Contradicting effects of subjective economic and cultural values on ocean protection willingness: preliminary evidence of 42 countries

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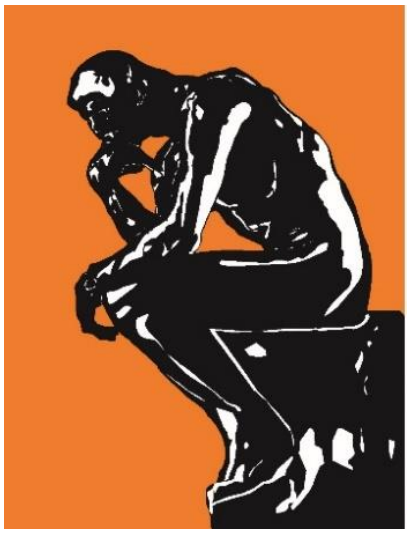

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Abstract: Coastal protection is crucial to human development since the ocean has many values associated with the economy, ecosystem, and culture. However, most ocean-protecting efforts are currently ineffective due to the burdens of finance, lack of appropriate management, and international cooperation regimes. For aiding bottom-up initiatives for ocean protection support, this study employed the Mindsponge Theory to examine how the public's perceived economic and cultural values influence their willingness to support actions to protect the ocean. Analyzing the European-Union-Horizon-2020-funded dataset of 709 respondents from 42 countries, we discovered that perceived economic values have negative effects on the tendency of ocean protection supports (i.e., food, transportation, renewable energy, oil and gas, and recreation). In contrast, certain perceived cultural values can help increase the willingness to do so (i.e., mental well-being and sense of identity). However, the effects of perceived cultural values are only moderately reliable. These findings suggest that designing cultural information delivery campaigns can help promote coastal reserve supports, such as fundraisings and preserving the oceans from the community.

Keywords: ocean protection; economic values; sense of identity; community base; bottom-up strategy, Bayesian Mindsponge Framework analytics, BMF

"— Perch or carp, no matter what is up to the Heaven."

In "Joint Venture"; *The Kingfisher Story Collection* (2022)

1. Introduction

The world's oceans are an invaluable source of biodiversity, home to endangered species and genetic resources that support ecosystem services that are extremely valuable to humanity (Costello et al., 2020; Worm et al., 2006). However, growing anthropogenic effects are endangering the ocean's capacity to provide these services (Meredith et al., 2019), which has sparked a global debate about broadening the ocean protection zones. The importance of ocean protection has been highlighted in Sustainable Development Goal 14 "*Conserve and sustainably use the oceans, seas and marine resources for sustainable development*" (Rees et al., 2018). Although marine protected areas (MPAs) are useful for preserving ocean biodiversity and ecosystem services, only 2.9% of the ocean is currently primarily protected (Institute, 2023). Sala et al. identified the global highest priority areas and suggested that increasing the protected areas from 2.9% to 21% in such zones can help increase the average protection of endangered species and carbon storage (Sala et al., 2021). However, scaling up the action can be very challenging.

First, the current protection systems are run mainly by the public sector (Agardy, 2010), and increasing the protected areas demands more resource allocation, including finance and

forces (Berkman, 2012; Salm et al., 2000). Because most economies worldwide suffered economic downtrends due to the Covid-19 pandemic, governments tend to cut their expenditure on ocean protection (Aung et al., 2022; Commonwealth, 2020). Secondly, the instrument and mechanisms to achieve worldwide cooperation in conservation principles based on legal treaty responsibilities are lacking. In particular, whether one country (located in the non-high priority areas with free economic activities) allows other countries (located in the high priority areas with limited economic activities in the zones) to make extractive uses within their boundaries. Based on the independence of countries (Sens, 1968), building a legal mechanism to force a country to participate in international cooperation to preserve oceans can be arduous. Even though institutional, legislative, and regulatory policies are applied to protect the oceans, illegal economic activities still take place in the protected coastal and ocean areas (including overfishing, destruction of habitats, and water contamination), which leads to nature reserve policies not fully succeeding as expected (Brussevich, 2020; Cicin-Sain & Belfiore, 2005). Thus, a community-based approach is increasingly important to preserve oceans (Cox et al., 2010) as it appears to be sustainable and long-lasting (Ostrom, 1990).

There are some concepts related to environmental perceptions at the individual level. Ocean literacy level is a key subject in promoting marine protection via community-based strategies (Craik, 1973). There are some definitions of ocean literacy in literacy. Cava et al. (Cava et al., 2005) define ocean literacy as "being able to make informed and responsible decisions regarding the ocean and its resources," while Santoro et al. defines it as "understanding of the ocean's influence on you and your influence on the ocean" (Santoro et al., 2017). Another important concept is ocean citizenship, which "reflects an individual's relationship with place—either in a direct sense through personal interaction or indirectly through resource use and lifestyle choice" (Fletcher & Potts, 2007). The idea of ocean citizenship has recently been expanded to include environmental behavior and calls for significant individual behavioral adjustments, such as those connected to consumer choice, to lessen environmental impacts (Jefferson et al., 2015; McKinley & Fletcher, 2010; Santoro et al., 2017). It is noticed that both concepts focus on the roles of individuals in marine protection.

Previous studies have indicated the objective benefits of supporting ocean protection efforts as: (1) economic benefits: fisheries (Roberts et al., 2017), tourism and recreation (Brander et al., 2012; Pendleton et al., 2016), renewable energy (Smith-Godfrey, 2016); and (2) cultural values: heritage (Bennett et al., 2017), recreation and aesthetic (Martin et al., 2016), sense of place and identity (Ainsworth et al., 2019), and spiritual connections (Gelcich et al., 2014). The current study, on the other hand, aims to fill the knowledge gap by examining how perceived benefits may influence the tendency of ocean protection supports via information processing. To our knowledge, this study is one of the few studies providing general (although preliminary) evidence on how subjective cost-benefit evaluations of 42-

country public influence their ocean protection supports. Following the recent requirements to promote ocean protection through community-based strategies, issues that can affect the willingness of ocean protection supports, such as perceived economic and cultural values, require a better understanding. Understanding the associations between the subjective evaluation of ocean's economic and cultural values and ocean protection willingness can aid the transition from top-down to bottom-up approach. The study can help policymakers to develop appropriate policies to promote ocean protection of the community, and crowdfunding fundraisers to finance marine protection activities.

Based on these reasons, the current study had two main objectives:

(i) Examine the impacts of perceived economic benefits of coasts and oceans on people's support for ocean protection; and
(ii) Examine the impacts of perceived cultural/mental benefits of coasts and oceans on people's support for ocean protection.

