assume that at least some of the 80% of Americans that believe in climate science tend to deride or otherwise condescend to their skeptical peers. The skeptics' position has also been mocked many times over by politicians and comedians alike (figure 2.4.1). Although it is impossible to cite a definitive metric of social stigma, the general state of the public debate on this topic provides ample justification for the exploration of a kind of Bradley effect through a mode variable.⁵⁰

⁵⁰ Paul Hsieh, "Should Therapists Treat Climate Change Denial As A Psychological Disorder?," Forbes (Forbes Magazine, February 26, 2019), <https://www.forbes.com/sites/paulhsieh/2019/02/26/should-therapists-treat-climate-change-denial-as-a-psychological-disorder/#26d3625d1e2b>

There is already evidence that beliefs, and belief in climate change in particular, can be rather contextual. Patrick J. Egan and Megan Mullin (2012) found that merely being exposed to certain weather changes can affect a respondent's likelihood to express belief in climate change.⁵¹ This study, which used Pew survey respondents' geographical information to determine if a respondent had been exposed to abnormal weather patterns, found that there was indeed a relationship between recent weather conditions and climate attitudes. This effect was found to be smaller than variables like party identification but still decidedly significant.⁵² If a warm week is a strong enough setting to move the needle on climate skepticism, then the determining power of different social settings also merits evaluation.

Recall that only a portion (about one quarter) of ANES respondents were surveyed through live face-to-face interviews, with the remaining responses being gathered over the internet. This creates an opportunity to test for social desirability bias in responses, as telling a computer that one doubts climate change does not carry with it the fear of disapproval as telling a person does. While no prior studies have explored this effect in the context of climate change denial, I do by controlling for interview mode in my analysis.

2.5 Survey Experiments of Climate Skepticism

Finally, this literature review considers existing scholarship on climate change attitudes. There are several distinct strains of scholarship in this subfield. The substantial amount of existing work that overlaps with the motivated reasoning subfield has been

⁵¹Patrick J. Egan, and Megan Mullin. "Turning personal experience into political attitudes: The effect of local weather on Americans' perceptions about global warming." *The Journal of Politics* 74, no. 3 (2012): 796-809.

⁵² *Ibid.*

addressed above. There are also some quasi-journalistic histories and accounts of the corporate sponsorship of climate change denial. Lastly, there are a handful of relevant survey experiments concerning climate change attitudes in well-defined populations.

Scholars tend to agree that climate denial originated with research sponsored by the fossil fuels industry.⁵³ Dunlap & McCright, the authors of the study in climate attitudes among conservative white males that is referenced in Section 3.3, assert that “a bevy of amateur climate bloggers and self-designated experts, public relations groups” and conservative media personalities formed a “denial machine” sponsored by fossil fuel interests.⁵⁴ Dunlap & McCright do an impressive job of addressing the substance of climate denial, providing a comprehensive account of climate denial’s origin and ongoing macro-dynamics. Yet for the question of what personal characteristics can lead an *individual* to deny climate science, survey research is needed.

Two survey experiments in particular have addressed individual-level attitude formation. The first used a 2003-2008 dataset and was published in 2011 by Laura Whitmarsh.⁵⁵ It explicitly sought to determine the “dimensions and determinants” of denial. It found living in a rural area, age, and partisanship to be significant in different models, but stopped short of considering where one’s “bread is buttered” or what material stakes a respondent had with regard to climate change. An interesting companion to this study is *Who Wants to Reduce Emissions* from O’Connor et al.⁵⁶ This study surveyed

⁵³ Riley E. Dunlap and Aaron M. McCright, "Organized climate change denial." *The Oxford handbook of climate change and society* 1 (2011): 144-160.

⁵⁴ *Ibid.*

⁵⁵ Lorraine Whitmarsh, "Scepticism and uncertainty about climate change: Dimensions, determinants and change over time." *Global environmental change* 21, no. 2 (2011): 690-700.

⁵⁶ Robert E. O'Connor, Richard J. Bord, Brent Yarnal, and Nancy Wiefek. "Who wants to reduce greenhouse gas emissions?." *Social Science Quarterly* 83, no. 1 (2002): 1-17.

residents of central Pennsylvania in 2002, a region dependent on coal for both power generation and employment. The findings were promising, showing that support for curbing emissions was higher among respondents who didn't think emissions reductions would reduce employment in their field. Yet this study's generalizability is limited by how apt the sampling frame was. The authors themselves write that "Central Pennsylvania is by no means a microcosm of America" that "contains no significant urban areas, except for the part of Centre County surrounding the Pennsylvania State University" and is "overwhelmingly white (96 percent)." Nevertheless, surveying the population of Central Pennsylvania is an interesting case of testing climate attitudes among a population whose relationship to carbon emissions is fundamentally different than the rest of the country's.

Though they are of limited external validity, these studies point in the right direction in exploring the *determinants* of climate skepticism. Truly, the resilience of climate denial shows that addressing the logic and substance of those arguments has never been enough. Rather, scholars should assess what is making segments of the population susceptible to such anti-empiricism in the first place.

2.6 Contributions within Existing Literature

This research contributes in some way to all of the literatures discussed above. Additionally, simply displaying and describing the *de facto* demographics and voting habits of the climate-skeptical population will generate immediately useful insight into the limited debate on climate change denial and will clarify the electoral implications of these attitudes.

The relationship of the carbon-intensity question to the egotropic-sociotropic dilemma is self-explanatory. Evidence that the high-emissions occupations predict anti-climate attitudes strengthens the case for egotropism, while a non-effect would mean climate change attitudes can join economic voting and immigration as sociotropically-dominated areas of opinion formation.

As for the motivated reasoning field, both the carbon-intensity and coastal geography models reveal whether the prospect of material insecurity can become a cognitive motivator to rival partisanship. Evidence that distressing scenarios produce heuristic shortcuts strong enough to overcome scientific consensus could catalyze discussion of how material stakes affect reasoning. Conversely, an insignificant relationship in this area would leave partisan-motivated reasoning as the only motivated cognition effect confirmed as a driver of climate change denial.

The exploration of interview mode as a determinant of (reported) climate attitudes will broaden the current understanding of the Bradley Effect. Most of the demonstrations of this effect draw on views on sex and race for their stigmas. Belief in climate science is a race and sex-neutral question that may still carry social stigma, which is something of a novelty in that field.

3 – Discussion of Theories

3.1 Carbon-Intensive Employment as a Cause of Skepticism

To say climate change will have consequences is an understatement. Temperatures and sea levels *will* rise across the globe, and entire species are at risk of extinction.⁵⁷ The degree to which these worst projections come true is contingent on how the international community adjusts to these threats. By all accounts, mitigating climate change begins by controlling emissions.^{58,59} Lowering emissions, in turn, begins by targeting those sectors of the economy that are the largest producers of GHGs. Broadly speaking, this category in the United States includes heavy industry and transportation, which account for 51% of U.S. emissions.⁶⁰ Not only do these sectors produce copious amounts of emissions in their own processes, they are also electricity-intensive and create millions of tons of offsite emissions.⁶¹ It is clear, then, that reducing emissions requires a large degree of reduction in, or restructuring of, these industries. At best, policies like a carbon tax and minimum efficiency requirements will hurt industry profitability and shrink the manufacturing pie. At worst, nationwide policies that cut the consumption of energy, fuels and carbon-

⁵⁷ Chris D. Thomas, Alison Cameron, Rhys E. Green, Michel Bakkenes, Linda J. Beaumont, Yvonne C. Collingham, Barend FN Erasmus et al. "Extinction risk from climate change." *Nature* 427, no. 6970 (2004): 145-148.

