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Acceptability of meat tax and subsidy removal by meat-eaters: Insights from five European countries

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Acceptability of Meat Tax and Subsidy Removal by Meat-Eaters: Insights from Five European Countries

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Abstract:

Governments worldwide are exploring policies aimed at promoting healthier and more sustainable dietary choices. This study examines the public acceptability of two promising yet controversial policy interventions: the introduction of a meat tax and the removal of meat subsidies. Drawing on existing literature about the impact of policies on food consumption, particularly meat, we analyze data from a multi-country survey conducted across five European countries. We employ ordered logistic models and cluster analysis to examine factors influencing respondents' support for these policies. Our findings highlight the role of value-based, diet-related and socio-demographic factors. Notably, respondents from Spain, Portugal, and the UK showed significantly greater support for these meat policies compared to Latvians and Czechs. Age emerged as a key factor, indicating an increasing likelihood of support for both policies among younger individuals. Moreover, environmental and egoistic values were associated with increased odds of support, while security concerns and hedonic values had the opposite effect. Education, employment, or income did not emerge as significant predictors. Our study underscores the complexity of public opinions toward meat policies and provides valuable insights for policymakers seeking to design effective strategies to promote healthier and more sustainable dietary behaviours in Europe.

JEL: C34, C38, I15, O12, O13, Q56

Keywords: acceptability, clustering, meat policies, meat tax, meat subsidy removal, values

1 Introduction

Global trends reveal the pressing need to tackle meat consumption. According to the Food and Agriculture Organization (FAO), global meat consumption increased by 52% between 2000 and 2023, reaching 354 million tonnes. Despite the perception of stagnation in Europe, its average per capita meat consumption increased from 70 kg per year in 2000 to 78 kg per year in 2022 (FAO 2024). This uptrend underscores the persistence of meat consumption as a significant dietary choice across European populations, highlighting the need to implement measures aimed at moderating its intake.

Many studies have linked high consumption of red and processed meat to various health risks, including cardiovascular diseases, type 2 diabetes, and certain cancers (Abete et al. 2014; Chen et al. 2013; Feskens et al. 2013; Pan et al. 2012; Sinha et al. 2009; Etemadi et al. 2017; Farvid et al. 2014; 2015). The International Agency for Research on Cancer has classified processed red meat as carcinogenic to humans and unprocessed red meat as probably carcinogenic, underscoring the health implications of meat consumption (Bouvard et al. 2015). Additionally, meat production significantly contributes to environmental degradation, driving land use changes that result in biodiversity loss and species endangerment (Willett et al. 2020). The livestock sector is a major source of global greenhouse gas emissions and freshwater use, contributing to pollution and release of pesticides (Vermeulen et al. 2012; Merrey et al. 2007; Tilman et al. 2001). Meat and meat products alone account for 4–12% of the impact on global warming (Tukker and Jansen 2006).

As a consequence, public concern over the health and environmental impacts of meat consumption has received significant attention in recent years, urging policymakers worldwide to explore interventions aimed at reducing meat intake. Encouraging healthier and more sustainable dietary choices has become a priority for governments (Willett et al. 2020), with fiscal policies emerging as potential tools to shape consumer behaviour in this regard. Research shows that subsidies on healthy foods and taxes on unhealthy ones can improve dietary habits and health outcomes (Afshin et al. 2017; Thow et al. 2014). Funke et al. (2022) underscore the potential of consumption taxes on meat in addressing various externalities, particularly in high-income countries where livestock farming and meat consumption are prominent. Additionally, European modelling studies suggest that taxes linked to greenhouse gas emissions can shift consumer preferences towards environmentally friendly foods (Abadie et al. 2015; Bonnet et al. 2018; Edjabou and Smed 2013; Säll and Gren 2015; Smed et al. 2007; Jensen and Smed 2007; Chouinard et al. 2007; Allais et al. 2009; Thow et al. 2014; Roosen et al. 2022). A social cost-benefit analysis from the Netherlands demonstrates that a meat tax, combined with subsidies for fruits and vegetables, could yield significant societal benefits, including reduced healthcare costs, improved quality of life and environmental gains (Broeks et al. 2020). Schönbach et al. (2019) conducted a health impact assessment on the potential benefits of processed meat taxation in Germany, finding that even modest taxes could significantly reduce cases of ischemic heart disease, diabetes, and colorectal cancer, possibly saving thousands of lives.

Despite these promising findings, most studies focus on the design and potential impacts of such taxes rather than on public support for these policies. Public opinion plays a critical role in the success or failure of fiscal measures. While several EU countries apply reduced VAT rates on food (EU 2024; Greenpeace 2021), including meat, public support for additional taxes remains inconsistent. Similarly, the removal of meat subsidies has been largely underexplored in the literature. This gap is particularly concerning given

that over 80% of EU agricultural subsidies currently support animal production or feed, which contributes to 84% of the EU’s food-related greenhouse gas emissions (Kortleve et al. 2024). This creates a conflict between existing subsidy structures and the EU’s ambitious climate targets.

In practice, policies such as Spain’s VAT adjustments in 2011, which increased meat taxes while reducing VAT on fruits and vegetables, provide examples of how fiscal measures can be implemented to promote healthier diets (Romero-Jordán 2013). Recent discussions in Germany and Sweden reflect a growing interest in implementing meat taxes as part of broader environmental and health initiatives (BBC 2019; Charlton 2019). Surveys in Western Europe also indicate a more favourable stance toward higher meat prices, provided that revenues are used to reduce the cost of fruits and vegetables or support low-income households (IPSOS 2023). However, Denmark’s attempt to introduce a saturated fat tax faced strong opposition and was eventually repealed (Jensen et al. 2015). Hence, it is important to evaluate public support for these policies, particularly in different regions and socioeconomic groups, which is crucial to understanding the feasibility and effectiveness of such interventions.

Our study aims to address this research gap by examining the opinions of meat-eaters on two key interventions: the introduction of a meat tax (TAX) and the removal of meat subsidies (noSUBS). We analyze respondents’ views in diverse socio-economic and cultural contexts across five European countries: the Czech Republic (CZ), Latvia (LV), Portugal (PT), Spain (ES), and the United Kingdom (UK). The objective is to uncover critical demographic, economic, diet-related and value-based drivers linked to higher support of meat tax introduction and meat subsidy removal among meat eaters. This is done in two ways. First, we analyze the two policies independently using ordinal and multinomial regression models. Second, we employ clustering techniques to construct a latent variable summarizing respondents’ combined attitudes toward both policies and evaluating factors correlated with being in a more supportive cluster. This provides valuable insights into the determinants of public support or opposition to meat policies across different regions.

