WARWICK
ECONOMICS

How the facets of energy security impact the support for energy sources: Evidence from UK household data

Andreas Markoulakis & Eleanya Nduka

March 2025 No: 1556

Warwick Economics Research Papers

ISSN 2059-4283 (online)
ISSN 0083-7350 (print)

How the facets of energy security impact the support for energy sources: Evidence from UK household data

Andreas Markoulakis[1], Eleanya Nduka[2]

[1]Department of Economics, University of Warwick, Coventry, CV4 7AL, UK., Andreas.Markoulakis@warwick.ac.uk
[2]Department of Economics, University of Warwick, Coventry, CV4 7AL, UK., Eleanya.Nduka@warwick.ac.uk

Highlights

- This study explores the nuanced influence of energy security across four critical dimensions: vulnerability, affordability, reliability, and import dependency.
- Support for all energy sources declines as energy vulnerability concerns diminish, with the sharpest impacts observed for nuclear and shale gas.
- Energy affordability plays a minimal role, affecting only support for shale gas, while leaving renewables and nuclear energy largely untouched.
- Improved energy reliability slightly boosts support for renewables but significantly dampens support for nuclear and shale gas.
- Concerns over import dependency increase support for nuclear energy and shale gas, but have a much weaker effect on renewables.

Abstract

Using UK household data, we examine empirically how different facets of energy security, energy vulnerability, affordability, reliability and imports dependency impact the support for three different energy sources: renewables, nuclear and shale gas extraction. Our approach utilises an ordered logistic econometric model and controls for various socio-demographic variables. We find that each facet can have a differential impact in the probability of support for each energy source and in general, as energy security concerns decline, households are becoming less likely to support each energy source, however, the effects are larger for nuclear and shale gas compared to renewables. Our findings are robust to potential endogeneity concerns which are addressed by using instrumental variables. The above results can be useful for policy appraisal purposes to inform policy makers on the differential impact of energy security facets when designing future energy policies towards the net zero targets.
Keywords: Energy security, renewable energy, nuclear energy, shale gas, climate change concern.
JEL Classification: D12, Q20, Q40, Q42

1. INTRODUCTION

Energy security has become a critical concern in contemporary policy and academic discourse, encompassing facets (dimensions) such as vulnerability, affordability, reliability, and import dependency. These interrelated facets influence not only the stability of energy systems but also the socio-economic fabric of nations. The growing interest in this area is reflected in studies like Arndt (2023), who emphasizes energy supply disruptions and geopolitical risks associated with import dependency, and Demski *et al.* (2014), who examine affordability concerns linked to energy prices. A historical perspective provided by Jewell and Brutschin (2021) highlights the evolution of energy security from a concept closely tied to national security to a multifaceted framework incorporating diverse indicators. Recent conceptual frameworks, such as in Sovacool and Mukherjee (2011), further expand the scope by integrating environmental sustainability and resilience against geopolitical and economic risks. These foundational perspectives underscore the multifaceted nature of energy security and its critical role in shaping energy preferences, aid, and justice policies (Baker *et al.*, 2023; Dong *et al.*, 2024).

In developed nations like the United Kingdom, energy security is uniquely influenced by the transition towards a net-zero economy, alongside geopolitical challenges and rising domestic energy demands. Studies such as Demski *et al.* (2014) reveal that energy security concerns among UK households are intricately linked to climate change awareness, with affordability and reliability emerging as key considerations. Notably, Demski *et al.* (2014) found that over half of respondents view energy security as equally important as climate change, underscoring its significance in public perception. Such public attitudes in energy policies might not be easy to model, for example, Thomas *et al.* (2017) and McNally *et al.* (2018) illustrate the ambivalence in public attitudes towards shale gas extraction, rooted in perceived risks and benefits, the complexity of shale gas development and even the presence of framing effects in decision making. These findings illustrate the complex interplay of technological, economic, and environmental factors shaping public support for diverse energy sources.

Despite increasing interest in energy security, significant gaps persist in understanding how different facets of energy security influence public support for specific energy sources. The literature is still rather limited, and the few existing studies, such as Arndt (2023) and Demski *et al.* (2018), often aggregate energy security into singular indices or examine limited dimensions, overlooking granular household-level dynamics. This approach risks obscuring the nuanced impacts of energy security facets. Moreover, while renewable energy has received substantial attention, there is limited comparative analysis of its relationship with energy security facets alongside nuclear and shale gas. These gaps are particularly pertinent for UK policymakers following the British Energy Security Strategy report, which aims to enhance energy independence (DESNZ, 2022). This study addresses these gaps by adopting a nuanced approach to analyse the effects of energy vulnerability, affordability, reliability, and import dependency at the household level.

Energy security is a concept with multiple facets which can encompass critical dimensions like vulnerability, affordability, reliability, energy efficiency, environmental sustainability, energy governance (Brown *et al.*, 2014; Ang *et al.*, 2015; Sovacool, 2016). Its definition is context-dependent and has evolved over time, prompting researchers to propose indices to guide policymakers (Patlitzianas *et al.*, 2008; Gatto and Busato, 2020).

This paper employs four key facets of energy security to provide a deeper understanding of their impacts. While focusing on household-level data, these facets also reflect broader national-level concerns. As of 2023, the UK's dependency on imported energy was approximately 40%, reflecting concerns about supply disruptions and vulnerability (DESNZ, 2024). Frequent power outages and rising energy costs further highlight the challenges related to reliability and affordability, with 40% of households expressing significant concern about energy bills (BEIS, 2021). These realities, coupled with the UK's commitments to decarbonization, amplify the need for comprehensive energy policies addressing these multifaceted challenges.

To enhance energy security, the UK government has pursued various initiatives. Investments in renewable energy, such as the Offshore Wind Sector Deal of 2019 and the Clean Power 2030 Action Plan (UK Government, 2024), exemplify efforts to promote environmental sustainability without compromising security. Simultaneously, nuclear energy remains central to the UK's strategy, with plans for new reactors under the Roadmap to 2050 report (DESNZ, 2024). Shale gas, despite its potential, faces regulatory hurdles and public opposition due to environmental and social concerns. These policies reflect the delicate balance between energy security, public preferences, and environmental stewardship, a balance this study seeks to explore at the household level.

Existing studies offer valuable insights into public attitudes and government policies. For instance, high public support for renewable energy is driven by climate change concerns, although energy security also plays a role (Roddis *et al.*, 2019). Lucas *et al.* (2016) link renewable energy development to energy security conceptualisations, while Cergibozan (2022) highlight the heterogeneous impacts of renewables across countries. Similarly, Iyke (2024) discuss how investments in renewables mitigate energy security risks and climate change. Regarding nuclear power, Corner *et al.* (2011) found that concerns for energy security will increase acceptance for nuclear power in the UK and Arndt (2023) reports a similar finding for European countries. Moreover, Gupta *et al.* (2019) finds that in the USA, energy security risk carries weight and impacts positively public opinion and can even help counterbalance the effects of accidents. Shale gas, though less studied, is highlighted by Upham *et al.* (2015) as contentious in energy security debates, with McNally *et al.* (2018) and Bradshaw *et al.* (2022) exploring its socio-political dynamics in the UK. These studies underscore the need for empirical evaluations addressing the complexities of achieving energy security in the UK.

This study bridges these gaps by examining the relationship between energy security facets and public support for renewables, nuclear energy, and shale gas. Specifically, we hypothesise that higher energy security concerns correlate positively with support for all three energy sources, although the magnitude of this relationship may vary across sources and facets. These hypotheses provide a framework to investigate the nuanced trade-offs households perceive across energy sources concerning energy security.

Our study contributes to this emerging literature by investigating how energy security is related to support for three different energy sources, renewable energy, nuclear energy and shale gas. We break down energy security in four different facets, vulnerability, affordability, imports dependency, reliability and we examine separately for each of them their impact of energy source support. To our knowledge no other paper has attempted to compare directly the levels of support for renewables, nuclear and shale gas energy sources in the UK. We make use of UK household-level data from the Public Attitudes Tracker which allows us to incorporate socio-demographic controls along with distinct energy security facets, allowing for a more granular understanding compared to aggregate-level analyses. The novelty lies in disentangling the impacts of energy security facets on individual energy preferences, providing robust empirical evidence to inform policy decisions. We employ an ordered logistic regression and a maximum likelihood approach to test the impact of the energy security parameters. This approach can better uncover patterns in the data and can offer more easily interpretable results than OLS.

Our findings reveal significant variations in public support based on energy security concerns. Declining energy vulnerability concerns reduce support for all energy sources, with sharper declines for nuclear and shale gas compared to renewables. Affordability concerns have a minor effect, limited to shale gas, while reliability concerns positively impact renewables but negatively affect nuclear and shale gas. Import dependency concerns significantly drive support for nuclear and shale gas but have a weaker effect on renewables. Moreover, oil imports concerns can impact all three energy sources. These findings, robust to endogeneity concerns, underscore the importance of tailored energy policies addressing specific energy security facets to achieve a balanced and sustainable transition to a net-zero economy.

The remainder of this paper is structured as follows: section 2 details the data and variables (section 2.1), and outlines the econometric model (section 2.2). The empirical results are presented in section 3, and section 4 concludes and higlights the policy implications of our findings.

2. METHODOLOGY

2.1. Data

The data utilised in this study is derived from the "Public Attitudes Tracker" survey, Wave 37, conducted in March 2021 through online interviews by the Department for Business, Energy & Industrial Strategy (BEIS). At the time, the survey was administered quarterly across the United Kingdom and adhered to the rigorous statistical standards outlined in the Code of Practice for Statistics by the UK Statistics Authority. The sample, comprising 4,029 households, was designed to be representative of the UK population and its regions. The core questionnaire encompassed a wide range of energy and environmental topics, including renewable energy, nuclear power, shale gas, climate change, energy security, energy savings, net-zero targets, and energy bills. For this analysis, we focus on specific questions relevant to energy preferences and security, complemented by socio-demographic variables at the household level.

The use of this dataset allows us to investigate how households shape their energy preferences with respect to individual socio-demographic variables and especially the energy security facets as we will explain in more detail later in this section. This is a departure from other papers investigating energy security (Demski *et al.*, 2018; Arndt, 2023) who make use of aggregate data across different countries. The richness of the data at household level can make it easier to uncover any patterns and avoid problems of unobserved heterogeneity which are likely to be present in aggregate data across countries where characteristics at national level (like GDP, well-being index etc.) are considered. Household data allows us to control for socio-demographic characteristics at household level only, offering thus, not only the opportunity to see how these characteristics might impact energy preferences but also to have more controls and enhance the validity of our findings. In this regard, the derived policy recommendations can be more robust and more useful to the policy makers.

2.1.1. Dependent variables

The dependent variable in the empirical analysis is the level of support for electricity and heat generation from three different energy sources: "renewable energy", "nuclear energy" and "extracting shale gas". For the first source, renewable energy, the respondents were asked "Do you support or oppose the use of renewable energy for providing our electricity, fuel and heat." For the other two sources, the questions were slightly altered to account for the knowledge of households on nuclear and shale gas. For the latter, the respondents were asked: "From what you know, or have heard about, extracting shale gas to generate the UK's heat and electricity, do you support or oppose its use?" The answers of the respondents for each energy source were given across a scale ranging from 1 to 6 ("Strongly support", "Support", "Neither support nor oppose", "Oppose", "Strongly oppose", "Don't know").

To simplify the interpretation of the findings, we merged the two support and opposition categories and the neither-don't know answers. Hereafter, we use the following terminology to describe energy preferences: support, opposition, Neither/DK. The combination of neither and don't know is a common approach in applied work and is a sensible approach since not only simplifies the analysis, but it is also meaningful given that often respondents who answer neither are practically saying in another way "Don't know" (Sturgis *et al.*, 2014). The questions and the breakdowns of the answers for each alternative are shown in Table 1.

Table 1: Energy source preferences

Energy source questions	Frequency	Per cent
Do you support or oppose the use of **renewable energy** for providing our electricity, fuel and heat		
Support	3,140.0	77.9
Oppose	136.0	3.4
Neither/DK	753.0	18.7
Total	4,029.0	100.0
From what you know, or have heard about using **nuclear energy** for generating electricity in the UK, do you support or oppose its use		
Support	1,541.0	38.25
Oppose	696.0	17.27
Neither/DK	1,792.0	44.48
Total	4,029.00	100.0
From what you know, or have heard about, extracting **shale gas** to generate the UK's heat and electricity, do you support or oppose its use		
Support	962.0	23.88
Oppose	1,422.0	35.29
Neither/DK	1,645.0	40.83
Total	4,029.0	100.0

2.1.2. Energy security

The variables of interest in the empirical analysis will be the energy security variables. We consider four different variables which cover different facets of energy security. The first variable, called energy vulnerability, consisting of four items, described in Table 2 and capture concerns about supply and demand by "UK supplies of fossil fuels not being sufficient to meet the UK's demand for them," concerns on energy imports by "The UK becoming too dependent on energy from other countries," concerns on energy investment by "The UK not investing fast enough in alternative sources of energy" and concerns about energy development by "The UK not developing technology to use existing sources of fossil fuels sufficiently."[1] To facilitate the empirical analysis, these four items are aggregated into an additive index, reflecting their conceptual similarity in focusing on concerns about domestic energy supply. The reliability of this index is supported by a Cronbach's alpha value of $\alpha = 0.843$, a satisfactory number to accept the validity of this index.

The second variable, is energy affordability, capturing concerns about "Steep rises in energy prices in the future." The third variable is energy reliability, this captures concerns about "Power cuts becoming more frequent in the future." The last variable we consider is energy imports dependency, one of the items of energy vulnerability, which captures how concerned households are about "The UK becoming too dependent on energy from other countries." We have done this in order to explicitly control for energy imports since this parameter has been found to be an important energy security item (Demski *et al.*, 2014; Jones *et al.*, 2017; Verschoor *et al.*, 2020).[2] All items had the following 5-point response scale: 1 "Very concerned", 2 "Fairly concerned", 3 "Not very concerned", 4 "Not at all concerned", and 5 "Don't know". All the questions and their frequencies are described in Tables A1 and A2 in the Appendix.

We test the following hypotheses for each energy security facet with respect to energy preferences:

H1: *Higher (lower) levels of concern for energy security are associated with stronger (weaker) support for renewable energy in the UK.*

H2: *Higher (lower) levels of concern for energy security are associated with stronger (weaker) support for nuclear energy in the UK.*

H3: *Higher (lower) levels of concern for energy security are associated with stronger (weaker)*

[1] Here we use the energy vulnerability to describe potential disruptions in energy supply. This is a concept which has recently attracted attention in the literature and recently it has been attempted to offer a more comprehensive and standard approach (Gatto and Busato, 2020).

[2] In the Appendix, we discuss an additional energy security variable, which we call energy availability and consists of all the items of energy vulnerability apart from import concerns. We have done this so that to disentangle energy imports concerns from the other items of energy vulnerability. As we show there, the results are not affected compared to energy vulnerability.

support for the extraction of shale gas in the UK.

2.1.3. Control variables

The literature on environmental issues including energy preferences has identified a number of variables at household level which can be used as control variables in our empirical analysis like gender, age, income, household size, urban-rural residence, employment status (Brieger, 2019; Arndt, 2023). To account for environmental attitudes which could impact energy preferences, we include two variables often used in empirical work: climate change concern and how frequently households think about energy savings (energy savings thought). These two variables can complement each other, and energy savings can also serve as a proxy for beliefs about personal responsibility in combating climate change (Boto-García and Bucciol, 2020). Trust in government is also included as a control variable since lack of political trust can undermine environmentally friendly policies (Fairbrother *et al.*, 2019) and this can have an impact on the preferences for all energy sources examined. A summary statistics table for all the independent variables is shown in Table 2.