⁵⁸ *Global Warming of 1.5 °C*, Intergovernmental Panel on Climate Change, Accessed March 20, 2020. <https://www.ipcc.ch/sr15/>.

⁵⁹ Felix Creutzig, Patrick Jochem, Oreane Y. Edelenbosch, Linus Mattauch, Detlef P. van Vuuren, David McCollum, and Jan Minx. "Transport: A roadblock to climate change mitigation?." *Science* 350, no. 6263 (2015): 911-912.

⁶⁰ "Sources of Greenhouse Gas Emissions," EPA (Environmental Protection Agency, September 13, 2019), <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

⁶¹ *Ibid.*

intensive consumer products could result in systemic layoffs and industrywide employment disruption.⁶²

What, then, of the people whose livelihoods are dependent on creating those emissions? The U.S. Bureau of Labor Statistics estimated in December 2019 that over 113,000 Americans work in petroleum and coal products manufacturing.⁶³ Driving a tractor-trailer at highway speeds generates 190 pounds of CO₂ emissions *per hour*, yet the Census Bureau estimates 3.5 Million Americans make their living by driving either tractor-trailers or delivery trucks.^{64,65} Similarly jarring numbers are found across the entire American economy; chemical manufacturing generated 5% of total U.S. emissions in 2012 with emissions equivalent to 275 Million Metric Tons of CO₂. Other industries, like food and beverage manufacturing and paper and forestry products, are not far behind. The writing is on the walls for these industries and their employees. Indeed, most economic analyses have found that even in scenarios wherein the effects of decarbonization create a net increase in employment, the manufacturing and transportation sectors see significant job losses and real wage decreases.⁶⁶

⁶² Hadrian Mertins-Kirkwood, *Making decarbonization work for workers*. Canadian Centre for Policy Alternatives (2018): 12

⁶³ "About the Petroleum and Coal Products Manufacturing Subsector." U.S. Bureau of Labor Statistics. U.S. Bureau of Labor Statistics. Accessed March 20, 2020. <https://www.bls.gov/iag/tgs/iag324.htm>.

⁶⁴ U.S. Census Bureau. "America Keeps on Truckin'." The United States Census Bureau, June 6, 2019. <https://www.census.gov/library/stories/2019/06/america-keeps-on-trucking.html>.

⁶⁵ Josie Garthwaite, "Smarter Trucking Saves Fuel Over the Long Haul." Smarter Driver Behavior Improves Fuel Economy for Trucks, September 24, 2011. <https://www.nationalgeographic.com/news/energy/2011/09/110923-fuel-economy-for-trucks/>. Figures not explicit in this text were calculated by the author

⁶⁶ Frederik NG Andersson, "Effects on the manufacturing, utility and construction industries of decarbonization of the energy-intensive and natural resource-based industries." *Sustainable Production and Consumption* 21 (2020): 1-13.

Employment in the fossil fuels industry has already been declining for some time. During the gradual period of adjustment from 1978-2015, the coal industry shed about 60% of its employment.⁶⁷ The socioeconomic effects of this transition, which took place in Appalachian coal states like West Virginia and Kentucky, were crippling. Those regions are still adjusting to systemic poverty, lower life expectancies, and now opioid addiction.^{68,69} If past is prologue, it is clear that those individuals whose jobs are threatened by decarbonization have something very real to fear. Furthermore, given that they live in a society that does not guarantee healthcare nor provide affordable and access to higher education provides all the more reason for these individuals to feel insecure about their futures. The resulting anxiety might cause people to subvert reason (consciously or otherwise) and doubt the climate consensus. This formulation yields the first hypothesis:

H1: Individuals that work in carbon-intensive industries will be more likely to deny climate change than the general population.

This hypothesis is tested by using relative carbon-intensity of employment as an independent variable and climate skepticism as the dependent variable, with appropriate controls in place for partisanship, education, income, and survey mode.

⁶⁷ "Interactive Access to Industry Economic Accounts Data: GDP by Industry." BEA. Accessed March 20, 2020. <https://apps.bea.gov/iTable/iTable.cfm?ReqID=51&step=1>.

⁶⁸ Brian F. Snyder, "Vulnerability to decarbonization in hydrocarbon-intensive counties in the United States: A just transition to avoid post-industrial decay." *Energy Research & Social Science* 42 (2018): 34-43.

⁶⁹ Karen E. Kubecka, Jolene M. Simon, and Janet Hardy Boettcher. "Pain management knowledge of hospital-based nurses in a rural Appalachian area." *Journal of Advanced Nursing* 23, no. 5 (1996): 861-867.

3.2 Coastal Geography as a Cause of Skepticism

The section above hypothesizes above that those individuals who would be hurt by the policy implications of the climate consensus will be most likely to deny the empirical justification for that policy. Whereas carbon-intensive workers are only threatened by a *policy response* to climate science, the coastal population is threatened simply by the reality of climate change. In that sense, there is one less layer of static in exploring this relationship. There is also no incentive for respondents to lie on public opinion surveys in an effort to slow the response, whereas respondents with carbon-intensive employment that do believe in climate change might still respond otherwise in a survey to undermine the policy process.

While the threat of displacement is different in nature than that threat unemployment, these citizens do in reality face salient threats of being made homeless, with an estimated 1.8 Million coastal Americans living under the mean highwater mark (MHW) by 2100.⁷⁰ It is therefore fair to say that respondents in flood-prone areas can anticipate material losses that would be at least as frightening as a layoff. Furthermore, damage to property does not capture everything that is at stake for coastal Americans; roughly one third of ANES 2016 respondents reported performing community service in the last 12 months, and the average number of years that respondents had been living in their current communities was also well over a decade, at about 13 years. Between attachment to community and the prospects of losing whatever material possessions lay in the path of the flood, one can assert that the reality of climate change might create

⁷⁰ Mathew E. Hauer, "Migration induced by sea-level rise could reshape the US population landscape." *Nature Climate Change* 7, no. 5 (2017): 321-325.

appreciable anxiety in the coastal population. This formulation yields the second and third hypotheses.

H₂: Individuals that live in districts that are likely to see problematic rises in sea-level will be more skeptical of climate science than the general population.

H₃: Owning real estate in a coastal district will increase climate skepticism, even compared with other residents in coastal regions.

H₂ is designed to test whether threats to one's overall lifestyle (e.g. the combination of their work, residence, and relationships to their home areas) are strong enough to produce increased skepticism of climate science. H₃ refines this approach; implicitly, it tests whether having a valuable and immovable asset sitting in the path of climate change influences belief formation. It is constructed as a test for interactivity between owning a home and living on the coast.