To examine the objectives, the Mindsponge Theory was employed to construct models exploring factors influencing ocean protection supports (Nguyen et al., 2022b; Vuong et al., 2023). The models were then measured and validated using. Bayesian Mindponge Framework (BMF) analytics on a dataset of 709 respondents from 42 countries (Fonseca et al., 2023; Nguyen et al., 2022c)

2. Methodology

2.1. Theoretical Foundation and Assumptions

The mechanism underlying the ocean protection supports is explained using the mindsponge theory in this subsection. The mindsponge idea was first developed as a dynamic process or mechanism that explains how a mindset adapts to new cultural values and discards ones according to context (Vuong & Napier, 2015). The mindsponge mechanism was described as "the mind as a sponge that squeezes out inappropriate values and absorbs new ones that fit or complement the context." The mechanism was created by combining a number of well-known theories and models from the past, including the self-affirmation theory (Correll et al., 2004), multi-filtering process (Vuong & Napier, 2014), information processing model (Daft & Weick, 1984; Levy et al., 2007), trust (Paliszkiewicz, 2011), and inductive attitude (Pólya, 1954). Nevertheless, a concept derived from observing psychological and social phenomena is insufficient for understanding human psychology and behavior because the human body is a complex system.

Incorporating the most recent discoveries in the brain and life sciences, the mindsponge mechanism is thus expanded into the Mindsponge Theory. The Mindsponge Theory describes how the mind interprets, processes, and filters information. According to this perspective, the human mind can be described as a collection-cum-processor with the

following key characteristics: (i) It reflects the biosphere's natural patterns of system behavior; (ii) It is a dynamic, dynamically balanced process; (iii) It involves cost-benefit analysis, which aims to increase system's perceived benefits and reduce perceived costs; (iv) It consumes energy and adheres to the idea of energy conservation; (v) It has a goal/priority based on the system's demand; (vi) Its primary goal is to prolong the system's existence through survival, growth, and reproduction.

In other words, Mindsponge Theory suggests that individuals would think, act, and behave to maximize perceived benefits and decrease perceived costs to prolong their existence based on information contained in their minds and absorbed from the external environment. However, whether the values of a thing, action, or event are perceived as costly or beneficial depends on the total net value created by such thing, action, or event. Thus, the effects of perceived economic benefits of the ocean might be different from those of perceived cultural/mental benefits of the ocean. For example, economic values of the ocean require mass physical exploitation of ocean and coastal resources to be generated, seemingly contradicting the meanings of ocean protection. Meanwhile, cultural/mental values are relatively intangible and do not require mass physical exploitation to be achieved. Thus, we suspected that perceived economic and cultural/mental values would have different impacts on the public's willingness to support ocean protection.

2.2. Model Construction

2.2.1. Variable Selection and Rationale

The current study employed secondary data retrieved from the dataset of Fonseca et al. (2023) to examine the impacts of both perceived economic and cultural benefits of coasts and oceans on the people's willingness to support ocean protection. The data was a part of the "Marine Coastal Ecosystems Biodiversity and Services in a Changing World (MaCoBioS)" research project funded by the European Commission's Horizon 2020. The dataset provides socio-demographic data from 709 respondents in 42 countries, containing information on public perceptions of climate change, the importance of marine and coastal ecosystems, the anthropogenic effects on them, and their management. The data could be used as the foundation for future research and give an overview of public perceptions of the connections between climate change, its consequences on marine and coastal ecosystems, and strategies for sustainable management.

The data was obtained by the self-administered online survey in four languages, including English, French, Spanish, and Italian (Fonseca et al., 2022). The Qualtrics website hosted the online survey, which was available for participation from 16 November 2021 to 16 February 2022. The survey was piloted on a sample of 20 respondents before being distributed to the general public to ensure that it was completed and understandable. The survey contained four main categories: (1) climate change perceptions; (2) perceptions toward the value of,

and threats to, costs, oceans, and their wildlife; (3) climate change responses perceptions; and (4) socio-demographic characteristics. The informed consent was given to the participants before they started the survey and was available in the four languages. Because of confidentiality, personal identification was anonymized in the final dataset. The final dataset was peer-reviewed and published at https://www.sciencedirect.com/science/article/pii/S2352340923000422#bib0007 (accessed on 1 June 2023). The dataset and code snippet based on the bayesvl R package (La et al., 2022) are deposited on the Open Science Framework for transparency and replication (Vuong, 2018, 2020) at https://osf.io/dntxb.

Table 1 presents the selected variables based on the theoretical framework to examine the research objectives. The *SupportforOcean* variable indicates the respondent's willingness to support ocean protection.

Table 1: Variable Description

Variable name	Explanation	Type of variable	Coded value
SupportforOcean	The willingness of respondents to support actions to protect the oceans, even if it meant eating less seafood and paying more for it	Ordinal	Strongly disagree: 1; Disagree: 2; Neither agree nor disagree: 3; Agree: 4; Strongly agree: 5
Economic_Food	Food is the most perceived beneficial from the coast and oceans	Binary	No: 0; Yes: 1
Economic_Transport	Transport and shipping are	Binary	No: 0; Yes: 1

	the most perceived beneficial from the coast and oceans		
Economic_RenewableEnergy	Renewable energy is the most perceived beneficial from the coast and oceans	Binary	No: 0; Yes: 1
Economic_RawMaterial	Raw materials for construction are the most perceived beneficial from the coast and oceans	Binary	No: 0; Yes: 1
Economic_OilandGas	Oil and gas are the most perceived beneficial from the coast and oceans	Binary	No: 0; Yes: 1
Culture_SenseofIdentity	Places that provide a sense of identity are the most perceived beneficial from the coast and oceans	Binary	No: 0; Yes: 1

Culture_Aesthetics	Aesthetic pleasure is the most perceived beneficial from the coast and oceans	Binary	No: 0; Yes: 1
Culture_HistoryandHeritage	Places that support history and cultural heritage are the most perceived beneficial from the coast and oceans	Binary	No: 0; Yes: 1
Culture_Recreation	Recreation and tourism are the most perceived benefits of the coast and oceans	Binary	No: 0; Yes: 1
Culture_MentalHealth_Wellbeing	Places to support mental health and well-being are the most perceived beneficial from the coast and oceans	Binary	No: 0; Yes: 1

Regarding the perceived cultural values about coasts and oceans, *Culture_SenseofIdentity* variable presents the respondent's perception that coasts and oceans provide a sense of identity to the people in their country. *Culture_Aesthetics* variable illustrates the perception towards aesthetic pleasure, while *Culture_HistoryandHeritage* variable indicates the perception towards history and cultural heritage. The recreation and tourism values are presented by *Culture_Recreation* variable, and coasts and oceans serve as places to support mental health and well-being, indicated by *Culture_MentalHealth_Wellbeing* variable.

Concerning economic values, *Economic_OilandGas* variable presents the respondents' perception of oil and gas, which is one of the most important benefits that the coast and oceans bring to people in their country. Transport and shipping values are presented by *Economic_Transport* variable, and *Economic_RenewableEnergy* variable demonstrates the renewable energy sources provided by the coasts and oceans. *Economic_RawMaterial* and *Economic_Food* variables indicate the raw materials for construction and food benefits from the oceans, respectively.