Table 2: Summary statistics for independent variables

Variable	Mean	Std. Dev.	Min.	Max.	N
energy saving thought	2.06	0.814	1	5	4029
energy vulnerability	2.322	0.971	1	5	4029
energy affordability	1.936	0.924	1	5	4029
energy reliability	2.46	1.041	1	5	4029
climate concern	1.962	0.941	1	5	4029
government trust	1.496	0.653	1	3	4029
gender	1.512	0.5	1	2	4029
age	3.583	1.7	1	6	4029
work	2.395	1.329	1	4	3999
household size	2.708	1.286	1	5	4029
ethnicity	1.136	0.343	1	2	3847
area	1.175	0.38	1	2	3558
income	3.254	1.825	1	7	4029

2.2. The Model

To investigate how the facets of energy security and climate concerns influence energy source preferences, we employ ordered logistic econometric models. In these models, the dependent variable, y_i, represents the ordinal response of respondent i to survey questions regarding preferences for three energy sources: renewables, nuclear energy, and shale gas. The variable takes values $j = 1, 2, 3$, corresponding to the number of alternative responses. These responses are categorised as follows:

$$y_i = 1, -\infty < y_i^* < k_1$$
$$y_i = 2, k_1 < y_i^* < k_2$$
$$y_i = 3, k_2 < y_i^* < +\infty$$

where $y_i = 1, 2, 3$ correspond to the category chosen by the respondents and takes the values of the three alternatives mentioned earlier: Support, Oppose, Neither/DK. Notice that the variable y_i^* is a continuous latent (unobservable) variable and which its values determine the observed variable y_i. The parameters $k_j = k_1, k_2$ represent the cut-off points or thresholds, so the value of y_i depends on whether these thresholds have been crossed. For example, if $y_i^* < k_1$ then the respondent supports the energy source, if $k_1 < y_i^* < k_2$, the respondent opposes the energy source and if $y_i^* > k_2$ then they are neutral. All these are estimated using the model:

$$y_i{}^* = \boldsymbol{\beta X_i} + \boldsymbol{\gamma Z_i} + u_i \tag{1}$$

where $\boldsymbol{X_i}$ is the vector containing the energy security parameters, $\boldsymbol{Z_i}$ is the vector of all the other control variables discussed earlier and $\boldsymbol{\beta}, \boldsymbol{\gamma}$ the coefficients vectors. In this paper, we focus on $\boldsymbol{\beta}$, the energy security coefficients. The vectors and the cut-off points are estimated via maximum likelihood approach using a logistic distribution for the error term u_i. Although the sign of the vector of coefficients $\boldsymbol{\beta}$ can reveal if y_i^* increases or decreases, we estimate the marginal effects to determine the changes. The marginal effects formula is:

$$\frac{\partial Pr(y_i = j \mid \boldsymbol{X_i})}{\partial \boldsymbol{X_i}} = [F'(k_{j-1} - \boldsymbol{\beta X_i} - \gamma \boldsymbol{Z_i}) - F'(k_j - \boldsymbol{\beta X_i} - \boldsymbol{\gamma Z_i})]\boldsymbol{\beta}$$

where $F^{'}(\cdot)$ is the probability density function of the logistic distribution. Note that the estimation of marginal effects for each alternative is a major advantage of ordered logit over OLS where no differentiation between the different alternatives is assumed. Finally, standard errors are clustered at government level to account for any correlation within these regions[3].

[3]The multilevel ordered logit models (random intercept at region level) are not supported statistically since the LR test always rejects this specification in favour of ordered logit models. This is shown clearly in the discussion of the predicted probabilities graphs where there is little variability among regions in the UK.

3. RESULTS

We begin the discussion of the empirical results by focusing on the findings related to renewable energy preferences. Initially, we assess the impact of each energy facet individually (Models 1-4) and then we put all the facets together (Model 5) to evaluate the robustness of the results and identify any potential interactions. The regression coefficients and marginal effects for support, pertaining to the energy security facets and each energy source, are summarised in Tables 3-6. For a comprehensive overview, the tables containing all variables for all regressions are provided in the Appendix (Tables A6-A8).

3.1. Renewable energy

In Fig. 1, we plot the predictive margins for Model 1 across the levels of the energy vulnerability variable (results are summarized in Table 3). The graph clearly shows that the predictive margins are falling for outcome 1 (support). The interpretation is that as energy vulnerability concerns ease (move rightwards), then households are becoming less likely to support renewable energy sources. This fall in probability is relatively small, equal to 7 percentage points (hereafter %pt), from 0.85 to 0.78 when households are not very concerned, but then the rate of fall increases (from 0.78 to 0.68). This shows the non-linear impact of energy vulnerability which is larger when households answer that they are at least not very concerned. This decline is on average equal to 3.92%pt drop in probability of support. Therefore, greater concerns about energy vulnerability are directly associated with higher levels of support for renewable energy sources, thus supporting our hypothesis (**H1**).

Furthermore, the opposition to renewable energy sources remains very low. It is at most 3.8% and there is a rise in answers when households express no clear opinion (Neither/DK), as energy vulnerability concerns ease. Ultimately, this reveals the clear impact of energy vulnerability concerns on energy preferences. Note that the probabilities of support above 0.8 (80%) for the first two concern levels are meaningful, since they are close to what Corner *et al.* (2011) reported (0.82 and 0.88 for wind and solar power respectively), the predicted probabilities we estimate later are also very close to these results.

Regarding affordability, the results are consistently statistically insignificant, showing no discernible impact—either positive or negative—of higher future energy prices on preferences for renewable energy. This holds true whether the variable is considered in isolation or alongside other energy security factors in Model 5.

Per energy reliability (frequency of power cuts in the future), the results of Model 3 are statistical insignificant except for a small rise in support by 3.9%pt when households become not very concerned (see Fig. 2, top right panel). However, in Model 5 the impact of affordability can be felt more intensely since the corresponding probability of support can now rise by 6.5%pt for the same change in concern levels. Moreover, the rise in support can further increase by 9.2%pt when households answer DK. Thus, this reveals that larger energy reliability concerns are related to lower support (as concerns ease, support is increasing), this is the opposite of what we found earlier. Here, reliability and vulnerability follow different paths. We are unsure why this is the case. It could be that people in the UK are less familiar with power cuts and put less emphasis on this energy security facet (Demski *et al.*, 2014).

Finally, we examine the impact of energy import dependency, specifically how concerned households are about the UK becoming reliant on other countries for energy imports. It is important to note that, since this factor has already been included in the energy vulnerability index constructed earlier, direct comparisons with vulnerability cannot be made. The marginal effects for energy import dependency can be seen in Fig. 2 bottom left panel. Statistically significant effects appear when households become not very concerned, and the probability of support is falling by -4.4%pt and even more by -9%pt when households have no opinion. Opposition is not affected at all. This fall is slightly larger than the fall in the energy vulnerability index (-3.92%pt). Overall, the concerns about energy imports have a negative impact on probability of support, so our hypothesis (**H1**) is supported. The impact of import dependency is similar to that of vulnerability, although the literature has primarily focused on the former as a key aspect that renewable energy development can address (Paravantis and Kontoulis, 2020).

Table 3: Renewable energy preferences – Energy security variables

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Energy vulnerability	0.303***				0.365***
	[-0.039***]				[-0.047***]
	(0.0297)				(0.0332)
Energy affordability					
Fairly concerned		-0.186			-0.180
		[0.0242]			[0.0232]
		(0.147)			(0.146)
Not very concerned		0.0402			0.00675
		[-0.0055]			[-0.0009]
		(0.156)			(0.166)
Not at all concerned		0.134			0.0256
		[-0.0187]			[-0.0034]
		(0.300)			(0.344)
Don't know		0.356			0.0920
		[-0.052]			[0.0125]
		(0.235)			(0.234)
Energy reliability					
Fairly concerned			-0.167		-0.241
			[0.023]		[0.033]
			(0.166)		(0.160)
Not very concerned			-0.290*		-0.494***
			[0.038*]		[0.065***]
			(0.159)		(0.159)
Not at all concerned			-0.0810		-0.403
			[0.011]		[0.054]
			(0.235)		(0.249)
Don't know			-0.270		-0.741***
			[0.036]		[0.092***]
			(0.205)		(0.250)
Import dependency					
Fairly concerned				-0.0304	
				[0.0038]	
				(0.0907)	
Not very concerned				0.320**	
				[-0.044**]	
				(0.136)	
Not at all concerned				-0.0547	
				[0.0068]	
				(0.183)	
Don't know				0.616***	
				[-0.089***]	
				(0.154)	
Controls	Yes	Yes	Yes	Yes	Yes
Observations	3,445	3,445	3,445	3,445	3,445
Pseudo R^2	0.1480	0.1410	0.1404	0.1443	0.1528

Robust standard errors in parentheses
Average marginal effects for support in brackets
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

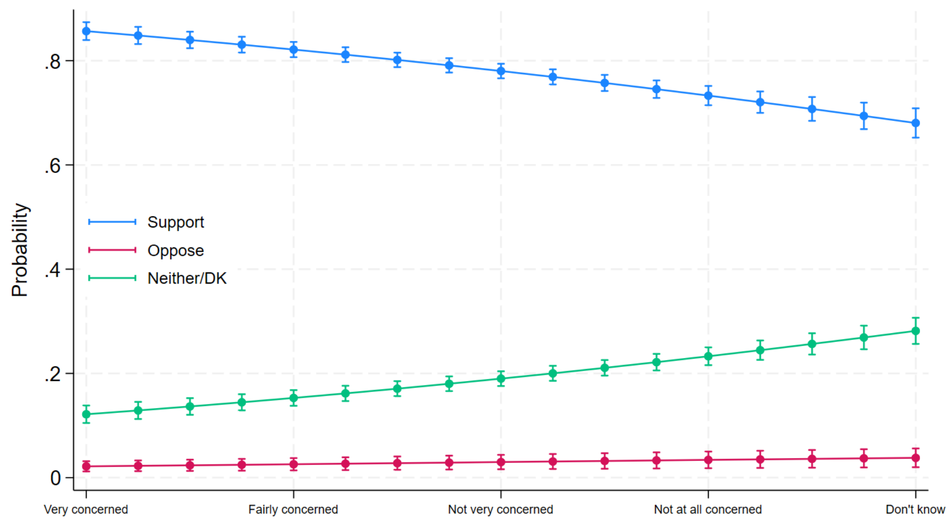

Figure 1: Predictive margins for energy vulnerability: Renewables

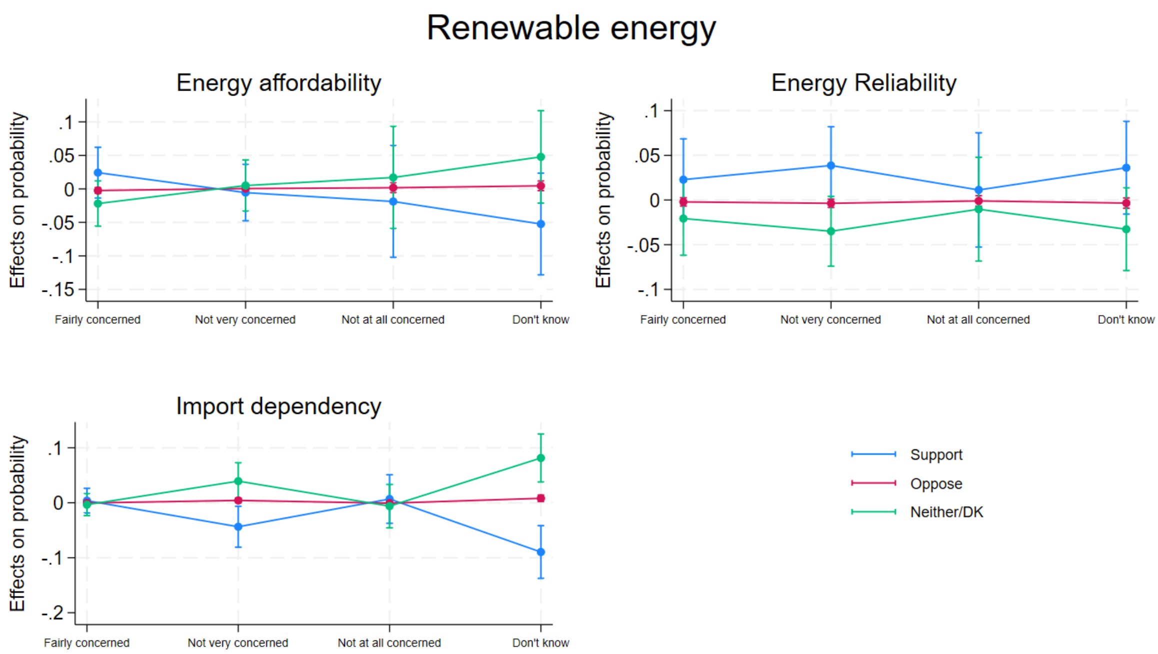

Figure 2: Renewables: Marginal effects plots

3.2. Nuclear energy

On nuclear energy preferences (the results are summarized in Table 4), the predictive margins for Model 1 are plotted across the energy vulnerability levels in Fig. 3. The graph shows that the predictive margins fall continuously for expressions of support (from 49.5% to 19%), they rise when households do not have clear opinion by 32pt, (Neither/DK) and remain relatively constant on opposition to nuclear energy. On average, the marginal change is -7.9%pt for support and almost equal change (8%pt) for no clear opinion (Neither/DK). Note that the results show that households only have a higher probability of support than of no opinion (Neither/DK) when households report the highest level of concern (very concerned) and in addition, the probabilities of these two alternatives are equal at 41% for the next level of concern (fairly concerned). Again, Corner *et al.* (2011), report 35% favourability for nuclear, very close to our finding of 38.4% at the average of energy vulnerability.

The interpretation is that as concerns about energy vulnerability ease (shifting rightwards), households are less likely to support nuclear energy. Therefore, higher energy security concerns are associated with greater support for nuclear energy. Thus, **H2** is supported. On the other hand, opposition to nuclear energy remains relatively constant, peaking at 18.1%, with the curve displaying a slight inverted U-shape, reaching a maximum at 0.18 before declining to 0.145. Ultimately, these results show that support for nuclear energy is highly influenced by energy vulnerability, whereas opposition is not, a pattern similar to that observed for renewable energy, though the impact of vulnerability is notably larger in this case

On affordability, the results are statistically insignificant, but when all the facets are considered together, there is an almost equal change in probabilities of support (4.6%pt rise) and Neither/DK (4.6%pt decline) when households declare they are not very concerned (see Fig. 4 top left panel). This change is almost tripled when households answer DK and most likely this happens due to the distribution of nuclear preferences where around 44% respond Neither/DK, and the distribution of the energy affordability which is skewed to the right. It might also be that this reflects interactions among the energy facets.

Regarding reliability, statistically significant results are observed only when households are either not very concerned or state that they have no opinion (don't know). In both cases, their responses are associated with a decrease in the probability of support by 7.8%pt and 17.2%pt, respectively. Thus, as concerns ease beyond the first two levels, the likelihood of supporting nuclear energy can indeed decline, with support more than halving when households have no opinion. Ultimately, this reveals an inverse relationship between support and levels of concern. These results align with the findings for energy vulnerability, although not for every level of concern, suggesting a non-linear relationship between reliability concerns and preferences for nuclear energy. It is also worth noting that in Model 5, this relationship weakens and only holds when households express no opinion (don't know).

Concerns of import dependency are reflected at all levels below being fairly concerned and the fall in support from -7.5%pt to -19.6%pt. Opposition is little affected (see Fig. 4 bottom left panel). So, as energy imports concerns ease, support is falling, and this fall follows a pattern, and it increases as concerns decline. As expected, this decline is close to the one reported earlier on vulnerability (-7.9%pt on average). This is reflected in the last 3 categories (when households are not very/fairly concerned). This is something "masked" on the vulnerability discussion. Moreover, these results are quite different from those on renewables, the fall in support is much larger and its pattern clearer. Apparently, the public support for renewables remains very strong and thus, affected less by imports dependency concerns compared to nuclear energy. Still, these findings confirm the importance given to this energy security facet (Demski *et al.*, 2014; Jones *et al.*, 2017; Verschoor *et al.*, 2020).