Our paper is structured as follows: in section 2, we provide background information based on current research. Next, section 3 describes data and methods used in the analysis and the empirical model is explained. The results of our analysis are presented in section 4, where we discuss the factors influencing public opinions on meat policies across the examined countries. Finally, section 5 contains a discussion of our findings, implications for policymakers, and concluding remarks.

2 Literature review

Environmental policies, including those targeting meat consumption, are shaped by a combination of demographic, personal, and policy-specific factors (Ejelöv and Nilsson Hed 2020). While demographic variables, such as age and gender, often have modest effects on policy acceptability, personal factors like values and ideology emerge as more consistent predictors. However, research on some personal factors has often relied on smaller, non-representative samples. To enhance the reliability and generalizability of findings in this field, there is a need to prioritize larger and more representative samples, particularly when examining underexplored factors.

A review of 200 studies found that public acceptability of the interventions aimed at changing health-related behaviours varies with the targeted behaviour, intervention type,

and respondents’ characteristics (Diepeveen et al. 2013). Less intrusive interventions, particularly those focused on children and young people, tend to receive the most support. Demographic factors also influence acceptability, with older respondents and women generally favouring more restrictive policies (Diepeveen et al. 2013).

According to research by Harguess et al. (2020), forming opinions regarding meat policies (MP) requires an awareness of the socio-psychological and environmental factors. For instance, moral and value-based considerations often play a significant role. Perino and Schwickert (2023) found that concerns about animal welfare frequently outweigh climate change motivations as drivers of support for meat taxes. Aligning policy narratives with widely shared values, such as the ethical treatment of animals, may, therefore, enhance public support.

Additionally, demographic characteristics like age, gender, and education play a role in shaping attitudes toward meat reduction policies. Younger individuals are typically more supportive of meat taxes (Kwasny et al. 2021; Sanchez-Sabate and Sabaté 2019). Values such as environmental concern and altruism correlate positively with support, whereas security and hedonic values are often linked to opposition (Graça et al. 2015a). These findings highlight the importance of socio-economic and value-based factors in shaping public opinion, though further research is needed to fully understand their relationship.

Case studies from specific countries illustrate how public attitudes toward meat-related fiscal measures can vary based on cultural and economic contexts. In Switzerland, direct fiscal measures like VAT increases on meat products were generally rejected, whereas less intrusive strategies, such as sustainable diet education or stricter animal welfare regulations, were more widely accepted (Richter et al. 2023). Research in the Netherlands demonstrated that public support for meat taxes was higher when specific exemptions, such as for organic products, were included, or when the tax was part of a collective EU effort (Siegerink et al. 2024). These examples suggest that attitudes toward such policies can be shaped by regional values and priorities, highlighting the need to tailor policy design and communication strategies to specific national contexts.

While broader research evaluates public attitudes toward various meat interventions, studies specifically addressing support for the removal of meat subsidies or general meat taxation remain limited. Much of the existing literature focuses on broader implications or narrowly defined policy attributes, leaving significant gaps in understanding how socio-demographic, value-based, and consumption-related factors shape public opinion on these interventions. Moreover, “meat paradox”, where individuals express concern for animal welfare but continue to consume meat, illustrates the cognitive dissonance that complicates policymaking in this area (Loughnan et al. 2014).

Less intrusive measures, such as labelling and media campaigns, generally garner higher public support due to their voluntary nature and lower sense of obligation (Pechey et al. 2022). However, their overall effectiveness is often more limited compared to fiscal interventions, which can directly influence consumption behaviour (Richter et al. 2023). Among these, Pigovian taxes—designed to internalize the environmental and social costs of meat production—are recognized as some of the most efficient policy tools (Bryant et al. 2024). Despite their potential, such direct interventions frequently face resistance (Somerville et al. 2015; Thomas-Meyer et al. 2017; Reynolds et al. 2019; Richter et al. 2023; Bryant et al. 2024; Lentz et al. 2018). Their success depends on public acceptance, which can be strengthened through transparency in revenue allocation, such as redirecting funds toward public goods or environmental benefits (Grimsrud et al. 2019; Graça et al.

2020; Espinosa and Nassar 2021; Pechey et al. 2022).

Motivated by the challenges posed by high levels of meat consumption and the gaps in existing research, our study examines public support for two key fiscal interventions: the implementation of a meat tax and the removal of meat subsidies. We focus on how socioeconomic, demographic, diet-related, and value-based factors correlate with higher policy support, offering insights into the underlying determinants of public acceptability. Furthermore, by examining cross-national differences across five European countries, this research highlights the importance of cultural and regional contexts in shaping public opinions on fiscal interventions targeting meat consumption.

3 Materials and methods

3.1 Data

The five European countries were selected because of their different political, geographical, and socio-economic contexts, facilitating a more accurate representation of the broader European landscape. Country subsamples are representative of national populations aged 18 to 65 years with respect to gender, age, region, and education.¹ Social-psychological, sociological, and economic approaches were combined to design the survey and analyse the data.

After the pre-survey and pre-testing, which included language, translation and programming checks, the pilot survey was carried out in July 2018 (212-323 respondents by country), and the main wave followed shortly after. For the analysis, incomplete and non-valid (i.e., "speeders"²) observations were excluded from the dataset. Table A.1 shows the number of completed questionnaires as well as the number of excluded non-valid observations in each country. The overall number of completed valid questionnaires in the final sample was 10,346.

Figure A.1 depicts meat and fish consumption trends among countries that are part of our analysis and the global average values. Spain and Portugal exhibited a rapid surge in meat consumption over the past six decades, with a subsequent slowdown in recent years. Computing the percentage change in meat and fish consumption from 2000 to 2022 for each country, Latvia experienced the highest increase (126% for meat and 86% for fish), and Spain witnessed the most significant decrease (7.5% for meat and 5% for fish). The remaining countries showed relatively moderate increases in meat consumption, ranging from 7-12%. Since meat consumption in these countries spans from 83 to 105 kilograms per capita per year, well above the world average of 45 kg per capita per year (FAO 2024), it becomes evident that analyzing potential interventions is essential.

¹There was a slight deviation from quotas in some sample proportions; hence, weights were derived to make all analysed countries representative in terms of gender, age, region, and education.