2.2.2. Statistical Models

To examine the first research objective, Model 1 was formulated with *SupportforOcean* as the outcome variable and the perceived economic values as predictor variables. Model 1 was constructed as follows:

$$SupportforOcean \sim normal(\mu, \sigma) \quad (1.1)$$

$$\mu_i = \beta_0 + \beta_{Economic\_OilandGas} * Economic\_OilandGas_i + \beta_{Economic\_Transport} * Economic\_Transport_i + \beta_{Economic\_RenewableEnergy} * Economic\_RenewableEnergy_i + \beta_{Economic\_RawMaterial} * Economic\_RawMaterial_i + \beta_{Economic\_Food} * Economic\_Food_i \quad (1.2)$$

$$\beta \sim normal(M, S) \quad (1.3)$$

The shape of the normal distribution, whose width is determined by the standard deviation σ and mean μ determines the highest probability of occurring of the coefficient's value. μ_i indicates the level of respondent i's ocean protection willingness; $Economic\_OilandGas_i$ presents that oil and gas are the economic values of oceans from the respondent i's perspective. Model 1 contains $\beta_{Economic\_OilandGas}$, $\beta_{Economic\_Transport}$, $\beta_{Economic\_RenewableEnergy}$, $\beta_{Economic\_RawMaterial}$, and $\beta_{Economic\_Food}$ as the coefficients, β_0 as the intercept, and the standard deviation σ indicates the "noise." The logical model of Model 1 can be visualized in Figure 1.

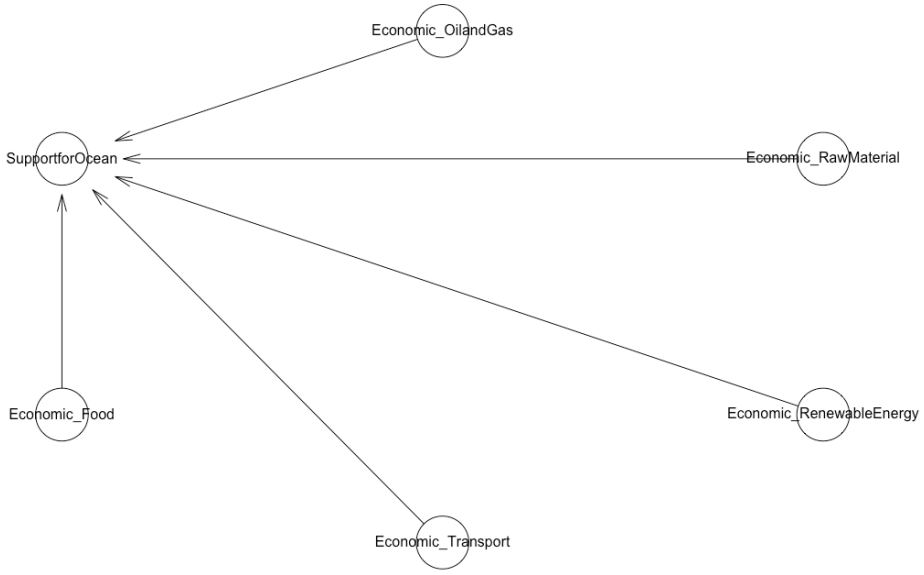

Figure 1: Logical connection of Model 1

Regarding the second research objective, which aims to examine the effects of cultural values on the willingness for oceans protection, Model 2 is formulated as below:

$$SupportforOcean \sim normal(\mu, \sigma) \quad (2.1)$$

$$\mu_i = \beta_0 + \beta_{Culture\_SenseofIdentity} * Culture\_SenseofIdentity_i + \beta_{Culture\_Aesthetics} * Culture\_Aesthetics_i + \beta_{Culture\_HistoryandHeritage} * Culture\_HistoryandHeritage_i + \beta_{Culture\_Recreation} * Culture\_Recreation_i + \beta_{Culture\_MentalHealth\_Wellbeing} * Culture\_MentalHealth\_Wellbeing_i \quad (2.2)$$

$$\beta \sim normal(M, S) \quad (2.3)$$

The logical connections between outcome and predictor variables are presented in Figure 2.

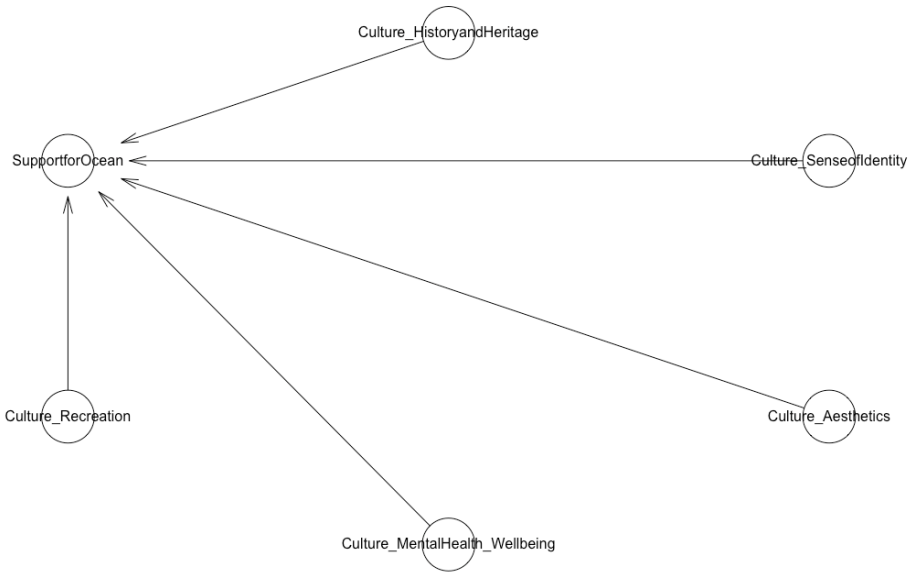

Figure 2: Logical connection of Model 2

2.3. Analysis and validation

To examine the effects of the perceived economic and cultural benefits on people's willingness to support ocean protection, this study employed the BMF analytics. Specifically, we utilized the Bayesian analysis aided by Markov Chain Monte Carlo (MCMC) techniques to analyze the constructed models based on the Mindsponge Theory (Nguyen et al., 2022a, 2022c; Vuong et al., 2022). There are some important reasons to employ the BMF in this study. Firstly, the mindsponge mechanism and Bayesian inference are highly compatible (Nguyen et al., 2022a). Secondly, Bayesian inference estimates all attributes using a probabilistic approach, enabling precise prediction using parsimonious models (Csilléry et al., 2010; Gill, 2014). Flexibility is a key benefit of Bayesian approaches since it allows them to fit a wide range of models, including multi-level correlation structures and non-linear regression frameworks, with the aid of the MCMC technique (Dunson, 2001).

Comparing the Bayesian inference to the Frequentist approach, there are a number of advantages. In particular, Bayesian inference allows researchers to consider the parameters with the highest probability and reduce the reliance on the *p*-value, ultimately reducing the risk of misinterpretations (Wagenmakers et al., 2018). Additionally, the reproducibility crisis, which has been identified as an issue with the Frequentist approach, can be resolved

by using the Bayesian inference since it provides opportunities for researchers to update the prior information (Halsey et al., 2015). The posterior expectations for summary inferences can be expressed below:

$$\mathbb{E}\{\theta(x)|y\} = \int \theta(x)\pi(x|y)dx$$

Where $\mathbb{E}\{\theta(x)|y\}$ is the expected value, given a sample y and a prior density for $x \in \mathbb{R}^p$ (denote a joint density), and the posterior is denoted as $\pi(x|y)$ (also known as the induced full conditional densities for each of the components x given values of the other components y).