Table 4: Nuclear energy preferences – Energy security variables

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Energy vulnerability	0.384***				0.389***
	[-0.0791***]				[-0.0797***]
	(0.0248)				(0.0226)
Energy affordability					
Fairly concerned		0.0705			-0.124
		[-0.0148]			[0.025]
		(0.0897)			(0.102)
Not very concerned		0.0677			-0.226*
		[-0.0142]			[0.046*]
		(0.103)			(0.119)
Not at all concerned		-0.0113			-0.286
		[0.0023]			[0.0586]
		(0.138)			(0.192)
Don't know		0.247			-0.695***
		[-0.051]			[0.145***]
		(0.182)			(0.190)
Energy reliability					
Fairly concerned			0.113		0.0209
			[-0.0244]		[-0.0043]
			(0.136)		(0.142)
Not very concerned			0.369***		0.199
			[-0.0781***]		[-0.041]
			(0.129)		(0.139)
Not at all concerned			0.190		-0.0617
			[-0.041]		[0.013]
			(0.163)		(0.174)
Don't know			0.864***		0.607***
			[-0.173***]		[-0.12***]
			(0.107)		(0.141)
Import dependency					
Fairly concerned				0.122	
				[-0.0264]	
				(0.0957)	
Not very concerned				0.347***	
				[-0.0734]	
				(0.120)	
Not at all concerned				0.352***	
				[-0.0745]	
				(0.125)	
Don't know				1.009***	
				[-0.1962]	
				(0.164)	
Controls	Yes	Yes	Yes	Yes	Yes
Observations	3,445	3,445	3,445	3,445	3,445
Pseudo R^2	0.0864	0.0743	0.0786	0.0813	0.0891

Robust standard errors in parentheses
Average marginal effects for support in brackets
*** p<0.01, ** p<0.05, * p<0.1

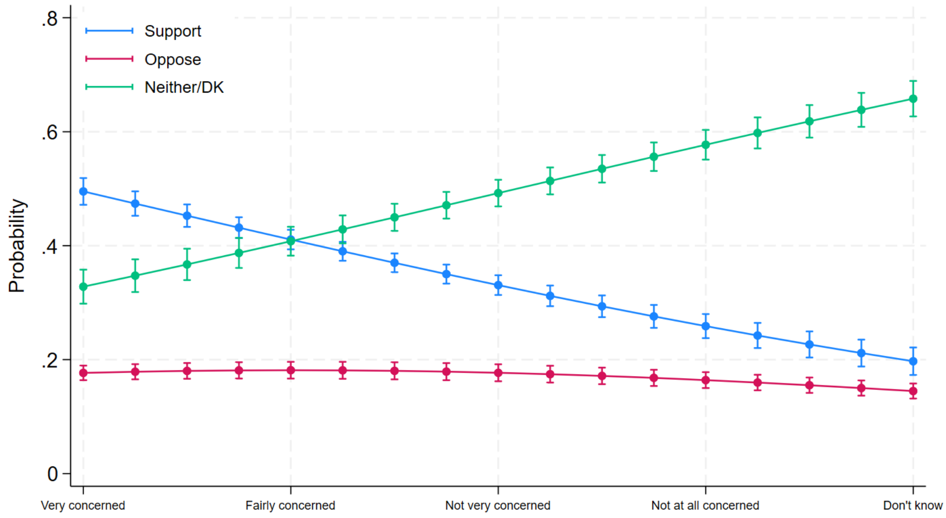

Figure 3: Predictive margins for energy vulnerability: Nuclear

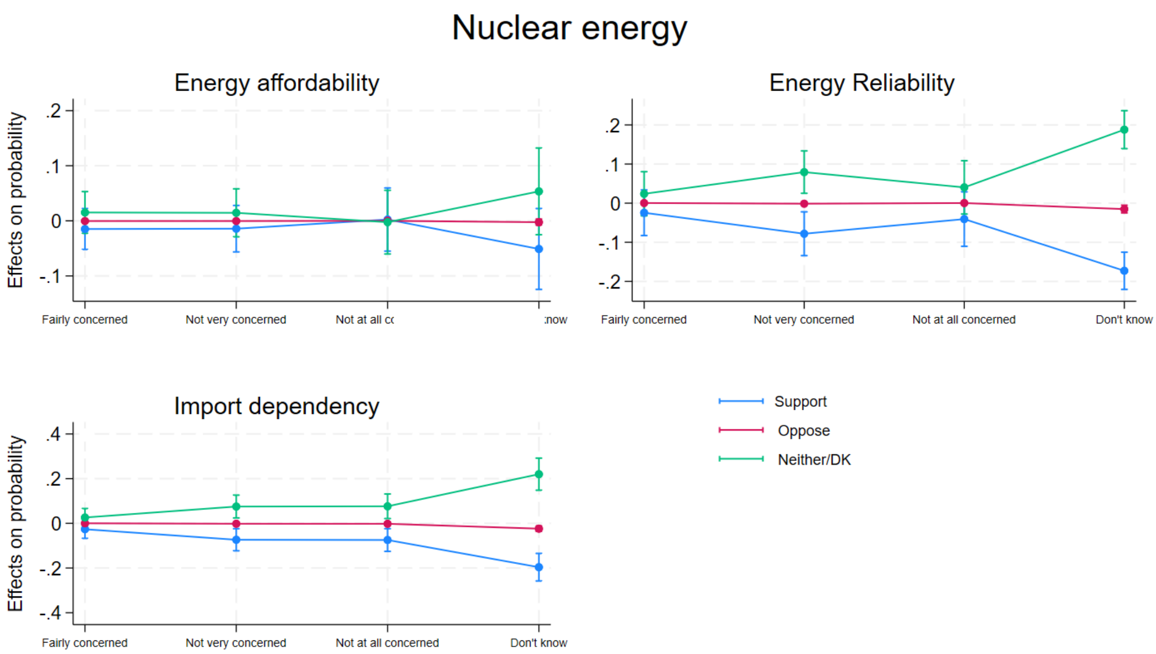

Figure 4: Nuclear: Marginal effects plots

3.3. Shale gas

We start our discussion with energy vulnerability and its impact on shale gas extraction (the results are summarized in Table 5). In Fig. 5, we can see that shale gas extraction exhibits three main differences from the other two energy sources, First, both support and opposition fall as households become less concerned for energy vulnerability. Second, across all levels of energy vulnerability, the probability of opposition is always larger than the probability of support. And third, opposition to shale gas is the strongest across all energy sources. Moreover, the fall in support is much larger than the fall in opposition since the average marginal effects are -7%pt and -1.78%pt. This is also evident in the predictive margins, where support starts at 33% and decreases to just 9%, while opposition begins at 36% and drops to 27%. Note also that households are more likely to have no clear opinion as they become less concerned on energy vulnerability, a finding that persists across all sources.

A notable similarity with nuclear energy is that households only show a higher probability of supporting when compared to having no opinion (Neither/DK) when they report the highest level of concern (very concerned). In all other cases, individuals tend to express no opinion. We suspect that this is likely due to the unfamiliarity of many UK households with shale gas extraction (Whitmarsh *et al.*, 2015; Roddis *et al.*, 2019). Ultimately, the key conclusion is that as concerns about energy security decrease (shifting rightward), households are less likely to support shale gas extraction, with support reaching its lesser point. Thus, **H3** is supported.

On affordability, there is a small decline in support by 3.3%pt (Model 2) between the first two categories, accompanied by a slightly larger rise in having no opinion (Neither/DK) as households become less concerned about affordability. This finding is in accord with our hypotheses earlier and is depicted in Fig. 6 (top left panel). On the other hand, in Model 5, the previous impact is absent when all facets are considered, however, in this model there is a rise in support for shale gas when households answer DK (statistically significant at 10%). This most likely reveal the unfamiliarity of the respondents since around 40% of respondents have no clear opinion on shale gas.

Regarding reliability, the findings are similar to those of nuclear energy. The fall in probability of support can be up to -8.6%pt when households' opinion moves two levels and are not very concerned. This fall increases to -11.3%pt when households have no clear opinion. So, as level of concern for power cuts eases, support for shale gas is falling, so **H3** is supported (see Fig. 6 top right panel). Note that the probability fall reaches its maximum when households answer "not very concerned" (level 3). Opposition to shale gas is relatively constant. Notice also the expected rise in probability (11.3%pt) for no clear opinion when households answer DK, this is likely an indication that people do not know many things about shale gas. For model 5, the pattern is similar, but the marginal effect (probability fall) is less than half (-3.9%pt) and impacts only one level (not very concerned).

The concerns for energy imports follow a similar pattern to those of nuclear energy but the impact is spread across levels: the fall in support as households become less concerned about energy imports, constantly increases from -3.85%pt to -8.6%pt, -7%pt to -16.5%pt. This fall is statistically significant across all concern levels, unlike the other two energy sources. Also noteworthy is the decline in opposition to shale gas, which decreases by up to 9.2%pt, though this change is significant at all levels of concern except for those who are "not at all concerned." This reduction in opposition—also reflected in energy vulnerability—distinguishes shale gas from renewables and nuclear energy, where opposition remains unaffected by energy security concerns.

Table 5: Shale gas extraction preferences – Energy security variables

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Energy vulnerability	0.410***				0.410***
	[-0.07***]				[-0.0698***]
	(0.0302)				(0.0272)
Energy affordability					
Fairly concerned		0.190***			-0.0141
		[-0.0334***]			[0.0024]
		(0.0507)			(0.0555)
Not very concerned		0.216			-0.0828
		[-0.038]			[0.0142]
		(0.182)			(0.196)
Not at all concerned		0.131			-0.0862
		[-0.0234]			[0.0148]
		(0.194)			(0.195)
Don't know		0.406*			-0.378*
		[-0.068*]			[0.069*]
		(0.214)			(0.219)
Energy reliability					
Fairly concerned			0.289***		0.152
			[-0.054***]		[-0.0267]
			(0.107)		(0.0965)
Not very concerned			0.477***		0.230***
			[-0.0855***]		[-0.0398***]
			(0.0901)		(0.0680)
Not at all concerned			0.174		-0.138
			[-0.0333]		[0.0257]
			(0.163)		(0.148)
Don't know			0.663***		0.274**
			[-0.1138***]		[-0.0468**]
			(0.126)		(0.111)
Import dependency					
Fairly concerned				0.207***	
				[-0.0384***]	
				(0.0614)	
Not very concerned				0.499***	
				[-0.0864***]	
				(0.0726)	
Not at all concerned				0.395*	
				[-0.0701*]	
				(0.234)	
Don't know				1.125***	
				[-0.1654***]	
				(0.126)	
Controls	Yes	Yes	Yes	Yes	Yes
Observations	3,445	3,445	3,445	3,445	3,445
Pseudo R^2	0.0535	0.0401	0.0427	0.0487	0.0551

Robust standard errors in parentheses
Average marginal effects for support in brackets
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

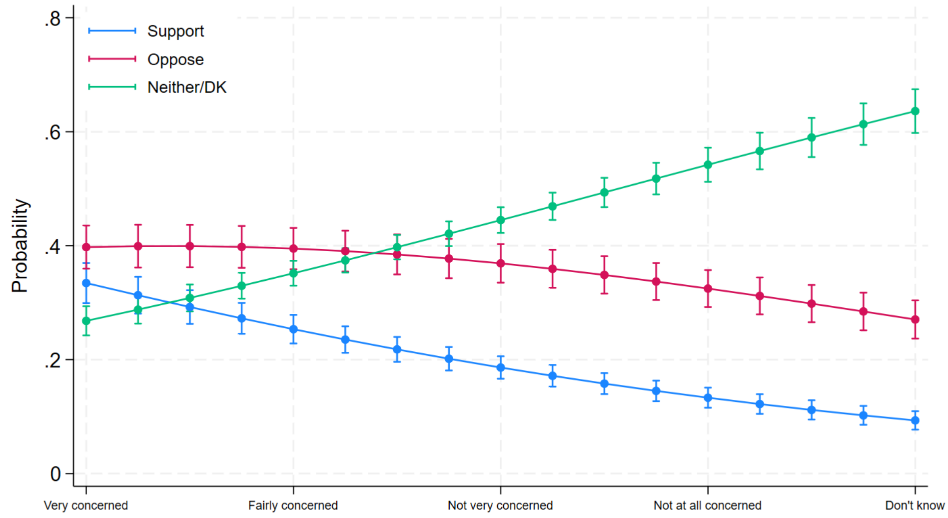

Figure 5: Predictive margins for energy vulnerability: Shale gas

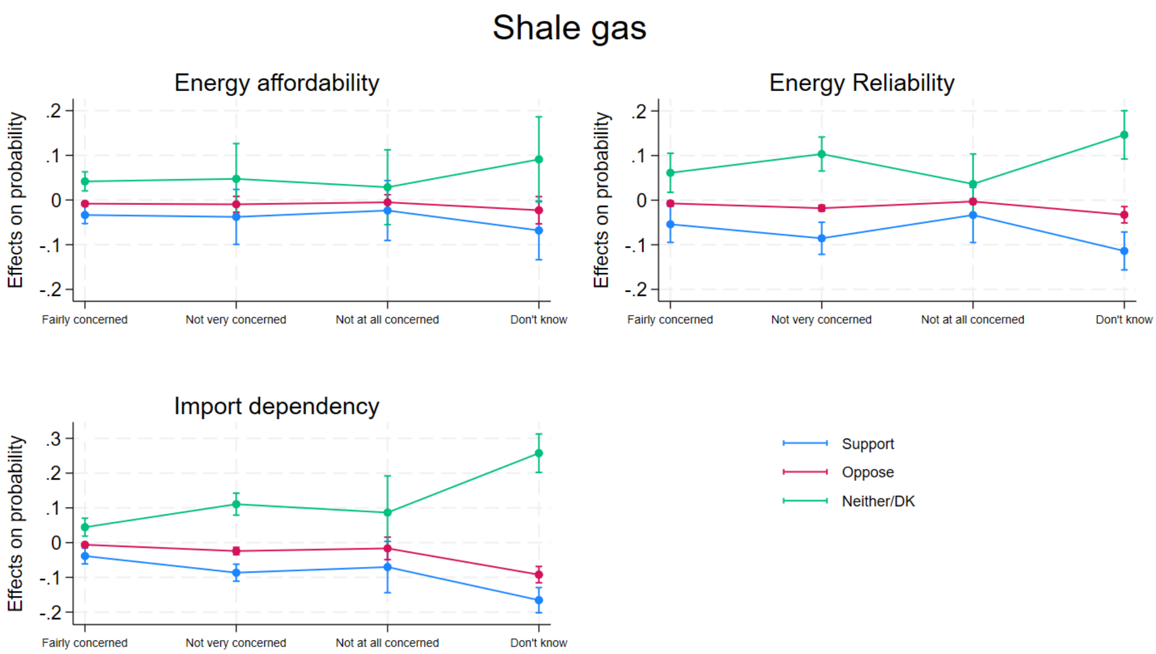

Figure 6: Shale gas: Marginal effects plots

3.4. Energy import concerns

We examine the relationship between energy preferences and three specific energy types—oil, gas, and electricity[4]—while considering concerns about energy import dependency. Our analysis focuses on households that express higher levels of concern (categorized as 'very concerned' or 'fairly concerned'), which account for approximately 71.6% of the sample (see Table A2). The results reveal that greater concern about oil dependency is associated with an increased likelihood of supporting all energy sources, with the most notable increase (5.4%pt) observed for renewable energy. Interestingly, oil is the only energy type linked to a heightened support for renewables, despite both oil and gas being fossil fuels and the UK being a net importer of both. The reasons behind this pattern remain unclear and warrant further investigation.

However, when considering gas and electricity supply, nuclear energy receives greater support, with an increase of 9.1%pt for gas and 7.8%pt for electricity. These are substantial rises, in line with what found earlier on marginal effects on support for nuclear energy. Moreover, shale gas extraction also gets a support boost, albeit smaller, by 6.5%pt and 2.5%pt respectively, in line with previous findings. The relatively big rises in support for gas and electricity are likely related with the energy reality in the UK where the country is increasingly reliant on imports to meet the domestic demand for natural gas which is the biggest source of electricity production, 39.9% in 2021 the year of the survey (DESNZ, 2023) and in addition, the fact that UK is increasingly a net electricity importer from practically all its neighbouring countries (DESNZ, 2024).

Note that the increase in support for electricity is consistently smaller compared to gas, which may reflect the fact that fewer households are concerned about electricity imports. It seems that UK households may either be unaware that the country is a net importer of electricity or perceive the countries from which the UK imports electricity (France, Norway, Belgium, and the Netherlands) as non-threats for any security risk. While this issue is beyond the scope of the current paper and the available data does not allow for a deeper analysis, it presents an interesting avenue for future research.

[4]In Table A4 in the Appendix, we offer the descriptive statistics for each of these energy types.

Table 6: Energy preferences and import dependency per energy type

Marginal effects on support

Energy type	Renewable	Nuclear	Shale gas
Oil	0.054***	0.035***	0.048***
	(0.0097)	(0.0143)	(0.0129)
Gas	0.0170*	0.091***	0.0649***
	(0.0096)	(0.0148)	(0.0162)
Electricity	-0.0039	0.078***	0.0247**
	(0.013)	(0.019)	(0.0101)
Observations	2,529	2,529	2,529

Standard errors in parentheses (delta-method)

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

3.5. Climate concerns

We now examine the impact of climate concerns on energy preferences with a particular focus on shale gas extraction given the limited literature on this energy source. The literature has documented the positive relationship between renewable energy support and climate change concerns and the inverse relationship for nuclear energy (Spence *et al.*, 2010; Roddis *et al.*, 2019). On shale gas, we expect the relationship to be like that of nuclear energy although less familiarity and even political perspectives might have an impact (Christenson *et al.*, 2017). Thus, we test the following hypothesis:

H4: *Higher concerns about climate change increase the support for renewable energy, but on the other hand, they decrease the support for shale gas extraction and nuclear energy*.