4 – Data, Methods, and Variable Coding

4.1 The ANES 2016 Dataset and Dependent Variables

The ANES 2016 Times Series Study is the latest iteration of the American National Election Studies' survey, administered in some form since 1948. The survey has been conducted in advance of every presidential and certain midterm elections, with every iteration including a follow-up interview with a majority of respondents. Certain questions have formed a consistent "core" of survey data over the nearly seven decades of the survey; these questions include things like race, gender, ideology, and preferred political party. Other questions were only added with changes of the times. A question on climate change (referred to in the questionnaire as global warming) was first added in 1996. It was:

Do you think the government should put LESS, THE SAME AMOUNT, or MORE effort into) Addressing global warming?

20 years later in 2016, the ANES asked all interviewees the following question:

You may have heard about the idea that the world's temperature may have been going up slowly over the past 100 years. What is your personal opinion on this? Do you think this has probably been happening, or do you think it probably hasn't been happening?

Respondents' answer choices were either "has probably been happening" or "probably hasn't been happening." Respondents were also able to refuse the question or reply that they "didn't know." Critically, this question assesses *belief* in the phenomenon, as opposed to whether respondents are concerned about its effects or satisfied with the government response. Indeed, many European counterparts to the ANES survey currently skip questions of belief and instead ask respondents how serious they expect the effects to be.⁷¹ While the inclusion of a belief question is certainly an indicator of where the climate debate in the United States is relative to the rest of the world, it is also a critical entry point for public opinion studies. In a time when the role of epistemology in policymaking is in question, this question on belief is actually something of a gift.

The 2016 iteration of the ANES survey yielded 4,270 responses. 3,090 of those responses were gathered over the internet. The remaining 1,180 responses were gathered through face-to-face and computer-assisted live interview (CASI) methods. Respondents that answered "probably hasn't been happening" to the first question were coded as a 1 in a "Climate Skepticism" variable. Anyone who refused or said they didn't know was grouped with those who believed in climate science in a "non-skeptic" category and given a score of 0.

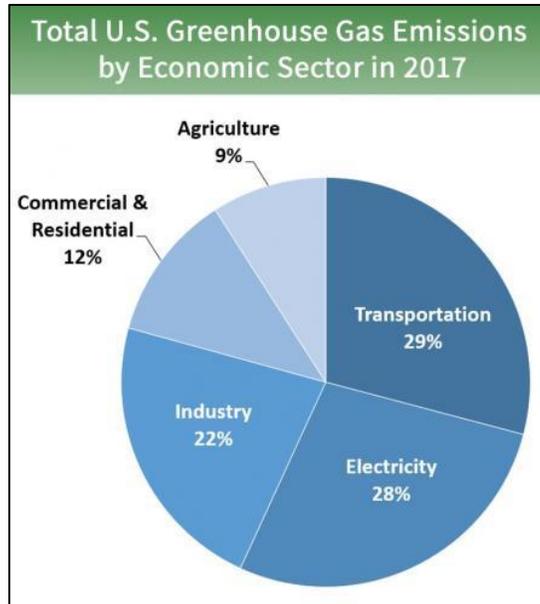
⁷¹ "Special Eurobarometer 459", Directorate General for Communication of the European Union.

4.2 Independent and Control Variable Codings

The logics of the various variable codings are presented below, with the key independent variables discussed first and control variables discussed thereafter.

4.2.1 Carbon-Intensity

The single most complicated coding logic is the carbon-intensity of someone's employment. The proposed mechanism of employment anxiety being a motivator of climate skepticism rests on several assumptions. First, that the respondents' employment generates a problematic amount of GHGs. Second, that their industry and employment prospects, including both current and potential future employers, would be harmed by a given climate change policy push. Third, that the respondents are actually aware of these realities and have internalized them. In order to account for potential problems with all three of these assumptions, the carbon-intensity score was constructed in three different ways. Each one was tested separately as a predictor of climate skepticism. In order of increasing specificity, the definitions of carbon-intensity derived were: 1) any individual working in either the transportation or manufacturing sectors, 2) any individual working in a subsector of the transportation or manufacturing sectors responsible for more than 2% of annual U.S. emissions and 3) anyone whose employment centered around a fossil fuel end product and/or the everyday processing of fossil fuels. All three definitions were limited to individuals currently working or seeking work. Former workers who were retirees, homemakers, or disabled were not eligible for these definitions on the grounds that none of their *future* income or e.g. health insurance relied on the production of carbon emissions.



Source: United States Environmental Protection Agency.
<https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

For the first definition, consider that according to the EPA, the industry and transportation sectors together account for 51% of U.S. emissions. Additionally, electricity generated in support of residential and industrial activities accounted for an additional 28% of emissions (energy for transportation is, by nature, generated on-site; aircraft and trucks burn their fuels off-grid). The broadest definition of carbon-intensive therefore included all respondents whose industry of employment involved any form of manufacturing, fossil fuel power generation, or truck or air transportation. Waterborne shipping was excluded because of the large amount of international volume. Freight railroads were excluded because freight trains are actually the most efficient form of

continental transportation and would likely see increased volume in a decarbonization push.⁷² This definition included 436 respondents, more than 10% of the entire sample.

My second definition accounts for different forms of manufacturing producing different amounts of GHGS. It identifies only those respondents that work in a manufacturing or transportation subsector that is a particularly large source of emissions, defined as being responsible for 2% or more of annual U.S. emissions. This was determined through a combination of U.S. EPA and Department of Energy reports that break down the manufacturing and transportation sectors into subsector level emissions sources.^{73,74} These reports were used to determine a subsector's overall share of U.S. emissions. For manufacturing and industry, the offsite emissions generated by their electricity usage are included in the carbon footprint, as electricity is not generated for its own sake. If a respondent worked in an industry that generated more than 2% of overall emissions, they worked in a carbon-intensive industry under this second definition.

While the above definitions are certainly carbon-intensive, for it to affect their attitudes, the respondents must know that their industries lie in the path of a policy change. The third definition was therefore derived to identify a category of people for whom awareness of the tension between their employment and decarbonization would be

⁷² "Freight Rail Fuel Efficiency - Association of American Railroads" Accessed March 23, 2020. <https://www.aar.org/wp-content/uploads/2018/07/AAR-Environmental-Benefits-Movig-Freight-by-Rail.pdf>.

⁷³ Sabine Brueske, Ridah Sabouni, Chris Zach, and Howard Andres. *US manufacturing energy use and greenhouse gas emissions analysis*. No. ORNL/TM-2012/504. Oak Ridge National Lab.(ORNL), Oak Ridge, TN (United States); Building Technologies Research and Integration Center, 2012.

⁷⁴ U.S. Environmental Protection Agency, *Fast Facts: U.S. Transportation Sector Greenhouse Gas Emissions 1990-2017*, Washington, D.C., June 2019 <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockkey=P100WUHR.pdf> accessed March 30, 2020

inescapable. This definition includes only respondents whose industries' end product was itself a fossil fuel. For lack of a better word, these are carbon emissions boogymen; they are in the crosshairs of even the least ambitious decarbonization plans. There were 32 respondents in this group, who mostly worked in the extraction and manufacturing of hydrocarbons. (e.g. oil refiners, natural gas hydrofracturing and extraction workers).