²To identify speeders, we calculated the median duration of survey completion for respondents segmented by country, age category, education level, and whether they participated before or after the questionnaire was shortened. Those who completed the survey faster than 48% of the median time for their segment were labelled as speeders and excluded from further analysis.

3.1.1 Meat policies

Non-vegetarian³ participants were presented with two proposed measures: implementing a meat tax and removing subsidies for meat production. Through a 7-point Likert scale, respondents expressed their views on these measures, spanning from strong opposition to strong support, with options also available for “prefer not to answer” or “do not know” (the last two denoted as DK). We categorized ordinal responses as opposed (1–3), neutral (4), or supportive (5–7).

Figure 1 and Figure 2 illustrate the country-specific distribution of responses to questions concerning the introduction of a meat tax and the removal of meat subsidies. Our survey revealed a higher resistance towards the implementation of a meat tax, with over 48% expressing opposition, 15% remaining neutral, 25% supporting the idea, and 12% not knowing or preferring not to respond. However, notable disparities emerged across countries. For instance, Latvians and Czechs exhibited the greatest opposition to the meat tax (56% and 53% respectively), while Portuguese and Spaniards displayed comparatively lower levels of opposition (36% and 38% respectively). Conversely, support for the meat tax was most pronounced in the UK, Portugal, and Spain, with 26%, 31%, and 33%, respectively (Figure 1). Similarly, attitudes towards stopping meat subsidies varied, albeit with slightly lower opposition and higher support compared to the meat tax proposal.

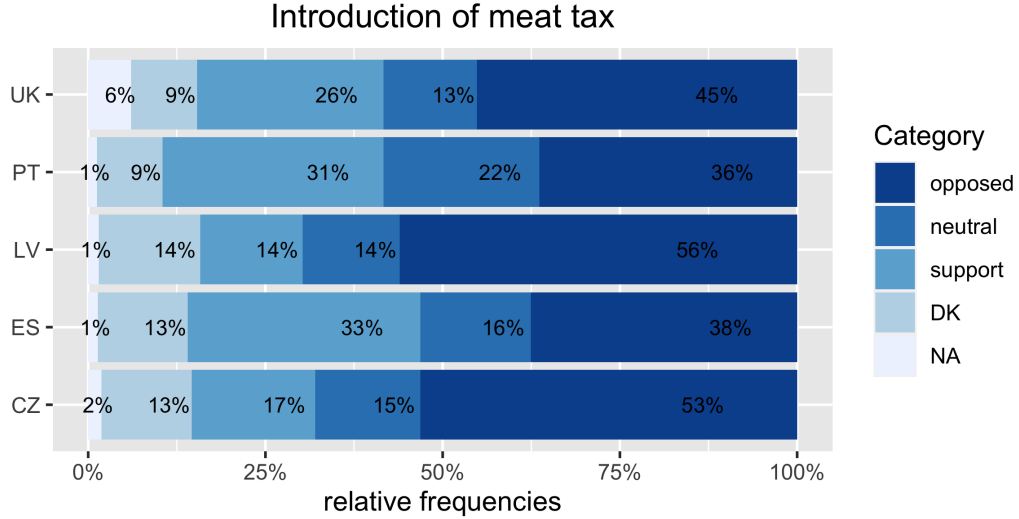


Figure 1: Respondents’ opinion on the introduction of meat tax. DK stands for ‘did not know’ or ‘did not want to answer’. Respondents marked as ‘NA’ represent vegetarians for whom the question was not displayed.

For the econometric analysis, we used three-level variables representing opposition, neutrality, and support for an intervention, excluding the DK category to keep the ordinal nature of the variables. To ensure robustness, the DK category was included in models designed for nominal categorical variables. The distribution of the opinions (with and without DK) is illustrated in Table A.2.

³The number of missing observations (“NAs”) is equal to the number of respondents who do not eat meat or fish since the question was not displayed to them.

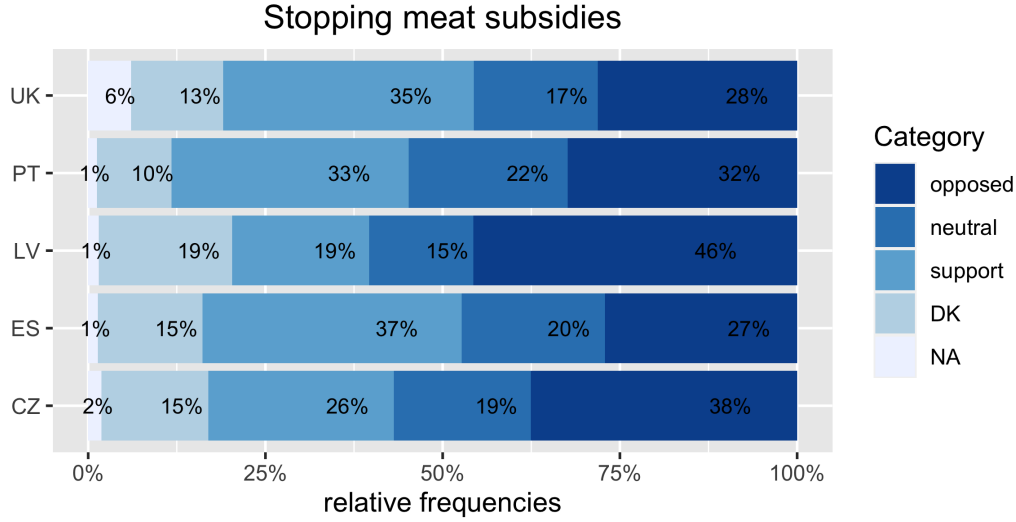


Figure 2: Respondents’ opinion on the removal of meat subsidies. DK stands for ‘did not know’ or ‘did not want to answer’. Respondents marked as ‘NA’ represent vegetarians for whom the question was not displayed.

3.1.2 Explanatory variables

Participants were asked to choose from 12 income ranges to indicate their total monthly income after taxes and mandatory deductions. For those unsure or unwilling to share, there were options labelled “I do not know” and “I would prefer not to respond”. To simplify analysis, a numerical value was assigned based on the midpoint of each range. Missing data points were filled in using a respective country’s average income. Since different currencies were used across countries, incomes were converted to Purchasing Power Standard (PPS) euros. The distribution of household income across countries is shown in Figure A.2.