We report findings based on Model 1 (with vulnerability as the independent variable for energy security but the results are similar for the other model specifications). On renewable energy, the marginal effects plot is seen in Fig. 7, where a continuous fall in probability of support (-25.6%pt) is observed when households are not very concerned and 29.5%pt when they are not at all concerned. Again, the fall rises when households have no clear opinion, up to 35.8%pt. The opposition remains constant. The main conclusion here is that probability of support for renewable energy is continuously falling when climate concerns ease. So, **H4** is supported since as climate concerns decline, renewable energy support is also declining.

Regarding nuclear energy, a different pattern emerges: the probability of support increases as concerns ease, up to 16%pt and then it falls by the same amount for households which express no opinion revealing that nuclear energy can be a controversial topic. Opposition to nuclear is not affected by climate concerns. Thus, **H4** is again supported since as climate concerns decline, nuclear energy support is increasing.

Regarding shale gas, we can only detect a fall in probability of support only when households become fairly concerned by 2.9%pt accompanied by a larger fall at 7.9%pt when households have no clear opinion. Notice again, as in the other energy sources, the constant levels of opposition irrespective of climate concern levels. There is no clear conclusion here between climate concerns and shale gas preferences, meaningful changes are very small to draw safe conclusions, the hypothesis is not supported by the data.

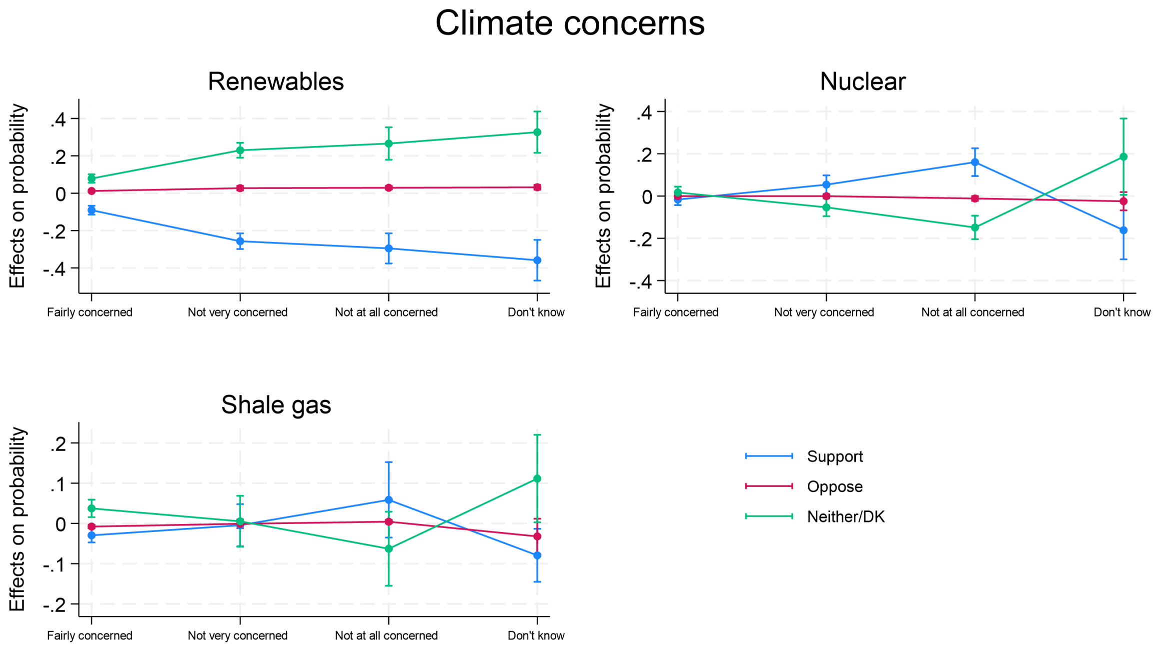

Figure 7: Climate concerns: Marginal effects plots across energy sources

3.6. Local area predicted probabilities

Another interesting finding is the impact of living in a rural area on energy preferences. Here, the results reveal an impact only for renewable energy sources: households in rural areas are more likely to support renewable energy sources by 4.1%pt compared to those in urban areas.[5] This is an interesting finding since it implies that rural households are apparently more familiar with wind, biomass, wave/tidal energy sources, so this can increase their familiarity with these sources and subsequently their support for these sources, something that Warren *et al.* (2005) have called "inverse NIMBY" (Not In My Back Yard). However, this is not the case for nuclear and shale gas given the few existing plants and the moratorium respectively. In addition, the presence of these renewable energy sources in rural areas, is likely to have value-added and employment benefits in their areas, for example, local people are likely to be employed by firms operating these renewable sources (Del Rio and Burguillo, 2009; Roddis *et al.*, 2019).

In Figs. 8, 9 and 10 below, the predicted probabilities for each observation and for each alternative are presented for each region in the UK (arranged in descending order for the probability of support). The first observation is that there is little variability among the UK regions for each alternative, so no geographical impact can be spotted here. Notice however that the predicted probability of support for renewables is higher in more rural areas (Wales, Yorkshire & The Humber, East of England) which reflects the positive impact on support for renewables reported earlier (Heavner and Del Chiaro, 2007; Heinbach *et al.*, 2014).

In these figures, it can be seen that the variability in probability of support, which is on average 0.8 for renewables, 0.4 for nuclear and only 0.24 for shale gas. The probabilities of opposition are highest on average for shale gas (0.37), for nuclear (0.17), and just below 0.02 for renewables. Notice finally the high probabilities for Neither/DK for nuclear (0.433) and shale gas (0.38). It is likely that these results reflect the unfamiliarity or even non-proximity of the participants to these energy sources given the fracking moratorium and the low number of nuclear plants – only six, currently operating in the UK. These results untimately reveal the different perceptions households have for each energy source.

[5] 4.1% is the marginal effect for Model 5 (all energy security facets included), the results are very similar for the other models.

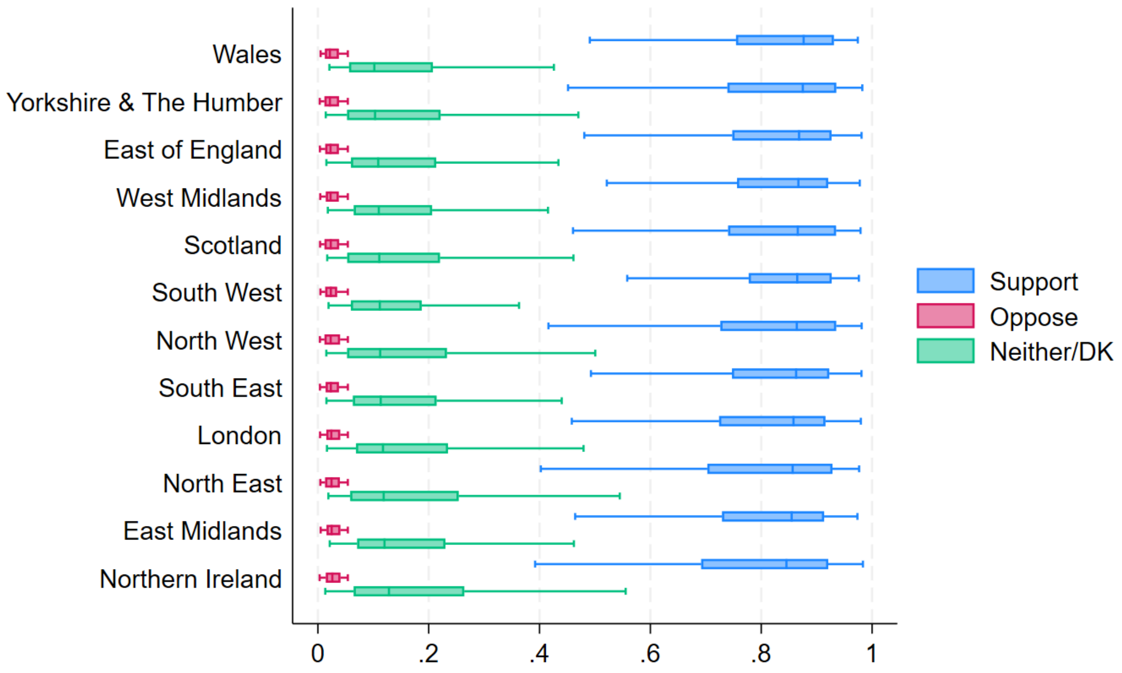

Figure 8: Predicted probabilities for renewable energy (UK regions)

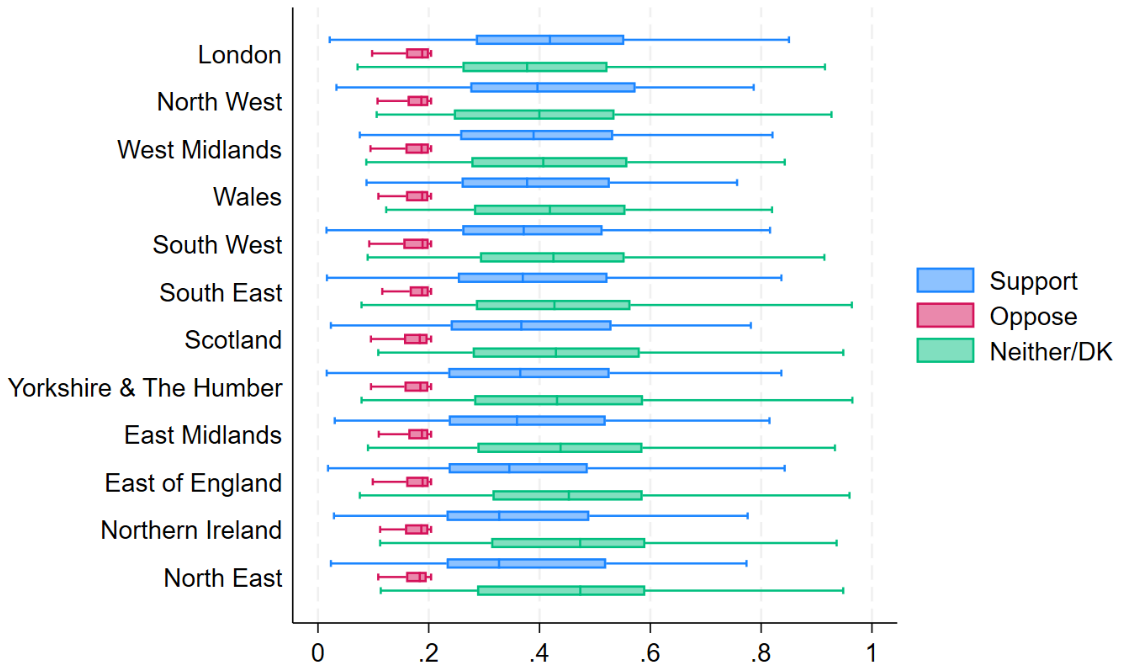

Figure 9: Predicted probabilities for nuclear energy (UK regions)

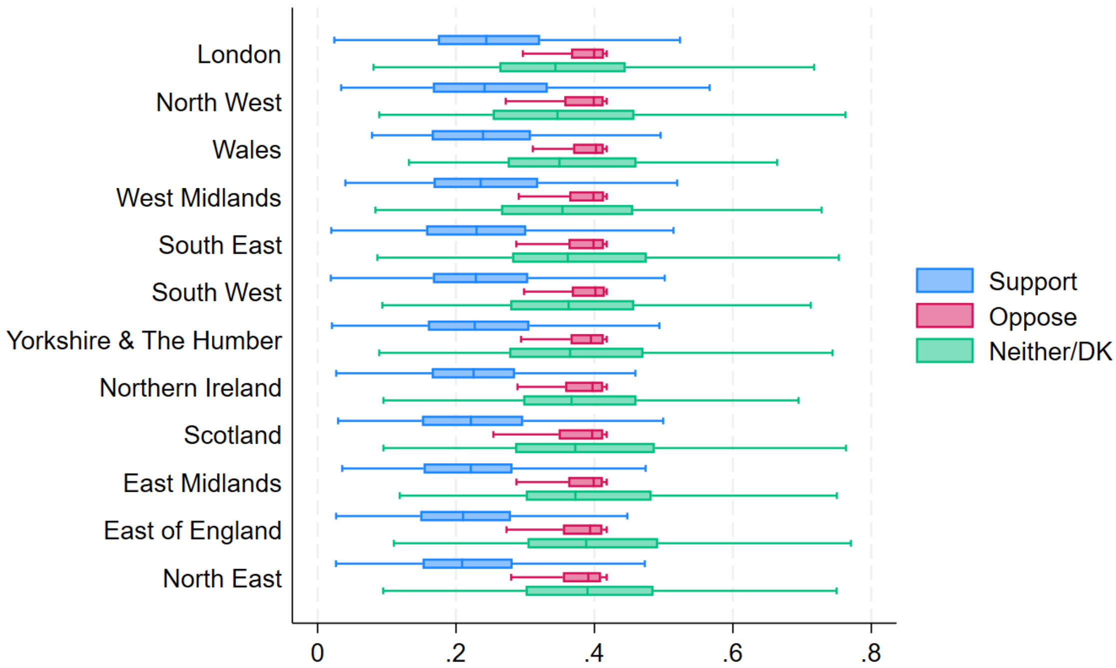

Figure 10: Predicted probabilities for shale gas (UK regions)

3.7. Robustness checks

To further examine the robustness of our findings, we have estimated the same models by using OLS where we treat each energy source as a six-category continuous variable compared to the three-category variables under ordered logit. We present the results in Tables A9-A11 in the Appendix, and we show that our findings and the fitting of the models are very similar for all energy security facets.

A concern about the presence of potential endogeneity might arise in our model due to the energy savings thought variable. This variable could be endogenous since energy savings could be related to unobservable variables in the error term, like personal preference and behavioural and social indicators (Sweeney *et al.*, 2013) for which we have no available data. Moreover, the direction of causality between energy savings and energy preferences might be ambiguous since the latter could also cause the former. In the Appendix, we address these concerns by using instrumental variable techniques where we show that endogeneity is not present in our model since the energy savings thought variable is considered exogenous according to Hausman-Wu test. Furthermore, we control for the impact of unobservable variables according to Oster (2019) and we find that the energy savings coefficients are stable. Overall, these robustness checks offer validity to the findings reported earlier.

Finally, we view all the energy security facets as exogenous variables. We consider this to be a safe assumption since facets like future prices or power cuts are determined outside the household level studied here, say, at macroeconomic or government level.

4. CONCLUSIONS AND POLICY IMPLICATIONS

In this study, we empirically investigated the influence of four facets of energy security —vulnerability, affordability, reliability, and import dependency—on public preferences for renewables, nuclear energy, and shale gas. Our findings highlight that public support for renewables is comparatively less sensitive to energy security concerns than nuclear energy and shale gas, which exhibit similar response patterns. Specifically, reduced concerns about energy vulnerability lead to a decline in support for all energy sources, but this effect is nearly twice as pronounced for nuclear energy and shale gas compared to renewables. Affordability concerns appear to have no statistically significant impact on renewables or nuclear energy and only a marginal effect on shale gas. Reliability concerns reveal a differential pattern: while support for renewables increases as reliability concerns ease—an exception to the inverse relationship typically observed—support for nuclear energy and shale gas decreases significantly. Lastly, import dependency concerns result in a decline in support for all energy sources, with nuclear energy and shale gas experiencing a substantially larger reduction compared to renewables. When energy security concerns are pronounced, (households are at least fairly concerned), nuclear energy garners the highest increase in public support, followed by shale gas.

A notable and somewhat unexpected finding is the negligible impact of energy affordability on public preferences, apart from a minor effect on support for shale gas. We hypothesise that this outcome is primarily attributable to framing effects, specifically the way the survey question was constructed, which employed a time horizon of 10–20 years. Such an extended timeframe likely results in a steep discounting of concerns, as households may find it challenging to project or evaluate their concerns over such a distant period. This phenomenon is analogous to time discounting, where the subjective value of future rewards diminishes with increased delay. Nevertheless, it is improbable that households are indifferent to rising energy costs, as the same survey indicates that approximately 43% of respondents express at least moderate concern about energy bills.

It is plausible that these findings might have differed if a shorter time horizon, such as 5–10 years, had been adopted, given that variations in temporal framing can significantly influence discounting behaviour (Scholten and Read, 2010). Additionally, altering the timeframe could affect how households perceive other facets of energy security, not solely affordability. This represents a valuable avenue for future research. Importantly, policymakers should recognise that households may lack a comprehensive understanding of potential future energy price increases, which could exacerbate their financial vulnerabilities and deepen their energy insecurities (Carley and Konisky, 2020).