Because the current study is explorative, models were built using uninformative priors specifying a flat prior distribution to provide the least amount of prior information, aiming to reduce the bias to the expected outcomes. According to Roberts and Smith (1994), the Markov chain mimics a random sample from π, given realizations $\{X^t: t = 0, 1, \dots\}$. The distribution of the state of the chain converges at time t to π when $t \to \infty$ for any scalar functional θ as follows (Brooks, 1998):

$$\frac{1}{n}\sum_{t=1}^{n} \theta(X^t) \xrightarrow{n\to\infty} \mathbb{E}_\pi\{\theta(X)\}$$

The convergence of Markov chains needs to be held to interpret the estimated results. It can be verified statistically using the effective sample size (*n_eff*) and the Gelman-Rubin shrink factor (*Rhat*) and visually using autocorrelation plots, Gelman-Rubin-Brooks plots, and trace plots. The number of iterative samples that are not autocorrelated in a stochastic simulation is denoted as *n_eff*. Effective samples are typically considered satisfactory for reliable inference if *n_eff* is greater than 1000 (McElreath, 2018). The convergence of the Markov chains is also measured using the *Rhat* value, which indicates the Gelman-Rubin shrink factor and potential scale reduction factor (Brooks & Gelman, 1998). When *Rhat* equals 1, it typically suggests that a model is convergent. Lynch (51) proposes that the mathematical equation to calculate the Rhat value is below:

$$Rhat = \sqrt{\frac{T}{\widehat{\mathbb{V}}}}$$

Where $\widehat{\mathbb{V}}$ is the within-sequence variance, and T is the estimated posterior variance.

3. Results

3.1. Convergence diagnostics

The simulation of two models can be regarded as well-convergent based on convergence diagnosis indicators. In particular, all model parameters have effective sample sizes (*n_eff*)

that are higher than the threshold of 1000, and all Rhat values are equal to 1 (see Table 2 and Table 3).

Table 2: Results of Model 1

Parameters	Mean	Standard deviation	*n_eff*	*Rhat*
Constant	4.58	0.05	7198	1
Economic_Food	-0.17	0.06	8365	1
Economic_Transport	-0.13	0.07	10574	1
Economic_RenewableEnergy	-0.10	0.09	11993	1
Economic_RawMaterial	-0.09	0.30	14520	1
Economic_OilandGas	-0.44	0.15	13910	1

Table 3: Results of Model 2

Parameters	Mean	Standard deviation	*n_eff*	*Rhat*
Constant	4.46	0.05	7423	1
Culture_Recreation	-0.10	0.06	9038	1
Culture_MentalHealth_Wellbeing	0.06	0.07	11140	1
Culture_Aesthetics	-0.05	0.11	13253	1
Culture_SenseofIdentity	0.07	0.10	14063	1
Culture_HistoryandHeritage	0.00	0.10	11958	1

Markov chains are regarded as well-convergent in the trace plot when they are good-mixing and stationary around an equilibrium. A strong indication of convergence can be seen in Figure 3 and Figure 4 through the Markov chains' fluctuations around a central equilibrium. The convergence is further supported by the shrink factors dropping to 1 during the warm-up phases (see Figure 5 and Figure 6).