4.2.2 Coastal Congressional Districts

The ANES 2016 dataset includes respondents' congressional districts. In the absence of a more precise geographic identifier, these data were leveraged to identify whether or not a respondent lived in a coastal area that would be affected by climate change. As of March 2020, The Union of Concerned Scientists maintained a model of the 48 contiguous states that identifies congressional districts by the degree of flooding they are likely to experience in given climate change scenarios.^{75,76} This model was used to identify congressional districts that will see at least 1,000 individuals displaced in a *best-case* scenario by 2035. This definition was constructed to maximize salience. First, 1,000 individuals is assumed to be a visible and significant amount of people to be displaced. Second, the best-case flooding scenario was chosen because it limits the data to districts that cannot hope to escape the effects of global warming (should it turn out to be real). Last, the 2035 timeframe was chosen (the other option being a 2100 timeframe) because it

⁷⁵"Property at Risk from Rising Seas, by Congressional District," the Union of Concerned Scientists, ucsusa.maps.arcgis.com, accessed March 19, 2020, <https://ucsusa.maps.arcgis.com/apps/MapJournal/index.html?appid=b53e9dd7a85a44488466e1a38de87601#>).

⁷⁶ Kristina Dahl, R. Cleetus, E. Spanger-Siegfried, S. Udvardy, A. Caldas, and P. Worth. "Underwater: Rising Seas, Chronic Floods, and the Implications for US Coastal Real Estate." Cambridge, MA: Union of Concerned Scientists. Online at www.ucsusa.org/sites/default/files/attach/2018/06/underwater-analysis-full-report.pdf (2018).

brings the problem into the very near term. 2035 is only 19 years from 2016, well within the timescale of e.g. raising a child or paying a mortgage. The flooding data were then joined to the ANES data to produce a finished binary coastal geography variable. This definition included diverse districts ranging from southern Alabama to San Francisco suburbs. Lastly, because the UCS flooding model does not include Washington D.C., Alaska, or Hawaii, respondents from those places were dropped from the sample for these tests.

4.2.3 Partisanship, Education, and Income

Given the repeated finding of partisanship as a strong predictor of climate attitudes and given that this is not the effect being investigated, respondents' party preference was included as a control variable. Additionally, there is reason to believe that members of certain professions self-select into certain parties, creating more potential for confound variable effects. In the ANES interviews, respondents were asked to self-identify their party preference on a 7-point ordinal scale, with 0 being a strong Democrat and 7 being a strong Republican, with non-leaning independents given the median score of 4. For simplicity's sake, this was recoded into an ordinal 3-point scale, with left-leaning respondents scored as 1, true independents scored as 2, and right-leaning respondents scored as 3. This is consistent with the finding that self-identified independents with partisan lean tend to actually act in accordance with their favored party more often than not.⁷⁷

Education was included as a control variable to ensure any observed effects on skepticism were a result of carbon-intensity and not of different levels of education. My

⁷⁷ John Richard Petrocik, "Measuring party support: Leaners are not independents." *Electoral Studies* 28, no. 4 (2009): 562-572.

concern is that respondents with higher levels of education are more likely to work in more white-collar professions, often with higher pay. Higher levels of education also equip people to approach scientific consensus differently and be more comfortable with the idea that experts in a given field can arrive at a conclusion that is not entirely evident to people outside of that field. Additionally, education level largely coincides with employability and skill level, meaning levels of anxiety about being permanently put out of work by climate science can be expected to vary with education level. Thus, to ensure observed differences in climate skepticism are not a result of varying levels of education, respondents' educational attainment is included as a control variable. Those holding a bachelor's or above were coded as 0, and those without were coded as 1.

Income was also included as a control variable on the grounds that it changes the salience of unemployment anxieties among respondents. One would expect those with higher incomes to have higher savings and assets, therefore making unemployment less of a disruptive prospect. This may in turn reduce the anxiety that might be causing climate skepticism. They would also be in a better position to pursue alternative training or education should they find their native industry is shedding jobs. Controlling for income allows these individuals to be included in the carbon-intensive category without the possible confounds that come with being in higher income brackets. The income variable was recoded on a 3-point ordinal scale. Those with a score of 1 made \$49,999 or less. Those with a score of 2 made between \$50,000 to \$99,999. Incomes of \$100,000 or above were coded as 3.

4.2.4 Survey Mode

As discussed in the literature review, a peripheral interest of this research is to determine whether the stigmatization of climate skepticism can produce a kind of Bradley effect in survey research. Therefore, I included a dummy variable indicating whether a respondent took the survey online, with the expected correlation between the internet mode and climate skepticism being positive.

5 – Results

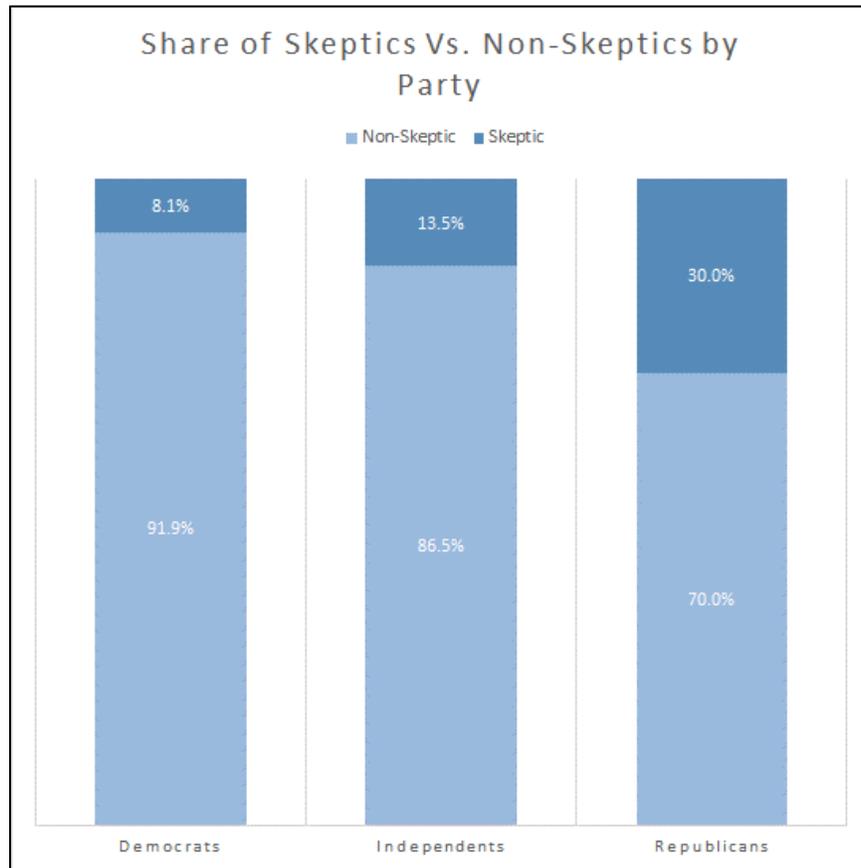
5.1 Results I: Crosstabulations of Partisanship, Turnout, and Education

The utility of crosstabulations is that, unlike inferential statistics, they *count* relationships instead of estimating them. In examining the rates of climate skepticism across party groups, I find a high coincidence of rightward political lean and skepticism. Figure 5.1.1 is a crosstabulation of the three party identifications by skepticism. Figure 5.1.2 is a bar chart visualizing those data. Demographic weights were used where appropriate to account for underrepresentation of minorities in the ANES sample.