The significance of energy import dependency is strongly corroborated by our models and data, aligning with the limited existing literature (Demski *et al.*, 2014; Jones *et al.*, 2017; Verschoor *et al.*, 2020). Notably, concerns about energy imports predominantly affect nuclear energy and shale gas, with limited impact on renewables. This suggests that households perceive nuclear energy and shale gas as hedging strategies to mitigate risks associated with import dependency, particularly when such concerns are pronounced. However, the marked influence of these concerns is somewhat puzzling, given that the UK sources electricity and other energy imports primarily from geopolitically stable countries, such as Belgium, the Netherlands, France, and Norway. Furthermore, according to Gatto and Busato (2020), the UK is not categorised as an energy-vulnerable nation in global indices.

We hypothesise that this perception arises from a general association of energy security with a country's net importer status rather than specific geopolitical risks. Additionally, cultural memory may play a role, as the 1970s oil embargoes, which significantly disrupted the UK economy and continue to resonate in public consciousness. This aligns with the findings of Bauer *et al.* (2019), who demonstrated that societal responses to energy issues can be shaped and constrained by historical events, even in the absence of contemporary geopolitical threats.

Our findings further indicate that nuclear energy and shale gas exhibit similar patterns of public support, with one notable distinction: opposition to shale gas tends to decrease as energy concerns diminish. We attribute this to the relative unfamiliarity of households with shale gas, evidenced by the high proportion of "Neither/DK" responses. This unfamiliarity likely stems from shale gas being a relatively new technology and the ongoing moratorium on its extraction in the UK. Nonetheless, households appear to perceive shale gas as a hedge against energy insecurity, particularly in relation to import dependency and reliability.

Given the prevalent discourse in the UK, which often emphasises the risks and uncertainties associated with shale gas (Thomas *et al.*, 2017), policymakers should consider its potential role as a contingency measure in scenarios of severe energy disruptions. The contribution of shale gas to energy security has been recognised in the literature as a robust conclusion applicable across various national contexts (Upham *et al.*, 2015). This perspective is particularly relevant as the UK transitions towards its net-zero targets, where shale gas could serve as a transitional energy source to bolster energy security during this critical period. Furthermore, the energy vulnerability index, which incorporates elements related to the supply and technological development of fossil fuels, underscores the potential role of shale gas as a reliable energy source during the transition to net-zero targets in the UK. This transitional reliance on fossil fuels may not have been fully recognised in several European countries, which are grappling with elevated energy prices and heightened competition from the United States, bolstered by fossil fuel subsidies under the Inflation Reduction Act (IRA). While the UK's commitment to advancing nuclear power through its "Roadmap to 2050" is commendable, its efficacy in reducing energy prices remains uncertain.

An additional insight for policymakers is the non-linear nature of public concerns about energy security, which often exhibit threshold effects. For instance, concerns regarding import dependency influence support for nuclear energy and shale gas only at higher levels of concern, specifically at the last three and four levels of concern, respectively. Although we are unaware of comparable findings in the energy security literature, parallels can be drawn with the insurance literature, where risks are often ignored when perceived probabilities fall below a subjective threshold, leading to decisions against purchasing insurance (Slovic *et al.*, 1977; Robinson and Botzen, 2020). A similar heuristic likely applies to energy security, where concerns become impactful only after surpassing specific thresholds. This complexity adds to the challenges of addressing energy security concerns, necessitating a more nuanced approach by policymakers.

Finally, it is important to emphasise that energy security is a multifaceted and polysemic concept (Jewell and Brutschin, 2021). While this study focuses on select dimensions, other critical facets warrant attention. Environmental sustainability, for instance, is essential, as energy production and supply must minimise adverse impacts on greenhouse gas (GHG) emissions and vital ecosystem services such as water provision, land use, and habitat preservation (Sovacool and Mukherjee, 2011; Ang *et al.*, 2015). Exploring the interplay between environmental protection and geopolitical priorities, such as import dependency, would offer valuable insights for policymakers. Furthermore, energy efficiency and the government's role in promoting investments to enhance efficiency, assisting businesses and households in reducing GHG emissions, and regulating energy markets effectively are integral components of energy security (Brown *et al.*, 2014). These aspects should be carefully incorporated into policy assessments to ensure a comprehensive and balanced approach to energy security.

References

Ang, B.W., Choong, W.L. and Ng, T.S. (2015) Energy security: Definitions, dimensions and indexes *Renewable and sustainable energy reviews* **42**, pp. 1077–1093

Arndt, C. (2023) Climate change vs energy security? the conditional support for energy sources among Western Europeans *Energy Policy* **174**, p. 113471

Baker, E., Carley, S., Castellanos, S., Nock, D., Bozeman III, J.F., Konisky, D., Monyei, C.G., Shah, M. and Sovacool, B. (2023) Metrics for decision-making in energy justice *Annual Review of Environment and Resources* **48**(1), pp. 737–760

Bauer, M.W., Gylstorff, S., Madsen, E.B. and Mejlgaard, N. (2019) The Fukushima accident and public perceptions about nuclear power around the globe–a challenge & response model *Environmental Communication* **13**(4), pp. 505–526

BEIS (2021) Public attitudes tracker: Wave 37. department for business, energy industrial strategy https://www.gov.uk/government/statistics/beis-public-attitudes-tracker-wave-37

Boto-García, D. and Bucciol, A. (2020) Climate change: Personal responsibility and energy saving *Ecological Economics* **169**, p. 106530

Bradshaw, M., Devine-Wright, P., Evensen, D., King, O., Martin, A., Ryder, S., Short, D., Sovacool, B.K., Stretesky, P., Szolucha, A. *et al.* (2022) 'We're going all out for shale:'explaining shale gas energy policy failure in the United Kingdom *Energy Policy* **168**, p. 113132

Brieger, S.A. (2019) Social identity and environmental concern: The importance of contextual effects *Environment and Behavior* **51**(7), pp. 828–855

Brown, M.A., Wang, Y., Sovacool, B.K. and D'Agostino, A.L. (2014) Forty years of energy security trends: A comparative assessment of 22 industrialized countries *Energy Research & Social Science* **4**, pp. 64–77

Carley, S. and Konisky, D.M. (2020) The justice and equity implications of the clean energy transition *Nature Energy* **5**(8), pp. 569–577

Cergibozan, R. (2022) Renewable energy sources as a solution for energy security risk: Empirical evidence from oecd countries *Renewable Energy* **183**, pp. 617–626

Christenson, D.P., Goldfarb, J.L. and Kriner, D.L. (2017) Costs, benefits, and the malleability of public support for "fracking" *Energy Policy* **105**, pp. 407–417

Corner, A., Venables, D., Spence, A., Poortinga, W., Demski, C. and Pidgeon, N. (2011) Nuclear power, climate change and energy security: Exploring british public attitudes *Energy Policy* **39**(9), pp. 4823–4833

Del Rio, P. and Burguillo, M. (2009) An empirical analysis of the impact of renewable energy deployment on local sustainability *Renewable and sustainable energy reviews* **13**(6-7), pp. 1314–1325

Demski, C., Poortinga, W. and Pidgeon, N. (2014) Exploring public perceptions of energy security risks in the UK *Energy Policy* **66**, pp. 369–378

Demski, C., Poortinga, W., Whitmarsh, L., Böhm, G., Fisher, S., Steg, L., Umit, R., Jokinen, P. and Pohjolainen, P. (2018) National context is a key determinant of energy security concerns across Europe *Nature Energy* **3**(10), pp. 882–888

DESNZ (2022) British energy security strategy https://assets.publishing.service.gov.uk/media/626112c0e90e07168e3fdba3/british-energy-security-strategy-web-accessible.pdf

DESNZ (2023) UK energy in brief https://www.gov.uk/government/statistics/uk-energy-in-brief-2023

DESNZ (2024) Digest of UK energy statistics https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

Dong, K., Jiang, Q., Liu, Y., Shen, Z. and Vardanyan, M. (2024) Is energy aid allocated fairly? a global energy vulnerability perspective *World Development* **173**, p. 106409

Fairbrother, M., Sevä, I.J. and Kulin, J. (2019) Political trust and the relationship between climate change beliefs and support for fossil fuel taxes: Evidence from a survey of 23 european countries *Global Environmental Change* **59**, p. 102003

Gatto, A. and Busato, F. (2020) Energy vulnerability around the world: The global energy vulnerability index (GEVI) *Journal of Cleaner Production* **253**, p. 118691

Gupta, K., Nowlin, M.C., Ripberger, J.T., Jenkins-Smith, H.C. and Silva, C.L. (2019) Tracking the nuclear 'mood'in the united states: Introducing a long term measure of public opinion about nuclear energy using aggregate survey data *Energy Policy* **133**, p. 110888

Hamilton, I.G., Summerfield, A.J., Shipworth, D., Steadman, J.P., Oreszczyn, T. and Lowe, R.J. (2016) Energy efficiency uptake and energy savings in english houses: A cohort study *Energy and Buildings* **118**, pp. 259–276

Heavner, B. and Del Chiaro, B. (2007) Renewable energy and jobs: Employment impacts of developing markets for renewables in California *Environment California Research and Policy Center*

Heinbach, K., Aretz, A., Hirschl, B., Prahl, A. and Salecki, S. (2014) Renewable energies and their impact on local value added and employment *Energy, Sustainability and Society* **4**, pp. 1–10

Ivanova, D. and Middlemiss, L. (2021) Characterizing the energy use of disabled people in the european union towards inclusion in the energy transition *Nature Energy* **6**(12), pp. 1188–1197

Iyke, B.N. (2024) Climate change, energy security risk, and clean energy investment *Energy Economics* **129**, p. 107225

Jewell, J. and Brutschin, E. (2021) The politics of energy security in: *The Oxford Handbook of Energy Politics* Oxford University Press

Jones, C.R., Kaklamanou, D. and Lazuras, L. (2017) Public perceptions of energy security in greece and turkey: Exploring the relevance of pro-environmental and pro-cultural orientations *Energy Research & Social Science* **28**, pp. 17–28

Lacy, M.G. (2006) An explained variation measure for ordinal response models with comparisons to other ordinal R^2 measures *Sociological Methods & Research* **34**(4), pp. 469–520

Lucas, J.N.V., Francés, G.E. and González, E.S.M. (2016) Energy security and renewable energy deployment in the eu: Liaisons dangereuses or virtuous circle? *Renewable and sustainable energy reviews* **62**, pp. 1032–1046

McKelvey, R.D. and Zavoina, W. (1975) A statistical model for the analysis of ordinal level dependent variables *Journal of mathematical sociology* **4**(1), pp. 103–120

McNally, H., Howley, P. and Cotton, M. (2018) Public perceptions of shale gas in the uk: framing effects and decision heuristics *Energy, Ecology and Environment* **3**, pp. 305–316

Oster, E. (2019) Unobservable selection and coefficient stability: Theory and evidence *Journal of Business & Economic Statistics* **37**(2), pp. 187–204

Paravantis, J.A. and Kontoulis, N. (2020) Energy security and renewable energy: a geopolitical perspective in: *Renewable energy-resources, challenges and applications* IntechOpen

Patlitzianas, K.D., Doukas, H., Kagiannas, A.G. and Psarras, J. (2008) Sustainable energy policy indicators: Review and recommendations *Renewable Energy* **33**(5), pp. 966–973

Robinson, P.J. and Botzen, W.W. (2020) Flood insurance demand and probability weighting: The influences of regret, worry, locus of control and the threshold of concern heuristic *Water Resources and Economics* **30**, p. 100144

Roddis, P., Carver, S., Dallimer, M. and Ziv, G. (2019) Accounting for taste? analysing diverging public support for energy sources in great britain *Energy Research & Social Science* **56**, p. 101226

Scholten, M. and Read, D. (2010) The psychology of intertemporal tradeoffs. *Psychological review* **117**(3), p. 925

Slovic, P., Fischhoff, B., Lichtenstein, S., Corrigan, B. and Combs, B. (1977) Preference for insuring against probable small losses: Insurance implications *Journal of Risk and insurance* pp. 237–258

Sovacool, B.K. (2016) Differing cultures of energy security: An international comparison of public perceptions *Renewable and Sustainable Energy Reviews* **55**, pp. 811–822

Sovacool, B.K. and Mukherjee, I. (2011) Conceptualizing and measuring energy security: A synthesized approach *Energy* **36**(8), pp. 5343–5355

Spence, A., Poortinga, W., Pidgeon, N. and Lorenzoni, I. (2010) Public perceptions of energy choices: The influence of beliefs about climate change and the environment *Energy & environment* **21**(5), pp. 385–407

Staiger, D. and Stock, J. (1997) Instrumental variables regression with weak instruments *Econometrica* **65**(3), pp. 557–586

Sturgis, P., Roberts, C. and Smith, P. (2014) Middle alternatives revisited: How the neither/nor response acts as a way of saying "I don't know"? *Sociological Methods & Research* **43**(1), pp. 15–38

Sweeney, J.C., Kresling, J., Webb, D., Soutar, G.N. and Mazzarol, T. (2013) Energy saving behaviours: Development of a practice-based model *Energy Policy* **61**, pp. 371–381

Taylor, E. (2011) *Public Attitudes to Housing in England: Report Based on the Results from the British Social Attitudes Survey* Department for Communities and Local Government

Thomas, M., Partridge, T., Harthorn, B.H. and Pidgeon, N. (2017) Deliberating the perceived risks, benefits, and societal implications of shale gas and oil extraction by hydraulic fracturing in the US and UK *Nature Energy* **2**(5), pp. 1–7

UK Government (2024) Clean power 2030 action plan https://www.gov.uk/government/publications/clean-power-2030-action-plan

Upham, P., Lis, A., Riesch, H. and Stankiewicz, P. (2015) Addressing social representations in socio-technical transitions with the case of shale gas *Environmental Innovation and Societal Transitions* **16**, pp. 120–141

Verschoor, M., Albers, C., Poortinga, W., Böhm, G. and Steg, L. (2020) Exploring relationships between climate change beliefs and energy preferences: A network analysis of the european social survey *Journal of Environmental Psychology* **70**, p. 101435

Warren, C.R., Lumsden, C., O'Dowd, S. and Birnie, R.V. (2005) 'Green on green': Public perceptions of wind power in Scotland and Ireland *Journal of environmental planning and management* **48**(6), pp. 853–875

Whitmarsh, L., Nash, N., Upham, P., Lloyd, A., Verdon, J.P. and Kendall, J.M. (2015) UK public perceptions of shale gas hydraulic fracturing: The role of audience, message and contextual factors on risk perceptions and policy support *Applied Energy* **160**, pp. 419–430

A. Appendix

Tables A1–A2 present the descriptive statistics for all energy security facets. Table A3 presents descriptive statistics for the variables climate change concern and area while Table A4 presents descriptive statistics for the three energy types (oil, gas, electricity).