The model includes socio-demographic variables such as gender, age, education, type of residence, country, and unemployment status (detailed in Table A.3). Besides that, we were interested in examining the effect of values and shopping behaviour on meat policies. Dummy variables denoted as food factors (FF) indicate whether a specific factor (e.g., price, taste, convenience) is important when purchasing groceries⁴ (Table A.3). Additionally, we measured biospheric values (emphasizing environmental concern), hedonic values (emphasizing pleasure and comfort), egoistic values (emphasizing personal resource protection), altruistic values (emphasizing the welfare of others), and security values (emphasizing health, safety, and societal stability). For instance, biospheric values were measured using items such as preventing environmental pollution, respecting the earth, and protecting the environment, rated on a 9-point scale from 7 (supremely important) to 0 (not important) and -1 (opposed to my values). Confirmatory factor analysis (CFA) was conducted to validate these constructs, with a Cronbach’s alpha of 0.9 indicating high reliability. The model’s fit was supported by approximate fit indices, and the root mean square error of approximation (0.061) suggested a reasonable fit. Further details on the CFA model and its fit statistics are available in Zverinova et al. (2020). Missing observa-

⁴Respondents were asked the following question: “When buying food, what would you say are the most important factors that influence your choice?”. They were asked to choose all factors that applied to them.

tions for value variables were substituted with the mean value to handle any gaps in the data. Their summary statistics are available in Table A.4 and Figure A.3.

Lastly, we utilized data from the food consumption section of the questionnaire to express meat and fish consumption. The Short-Form Food Frequency Questionnaire (SFFFFQ), a standardised tool validated against an extensive Food Frequency Questionnaire and a 24-hour diet recall for the UK (Cleghorn et al. 2016), was used to elicit respondents’ eating patterns. Based on pre-survey feedback, minor modifications were made to the original SFFFFQ by Cleghorn et al. (2016). Specifically, frequency questions (e.g., “How often do you eat at least one portion of [a food group X]?”) were revised to ask directly about specific portions consumed (e.g., “How many portions of [a food group X] do you eat?”). These questions were supplemented with images depicting typical portion sizes for each food category. Because of the time constraints, three groups from the original SFFFFQ were removed (see more in Zverinova et al. (2018)).

We categorized respondents into three groups based on their consumption of meat and fish, creating the factor variables *meat_eaters* and *fish_eaters*. Following the approach by Scarborough et al. (2023), low meat-eaters were defined as those consuming less than 50 g of meat per day, medium meat-eaters as those consuming 50 to 100 g per day, and high meat-eaters as those consuming more than 100 g per day. Analogically, categories were established for fish eaters. Figure A.4 shows the relative distribution of these two variables.

3.2 Models and Methods

The Value Theory developed by Schwartz (1992; 1994) has been already applied in food research (Cicia et al. 2021). In our paper, it provides a foundational framework for understanding the factors associated with public support for meat taxation and subsidy removal. In the context of fiscal meat policies, five key value types are of particular interest: biospheric, altruistic, egoistic, hedonic, and security values. Biospheric values reflect concern for the environment and we assume they will correlate positively with higher support for meat-reduction policies. Altruistic values emphasize concern for others’ welfare, which might correlate with increased support for policies aimed at reducing meat consumption because of ethical or health-related reasons. Because of social justice, equality and stability, we can assume a positive association between security values and support for the policies. Hedonic values focus on pleasure and comfort, which can be tied to taste and enjoyment and therefore, negatively impact support. Egoistic values centre on personal benefits, such as financial implications, and could negatively affect the support.

In addition to values, sociodemographic variables (e.g. income, education, gender and type of residence) and food-related factors (e.g. price, taste, and convenience) are included as predictors of public support. Socio-demographics capture structural differences in policy acceptability, while food factors reflect practical and emotional considerations that interplay with individual value orientations. Lastly, consumption patterns, specifically meat and fish intake, provide a behavioural dimension to the analysis. This enables us to explore how dietary habits align with policy opinions.

We employ various statistical methods to analyze factors influencing public opinions on meat policies, specifically the introduction of a meat tax and the cessation of meat subsidies. First, we examine the two policies separately. Although a standard ordered logit model (OLM) may be adequate assuming parallel lines, the Partial Proportional Odds model (PPOM) becomes essential when this assumption is violated, making it a

better fit for our dataset (Williams 2006). While our dependent variable is ordinal, the distances between adjacent categories, such as "oppose" to "neutral" and "neutral" to "support," may be different. The PPOM addresses this variability by allowing certain coefficients to remain constant across categories while others can vary, providing a more flexible approach to modelling ordinal outcomes. By accommodating non-parallel slopes across categories, the PPOM ensures a more accurate representation of the underlying dynamics influencing the ordinal outcome.

The PPOM, as a special case of the GOLM, can be written as:

$$P(Y_i^k > j) = \frac{\exp(\alpha_j + X_{1i}\beta_1 + X_{2i}\beta_{2j})}{1 + \exp(\alpha_j + X_{1i}\beta_1 + X_{2i}\beta_{2j})}, \quad j = 1, 2, \dots, M - 1,$$

where M is the number of categories of the ordinal dependent variable, Y_i^k , which represents how supportive respondent i is of meat policy k , where $k = \text{TAX, noSUBS}$. The coefficient α_j is the intercept (scalar). Then, β_1 and β_{2j} are the vectors of estimates, where some of the coefficients can be the same for all values of j (β_1), while others can differ (β_{2j}). Subsequently, there are matrices X_{1i} and X_{2i} that formed by the independent variables (specific to respondent i).

To evaluate the validity of the parallel lines assumption across explanatory variables, we conducted the Brant test, which enabled us to detect any variations in the slopes of explanatory variables across different categories of the dependent variable.

When the dependent variable is nominal (classified as opposed, support, neutral, or do not know/prefer not to answer), we employ the Multinomial Logit Model (MNL). Unlike the ordinal logistic regression models, which consider the ordinal nature of the dependent variable, the MNL simultaneously estimates binary logits among all pairs of categories. This allows us to analyze the probability of belonging to each category relative to a reference category, providing insights into the factors influencing nominal outcomes.

As a robustness check, we employed a Multivariate Ordered Logit Model (MVOLM), which extends the traditional ordered logit model by jointly modelling multiple ordinal outcomes. This method allows us to account for the correlation between responses to different meat policy interventions, such as a meat tax and the removal of meat subsidies. By modelling these outcomes simultaneously, the MVOLM provides a more nuanced analysis of the factors influencing public support for these policies, ensuring the robustness of our results across different model specifications.