Figure 5.1.1

	Democrats	Independents	Republicans
Non-Skeptic	91.9%	86.5%	70.0%
Skeptic	8.1%	13.5%	30.0%

Figure 5.1.2



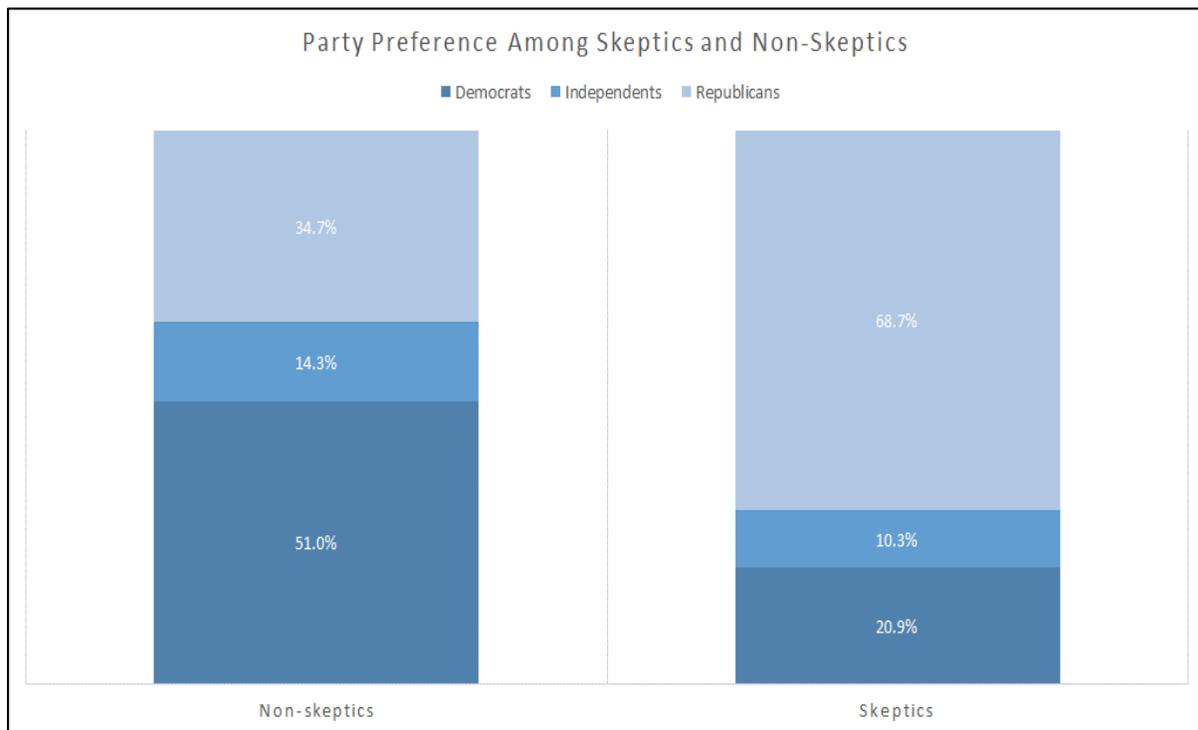
These figures demonstrate very clearly that climate skeptics make up a much larger proportion of Republicans than of Democrats and true Independents. Only 8.1% of Democratic-leaning respondents were climate skeptics, compared with a sizeable 30% of Republican-leaning respondents. Given an overall skepticism rate of 17.7% in this sample, this means climate skeptics are “overrepresented” on the right half of the spectrum by more than 50%. Although the independent group also has relatively more skeptics than the Democratic-leaning group, the 13.5% share of climate-skeptic respondents in that group is still less than half of the 30% incidence among Republicans. This first tabulation, then, shows a very pronounced relationship between party preference and climate skepticism.

Figures 5.1.3 and 5.1.4 below present complements to the figures above. They examine the party preferences of the skeptical population as compared with the non-skeptical population. They are the “inverse” of the first crosstabulation.

Figure 5.1.3

	Non-skeptics	Skeptics
Democrats	51.0%	20.9%
Independents	14.3%	10.3%
Republicans	34.7%	68.7%

Figure 5.1.4



More than half (51.0%) of the population of non-skeptics are Democrats or Democratic-leaning independents. This crosstabulation also shows that, given that a respondent believes that climate change is occurring, there is only a 14.3% chance that they are a Republican or a Republican-leaning independent. This is a remarkably low rate of

rightward lean, especially given that about 40% of respondents in the overall ANES sample reported a preference for the Republican party. Instead, those with rightward lean are represented in the second bar on the chart, with Republicans making up 68.7% of the entire climate-skeptic population. These findings mesh well with the first set of crosstabulations. That is, causal relationships notwithstanding, the Republican-leaning population and the climate-skeptic population have a large degree of overlap.

Figure 5.1.5

Turnout among non-Skeptics, by Party

	Didn't Vote	Voted
Democrat	12%	88%
Independent	32%	68%
Republican	12%	88%

The next crosstabulation describes turnout patterns of the non-skeptical population by party. Among those who do not deny climate science, turnout between Republicans and Democrats is identical. Independents lag behind, consistent with existing research showing that they have lower turnout than partisans.⁷⁸ Note that both Democratic and Republican turnout numbers in this figure are in line with the overall ANES sample's rate of 88%. Also

⁷⁸John LaLoggia, "6 Facts about U.S. Political Independents." Pew Research Center. Pew Research Center, May 15, 2019. <https://www.pewresearch.org/fact-tank/2019/05/15/facts-about-us-political-independents/>.

note that confirmation of whether a respondent voted could only be done in the post-election questionnaire; those ANES respondents who did not have a post-election interview were therefore excluded from this crosstabulation.

Figure 5.1.6

Turnout among Climate Skeptics, by Party

	Didn't Vote	Voted
Democrat	25%	75%
Independent	34%	66%
Republican	7%	93%

Figure 5.1.6 shows the 2016 turnout patterns of climate skeptics, broken down by party. Climate change skeptics with a preference for the Democratic party showed a turnout of 75%, 13 points lower than climate-change-affirming Democrats. Republican climate skeptics boast an impressive turnout of 93%. This is the highest rate of any category in both sets of turnout crosstabulations. This finding indicates that Republican climate skeptics might be something of a unique typology that may have other notable political habits. Lastly, climate-skeptic independents display a turnout that is essentially the same as climate-affirming independents. They therefore form the only partisanship category that did not display different turnout rates among the skeptic and non-skeptic groups.

Figure 5.1.7

Rates of Climate Skepticism across Education Levels

	Non-skeptics	Skeptics
Less than High School	81.7%	18.3%
High School	78.8%	21.2%
Bachelor's degree	85.2%	14.8%
Master's (non-professional)	88.0%	12.0%
Professional Degree (e.g. JD, MD)	88.6%	11.4%
Doctorate Degree	86.0%	14.0%

The last crosstabulation assesses skepticism across different levels of education. Recall that the sample's overall rate of climate skepticism is 17.7%. The educational groups with the highest rates of skepticism are, intuitively, those with only a High School diploma or less. Only these non-bachelor's categories have a rate of climate skepticism higher than the 17.7% sample average. Importantly, these top two columns account for about 60% of respondents in the sample (depending on demographic weights) which explains why they pull the rate of skepticism upward.