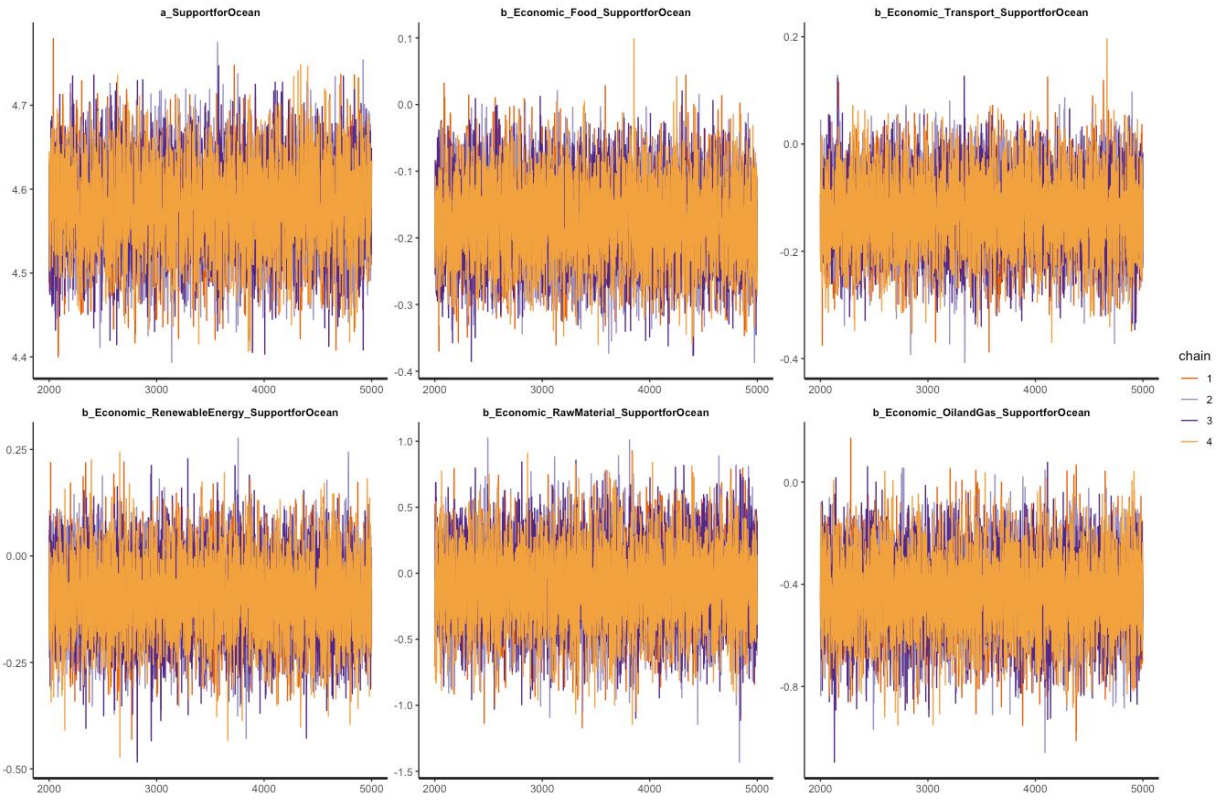

Figure 3: Trace plots of Model 1

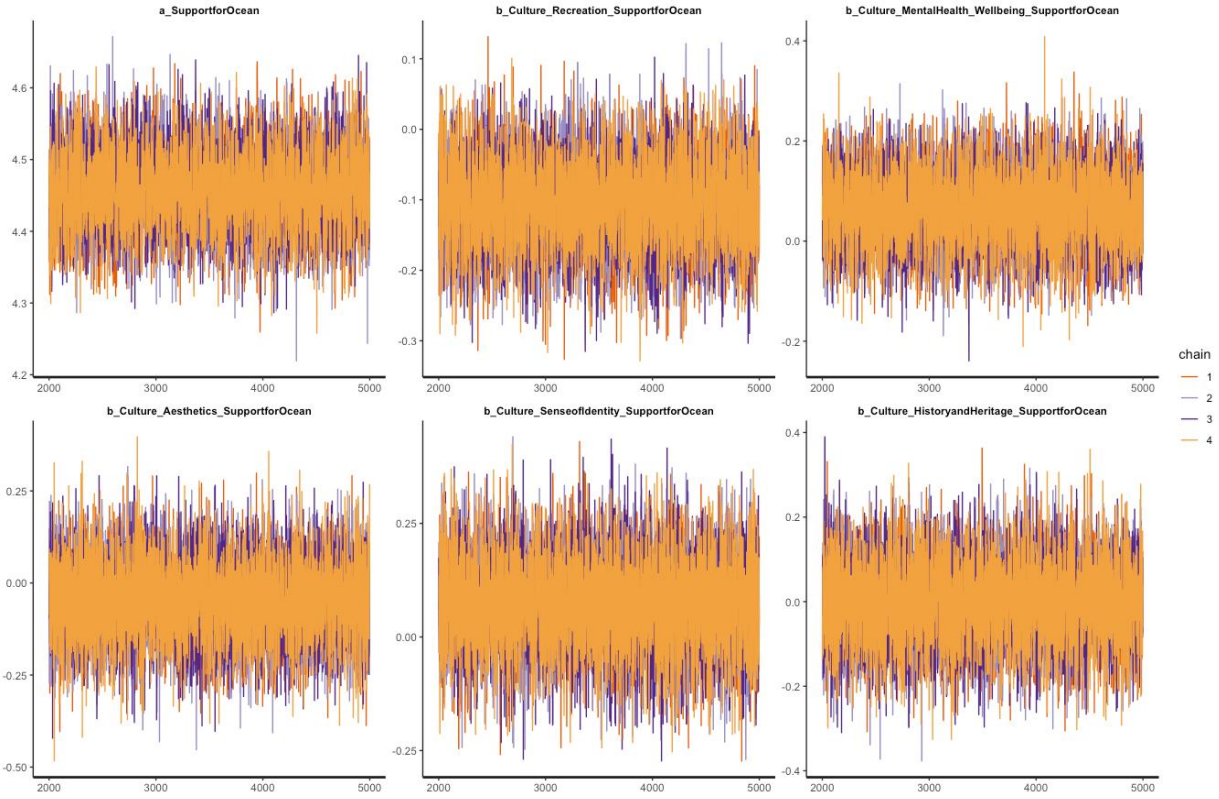

Figure 4: Trace plots of Model 2

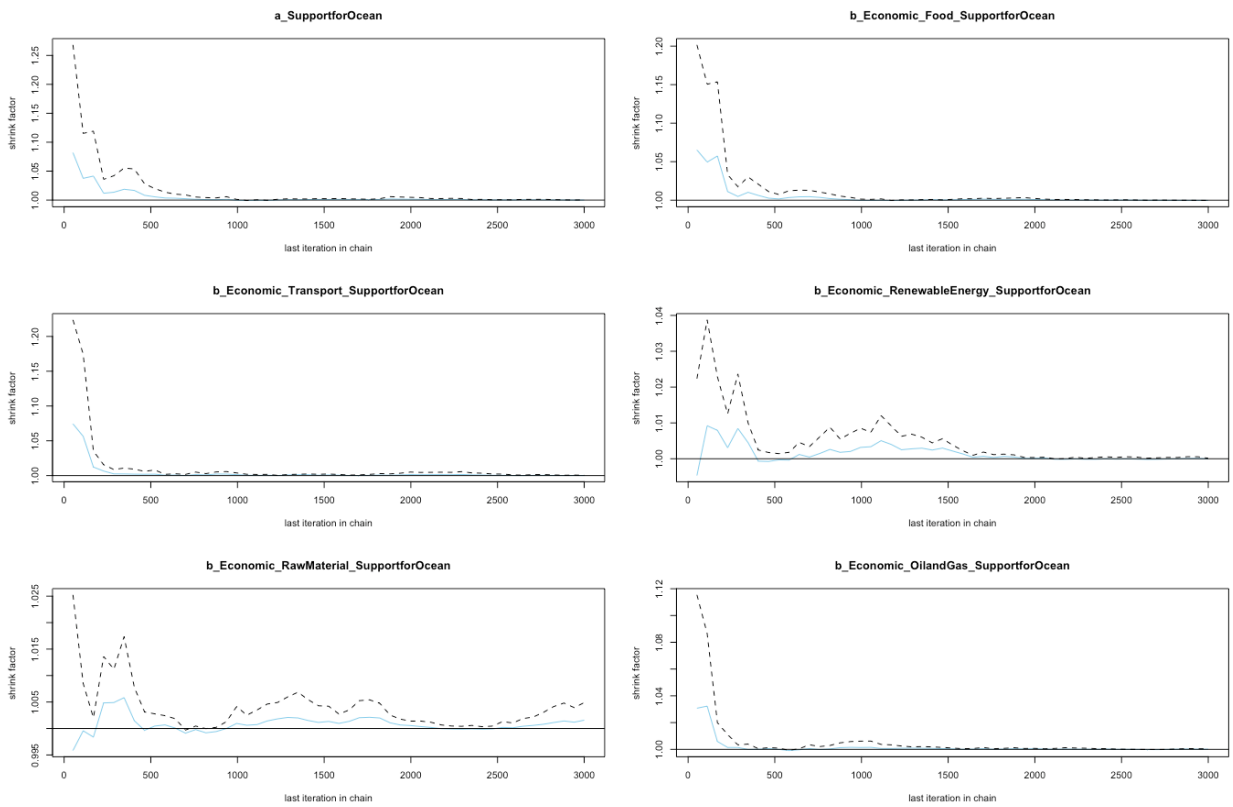

Figure 5: Gelman–Rubin–Brooks plots of Model 1

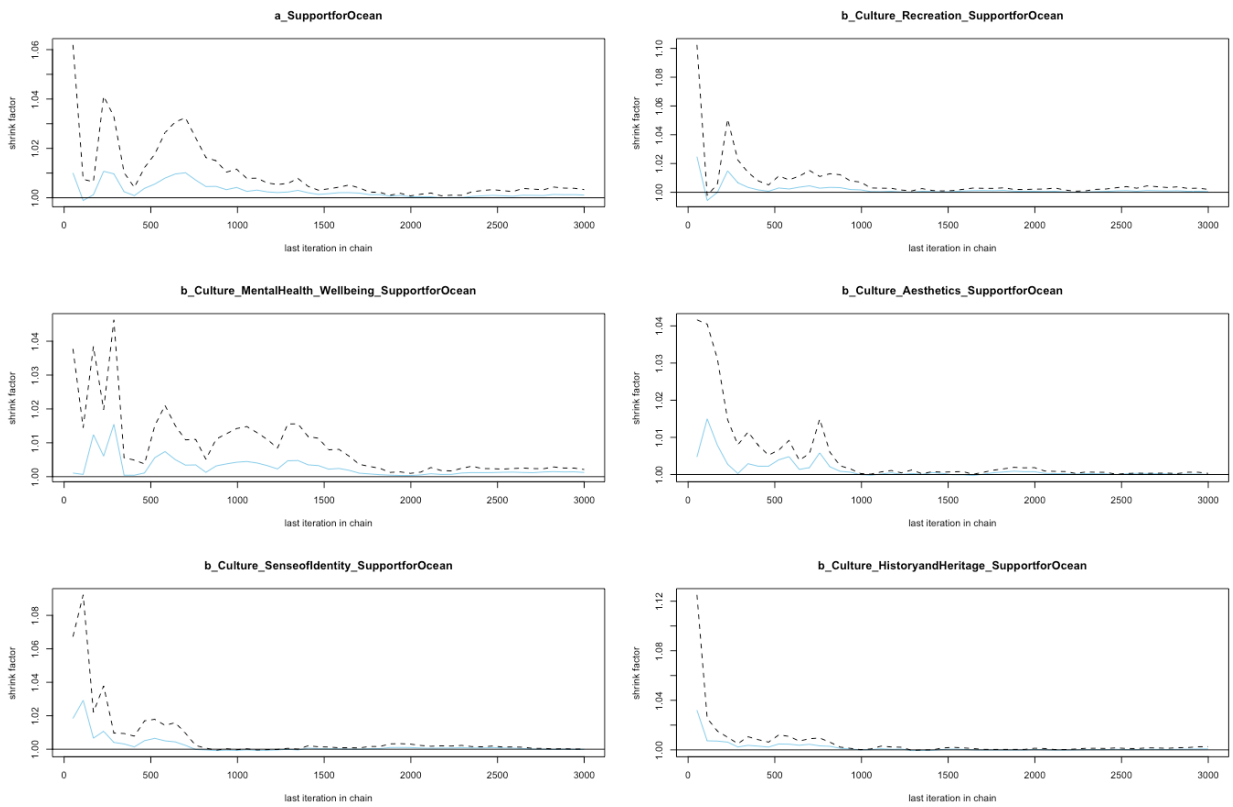

Figure 6: Gelman–Rubin–Brooks plots of Model 2

The autocorrelation plots in Figure 7 and Figure 8 also support the conclusion that Markov chains have converged. After a certain number of lags, autocorrelation levels quickly diminish to 0, which is a strong indicator of convergence. This suggests that iterative samples in the stochastic simulation process are memoryless.