The choice of modelling approach depends on the nature of the dependent variable and the research question. By comparing the results obtained from different models, such as the OLM, PPOM, MNL and MVOLM, we can assess the robustness of our findings and identify any discrepancies that may arise due to model specification. This process ensures that we choose the most appropriate model to accurately capture the relationships between variables and provide reliable insights into public support for meat policies.

Various statistical measures and tests are employed to guide our model selection process. The likelihood ratio test compares the fit of nested models, assessing whether the addition of explanatory variables significantly improves model fit. The log-likelihood function measures a model's goodness of fit to the observed data. Models with higher log-likelihood values indicate better fit, but this measure alone is insufficient for model comparison. AIC and BIC serve as complementary metrics, balancing model fit against complexity and penalizing overly intricate models. Lower values of AIC and BIC indicate superior model fit while simultaneously considering the trade-off between goodness of fit and the number

of parameters. We report these test statistics (Table A.14, Table A.15), which enable us to make well-informed decisions about selecting the most suitable model. For robustness checks, we provide results from the model with socio-demographics only (Model 1) and the model augmented by values (Model 2) in the Appendix (Figure A.5, Figure A.6, Figure A.7, Figure A.8, Table A.11, Table A.12).

Lastly, we apply clustering techniques to create a latent variable that captures respondents' overall opinions on both policies (Figure 3) and assess the factors associated with increased support for this combined measure. The profiling was conducted on respondents who provided clear opinions on these policies (those who did not know or did not answer were not clustered). Similarly to Grasso et al. (2021), we use a two-step cluster analysis, combining an agglomerative hierarchical clustering procedure and a non-hierarchical (k-means) approach. It was employed due to its suitability for handling large datasets and its ability to manage both continuous and categorical data effectively. The final number of clusters (k) was chosen based on a combination of the elbow method, low values of the BIC in the cluster analyses and interpretability. Then, a k-means clustering procedure was performed with 100 iterations to refine the classification.

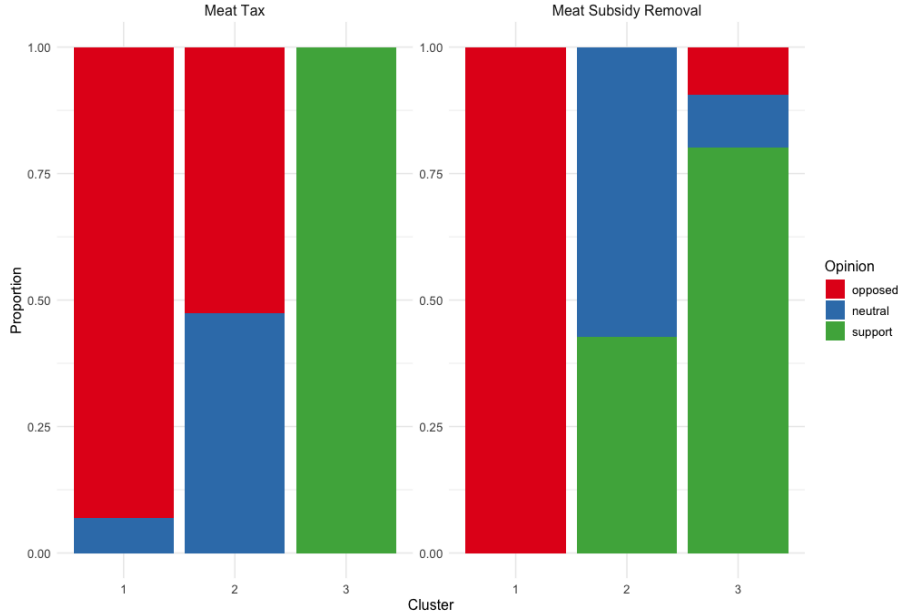


Figure 3: Segmentation of respondents based on their level of support for the introduction of a meat tax and meat subsidy removal.

We analyze created MP clusters based on socio-economic and value characteristics, as well as food factors and meat consumption patterns. To determine how various variables influenced cluster identification, chi-square tests were employed for categorical variables (Table A.5), while Kruskal-Wallis one-way tests were used for continuous variables (Table A.6). Then, we examine factors influencing the likelihood of being classified into a specific MP segment. Given that the dependent variable (segment membership) is not ordered, OLM or PPOM were not suitable. Therefore, we utilize MNLM, with the “Strong Opponents” cluster serving as the reference group for comparisons with other segments.

4 Results

4.1 Policy-Specific Regression Analysis

The regression analysis was performed in R (R Core Team 2020).⁵ The PPOM model was employed to analyse public positions on meat tax introduction and meat subsidy removal (classified as opposed, neutral, or in support). Estimated odds ratios (OR) provide insights into the factors influencing these opinions (Figure 4).⁶ In other words, we estimate the likelihood of being in higher attitudinal groups (i.e., being neutral or in support) compared to a lower attitudinal group (i.e., being opposed) for TAX and noSUBS.