Every other educational category has lower than average rates of climate change denial. After crossing the bachelor's degree threshold, rates of skepticism and belief are relatively uniform, with 85.2% of bachelor's holders, 86% of doctorate holders, and 88.0% of master's holders not expressing climate skepticism. There was little difference between those who held a professional master's degree and a non-professional one, with the former having a climate-affirming stance .6 percentage points higher than the latter. These findings reinforce the selection of education as a control variable. Additionally, the fact that

rates of skepticism only show cleavage across the bachelor's/non-bachelor's divide validates the implementation of education as a dummy variable, as opposed to as an ordinal scale or a continuous measure of years spent on education.

These crosstabulation results reinforce many of the preexisting assumptions of the climate skepticism debate. As far as partisan divides go, they show that under either the skeptic-first or party-first approach, there is a very pronounced relationship between partisan lean and climate attitudes. The turnout tables are important complements to these findings, as they indicate that turnout among at least Republican-leaning skeptics is exceptionally high, underscoring the electoral significance of climate change denial. The results of the education frequencies point toward the interaction of education and belief. Those respondents who did not graduate from a four-year college demonstrate a much higher propensity to deny climate science than those with higher levels of education. Finally, keep in mind that these crosstabulations count existing frequencies. They do not rely on inference to estimate relationships, but rather display the *de facto* breakdown of behaviors and beliefs across the groups mentioned. These crosstabulations, then, are valuable at the very least because they describe what can be immediately taken as fact, an important complement to the more inferential techniques described hereafter.

5.2 Results II: Carbon-Intensive Employment as a Predictor of Climate Skepticism

Figure 5.2.1

	<i>Dependent variable:</i> Climate.Skepticism
Party ID on 3 Point-Scale	0.110*** p = 0.000
Bachelor's Degree	-0.048*** p = 0.0001
Income on 3-point Scale	-0.026*** p = 0.0005
Web Interview	0.039*** p = 0.003
Carbon Intensive - Generalized Definition	-0.006 p = 0.747
Constant	-0.0004 p = 0.983
Observations	4,247
<i>Note:</i>	* p<0.1; ** p<0.05; *** p<0.01

23 observations dropped for missingness.

Figure 5.2.2

	<i>Dependent variable:</i>
	Climate Skepticism
Carbon-Intensive - Generalized Definition	-0.006 p = 0.747
Carbon-Intensive - Industries Generating Over 2% of Emissions	0.02 p = 0.596
Carbon-Intensive - Fossil Fuels Industries	-0.12* p = 0.078
Observations	4,247
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

23 observations dropped for missingness

Figure 5.2.1 shows the full results of the first multivariate regression model, which used the most general definition of carbon-intensive employment. Figure 5.2.2 shows the effect sizes and significances of all three definitions of carbon-intensive employment after they were tested in separate models. The sizes and significances of all four control variables were virtually identical under each definition of carbon-intensive employment. For that reason they are displayed only once, in figure 5.2.1.

Carbon-intensive employment is not found to be a significant predictor of climate skepticism under any of the three definitions. The model instead finds everything *except* measures of carbon-intensive employment to be highly significant predictors of climate skepticism. Note that because the skepticism variable is binary, all variable coefficients are mathematically equivalent to a percentage point increase over the outgroup.

The partisanship variable functions as expected and boasts the largest effect, with each point on the left-right party preference scale predicting an 11-point increase in the rate of climate skepticism. This model therefore predicts that self-identifying Republicans (as well as independent-leaning Republicans) deny climate science at a rate that is 22 percentage points higher than groups with leftward lean, assuming all else is held equal.

The effect of the education variable is also highly significant, although it is only about half the size of the partisanship effect. Holding a bachelor's degree reduces the rate of climate skepticism by just under 5 percentage points. Income is significant as well, with each \$50,000 dollar jump in earnings correlating with a 2.6 percentage point decrease in climate skepticism, showing that this form of material security may promote acceptance of climate science. Lastly, the interview mode variable is found to have a significant effect that is consistent with the expectations of the Bradley effect. Those respondents who did not have to share their opinion with a live interviewer were more likely to answer that they did not believe the earth was warming, with the effect size of 3.9 percentage points being larger than moving a point on the income scale and just smaller than holding a bachelor's degree.

Figure 5.2.2 presents the results of the three different constructions of carbon-intensive employment. None of the definitions produce a significant effect. The first and broadest definition returns a coefficient of essentially zero and a p-value of .747. The second definition, which included only industries accounting for more than 2% of annual U.S. emissions, also produces a p-value that is nowhere near significant.

Finally, the third and most specific construction of the carbon-intensive employment variable also fails to achieve significance. This category identified just 32 respondents who dealt directly with fossil fuels every day. Even under this ultra-specific definition, the test group did not demonstrate a higher propensity to deny climate science, with the p-value falling short of significance at the .05 level. As an aside, consider that of those 32 respondents, 5 of them held bachelor's degrees or advanced degrees. Not one of those 5 respondents were climate skeptics, making for a somewhat idiosyncratic demonstration of the power of the education variable.

Thus, under all three well-reasoned definitions of carbon-intensive employment, working in the selected industries does not meaningfully predict climate skepticism. While the high significance of the income variable hints that economic insecurity plays some part in the formation of these attitudes, the repeated finding of employment category as insignificant proves beyond doubt that the volume emissions created by one's occupation does not affect acceptance of climate science. This motivates a failure to reject the null hypothesis for H_1 .

5.3 Results III: Coastal Geography as a Predictor of Climate Denial

Figure 5.3.1

	<i>Dependent variable:</i>
	Climate Skepticism
Party ID on 3-point scale	0.110 ^{***} p = 0.000
Bachelor's Degree	-0.047 ^{***} p = 0.0002
Income on 3-point Scale	-0.025 ^{***} p = 0.001
Web Interview	0.039 ^{***} p = 0.003
Lives in a Coastal District	-0.004 p = 0.822
Constant	0.027 p = 0.127
Observations	4,219
<i>Note:</i>	* p<0.1; ** p<0.05; *** p<0.01

51 observations dropped for missingness

Figure 5.3.1 displays the results for the first coastal geography model. This regression uses all the same controls as the employment-based models, but substitutes living in a flood-prone district for carbon-intensity of employment as the independent variable. Once again, partisanship, education, and income are highly significant while the principal independent variable fails to show significance. The other coefficients are stable between this model and the employment-based ones preceding it. That is, rightward-leaning respondents are a full 22 percentage points more likely to deny climate science than leftward-leaning respondents, as they are separated by two points on a three-point

scale. Education and income also have virtually identical p-values and effect sizes. Interview mode retains its significance, again producing a sizeable four-point swing in climate skeptic responses. This model therefore fails to reject the null hypothesis for H₂ while joining the first model in demonstrating the significance of the control variables.