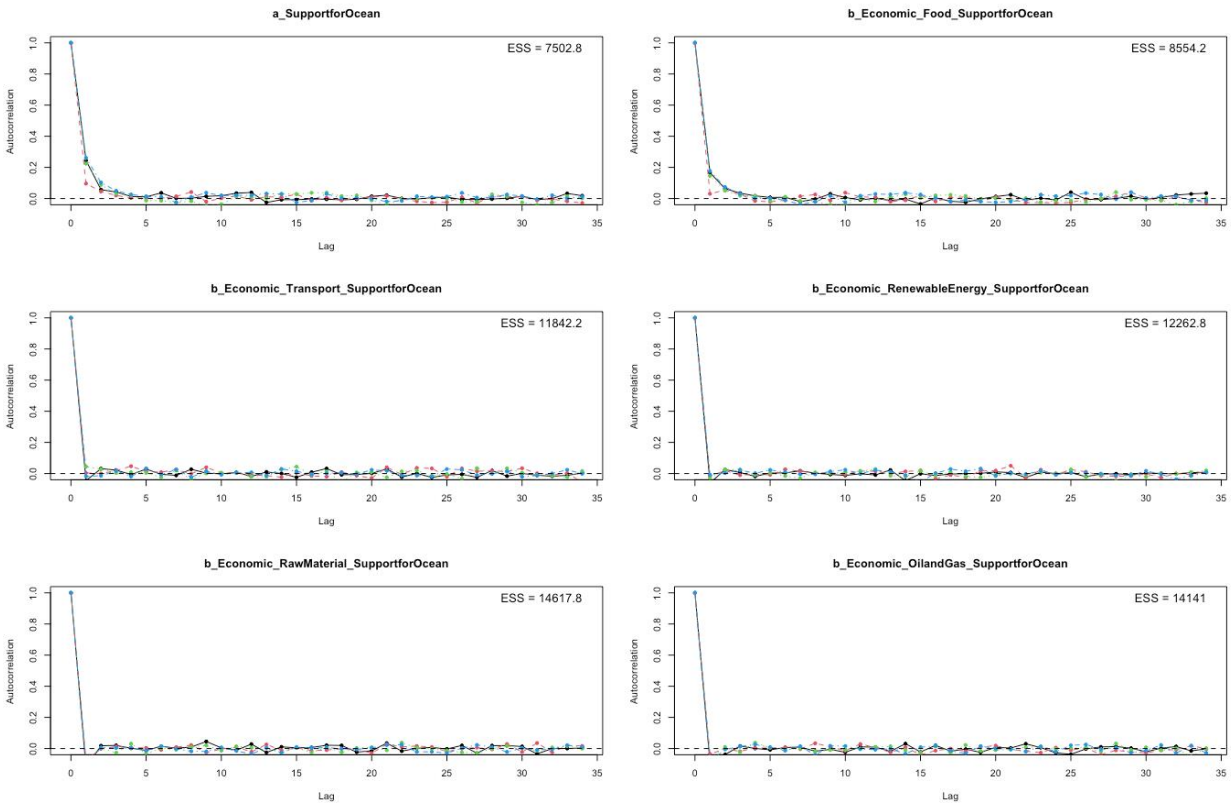

Figure 7: Autocorrelation plots of Model 1

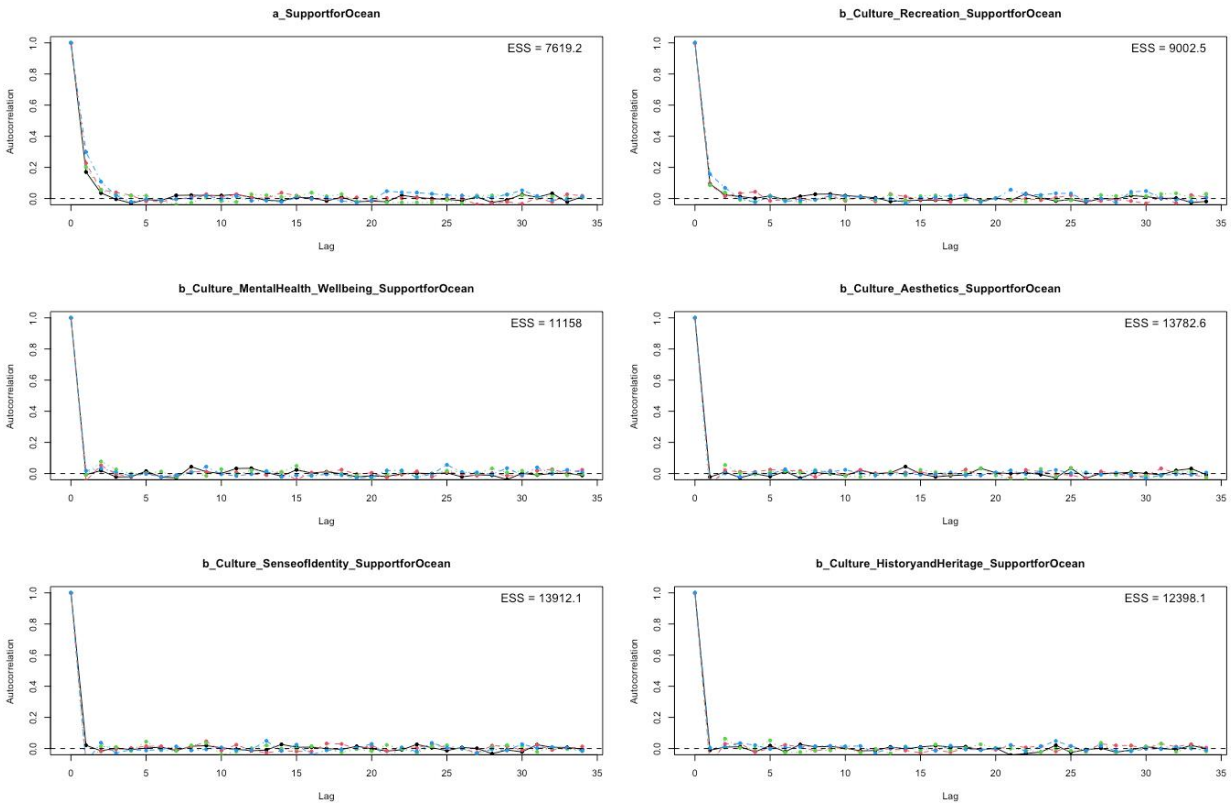

Figure 8: Autocorrelation plots of Model 2

3.2. Result Interpretation

The estimated posterior distributions of Model 1 are presented in Table 2 and shown graphically in Figure 9. It is better to visualize the results for interpretation because Model 1 is quite complex.

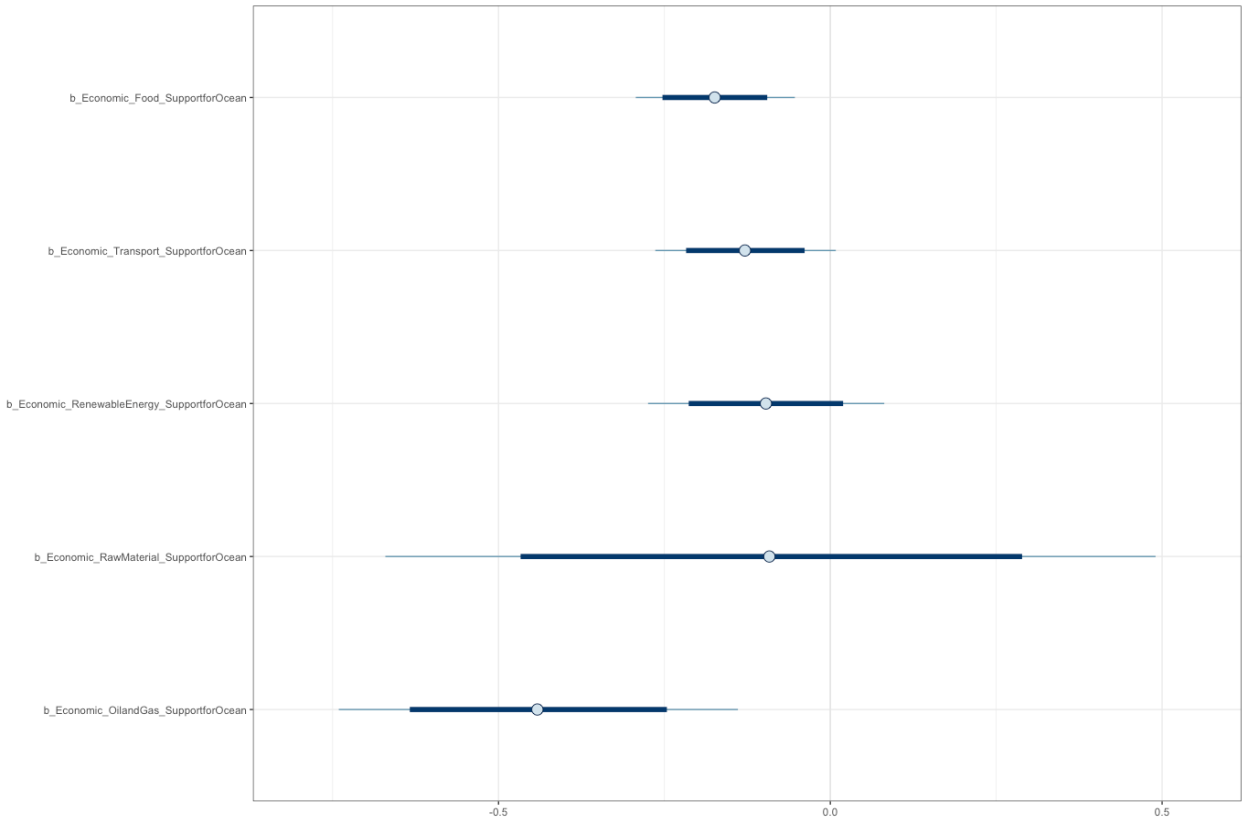

Figure 9: Interval plots of posterior distributions of Model 1

The posterior distributions of Model 1 are shown on an interval plot in Figure 9. The thin blue lines represent the probability mass outside the highest credible zone, and the thick blue lines represent the probability mass inside the 89% Highest Posterior Density Intervals (HPDI).

The study demonstrates a negative association between people's support for ocean protection and a high percentage of the perceived economic benefits of coasts and oceans (such as food, transportation, renewable energy, and oil and gas).