Table A1: Energy affordability and energy reliability statistics

Thinking about the next 10-20 years, how concerned, if at all, are you about Steep rises in energy prices in the future		
Energy affordability	Frequency	Per cent
Very concerned	1,371.0	34.0
Fairly concerned	1,902.0	47.2
Not very concerned	531.0	13.2
Not at all concerned	94.0	2.3
Don't know	131.0	3.3
Total	4,029.0	100.0
Thinking about the next 10-20 years, how concerned, if at all, are you about Power cuts becoming more frequent in the future		
Energy reliability	Frequency	Per cent
Very concerned	688.0	17.1
Fairly concerned	1,550.0	38.5
Not very concerned	1,285.0	31.9
Not at all concerned	261.0	6.5
Don't know	245.0	6.1
Total	4,029.0	100.0

Table A2: Energy vulnerability statistics

Thinking about the next 10-20 years, how concerned, if at all, are you about UK supplies of fossil fuels not being sufficient to meet the UK's demand for them		
Item	Frequency	Per cent
Very concerned	806.0	20.0
Fairly concerned	1,695.0	42.1
Not very concerned	873.0	21.7
Not at all concerned	197.0	4.9
Don't know	458.0	11.4
Total	4,029.0	100.0
Thinking about the next 10-20 years, how concerned, if at all, are you about the UK becoming too dependent on energy from other countries		
Item	Frequency	Per cent
Very concerned	1,262.0	31.3
Fairly concerned	1,623.0	40.3
Not very concerned	670.0	16.6
Not at all concerned	118.0	2.9
Don't know	356.0	8.8
Total	4,029.0	100.0
Thinking about the next 10-20 years, how concerned, if at all, are you about the UK not investing fast enough in alternative sources of energy		
Item	Frequency	Per cent
Very concerned	1,156.0	28.7
Fairly concerned	1,773.0	44.0
Not very concerned	645.0	16.0
Not at all concerned	116.0	2.9
Don't know	339.0	8.4
Total	4,029.0	100.0
Thinking about the next 10-20 years, how concerned, if at all, are you about the UK not developing technology to use existing sources of fossil fuels sufficiently		
Item	Frequency	Per cent
Very concerned	806.0	20.0
Fairly concerned	1,677.0	41.6
Not very concerned	868.0	21.5
Not at all concerned	188.0	4.7
Don't know	490.0	12.2
Total	4,029.0	100.0

Table A3: Climate change concern and area - Variables statistics

How concerned, if at all, are you about climate change, sometimes referred to as 'global warming'?		
Climate concern	Frequency	Per cent
Very concerned	1,372.00	34.05
Fairly concerned	1,818.00	45.12
Not very concerned	572.00	14.20
Not at all concerned	155.00	3.85
Don't know	112.00	2.78
Total	4,029.00	100.00
Area	Frequency	Per cent
Urban	2,937.00	82.55
Rural	621.00	17.45
Total	3,558.00	100.00

Table A4: Energy type concerns - Variables statistics

You said that you are very/fairly concerned about the UK becoming too dependent on energy from other countries. Were you thinking about a specific energy type? Oil		
Item	Frequency	Per cent
No	1,710.0	59.27
Yes	1,175.0	40.73
Total	2,885.0	100.00
You said that you are very/fairly concerned about the UK becoming too dependent on energy from other countries. Were you thinking about a specific energy type? Gas		
Item	Number	Per cent
No	1,664.0	57.7
Yes	1,221.0	42.3
Total	2,885.0	100.0
You said that you are very/fairly concerned about the UK becoming too dependent on energy from other countries. Were you thinking about a specific energy type? Electricity		
Item	Number	Per cent
No	2,148.0	74.5
Yes	737.0	25.5
Total	2,885.0	100.0

A.1. Cronbach calculations

The table below (A5) presents the results of the inter-item correlations for the components of the energy vulnerability variable. The average inter-item correlation is 0.5737, and the Cronbach's alpha coefficient is 0.8433. We have also compared this finding with Guttman's λ_4 and calculated the lower bound for this reliability metric. Guttman's λ_4 is 0.863, which is very close to Cronbach's alpha. Additionally, other Guttman λ metrics (λ_2, λ_3, λ_5, λ_6) all return coefficients above 0.80.

Table A5: Cronbach's alpha - Energy security variables

Item	Observations	Sign	Item-test correlation	Item-rest correlation	Average interitem correlation	alpha
Item 1	4029	+	0.8197	0.6697	0.5793	0.8051
Item 2	4029	+	0.8091	0.6525	0.5909	0.8125
Item 3	4029	+	0.8315	0.6892	0.5663	0.7966
Item 4	4029	+	0.8388	0.7014	0.5582	0.7913
Test scale					0.5737	0.8433

A.2. Ordered logit models

Tables A6–A8 present the full results of the ordered logit models discussed in the main text. At the bottom of these tables, we report the McKelvey and Zavoina (1975) R-square, R^2_{MZ}, a measure of fit for models with ordinal dependent variables like the one employed here. This measure refers to the variation of the latent continuous variable y_i^* , which is analogous to the R^2 for the OLS model and thus, a direct comparison between these measures reveals similarities between ordered logit and OLS. This is a common approach employed in empirical analysis (Lacy, 2006). In our case, these two measures are always very close for all energy sources, for example, R^2_{MZ} assumes the values 0.261, 0.193, 0.123 while R^2 assumes 0.204, 0.169, 0.132 for renewables, nuclear and shale gas respectively, confirming the similarity between OLS and ordered logit models.

Table A6: Renewables preferences-Full results

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Energy saving thought					

Continued on next page

Table A6 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
A fair amount	0.290**	0.360***	0.369***	0.323***	0.356***
	(0.113)	(0.103)	(0.103)	(0.106)	(0.0937)
Not very much	0.970***	1.080***	1.099***	1.024***	1.057***
	(0.0818)	(0.0725)	(0.0855)	(0.0766)	(0.0885)
None at all	1.412***	1.529***	1.564***	1.502***	1.466***
	(0.208)	(0.219)	(0.226)	(0.235)	(0.220)
Don't know	0.938**	1.198***	1.238***	1.093***	1.024***
	(0.380)	(0.371)	(0.404)	(0.358)	(0.387)
Energy affordability					
Fairly concerned		-0.186			-0.180
		(0.147)			(0.146)
Not very concerned		0.0402			0.00675
		(0.156)			(0.166)
Not at all concerned		0.134			0.0256
		(0.300)			(0.344)
Don't know		0.356			0.0920
		(0.235)			(0.234)
Climate concern					
Fairly concerned	0.830***	0.944***	0.941***	0.892***	0.886***
	(0.117)	(0.110)	(0.113)	(0.115)	(0.107)
Not very concerned	1.776***	1.936***	1.983***	1.883***	1.846***
	(0.133)	(0.134)	(0.113)	(0.117)	(0.136)
Not at all concerned	1.956***	2.143***	2.172***	2.123***	1.970***
	(0.221)	(0.205)	(0.214)	(0.215)	(0.216)
Don't know	2.241***	2.530***	2.647***	2.372***	2.281***
	(0.265)	(0.295)	(0.279)	(0.267)	(0.320)
UK government trust					
Not have much trust not trust at all	0.0818	0.0594	0.0613	0.0657	0.0870
	(0.139)	(0.130)	(0.134)	(0.131)	(0.133)
Not applicable/Don't know Depends	0.636***	0.752***	0.819***	0.711***	0.638***
	(0.168)	(0.154)	(0.150)	(0.164)	(0.149)
Female	0.268**	0.327***	0.325***	0.283**	0.263**
	(0.115)	(0.116)	(0.115)	(0.117)	(0.118)
Age: 25-34	-0.0217	-0.0114	-0.00863	0.00481	-0.0389
	(0.193)	(0.188)	(0.182)	(0.191)	(0.191)
Age: 35-44	-0.132	-0.107	-0.0793	-0.0958	-0.139
	(0.200)	(0.206)	(0.198)	(0.198)	(0.208)
Age: 45-54	-0.169	-0.128	-0.110	-0.114	-0.166
	(0.176)	(0.184)	(0.176)	(0.181)	(0.169)

Continued on next page

Table A6 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Age: 55-64	-0.0401	0.0112	0.0292	0.0320	-0.0245
	(0.159)	(0.165)	(0.156)	(0.162)	(0.165)
Age: 65+	-0.0268	0.0263	0.0443	0.0568	-0.0180
	(0.151)	(0.149)	(0.150)	(0.147)	(0.157)
Work: part-time	-0.0464	-0.0329	-0.0328	-0.0375	-0.0353
	(0.141)	(0.146)	(0.143)	(0.143)	(0.139)
Not work look	0.0713	0.0916	0.112	0.0672	0.0637
	(0.202)	(0.190)	(0.189)	(0.196)	(0.205)
Not work not look	-0.175*	-0.170*	-0.162*	-0.188**	-0.171*
	(0.0973)	(0.0993)	(0.0961)	(0.0954)	(0.0916)
Household size: 2	-0.0405	-0.0636	-0.0637	-0.0511	-0.0567
	(0.0826)	(0.0844)	(0.0851)	(0.0824)	(0.0943)
Household size: 3	0.0320	0.0376	0.0309	0.0267	0.0133
	(0.196)	(0.192)	(0.191)	(0.185)	(0.209)
Household size: 4	0.220	0.188	0.190	0.214	0.213
	(0.183)	(0.180)	(0.180)	(0.176)	(0.178)
Household size: 5+	0.238**	0.181	0.178	0.199*	0.221*
	(0.120)	(0.121)	(0.114)	(0.116)	(0.122)
Minority Ethnic	0.0558	0.0276	0.0237	0.0445	0.0159
	(0.154)	(0.155)	(0.150)	(0.150)	(0.161)
Area: rural	-0.328**	-0.343***	-0.357***	-0.331**	-0.333**
	(0.130)	(0.131)	(0.126)	(0.129)	(0.133)
Household income					
16,000 - 24,999	-0.455***	-0.454***	-0.455***	-0.477***	-0.450***
	(0.152)	(0.148)	(0.149)	(0.163)	(0.151)
25,000 - 34,999	-0.346***	-0.359***	-0.358***	-0.358***	-0.318***
	(0.127)	(0.137)	(0.128)	(0.133)	(0.122)
35,000 - 49,999	-0.454***	-0.419***	-0.433***	-0.464***	-0.436***
	(0.117)	(0.122)	(0.120)	(0.116)	(0.126)
50,000 or more	-0.403*	-0.393*	-0.395*	-0.401*	-0.358
	(0.225)	(0.223)	(0.213)	(0.225)	(0.229)
Don't know	-0.0227	0.0114	0.0203	0.0354	0.000783
	(0.203)	(0.206)	(0.217)	(0.198)	(0.225)
Refused	0.0758	0.143	0.134	0.120	0.102
	(0.242)	(0.251)	(0.262)	(0.245)	(0.255)
Vulnerability	0.303***				0.365***
	(0.0297)				(0.0332)
Reliability					
Fairly concerned			-0.167		-0.241
			(0.166)		(0.160)
Not very concerned			-0.290*		-0.494***

Continued on next page

Table A6 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
			(0.159)		(0.159)
Not at all concerned			-0.0810		-0.403
			(0.235)		(0.249)
Don't know			-0.270		-0.741***
			(0.205)		(0.250)
Import dependency					
Fairly concerned				-0.0304	
				(0.0907)	
Not very concerned				0.320**	
				(0.136)	
Not at all concerned				-0.0547	
				(0.183)	
Don't know				0.616***	
				(0.154)	
Threshold points					
/cut1	3.291***	2.721***	2.650***	2.801***	3.136***
	(0.290)	(0.302)	(0.330)	(0.287)	(0.345)
/cut2	3.506***	2.934***	2.863***	3.015***	3.352***
	(0.272)	(0.282)	(0.313)	(0.268)	(0.323)
Observations	3,445	3,445	3,445	3,445	3,445
Pseudo R^2	0.1480	0.1410	0.1404	0.1443	0.1528
R^2_{MZ}	0.261	0.250	0.249	0.261	0.268
ln L	-1683.48	-1697.23	-1698.50	-1690.77	-1673.96

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

R^2_{MZ} is the McKelvey & Zavoina R^2 for ordinal dependent variables

Table A7: Nuclear energy preferences - Full results

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Energy saving thought					
A fair amount	0.449***	0.496***	0.461***	0.486***	0.443***
	(0.0939)	(0.0947)	(0.0988)	(0.0947)	(0.0938)
Not very much	0.709***	0.809***	0.759***	0.772***	0.712***
	(0.0754)	(0.0802)	(0.0770)	(0.0803)	(0.0792)
None at all	1.014***	1.170***	1.141***	1.110***	1.058***
	(0.291)	(0.267)	(0.267)	(0.273)	(0.275)
Don't know	0.490	0.756*	0.666	0.644	0.513
	(0.450)	(0.443)	(0.455)	(0.448)	(0.444)

Continued on next page

Table A7 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Energy affordability					
Fairly concerned		0.0705			-0.124
		(0.0897)			(0.102)
Not very concerned		0.0677			-0.226*
		(0.103)			(0.119)
Not at all concerned		-0.0113			-0.286
		(0.138)			(0.192)
Don't know		0.247			-0.695***
		(0.182)			(0.190)
Climate concern					
Fairly concerned	0.0806	0.170***	0.150**	0.149**	0.0836
	(0.0655)	(0.0660)	(0.0715)	(0.0727)	(0.0663)
Not very concerned	-0.257**	-0.0484	-0.107	-0.122	-0.254**
	(0.106)	(0.116)	(0.117)	(0.108)	(0.107)
Not at all concerned	-0.753***	-0.483***	-0.509***	-0.573***	-0.695***
	(0.155)	(0.161)	(0.159)	(0.164)	(0.149)
Don't know	0.876*	1.254***	1.111***	0.965**	0.846**
	(0.449)	(0.399)	(0.404)	(0.419)	(0.426)
UK government trust					
Not have much trust not trust at all	0.200**	0.175**	0.164*	0.185**	0.177**
	(0.0821)	(0.0836)	(0.0856)	(0.0841)	(0.0826)
Not applicable/Don't know Depends	0.565***	0.752***	0.683***	0.633***	0.551***
	(0.119)	(0.123)	(0.127)	(0.124)	(0.129)
Female	0.932***	0.970***	0.967***	0.925***	0.926***
	(0.106)	(0.107)	(0.104)	(0.108)	(0.109)
Age:25-34	0.473***	0.483***	0.489***	0.485***	0.464***
	(0.168)	(0.156)	(0.151)	(0.161)	(0.168)
Age: 35-44	0.511***	0.554***	0.546***	0.548***	0.494***
	(0.132)	(0.126)	(0.126)	(0.130)	(0.133)
Age: 45-54	0.830***	0.859***	0.852***	0.881***	0.805***
	(0.139)	(0.143)	(0.137)	(0.131)	(0.145)
Age: 55-64	0.498***	0.546***	0.516***	0.573***	0.462***
	(0.148)	(0.150)	(0.147)	(0.144)	(0.148)
Age: 65+	0.0315	0.0901	0.0647	0.119	0.00268
	(0.117)	(0.118)	(0.116)	(0.116)	(0.122)
Work: Part time	0.208*	0.216*	0.209*	0.217*	0.207*
	(0.115)	(0.116)	(0.119)	(0.118)	(0.117)
Work: Not work look	0.162	0.202	0.186	0.159	0.166
	(0.123)	(0.138)	(0.133)	(0.126)	(0.123)

Continued on next page

Table A7 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Work: Not work not look	0.213***	0.226***	0.215***	0.223***	0.214***
	(0.0760)	(0.0849)	(0.0831)	(0.0832)	(0.0738)
Household size: 2	-0.0177	-0.0428	-0.0189	-0.0283	-0.00563
	(0.121)	(0.126)	(0.130)	(0.124)	(0.127)
Household size: 3	0.00536	-0.00405	0.0149	-0.00916	0.0137
	(0.128)	(0.132)	(0.139)	(0.135)	(0.136)
Household size: 4	-0.173	-0.226	-0.202	-0.186	-0.166
	(0.215)	(0.211)	(0.219)	(0.216)	(0.219)
Household size: 5+	-0.0900	-0.154	-0.133	-0.124	-0.0839
	(0.135)	(0.143)	(0.137)	(0.131)	(0.131)
Minority Ethnic	-0.0941	-0.121	-0.0945	-0.111	-0.0772
	(0.130)	(0.122)	(0.119)	(0.127)	(0.124)
Area: rural	-0.0278	-0.0436	-0.0375	-0.0309	-0.0272
	(0.0772)	(0.0681)	(0.0691)	(0.0709)	(0.0773)
Household income					
16,000 - 24,999	-0.109	-0.0997	-0.124	-0.117	-0.128
	(0.126)	(0.133)	(0.134)	(0.136)	(0.130)
25,000 - 34,999	-0.312**	-0.315**	-0.341***	-0.308**	-0.322***
	(0.127)	(0.131)	(0.126)	(0.127)	(0.125)
35,000 - 49,999	-0.349***	-0.340**	-0.364***	-0.355***	-0.360***
	(0.124)	(0.134)	(0.130)	(0.135)	(0.124)
50,000 or more	-0.387**	-0.376**	-0.412**	-0.368**	-0.393**
	(0.159)	(0.167)	(0.163)	(0.162)	(0.160)
Don't know	0.297	0.345*	0.293	0.349*	0.257
	(0.196)	(0.186)	(0.188)	(0.204)	(0.196)
Refused	0.00540	0.0508	0.00583	0.0383	-0.0305
	(0.232)	(0.218)	(0.207)	(0.225)	(0.227)
Vulnerability	0.384***				0.389***
	(0.0248)				(0.0226)
Reliability					
Fairly concerned		0.113		0.0209	
			(0.136)		(0.142)
Not very concerned			0.369***		0.199
			(0.129)		(0.139)
Not at all concerned			0.190		-0.0617
			(0.163)		(0.174)
Don't know			0.864***		0.607***
			(0.107)		(0.141)
Import dependency					
Fairly concerned				0.122	
				(0.0957)	