Figure 5.3.2

	<i>Dependent variable:</i> Climate Skepticism
Party ID on 3-point Scale	0.102 ^{***} p = 0.000
Bachelor's Degree	-0.024 p = 0.302
Income on 3-point Scale	-0.009 p = 0.556
Lives in a Coastal District	-0.006 p = 0.929
Homeowner	-0.008 p = 0.734
Interactivity: Lives in a Coastal District * Homeowner	0.028 p = 0.739
Constant	-0.019 p = 0.566
Observations	1,166
<i>Note:</i>	* p<0.1; ** p<0.05; *** p<0.01

14 observations dropped for missingness

Figure 5.3.2 adds homeownership as an interaction variable with coastal geography. Since the homeownership question was only asked in the face-to-face interview mode, the data for this model were filtered down only to those respondents that faced a live interviewer. This removed the possibility of using a mode variable. 1180 respondents were in this refined dataset, with 14 of those respondents omitted for missingness. Interestingly, the income and bachelor's degree variables did not produce significant effects in this

model. This is likely a function of the sample size, as the face-to-face only sample is a fraction of the size of the overall ANES sample. That being the case, it is perfectly reasonable to prefer the results of the first coastal geography model, wherein these variables were found to be highly significant. The partisanship variable retains its place as both the largest and most significant variable, with a p-value smaller than .001 and an effect size of 10.2 percentage points.

Moving to the key variables of interest, this model finds that neither living in a coastal area nor owning a home are meaningful predictors of climate skepticism. Additionally, there is no interaction between those two variables; a respondents' owning a home does not reliably increase the strength of the coastal geography variable. This model therefore fails to motivate a rejection of the null hypothesis for H₃.

6 – Discussion

6.2 Carbon Intensive Employment

None of the three employment-based models provided evidence that would justify rejection of the null hypothesis. Any anxiety arising from prospects of climate science putting carbon-intensive workers out of a job did not drive those respondents to deny that scientific consensus. This was true for all three conceptions of carbon-intensive employment of varying specificities. Instead, partisanship produces an effect that is large, highly significant, and consistent with existing scholarship in the field. Education, coded as holding at least a bachelor's degree, is also highly significant, although the effect size is only about half of partisanship. Increases in income also predicted significant decreases in rates of skepticism.

The key finding of carbon-intensity failing to predict climate skepticism provides strong evidence for the sociotropic hypotheses discussed in the literature review. The fact that individuals whose jobs would very likely be on the chopping block in a decarbonization push do not seek to deny or undermine climate science at a higher rate indicates that opinion formation in this area is in fact selfless. Instead of pushing back against the pieces of science that portend job losses and reduced earnings potential, these respondents mostly go the way of their economically and educationally equivalent peers. Recall the academic consensus that those at the bottom of the labor pool do not harbor anti-immigration attitudes on the basis of having to compete with immigrants.⁷⁹ The findings here parallel that dynamic, with those whose livelihoods would be most disturbed by a response not showing any extra resistance to that body of science.

The fact that all three different definitions of carbon-intensity that were tested produced equivalent results strengthens this claim. The argument that the polluting nature of a respondent's job is not obvious enough to make unemployment anxiety salient was preempted by the third, ultra-specific definition, which included only those individuals who dealt directly with fossil fuels. Granted, this test group was only 32 respondents and would benefit from a larger sample to bolster its statistical validity. Nevertheless, the fact that using only the most egregiously polluting industries could not push the effect into significance signals that the effect is unlikely to ever materialize in a meaningful way. Even if it were true for an even more specific group of employees, the population it described would be too small to be socially or electorally important.

⁷⁹ See section 3.1

The experiments also add weight to the consensus of partisan-motivated reasoning in this area of opinion formation. Recall that multiple studies of motivated reasoning specifically tested belief in climate change across party lines and found repeatedly that rightward lean consistently predicted skepticism or denial of climate change.⁸⁰ The experiments above show that even when controlling for the nature of one's employment, education, and income, this still holds true.

Given the proposed mechanism assumes that the material insecurity associated with unemployment could be driving climate denial, the repeated finding of income as significant also bears discussion. Jumping one \$50,000 income bracket produced a 2.5-percentage point decrease in the rate of skepticism. This indicates that material security has some effect on acceptance of climate science, even if the nature of one's employment does not. Importantly, this income effect is still significant even while controlling for education, meaning it is not a function of education causing high earnings, but rather of income itself predicting belief in climate change. Regardless, the significance of the income variable shows that economic anxiety might still be part of the denial equation. Given this finding, as well the existing studies that have found that economic anxiety produces deficits of public trust and harshness towards criminals, further research should "zoom-out" beyond respondent occupation but still investigate other measures of economic anxiety and material insecurity.⁸¹

The last novel finding of the employment-based experiments is the significance of the mode variable. In the context of racial minorities and women, it is accepted that social

⁸⁰ See section 3.3

⁸¹ See section 3.2

desirability bias is strong enough to affect survey results. The repeated finding of the mode variable's significance indicates that climate skepticism carries a stigma strong enough to create a social desirability effect of its own. According to the model shown in Figure 5.2.1, an entire 4 out of 100 respondents would change their answer based on interview mode alone. There are few possible explanations other than the presence of a human being driving these respondents to answer in support of climate change being real. This has serious implications for the climate change debate, as it indicates that the skeptical population feels stigmatized and has internalized disapproval of their positions. This, in turn, is damaging to the social fabric and is likely making it more difficult to persuade them. It may even be producing a "boomerang" effect, wherein resentment or perceived differences of opinion are actually driving the climate-affirming and climate-skeptical populations further apart.

While the key variable of interest was found patently insignificant, the employment-based models generated several valuable insights. Partisan differences of opinion are as prominent as ever, while increased income and education are both conducive to acceptance of climate science. The fact that income is found significant while occupation is insignificant indicates that the "border" where sociotropic reasoning in respondents activates lies somewhere in between occupation and broader income class. Additionally, the discovery of climate attitudes' own version of the Bradley effect sheds light on the underlying social dynamics of the climate change debate and indicates that those dynamics should be considered in future research.

6.3 Coastal Geography

The findings of the coastal geography tests mostly reinforce the findings of the occupation-based tests. Here as well, individuals with material reason to prefer climate change being false do not show different rates of belief or denial. Instead, the same control variables are significant with nearly identical correlation sizes. The headline here is the finding that living in an area that will see chronic flooding in even an optimistic climate change scenario does not affect belief in climate change. The fact that rising tides directly threatens their homes and neighborhoods does not appear to make these respondents budge on the issue of belief.

As an exercise, consider an alternate conception of the theory: perhaps those living on the coasts would be *more* likely to express belief in climate science because they believe that the costs of being wrong and not acting would be too high. Even so, coastal geography does not produce a statistical effect in support of this. Instead, its p-value approaches the upper bound of 1 with a figure of 0.928, while the 95% Confidence Interval straddles the 0 mark. Lying in the path of the flood, even in this very literal sense, does not appear to move the needle on climate skepticism one way or the other.

6.4 Refinements and Suggestions for Further Research

The construction and subsequent results of this experiment have revealed several shortcomings. The lessons learned are in many cases generalizable and would be useful to keep in mind for future research. Refinements for the carbon-intensity experiments are suggested first, followed by adjustments to the coastal geography tests.