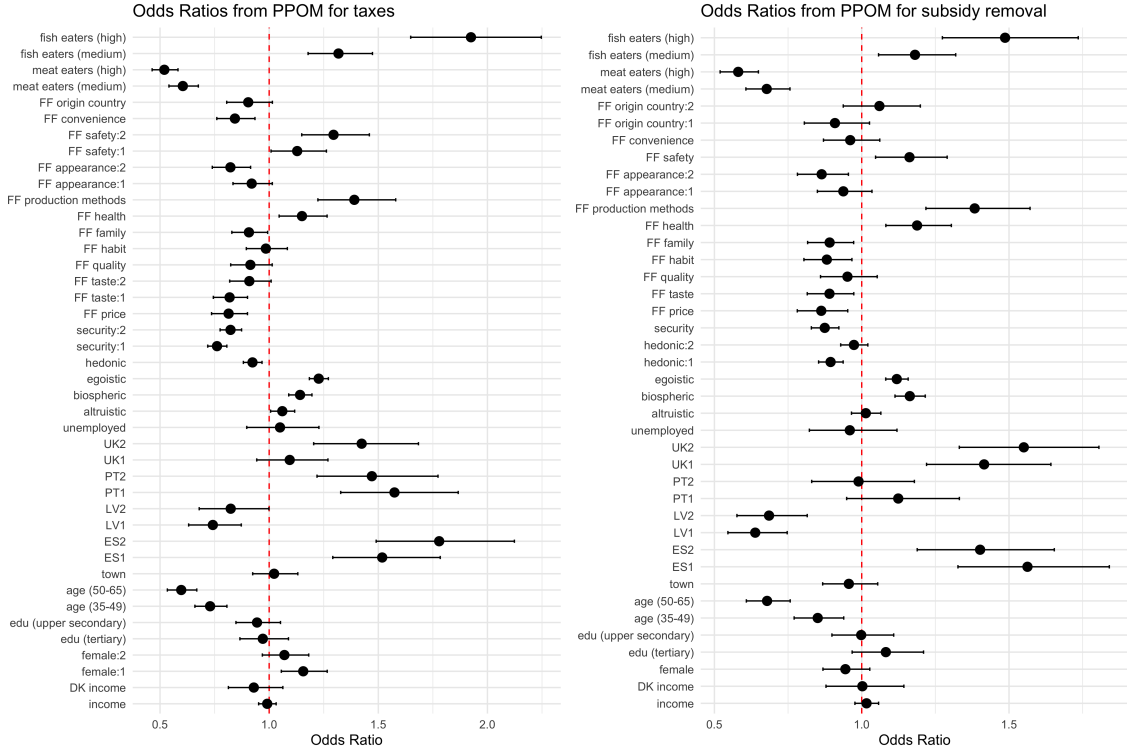


Figure 4: Odds Ratios from PPOM regression for meat taxes (left) and meat subsidy removal (right). XXX:1 represents the comparison between being opposed and being neutral or supportive, while XXX:2 compares being opposed or neutral versus being supportive.

Income, unemployment, and town were not found to be significantly associated with public support for TAX or noSUBS. As indicated in Figure 1 and Figure 2, significant differences among countries were found - the odds of being more likely to be neutral or in support vs being opposed to TAX are higher in Spain and Portugal, while the odds of being in support vs being opposed or neutral are higher for Spain, Portugal and the UK. On the other hand, ORs for TAX, as well as noSUBS, are lower for LV compared to CZ. Higher ORs for noSUBS were found for the UK and ES compared to CZ.

The odds of being more likely to be neutral or in support vs being opposed to TAX are higher for females compared to males (by 16%), but there is no statistical difference

⁵We use the package `stargazer` (Hlavac 2018) for regression tables.

⁶Regression results can be found in Table A.7 and Table A.8.

in their level of support for noSUBS. Holding other variables fixed, education does not seem to correlate with support for TAX or noSUBS. However, age does have an influence, indicating that older people are less likely to support TAX or noSUBS, with decreasing odds observed in the 35-49 and 50-65 age groups compared to the 18-34 year-olds.⁷

Pro-environmental values (“biospheric”) and egoistic tendencies increase the odds of being in the neutral or support category compared to being opposed.⁸ Security concerns and hedonic values, on the other hand, decrease the odds of being in the neutral or support category compared to being opposed (for both policies). Among food factors, price, taste, appearance and family have lower ORs, indicating a lower likelihood of being in support (or neutral) vs being opposed to TAX and noSUBS. Conversely, valuing health, production methods or safety in food is associated with a higher likelihood of support for TAX or noSUBS.

As expected, meat consumption also affects support for these policies. Compared to low-meat eaters, those who eat medium and high amounts of meat are less likely to be neutral or supportive of TAX (by 40% and 48%, respectively) and noSUBS (by 32% and 42%, respectively) compared to being opposed. On the other hand, higher fish consumption is associated with increased ORs. Compared to those who eat no or low amounts of fish, eating medium and high amounts of fish increases the likelihood of being supportive (or neutral) towards TAX by 32% and 92% and towards noSUBS by 18% and 49% (compared to being opposed).

For the robustness check, we compared PPOM estimates with those obtained from the OLM (Figure A.9). The significance and direction of effects remain unchanged. The main difference lies in some of the estimated values since PPOM provides estimates for non-parallel slopes, offering a more precise picture than the single value for parallel slopes given by the OLM. Additionally, we compared our results to MVOLM estimates (Figure A.10), which are roughly the same as those from OLM. The error structure revealed a correlation of 0.75 between the unobserved factors influencing responses to the meat tax and subsidy removal. This strong correlation suggests that the two policy preferences share common unmeasured determinants but does not indicate direct dependency between the dependent variables themselves. The similarity between MVOLM, OLM, and PPOM results demonstrate that our estimates are robust regardless of the econometric model used.

Moreover, we conducted an MNLM regression, which included the additional “I would prefer not to respond/do not know” (DK) category. In this case, the neutral response to the respective meat policy intervention served as the base category, unlike the opposed category used as the base in the PPOM model. MNLM results (Table A.13) closely mirror those of the PPOM model. Similar patterns emerge regarding the associations of gender, age, and pro-environmental values with opposition or support for TAX and noSUBS. For example, women, Portuguese respondents, and individuals with biospheric or egoistic values were found to be less likely to oppose TAX compared to being neutral. These findings align with the PPOM results, where females and individuals with pro-environmental values were also more likely to support or be neutral toward TAX than to oppose it.

Age remains a significant predictor in both models. Older respondents show higher

⁷For TAX, ORs are 0.73 and 0.6 for 35-49 and 50-65 age-group vs 18-34 year-olds. For noSUBS, ORs are 0.85 and 0.68 for 35-49 and 50-65 age-group vs. 18-34 year-olds.

⁸For biospheric, $OR_{TAX} = 1.14$, $OR_{noSUBS} = 1.16$. For egoistic, $OR_{TAX} = 1.23$, $OR_{noSUBS} = 1.12$.

odds of opposing both TAX and noSUBS and lower odds of being supportive relative to neutral—just as in the PPOM, where older age groups demonstrated lower odds of favouring either intervention compared to the younger respondents. Higher education levels (compared to the lower secondary) reduce the odds of being in the DK category (vs. neutral), but otherwise, educational background plays a similar role across the models and does not significantly influence support for either TAX or noSUBS.

Values such as security and hedonism maintain their positive association with opposition in both models, reinforcing the robustness of these findings. Egoistic and biospheric respondents continue to show greater support for TAX and noSUBS in the MNLM, as they do in the PPOM. Finally, meat and fish consumption patterns exert the same influence across both models. Higher meat consumption is associated with lower odds of support (and higher odds of opposition) for TAX and noSUBS, while high fish consumption decreases the likelihood of being opposed (and increases OR of support for TAX) compared to neutrality. Overall, the MNLM results reinforce the key insights from the PPOM model, with only minor variations due to the inclusion of the DK category and the different base categories for comparison.