Continued on next page

Table A7 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Not very concerned				0.347***	
				(0.120)	
Not at all concerned				0.352***	
				(0.125)	
Don't know				1.009***	
				(0.164)	
Threshold points					
/cut1	1.632***	0.995***	1.087***	1.085***	1.598***
	(0.207)	(0.222)	(0.226)	(0.221)	(0.223)
/cut2	2.457***	1.803***	1.901***	1.902***	2.427***
	(0.224)	(0.238)	(0.240)	(0.238)	(0.238)
Observations	3,445	3,445	3,445	3,445	3,445
Pseudo R^2	0.0864	0.0743	0.0786	0.0813	0.0891
R^2_{MZ}	0.193	0.164	0.175	0.181	0.199
ln L	-3255.27	-3298.49	-3283.38	-3273.75	-3245.69

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

R^2_{MZ} is the McKelvey & Zavoina R^2 for ordinal dependent variables

Table A8: Shale gas extraction preferences-Full results

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Energy saving thought					
A fair amount 2	0.413***	0.454***	0.428***	0.447***	0.389***
	(0.0688)	(0.0650)	(0.0635)	(0.0597)	(0.0665)
Not very much	0.539***	0.627***	0.603***	0.595***	0.524***
	(0.0880)	(0.0883)	(0.0909)	(0.0834)	(0.0892)
None at all	0.979***	1.112***	1.119***	1.058***	1.012***
	(0.255)	(0.250)	(0.232)	(0.233)	(0.247)
Don't know	0.494	0.797*	0.789*	0.685*	0.505
	(0.401)	(0.444)	(0.425)	(0.383)	(0.398)
Energy affordability					
Fairly concerned		0.190***			-0.0141
		(0.0507)			(0.0555)
Not very concerned		0.216			-0.0828
		(0.182)			(0.196)
Not at all concerned		0.131			-0.0862
		(0.194)			(0.195)

Continued on next page

Table A8 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Don't know		0.406*			-0.378*
		(0.214)			(0.219)
Climate concern					
Fairly concerned	0.173***	0.252***	0.236***	0.227***	0.155***
	(0.0503)	(0.0475)	(0.0423)	(0.0542)	(0.0468)
Not very concerned	0.0250	0.215	0.184	0.138	0.0175
	(0.152)	(0.148)	(0.153)	(0.156)	(0.153)
Not at all concerned	-0.311	-0.0480	-0.0224	-0.135	-0.252
	(0.239)	(0.253)	(0.247)	(0.246)	(0.237)
Don't know	0.504**	0.937***	0.874***	0.615***	0.530**
	(0.240)	(0.262)	(0.260)	(0.232)	(0.251)
UK government trust					
Not have much trust not trust at all	0.0292	0.0150	-0.00235	0.0172	0.0191
	(0.0888)	(0.0908)	(0.0911)	(0.0908)	(0.0904)
Not applicable/Don't know Depends	0.433***	0.631***	0.607***	0.509***	0.444***
	(0.142)	(0.144)	(0.149)	(0.141)	(0.147)
Female	0.516***	0.565***	0.555***	0.512***	0.514***
	(0.0734)	(0.0750)	(0.0728)	(0.0742)	(0.0756)
Age: 25-34	0.0379	0.0545	0.0687	0.0541	0.0497
	(0.191)	(0.179)	(0.177)	(0.184)	(0.187)
Age: 35-44	0.316	0.361	0.344	0.357	0.317
	(0.240)	(0.226)	(0.221)	(0.234)	(0.234)
Age: 45-54	0.442*	0.481**	0.452**	0.507**	0.428*
	(0.234)	(0.234)	(0.225)	(0.232)	(0.227)
Age: 55-64	0.416	0.474*	0.444*	0.515**	0.403
	(0.261)	(0.258)	(0.253)	(0.257)	(0.257)
Age: 65+	0.244	0.307	0.286	0.357	0.228
	(0.232)	(0.226)	(0.223)	(0.225)	(0.232)
Work: Part-time	0.0451	0.0430	0.0348	0.0455	0.0364
	(0.101)	(0.104)	(0.102)	(0.102)	(0.0989)
Not work look	0.151	0.195	0.188	0.144	0.152
	(0.112)	(0.122)	(0.120)	(0.116)	(0.111)
Not work not look	0.0327	0.0379	0.0298	0.0363	0.0299
	(0.0832)	(0.0785)	(0.0811)	(0.0842)	(0.0806)
Household size: 2	0.0370	0.0222	0.0414	0.0300	0.0539
	(0.0973)	(0.100)	(0.0986)	(0.0986)	(0.0960)
Household size: 3	0.00247	-0.00212	0.0181	-0.0130	0.0152
	(0.110)	(0.106)	(0.102)	(0.108)	(0.106)
Household size: 4	-0.0985	-0.145	-0.122	-0.105	-0.0918

Continued on next page

Table A8 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
	(0.0980)	(0.0932)	(0.102)	(0.0999)	(0.0977)
Household size: 5	-0.0159	-0.0757	-0.0609	-0.0432	-0.00795
	(0.180)	(0.182)	(0.190)	(0.174)	(0.182)
Minority ethnic	0.0791	0.0606	0.0888	0.0651	0.0972
	(0.102)	(0.106)	(0.0983)	(0.0996)	(0.0991)
Area: rural	0.00478	-0.0172	-0.0150	0.00340	-0.000376
	(0.0752)	(0.0782)	(0.0766)	(0.0770)	(0.0728)
Household income					
16,000 - 24,999	-0.132	-0.118	-0.139	-0.150	-0.147
	(0.0972)	(0.102)	(0.102)	(0.102)	(0.0974)
25,000 - 34,999	-0.100	-0.113	-0.129	-0.105	-0.113
	(0.0935)	(0.0947)	(0.0980)	(0.0976)	(0.0905)
35,000 - 49,999	-0.237**	-0.234**	-0.240**	-0.249**	-0.245***
	(0.0968)	(0.0979)	(0.0969)	(0.103)	(0.0922)
50,000 or more	-0.202*	-0.203*	-0.209*	-0.186	-0.211*
	(0.121)	(0.119)	(0.122)	(0.128)	(0.115)
Don't know	0.321	0.369	0.346	0.362	0.309
	(0.236)	(0.232)	(0.242)	(0.247)	(0.243)
Refused	-0.0806	-0.0383	-0.0472	-0.0541	-0.0897
	(0.134)	(0.126)	(0.121)	(0.129)	(0.132)
Vulnerability	0.410***				0.410***
	(0.0302)				(0.0272)
Reliability					
Fairly concerned			0.289***		0.152
			(0.107)		(0.0965)
Not very concerned			0.477***		0.230***
			(0.0901)		(0.0680)
Not at all concerned			0.174		-0.138
			(0.163)		(0.148)
Don't know			0.663***		0.274**
			(0.126)		(0.111)
Import dependency					
Fairly concerned				0.207***	
				(0.0614)	
Not very concerned				0.499***	
				(0.0726)	
Not at all concerned				0.395*	
				(0.234)	
Don't know				1.125***	
				(0.126)	
Threshold points					

Continued on next page

Table A8 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
/cut1	0.622***	0.0236	0.151	0.0890	0.703***
	(0.204)	(0.205)	(0.205)	(0.197)	(0.204)
/cut2	2.396***	1.763***	1.898***	1.850***	2.483***
	(0.215)	(0.217)	(0.214)	(0.210)	(0.211)
Observations	3,445	3,445	3,445	3,445	3,445
Pseudo R^2	0.0535	0.0401	0.0427	0.0487	0.0551
R^2_{MZ}	0.123	0.092	0.098	0.113	0.127
ln L	-3515.07	-3564.97	-3555.05	-3532.93	-3508.99

Robust standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

R^2_{MZ} is the McKelvey & Zavoina R^2 for ordinal dependent variables

A.3. OLS estimators

In Tables A9, A10, and A11 below, we present the results for the corresponding OLS models for each energy source. OLS is commonly used in similar contexts due to the ease of interpreting OLS coefficients, although it does not offer the same technical precision as the ordered logit model. As shown, the OLS coefficients are consistently positive (notice the only exception are the negative coefficients for reliability for renewable energy preferences, Table A9 , as in the ordered logit model), indicating a decline in support for each energy source as security concerns ease, thereby confirming the results of the ordered logit model in all cases.

Table A9: Renewable energy preferences - OLS models

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Energy saving thought					
A fair amount	0.130**	0.152***	0.161***	0.142***	0.147***
	(0.0432)	(0.0416)	(0.0415)	(0.0426)	(0.0388)
Not very much	0.320***	0.357***	0.374***	0.342***	0.342***
	(0.0305)	(0.0305)	(0.0289)	(0.0304)	(0.0326)
None at all	0.614***	0.659***	0.681***	0.650***	0.624***
	(0.179)	(0.178)	(0.186)	(0.182)	(0.172)
Don't know	0.654**	0.743**	0.773***	0.707***	0.669**
	(0.233)	(0.241)	(0.246)	(0.227)	(0.238)
Energy affordability					
Fairly concerned		-0.0175			-0.0197
		(0.0540)			(0.0510)
Not very concerned		0.0324			0.0284
		(0.0619)			(0.0602)

Continued on next page

Table A9 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Not at all concerned		0.131			0.0904
		(0.147)			(0.152)
Don't know		0.149*			-0.00298
		(0.0710)			(0.0777)
<u>Climate concern</u>					
Fairly concerned	0.367***	0.405***	0.413***	0.390***	0.384***
	(0.0288)	(0.0351)	(0.0320)	(0.0323)	(0.0328)
Not very concerned	0.763***	0.824***	0.851***	0.812***	0.784***
	(0.0469)	(0.0493)	(0.0470)	(0.0500)	(0.0461)
Not at all concerned	0.906***	0.974***	0.999***	0.985***	0.906***
	(0.136)	(0.148)	(0.140)	(0.148)	(0.140)
Don't know	1.134***	1.257***	1.291***	1.150***	1.133***
	(0.136)	(0.154)	(0.154)	(0.136)	(0.148)
<u>UK government trust</u>					
Not have much trust not trust at all	0.00338	-0.00347	-0.00459	-2.50e-05	0.00475
	(0.0375)	(0.0359)	(0.0359)	(0.0363)	(0.0362)
Not applicable Don't know Depends	0.294***	0.350***	0.360***	0.310***	0.285***
	(0.0476)	(0.0513)	(0.0525)	(0.0493)	(0.0509)
Female	0.112**	0.132**	0.132**	0.112**	0.112**
	(0.0436)	(0.0457)	(0.0431)	(0.0424)	(0.0433)
Age: 25-34	-0.0449	-0.0440	-0.0509	-0.0443	-0.0604
	(0.0858)	(0.0823)	(0.0830)	(0.0861)	(0.0825)
Age: 35-44	-0.101	-0.0929	-0.0934	-0.0943	-0.107
	(0.0710)	(0.0741)	(0.0754)	(0.0705)	(0.0725)
Age: 45-54	-0.165*	-0.152*	-0.154*	-0.156*	-0.165*
	(0.0793)	(0.0824)	(0.0828)	(0.0828)	(0.0763)
Age: 55-64	-0.119	-0.100	-0.101	-0.100	-0.116
	(0.0713)	(0.0739)	(0.0734)	(0.0714)	(0.0701)
Age: 65+	-0.0813	-0.0645	-0.0644	-0.0613	-0.0871
	(0.0722)	(0.0718)	(0.0747)	(0.0718)	(0.0727)
Work: Part time	-0.0132	-0.00742	-0.00652	-0.00993	-0.00697
	(0.0478)	(0.0499)	(0.0504)	(0.0501)	(0.0468)
Work: Not work look	0.0538	0.0633	0.0685	0.0510	0.0545
	(0.0796)	(0.0802)	(0.0776)	(0.0795)	(0.0807)
Work: Not work Not look	-0.0485	-0.0437	-0.0394	-0.0451	-0.0425
	(0.0412)	(0.0409)	(0.0398)	(0.0403)	(0.0388)
Household size: 2	0.000662	-0.00805	-0.0102	0.000846	-0.00677
	(0.0311)	(0.0311)	(0.0310)	(0.0311)	(0.0305)

Continued on next page

Table A9 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Household size: 3	0.0302	0.0250	0.0227	0.0281	0.0205
	(0.0500)	(0.0505)	(0.0494)	(0.0502)	(0.0513)
Household size: 4	0.111	0.0939	0.0914	0.110	0.102
	(0.0855)	(0.0861)	(0.0850)	(0.0845)	(0.0828)
Household size: 5+	0.124*	0.103	0.102	0.115	0.119*
	(0.0662)	(0.0660)	(0.0657)	(0.0654)	(0.0657)
Minority Ethnic	-0.0134	-0.0244	-0.0303	-0.0187	-0.0296
	(0.0541)	(0.0556)	(0.0554)	(0.0532)	(0.0566)
Area: rural	-0.102*	-0.107**	-0.111**	-0.105*	-0.101*
	(0.0487)	(0.0479)	(0.0479)	(0.0485)	(0.0482)
Household income, £					
16,000 - 24,999	-0.122**	-0.119**	-0.115*	-0.125**	-0.113*
	(0.0525)	(0.0536)	(0.0552)	(0.0548)	(0.0546)
25,000 - 34,999	-0.190***	-0.193***	-0.187***	-0.192***	-0.176***
	(0.0559)	(0.0577)	(0.0570)	(0.0557)	(0.0548)
35,000 - 49,999	-0.159***	-0.153***	-0.153**	-0.163***	-0.150**
	(0.0504)	(0.0491)	(0.0511)	(0.0504)	(0.0514)
50,000 or more	-0.201**	-0.196**	-0.190**	-0.197**	-0.186**
	(0.0721)	(0.0734)	(0.0729)	(0.0746)	(0.0723)
Don't know	0.0748	0.0905	0.0905	0.0873	0.0808
	(0.0934)	(0.0930)	(0.0967)	(0.0913)	(0.0999)
Refused	-0.0570	-0.0382	-0.0412	-0.0500	-0.0521
	(0.0824)	(0.0853)	(0.0905)	(0.0825)	(0.0854)
Energy vulnerability	0.120***				0.145***
	(0.0198)				(0.0180)
Energy reliability					
Fairly concerned			-0.0489		-0.0993*
			(0.0612)		(0.0511)
Not very concerned			-0.116**		-0.213***
			(0.0508)		(0.0398)
Not at all concerned			-0.0331		-0.178
			(0.114)		(0.106)
Don't know			-0.0210		-0.201**
			(0.0648)		(0.0768)
Imports dependency					
Fairly concerned				0.0423	
				(0.0284)	
Not very concerned				0.0758	
				(0.0526)	
Not at all concerned				0.0189	
				(0.0865)	

Continued on next page

Table A9 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Don't know				0.351***	
				(0.0722)	
Constant	1.239***	1.442***	1.486***	1.414***	1.293***
	(0.138)	(0.122)	(0.133)	(0.114)	(0.160)
Kleibergen-Paap rk Wald F test (test-statistic)	13.198	13.352	12.215	13.125	13.899
Sargan test (p-value)	0.8503	0.947	0.9041	0.973	0.8245
Hausman-Wu test (p-value)	0.777	0.6138	0.6011	0.6913	0.7262
Oster's δ for omitted variable bias	2.945	3.31	3.502	3.056	3.727
Observations	3,445	3,445	3,445	3,445	3,445
R^2	0.204	0.195	0.196	0.201	0.209

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A10: Nuclear energy preferences - OLS models

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Energy saving thought					
A fair amount	0.137***	0.195***	0.158***	0.176***	0.142***
	(0.0425)	(0.0429)	(0.0433)	(0.0439)	(0.0435)
Not very much	0.200***	0.303***	0.251***	0.258***	0.208***
	(0.0413)	(0.0408)	(0.0356)	(0.0417)	(0.0377)
None at all	0.250	0.387**	0.337*	0.321*	0.259
	(0.148)	(0.145)	(0.155)	(0.152)	(0.164)
Don't know	0.0778	0.321	0.261	0.181	0.107
	(0.208)	(0.209)	(0.228)	(0.201)	(0.207)
Energy affordability					
Fairly concerned		-0.0160			-0.170**
		(0.0575)			(0.0594)
Not very concerned		0.0787			-0.155**
		(0.0796)			(0.0682)
Not at all concerned		0.0282			-0.254*
		(0.142)			(0.116)
Don't know		0.413**			-0.420**
		(0.156)			(0.171)
Climate concern					
Fairly concerned	-0.156**	-0.0593	-0.0837	-0.0886	-0.137**
	(0.0590)	(0.0604)	(0.0615)	(0.0667)	(0.0579)