One problem with the carbon-intensity coding is that it only considers the income of the respondent. In reality, 66% of U.S. families with children are dual income households.⁸² That being the case, a refined version of this coding would actually consider all sources of household income, not just that of the individual respondents. Such a question was not included in the ANES dataset, but alternatives like the United States General Social Survey have asked respondents about their spouse's occupation in addition to their own.⁸³

As noted earlier, the last definition of carbon-intensity was specific enough to be airtight as far as a respondent's awareness of their role in the emissions regime, but too specific to have the fullest statistical validity. Thus, future research exploring this question can either use datasets with larger overall samples or could combine timeseries datasets like the 2012 ANES and 2008 ANES data sets to increase the size of the population that would fit this definition.

On the topic of using earlier data, there is an argument to be made that economic and employment-related anxieties will be more pronounced during economic downturns than in relatively good times. That being the case, data like the 2008 ANES survey should be leveraged and analyzed in a similar way to explore whether severe recessions change the dynamics explored in this research, especially given the findings of section 3.2 of the literature review.

Moving to coastal geography, the most serious flaw with my approach was the precision (or rather, lack of precision) of using congressional district as a proxy for being in

⁸² "The Rise in Dual Income Households." Pew Research Center, 18 June 2015, www.pewresearch.org/ft_dual-income-households-1960-2012-2/.

⁸³ United States General Social Survey Codebooks are viewable at [https://gss.norc.org/](https://gss.norc.umd.edu/)

a flood-prone area. In reality, many of the district identified by the Union of Concerned Scientists' model are quite large and can only be partially characterized as coastal.

Although it is restricted for most users, FIPS codes, which denote counties, are included in primary ANES data collection. Under the proper confidentiality controls, these data could be leveraged to more precisely define a population for whom flood risks are sufficiently salient.

Lastly, both sets of models would have benefited from alternative, nonbinary measures of climate skepticism. While it is true that one can only believe or not believe in something, there is something to be said for measuring *intensity* of opinion. A follow-up question gauging respondents' certainty of opinion or an alternative ordinal measure of climate attitudes would have made a valuable complement to the somewhat simplistic question administered by the 2016 ANES. Such questions are in fact included in European analogs, namely the Eurobarometer surveys.

7 – Conclusions

In light of these findings, it is tempting to default to the preexisting assumptions of the climate skepticism and partisan-motivated reasoning literatures. It would certainly be much easier to accept that theories of egotropic vs. sociotropic opinion formation and broader economic anxiety fall by the wayside when citizens consistently gravitate toward partisan perceptions of reality. Yet one assumes, or perhaps only hopes, that citizens do not throw objective facts and critical thinking in the dustbin at the first arrival of a partisan cue. An implicit goal of this research was to find a valid *excuse* for climate skeptics to hold on to their denial. In examining vulnerability to economic and demographic upheaval as

determinants of climate attitudes, I ventured to find an effect that would leave readers, social scientists, and policymakers with no choice but to empathize with climate skeptics. If it was fear of unemployment and destitution that was driving climate denial, who could bring themselves to blame the skeptics for pushing back against a consensus that promised to upend their lives? Rather than ascribe climate change denial to “system-justification tendencies” and a desire for “protection of the current industrial capitalist order,” as some authors do, this research sought to identify more salient and easily addressable motivations of climate skepticism that would be humanizing instead of vague and sinister.^{84,85}

Yet with partisanship accounting for double-digit swings in opinion across the spectrum, economic anxiety and its concomitant theories are overshadowed by an increasingly obvious trend of citizens being polarized not just in their party preferences, but in their acceptance of objective scientific facts. Who needs selfish reasoning when you can have a Republican version of reality? McRight, Dunlap, and their peers can still lay claim to the most correct explanation of climate skepticism with their identity-driven models.

There are prospects for progress, however, found in the results of the education and income variables. Recall the high significance and sizeable effects of these simplified measures even when both were controls were present. The results indicated that a Republican holding a bachelor’s degree would be 4.8 percentage points more likely than

⁸⁴ Aaron M. McCright and Riley E. Dunlap, “Cool Dudes”

⁸⁵ Olve Krange, Bjørn P. Kaltenborn, and Martin Hultman. “Cool dudes in Norway: climate change denial among conservative Norwegian men.” *Environmental Sociology* 5, no. 1 (2019): 1-11.

Republican without such a degree to affirm climate science. If one is worried that objective reasoning is not driving public debate to the degree that it should, it is intuitive to prescribe more education as a panacea. At the very least, it is reassuring to find that those who have spent four years pursuing a degree in any field were more likely to give credence to the scientific processes that created the climate change consensus. This reasoning, however, does not explain why the United States lags behind the rest of the world in climate acceptance, as it is in the relative middle of the pack when it comes to educational attainment of OECD countries.⁸⁶ Nevertheless, lifting the uneducated to higher degrees of educational attainment is one avenue for mitigating anti-empiricism in at least this realm of public opinion.

Turning to income, this variable's significance shows that there is something other than political and demographic identities that can explain who denies climate change and who does not. There are two possibilities. The explanation that is consistent with the theories put forward above would assert that the economic security associated with higher income makes climate change "less scary" to the degree that it does not produce a motivated cognition effect in favor of rejection. Yet it is also possible that high earners are more comfortable with policies like emissions reductions because the associated increases in energy costs would be a smaller portion of their income than of their lower-earning peers. While either explanation would require further research to be confirmed, it is

⁸⁶"Percentage of Population of Select Countries with Bachelor's Degrees." Percentage of Population of Select Countries with Bachelor's Degrees or Higher, by Age | RSF. Accessed March 20, 2020. <https://www.russellsage.org/research/chartbook/percentage-population-select-countries-bachelors-degrees-or-higher-age>.

already true that there is a visible relationship between household economics and climate attitudes.

Last but not least is the significance of the survey mode variable. With a p-value of .003 and an effect size of 3.9 percentage points, this thesis found conclusively that respondents were more likely to deny climate science over the internet than in person. This finding demands to be contextualized within the larger climate skepticism debate. In addition to the visible divides across partisanship and education levels, future scholarship must now also consider that there are “lurking” skeptics that choose to keep their beliefs to themselves. Indeed, it is troubling that the public conversation on climate change has arrived at a point where individuals feel embarrassed enough by their views to keep them from their peers. These results signal that in trying to persuade those skeptics to accept the scientific consensus, we have instead alienated them. This calls for introspection among the climate-change-affirming majority, as it indicates that the communications strategies employed by the media and by public figures might actually be counterproductive. Indeed, it will be much harder to persuade climate skeptics if they take their opinions underground.

Ignoring a problem does not make it go away. This is true both of climate change denial, as well as climate change itself. Preserving the planet and the communities that live on it demands that we enact systemic changes in our energy production, consumption patterns, and supply chains. These changes would not be easy under a best-case scenario. They will be even harder so long as a large portion of the population insists on there not being a problem in the first place. Yet we have long known that opinions are not formed in

a vacuum; while we cannot build a consensus overnight, we can continue to identify the factors that have given rise to climate skepticism and seem to be undermining a facts-first policy process. Even if holding an at-risk job or living in a flood-prone area does not predict climate attitudes, exploring how one's social, economic, or political background affects these attitudes is still an important tool for understanding the problem. So long as it is used to humanize and understand skeptics rather than stigmatize them, this approach will become all the more critical as we seek to build the broadest possible climate coalition.

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