When comparing the DK category with being neutral, we found that Latvians (compared to Czechs), older individuals (compared to younger ones), and females (compared to males) are more likely to be in the DK category regarding TAX. Conversely, Portuguese respondents, more educated individuals, and those who prioritize appearance and quality when grocery shopping are less likely to be in the DK category than to be neutral. For meat subsidy removal, the increased odds of being in the DK category versus neutral are observed for Latvians, older individuals, and females. In contrast, high fish and meat eaters (vs. low fish and meat eaters) those who prioritize appearance, Portuguese respondents, and those with higher education levels are less likely to be in the DK category compared to being neutral.

4.2 Cluster Analysis

By profiling respondents based on their opinions on the introduction of meat tax and the removal of meat subsidies, three distinct groups emerged: strong opponents, mixed neutrals, and strong supporters (Figure 3). These clusters differ significantly in terms of various categorical variables, as indicated by chi-square test results (Table A.5). Additionally, Kruskal-Wallis one-way tests show that values are also highly correlated with the clusters (Table A.6). While these tests do not provide information about the strength or direction of the correlations, further analysis using MNLM regression allows us to quantify these relationships.

The MNLM results align with the previous PPOM and MNLM models to some extent, with some notable variations due to the different categorical bases (Figure 5). The mixed neutrals group, compared to strong opponents, is characterized by higher odds of support among Spanish respondents and those with biospheric values. Additionally, respondents who find food production methods or health important when buying food are more likely to be in the mixed neutral group, while medium and high meat consumption decreases the odds of being in this category. Conversely, higher fish consumption increases the odds of being in the mixed neutral group. Older respondents, especially those aged 50-65, are less likely to be in this group, reflecting a similar age effect seen in previous models.

The strong-supporters cluster shows even stronger associations with biospheric and egoistic values and fish consumption, while high meat consumption is associated with lower

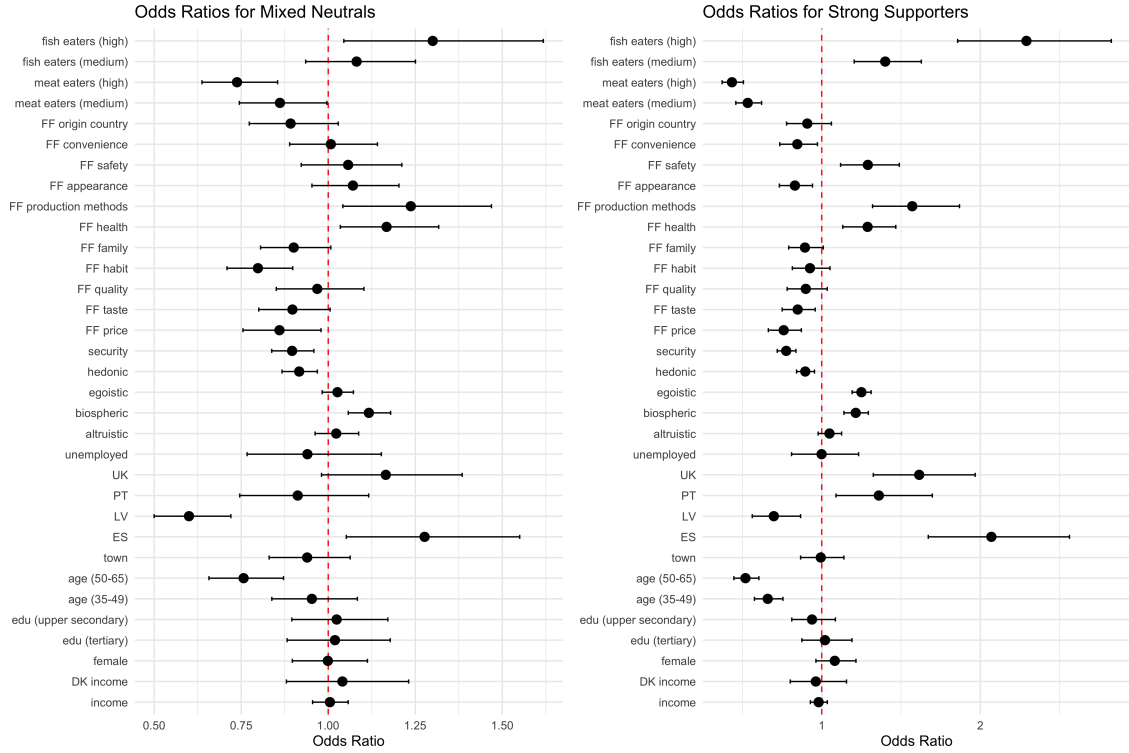


Figure 5: Odds Ratios from MNLM regression for clusters. Mixed Neutrals vs. Strong Opponents (left) and Strong Supporters vs. Strong Opponents (right).

odds of being a strong supporter (vs. being a strong opponent). Spaniards, Portuguese, and UK respondents are also more likely to fall into this group than Czechs. Hedonism and security concerns negatively influence the likelihood of being a strong supporter. A similar negative effect is seen in food factors such as price, taste, appearance, and convenience. If health, safety, and food production methods are important factors when buying food, the respondents have higher odds of being strong supporters versus strong opponents.

Examining the mixed neutrals versus strong opponents and strong supporters versus strong opponents reveals consistent patterns, though the effects are more pronounced for strong supporters compared to strong opponents. Overall, cluster results show consistency with the previous PPOM and MNLM analyses, with slight differences due to the clustering approach used in this model.

5 Discussion

Although taxes are effective in changing behaviours (Jensen and Smed 2013; Mytton et al. 2012), their implementation is often hindered by a lack of public acceptability (Richter et al. 2023; Pechey et al. 2022). A lower level of acceptability for the introduction of a meat tax has also been found in our survey. More than 45% oppose the introduction, 15% are neutral and 24% support this idea (Figure 1). In the case of meat subsidy removal, 34% are against it, 30% are in favour, and almost 18% are neutral to this change in policy (Figure 2).

To identify which groups are less supportive of these interventions, we conducted a set

of regression analyses. The results suggest that socio-economic factors such as income, unemployment, and type of residence are not significantly associated with preferences towards TAX or noSUBS, which is in line with Grimsrud et al. (2019). In contrast, cross-country variations are evident, with Spain, Portugal, and the UK exhibiting higher odds of supporting TAX compared to the Czech Republic, while Latvia presents lower odds for both TAX and noSUBS. Findings by Richter et al. (2023) and Siegerink et al. (2024) also suggest that culturally sensitive and contextually tailored approaches are essential for designing effective fiscal policies.