Continued on next page

Table A10 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Not very concerned	-0.520***	-0.346***	-0.391***	-0.402***	-0.509***
	(0.0472)	(0.0583)	(0.0539)	(0.0564)	(0.0471)
Not at all concerned	-0.778***	-0.562***	-0.600***	-0.629***	-0.746***
	(0.0642)	(0.0936)	(0.0793)	(0.0868)	(0.0738)
Don't know	0.195	0.530***	0.404**	0.204	0.124
	(0.148)	(0.131)	(0.158)	(0.154)	(0.141)
UK government trust					
Not have much trust					
not trust at all	0.348***	0.329***	0.324***	0.337***	0.333***
	(0.0710)	(0.0718)	(0.0726)	(0.0730)	(0.0700)
Not applicable					
Don't know					
It depends	0.340***	0.495***	0.431***	0.370**	0.293**
	(0.0906)	(0.101)	(0.0990)	(0.0943)	(0.0954)
Female	0.638***	0.690***	0.678***	0.633***	0.627***
	(0.0573)	(0.0566)	(0.0551)	(0.0582)	(0.0579)
Age: 25-34	0.0793	0.0837	0.0931	0.0843	0.0704
	(0.0732)	(0.0720)	(0.0701)	(0.0714)	(0.0718)
Age: 35-44	0.281***	0.304***	0.301***	0.302***	0.258***
	(0.0707)	(0.0680)	(0.0688)	(0.0661)	(0.0673)
Age: 45-54	0.330***	0.362***	0.355***	0.365***	0.308***
	(0.0541)	(0.0624)	(0.0580)	(0.0526)	(0.0536)
Age: 55-64	0.0923	0.136*	0.110	0.150**	0.0607
	(0.0685)	(0.0721)	(0.0726)	(0.0619)	(0.0693)
Age: 65+	-0.175*	-0.128	-0.144	-0.112	-0.191**
	(0.0832)	(0.0785)	(0.0811)	(0.0796)	(0.0849)
Work: Part time	0.116	0.126	0.118	0.125	0.116
	(0.0998)	(0.0997)	(0.101)	(0.0994)	(0.0967)
Work: Not work look	0.146	0.171	0.165	0.136	0.142
	(0.0913)	(0.111)	(0.100)	(0.0941)	(0.0918)
Work: Not work Not look	0.158**	0.170**	0.161**	0.170**	0.155**
	(0.0586)	(0.0601)	(0.0567)	(0.0647)	(0.0582)
Household size: 2	-0.0539	-0.0743	-0.0596	-0.0573	-0.0534
	(0.0635)	(0.0644)	(0.0705)	(0.0619)	(0.0651)
Household size: 3	-0.0597	-0.0688	-0.0599	-0.0697	-0.0582
	(0.104)	(0.100)	(0.107)	(0.106)	(0.104)
Household size: 4	-0.223*	-0.266**	-0.246**	-0.224**	-0.217*
	(0.102)	(0.103)	(0.106)	(0.102)	(0.103)
Household size: 5+	-0.0936	-0.148	-0.131	-0.114	-0.0927
	(0.108)	(0.113)	(0.111)	(0.104)	(0.108)
Minority Ethnic	-0.00775	-0.0334	-0.00751	-0.0212	0.000472

Continued on next page

Table A10 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
	(0.0642)	(0.0634)	(0.0636)	(0.0631)	(0.0636)
Area: rural	-0.0165	-0.0339	-0.0339	-0.0205	-0.0156
	(0.0399)	(0.0361)	(0.0324)	(0.0364)	(0.0386)
Household income, £					
16,000 - 24,999	0.0737	0.0812	0.0642	0.0670	0.0643
	(0.0676)	(0.0663)	(0.0680)	(0.0712)	(0.0682)
25,000 - 34,999	-0.0774	-0.0855	-0.105*	-0.0761	-0.0808
	(0.0466)	(0.0478)	(0.0478)	(0.0489)	(0.0459)
35,000 - 49,999	-0.107*	-0.0982*	-0.117*	-0.118**	-0.107*
	(0.0530)	(0.0538)	(0.0590)	(0.0472)	(0.0583)
50,000 or more	-0.107	-0.0985	-0.128	-0.0921	-0.104
	(0.0809)	(0.0832)	(0.0841)	(0.0820)	(0.0831)
Don't know	0.324*	0.358**	0.312*	0.362**	0.291
	(0.163)	(0.155)	(0.161)	(0.163)	(0.163)
Refused	0.118	0.164	0.114	0.135	0.0940
	(0.147)	(0.134)	(0.133)	(0.147)	(0.145)
Energy vulnerability	0.323***				0.311***
	(0.0252)				(0.0249)
Energy reliability					
Fairly concerned			0.0680		0.0173
			(0.0708)		(0.0718)
Not very concerned			0.254***		0.134*
			(0.0753)		(0.0664)
Not at all concerned			0.276**		0.0873
			(0.0980)		(0.0780)
Don't know			0.851***		0.610***
			(0.0699)		(0.0781)
Imports dependency					
Fairly concerned				0.0674	
				(0.0450)	
Not very concerned				0.225**	
				(0.0860)	
Not at all concerned				0.409**	
				(0.156)	
Don't know				1.025***	
				(0.106)	
Constant	1.779***	2.321***	2.242***	2.245***	1.853***
	(0.114)	(0.126)	(0.130)	(0.109)	(0.128)
Kleibergen-Paap rk Wald F test (test statistic)	13.198	13.352	12.215	13.125	13.899
Sargan test (p-value)	0.7705	0.9747	0.5902	0.9840	0.8128

Continued on next page

Table A10 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Hausman-Wu test (p-value)	0.7391	0.4762	0.586	0.5602	0.765
Oster's δ for omitted variable bias	1.95	3.451	3.211	2.534	2.528
Observations	3,445	3,445	3,445	3,445	3,445
R^2	0.169	0.135	0.149	0.164	0.178

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A11: Shale gas preferences - OLS models

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Energy saving thought					
A fair amount	0.230***	0.257***	0.230***	0.261***	0.211***
	(0.0676)	(0.0668)	(0.0674)	(0.0694)	(0.0675)
Not very much	0.328***	0.384***	0.342***	0.379***	0.303***
	(0.0737)	(0.0743)	(0.0704)	(0.0750)	(0.0707)
None at all	0.562***	0.646***	0.600***	0.640***	0.540***
	(0.153)	(0.165)	(0.154)	(0.147)	(0.144)
Don't know	0.275	0.423	0.385	0.386	0.263
	(0.258)	(0.258)	(0.254)	(0.247)	(0.257)
Energy affordability					
Fairly concerned		0.113**			-0.0345
		(0.0449)			(0.0549)
Not very concerned		0.170**			-0.0513
		(0.0670)			(0.0671)
Not at all concerned		0.166			-0.125
		(0.268)			(0.267)
Don't know		0.444**			-0.217
		(0.192)			(0.203)
Climate concern					
Fairly concerned	-0.325***	-0.269***	-0.288***	-0.271**	-0.332***
	(0.0849)	(0.0794)	(0.0782)	(0.0878)	(0.0793)
Not very concerned	-0.711***	-0.597***	-0.643***	-0.611***	-0.728***
	(0.0692)	(0.0772)	(0.0767)	(0.0817)	(0.0722)
Not at all concerned	-0.740***	-0.596***	-0.631***	-0.591***	-0.738***
	(0.0999)	(0.108)	(0.0933)	(0.104)	(0.0973)
Don't know	-0.244	0.00352	-0.106	-0.199	-0.296
	(0.228)	(0.250)	(0.240)	(0.243)	(0.239)
UK government trust					

Continued on next page

Table A11 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Not have much trust					
not trust at all	0.318***	0.310***	0.301***	0.308***	0.311***
	(0.0611)	(0.0608)	(0.0609)	(0.0630)	(0.0597)
Not applicable					
Don't know					
It depends	0.179	0.297**	0.244**	0.217*	0.152
	(0.104)	(0.114)	(0.107)	(0.105)	(0.113)
Female	0.347***	0.391***	0.375***	0.348***	0.343***
	(0.0567)	(0.0598)	(0.0594)	(0.0558)	(0.0584)
Age: 25-34	0.0695	0.0816	0.0961	0.0734	0.0828
	(0.0775)	(0.0783)	(0.0755)	(0.0771)	(0.0758)
Age: 35-44	0.388***	0.421***	0.410***	0.403***	0.389***
	(0.0995)	(0.0990)	(0.0900)	(0.0950)	(0.0930)
Age: 45-54	0.590***	0.629***	0.613***	0.617***	0.588***
	(0.106)	(0.114)	(0.105)	(0.106)	(0.106)
Age: 55-64	0.553***	0.597***	0.569***	0.596***	0.540***
	(0.0938)	(0.0984)	(0.0908)	(0.0944)	(0.0891)
Age: 65+	0.334***	0.373***	0.366***	0.380***	0.334***
	(0.101)	(0.0969)	(0.0980)	(0.0971)	(0.104)
Work: Part time	0.0428	0.0476	0.0404	0.0511	0.0371
	(0.0680)	(0.0712)	(0.0702)	(0.0700)	(0.0704)
Work: Not work look	-0.0537	-0.0353	-0.0433	-0.0588	-0.0582
	(0.0847)	(0.0919)	(0.0917)	(0.0852)	(0.0840)
Work: Not work Not look	0.137*	0.144*	0.133*	0.142*	0.129*
	(0.0695)	(0.0733)	(0.0713)	(0.0710)	(0.0699)
Household size: 2	-0.0853	-0.0951	-0.0839	-0.0869	-0.0771
	(0.0606)	(0.0585)	(0.0636)	(0.0608)	(0.0639)
Household size: 3	-0.151	-0.156	-0.142	-0.157	-0.141
	(0.102)	(0.0989)	(0.102)	(0.102)	(0.105)
Household size: 4	-0.317***	-0.348***	-0.321***	-0.319***	-0.302***
	(0.0634)	(0.0630)	(0.0630)	(0.0622)	(0.0640)
Household size: 5+	-0.185***	-0.224***	-0.206***	-0.205***	-0.179***
	(0.0471)	(0.0471)	(0.0490)	(0.0459)	(0.0468)
Minority Ethnic	-0.0992*	-0.115*	-0.0862	-0.113**	-0.0803
	(0.0507)	(0.0543)	(0.0496)	(0.0488)	(0.0493)
Area: rural	0.0775	0.0630	0.0644	0.0723	0.0759
	(0.0483)	(0.0492)	(0.0485)	(0.0520)	(0.0474)
Household income, £					
16,000 - 24,999	0.0112	0.0162	-0.00248	0.00350	-0.00185
	(0.0498)	(0.0514)	(0.0533)	(0.0530)	(0.0520)
25,000 - 34,999	0.117	0.105	0.0863	0.114	0.101
	(0.0657)	(0.0616)	(0.0600)	(0.0651)	(0.0624)

Continued on next page

Table A11 – *Continued from previous page*

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
35,000 - 49,999	-0.0211	-0.0222	-0.0353	-0.0315	-0.0336
	(0.0742)	(0.0683)	(0.0724)	(0.0733)	(0.0764)
50,000 or more	0.124	0.114	0.0951	0.132	0.104
	(0.0877)	(0.0857)	(0.0885)	(0.0914)	(0.0889)
Don't know	0.156	0.179	0.146	0.190	0.130
	(0.121)	(0.123)	(0.127)	(0.130)	(0.124)
Refused	0.0244	0.0519	0.0173	0.0453	-0.00112
	(0.128)	(0.110)	(0.115)	(0.121)	(0.129)
Energy vulnerability	0.253***				0.211***
	(0.0157)				(0.0159)
Energy reliability					
Fairly concerned			0.183***		0.120*
			(0.0530)		(0.0623)
Not very concerned			0.373***		0.255***
			(0.0281)		(0.0483)
Not at all concerned			0.455***		0.299***
			(0.0814)		(0.0930)
Don't know			0.850***		0.646***
			(0.0997)		(0.117)
Imports dependency					
Fairly concerned				0.0305	
				(0.0674)	
Not very concerned				0.193***	
				(0.0492)	
Not at all concerned				0.0711	
				(0.111)	
Don't know				0.699***	
				(0.0893)	
Constant	2.378***	2.744***	2.636***	2.761***	2.358***
	(0.138)	(0.143)	(0.133)	(0.127)	(0.129)
Kleibergen-Paap rk Wald F test (test statistic)	13.994	17.365	12.215	14.149	16.052
Sargan test (p-value)	0.9524	0.812	0.8750	0.7588	0.9823
Hausman-Wu test (p-value)	0.1366	0.0724	0.0937	0.0968	0.1276
Oster's δ for omitted variable bias	8.726	8.825	13.004	10.6	7.597
Observations	3,445	3,445	3,445	3,445	3,445
R^2	0.132	0.111	0.126	0.124	0.140

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

A.4. Instrumental variables

Below, we show that by using instrumental variables, the energy savings variable is always exogenous. But first, we discuss why we have chosen the two instruments we use, disability and long-standing illness and house tenure. Regarding the first instrument, disability, it is safe to assume that having a disability, long-standing illness or infirmity, is exogenous to household characteristics since it is not something that is determined at household level, so we consider this variable to be exogenous. This variable is also likely to be correlated with the energy savings variable since people who suffer from such health conditions are more likely to use less energy and exhibit energy savings behaviour (Ivanova and Middlemiss, 2021).

For the second instrument, house tenure, it is unlikely to be correlated to behavioural characteristics at household level, surveys have shown that the attitudes of UK people to housing are unlikely to be determined by behavioural characteristics for which we don't control but rather by variables like household income, working status and age (Taylor, 2011) for which we control in the regressions. Moreover, tenure has also been shown to be correlated with energy efficiency and energy savings (Hamilton *et al.*, 2016), hence we expect tenure to be relevant as an instrument.

A.4.1. Endogeneity tests

In Tables A9–A11 at the bottom, we present the results (test statistics and p-values) of three tests on endogeneity and instrument validity. First, the Kleibergen-Paap rk Wald F-statistic, suitable in the presence of clusters, which always returns a test statistic larger than 10 (Staiger and Stock, 1997) and which lies between the critical values of 10% and 15% regarding the 2SLS bias, revealing that weak identification is not a concern. In addition, the test for overidentifying restrictions always returns p-values much larger than 0.05. Thus, we conclude that our instruments are valid. Importantly, the Hausman-Wu test, always returns p-values much larger than 0.05, confirming that energy savings is exogenous, hence we consider that endogeneity is not present.

Since we have established that endogeneity is not present in our model, the OLS results are statistically valid and since the OLS results are very similar to the results of the ordered logit models, we establish that the results of the ordered logit models are also valid.

A.4.2. Oster's delta

The validity of the above findings is also confirmed by the values of Oster's δ which are reported at the bottom of Tables A9–A11. In all cases, δ is always larger than 1, as Oster (2019) suggests, implying that any potential bias from unobservables is unlikely (for example, $\delta = 3.72$ for renewables support implies that unobserved parameters are almost 4 times more important than the observables parameters in our regression), thus suggesting a causal interpretation of our results.

A.4.3. Energy availability

As mentioned earlier, the energy vulnerability variable contains the question about concerns for energy imports which we have examined separately. Subsequently, one might wonder what is the impact of the other items of energy vulnerability, that is, if we focus only on concerns about investment on fossil fuels and alternative sources of energy, excluding energy imports concerns. Thus, concerns on energy supply disruption are just driven by imports dependency but also from concerns on insufficient investment on fossil fuels and alternative energy sources. Here we show that even if we consider only the other three items on energy supply, investment and technology the results remain unaffected. We call this variable energy availability.

First, the Cronbach alpha table for these variables where the Cronbach's alpha coefficient is 0.812 (see Table A12), very close to 0.843 reported earlier, so the validity of this new index can be accepted.

Table A12: Cronbach's alpha - Energy availability

Item	Observations	Sign	Item-test correlation	Item-rest correlation	Average interitem correlation	alpha
Item 1	4029	+	0.8499	0.6568	0.5984	0.7488
Item 2	4029	+	0.8392	0.6361	0.6258	0.7698
Item 3	4029	+	0.8694	0.6956	0.5486	0.7085
Test scale					0.5909	0.8125

Then, in the table below (A13), you can see the results of the regression coefficients and the marginal effects of support for each energy source for energy availability is used. The results are basically the same (slightly smaller effects for nuclear and shale gas, -7.3%pt vs -7.9%pt for the former and -6.3%pt vs -7%pt for the latter). These findings are not affected even if all the energy security variables are included in the model.

Table A13: Energy preferences for energy availability
Average marginal effects for support

Energy availability	Renewable	Nuclear	Shale gas
Coefficients	0.302***	0.3586***	0.3699***
	(0.0301)	(0.0166)	(0.03038)
Marginal effects for support	-0.0391***	-0.0738***	-0.0633***
	(0.0037)	(0.0038)	(0.0056)
Observations	3,445	3,445	3,445

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$