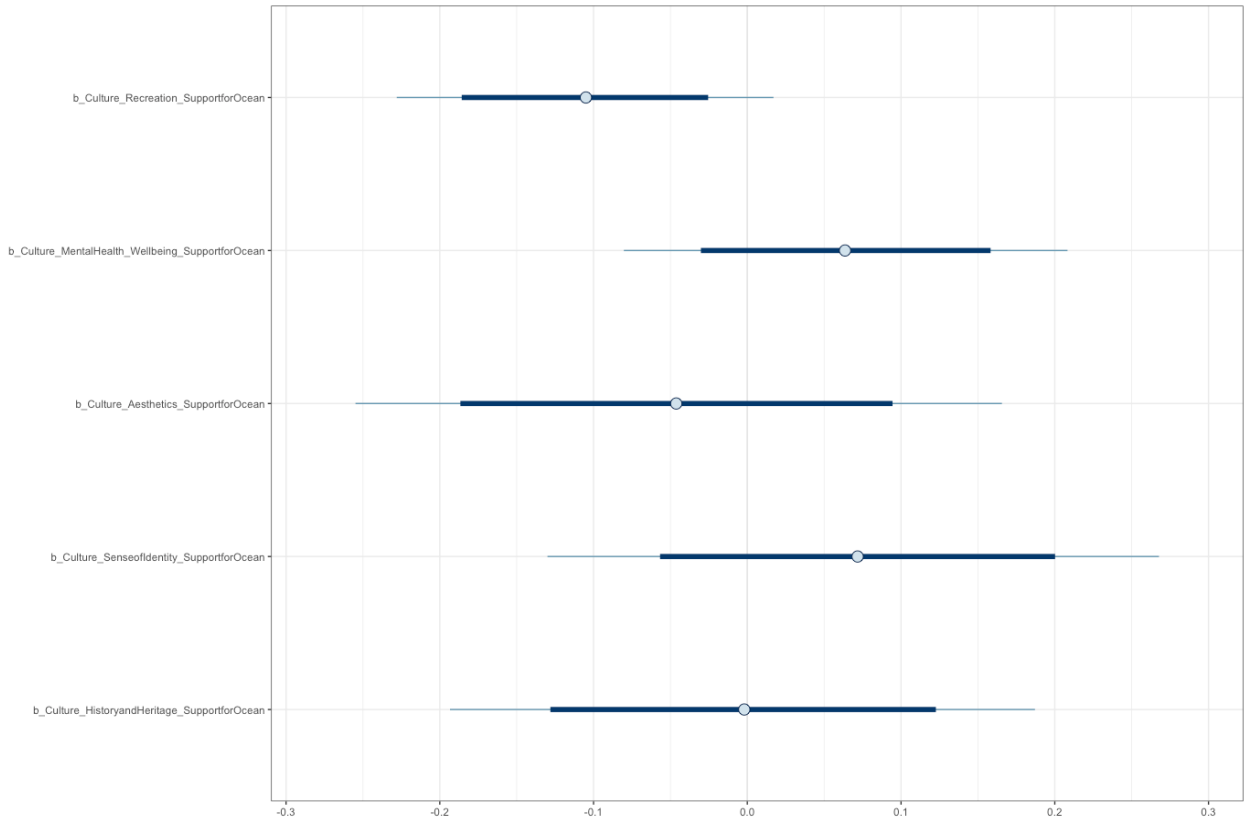

Figure 10: Interval plots of posteriors of Model 2

The results of Model 2 are visualized in Figure 10. The results suggest that people's support for ocean protection is influenced differently depending on perceived cultural benefits. Specifically, mental health, well-being, and sense of identity positively affect ocean protection, but the effects are only moderately reliable. Meanwhile, recreation has a negative influence on protective support. The history and heritage, and aesthetics factors have negligible impacts on the willingness to support ocean protection.

4. Discussion

Our findings show that among perceived economic benefits, most examined factors (food, transport, renewable energy, and oil and gas) are negatively associated with people's support for ocean protection. The beneficial factor of raw materials does not show a clear effect. Among perceived cultural/mental benefits, mental well-being and a sense of identity have positive associations with people's support for ocean protection, while recreation has a negative association with people's support for ocean protection. The beneficial factors of aesthetics and heritage do not show clear effects.

To take a closer look at these findings, seeing them from the perspective of subjective cost-benefit judgments is helpful. As we are interested in the outcome of supporting attitudes toward ocean protection, this is considered the result of a corresponding information

process. In this process, the perceived benefits of involved factors (trusted values used as references for the evaluation) are weighted against perceived costs. Values can be considered perceived costs or benefits, regardless of their objective influences. If the perceived benefits of a compared value compete with the idea of ocean protection, then the reference value will inhibit the acceptance of the outcome (Axelrod, 1994). Corresponding actions depend on the prioritization of which values as well as the actualization threshold of that particular process (Steg et al., 2014). However, since we are only considering the probability of a specific direction of attitude, the intensity of competing (in a sense – conflicting) values are the focus of the examination.

Arguably, ocean protection will lead to the sustainable attainment of the examined economic and cultural/mental benefits. However, it should be noted that humans make subjective judgments using mental simulations that may heavily involve the chronological factor in many processes (Fazio, 2000). In more familiar words, humans consider short-term and long-term benefits subjectively. It is quite intuitive here to find that relatively more materialistic concepts, such as food, transport, energy, fuel resources, etc., have negative associations with support for ocean protection. These concepts are easier to be grasped as short-term benefits. Thus, they are more likely to compete with ocean protection, which is arguably a large-scale, long-term effort (Robins & Beer, 2001). We also found that the benefit of recreation also has a similar negative association. While this value is more "mental" compared to the mentioned economic benefits, beach/sea tourism is relatively more materialistic compared to other mental values in the list. Following this line of reasoning, we see that the benefits of mental well-being and a sense of identity are factors that promote and do not inhibit ocean protection. These factors are not materialistic and thus are more likely to be considered as rather long-term benefits, which is in alignment with ocean protection. However, some other factors show no clear directions of influence. They probably have stronger underlying moderating information processes.

Our study suggests that policymakers should be careful when creating campaigns for promoting ocean protection. Human psychology regarding cost-benefit judgments is complex. People may prioritize other benefits that inhibit their willingness to support ocean protection. These prioritization processes are rightfully reasonable because the human mind always tries to optimize its attitudes and actions in the way seen as most beneficial for oneself. If they perceive that ocean protection efforts may compromise their existing beliefs about benefits, they will likely be against such notions, regardless of their objective impacts. On the other hand, if other related promoted values are in line with ocean protection, it will have a supportive effect. In brief, policymakers may want to include in their environmental campaigns more mental values of ocean protection that are long-term benefits (Kotler & Lee, 2008). That being said, which specific factors should be focused on will need more research to firmly determine and avoid misperceptions.

Besides, the findings hint at a potential conflict between different groups of people and partially explain unsuccessful ocean protection regimes. Depending on the current situation of regional development and the findings of the study, policymakers and leaders can develop bottom-up approaches to achieve short- and long-term development goals. For example, promoting cultural values of oceans can help increase the support of the community for ocean protection, reducing the burden for fiscal and public sectors. It should be noticed that mutual respect that balances both economic and cultural values is required to achieve the overall aimed development.

This study has some limitations (Vuong, 2020). Due to the nature of the data, it is not possible to know what specific psychological processes led to the associations found. Such processes are individual- and context-specific, which would require deeper investigation in qualitative forms. Additionally, while the dataset includes participants from 42 countries, most are from European countries such as France and Italy. Thus, this dataset is not representative of people from non-European regions. However, it can be deemed a preliminary effort to involve non-European viewpoints in a global analysis. There may also be biases about environmental perceptions in participants due to the data collection procedure. Those who volunteered to answer the survey this way may have preconceptions about environmental issues in certain directions.

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