Education did not emerge as a significant predictor of support for TAX or noSUBS, even though it was found to be significant by Grimsrud et al. (2019). We only found that respondents with higher education are less likely to be in the DK category compared to being neutral. Females showed higher odds of being supportive of TAX (similar to Diepeveen et al. (2013)), but there was no significant relationship between gender and noSUBS. Age, on the other hand, plays a notable role, indicating a decreasing likelihood of support for both policies among older people, similar to Grimsrud et al. (2019).

Recognizing that older age groups are less likely to support these interventions, tailored communication strategies should be developed to effectively convey the benefits of such measures to this demographic (e.g. educational campaigns specifically designed for older individuals, collaboration with senior community centres and healthcare providers, intergenerational communication strategies).

Our findings indicate that environmental values are positively associated with support for TAX and noSUBS, consistent with the findings of Pechey et al. (2022). However, Whitley et al. (2018) did not observe a significant relationship between biospheric values and support for meat policies, suggesting that the influence of environmental concerns may vary depending on the specific policy context or framing. Instead, they identified a positive association between altruistic values and support, which aligns with our results for TAX (but not for noSUBS). Additionally, they reported a negative effect of egoistic values when framed as environmental or animal welfare protection policy (otherwise non-significant). In our study, egoistic tendencies are positively correlated with support for TAX and noSUBS. This discrepancy could reflect differences in framing or regional contexts, suggesting that egoistic motivations may not uniformly oppose meat policies but could align with certain aspects, such as economic self-interest or perceived personal benefits. We show that security concerns and hedonic values are associated with a decreased likelihood of support, similar to findings by Graça et al. (2015b). Addressing these barriers (e.g. by enhancing the appeal, affordability, and perceived safety of plant-based alternatives) might improve acceptance of meat policies among meat-eaters.

Food-related factors such as price, taste, appearance, and family values correlate with lower odds of support while valuing health, production methods, or food safety increases the likelihood of support for both TAX and noSUBS. Individuals with higher meat consumption are less likely to support TAX and noSUBS compared to low-meat eaters, likely reflecting resistance to policies perceived as threatening their dietary habits. By contrast, higher fish consumption is linked to increased odds of support for both TAX and noSUBS. This may be due to fish being perceived as a more sustainable or healthier alternative to meat, aligning with pro-environmental or health-conscious attitudes. Also, viewing meat and fish as substitutable sources of animal protein, individuals who consume more fish might eat less meat. This potential substitution effect could explain why fish consumers may be more receptive to policies targeting meat reduction, as their dietary preferences

might already align with the intended policy outcomes. Overall, these findings are in line with research on meat consumption, which similarly identifies resistance to reduction linked to cultural, personal, and social factors such as habits and pleasure or taste (Macdiarmid et al. 2015; Graça et al. 2015a; Kmeťková et al. 2023).

Policy Implications

When considering policy interventions, taxes emerge as a controversial yet potentially effective tool in shaping dietary behaviours. Despite public resistance, well-designed meat taxes can significantly influence consumption patterns (OECD 2023; Pineda et al. 2024). Effective communication and framing of policies are essential for public acceptance (Fesenfeld 2023). Clearly explaining revenue allocation, such as funding environmental projects, could increase support in the case of carbon pricing (Klenert et al. 2018) and beef carbon tax (Yang et al. 2024). Transparency in revenue use, including directing funds to low-income households or animal welfare initiatives, can also enhance acceptability (Klenert and Mattauch 2016; Funke et al. 2022). Complementary measures, such as discounts on plant-based meals and information campaigns, may garner more public support (Fesenfeld et al. 2020; Pineda et al. 2024). Research also indicates that meat taxes in Europe can be designed to avoid overburdening low-income consumers (Klenert et al. 2023).

Policymakers can consider targeted strategies to address opposition from specific groups with lower odds of support. Enhancing the taste and variety of plant-based alternatives can be helpful for hedonism-oriented individuals. Addressing security concerns can involve promoting plant-based products with strict safety standards, emphasizing their role in food security in the context of climate change, and highlighting their reliability during crises. Messaging focused on affordability and highlighting the economic advantages of plant-based options, such as lower food costs compared to omnivorous diets (e.g., as shown by Pais et al. (2022) in Portugal), might engage price-conscious consumers. Emphasizing the health benefits of reducing meat consumption, such as managing chronic diseases and improving overall well-being, and advocating for policies where a meat tax is accompanied by subsidies on nutritious plant-based products can make healthier options more affordable and attractive to price-sensitive older individuals.

Despite the potential effectiveness of implementing higher tax rates on meat products to curb GHG emissions from the diet, some studies indicate that the impact may be modest. Simulation studies (Abadie et al. 2015; Bonnet et al. 2018; Edjabou and Smed 2013) reveal that even with measures like a high-level carbon tax on meat, the resulting reduction in GHG emissions from the diet typically falls below 10%. Similarly, a recent impact assessment report by (EC 2024) underscores that achieving a 10-30%⁹ reduction in the agricultural sector’s emissions by 2040, compared to 2015 levels, will be challenging.

Public scepticism about the link between meat consumption and climate change is one of the barriers. Many individuals underestimate the environmental impact of their diets (Vanhonacker et al. 2013; Lea and Worsley 2003; Tobler et al. 2011). Educational programs addressing both the health and environmental implications of meat consumption are essential. Studies (Jalil et al. 2020; Kwasny et al. 2021) demonstrate the effectiveness of education in reducing meat consumption and encouraging plant-based diets, although the generalizability of these findings (e.g. because of the studied population) requires further exploration.

⁹Depending on the ambitiousness of a scenario.

Behavioural interventions, such as nudging and choice architecture, offer additional avenues. Techniques like placing plant-based options at eye level, making them the default choice, using appealing descriptions (Rust et al. 2020), implementing ecolabels (Potter et al. 2021) or nutrition labelling (Ikonen et al. 2020) have shown potential. However, inconsistencies in label formats and limited evidence of their effectiveness require further research (Ikonen et al. 2020). Integrating these strategies with systemic changes, coupled with educational programs on vegetarian cooking and shopping (Kwasny et al. 2021), could further encourage reduced meat consumption.

Overall, combining fiscal policies with educational campaigns, behavioural interventions, and systemic changes has the potential to influence dietary behaviours. Policy-makers must account for diverse consumer preferences, particularly across demographic groups, and consider culturally sensitive approaches when designing meat-related policies in Europe.

Limitations

One of the limitations of our study is its reliance on cross-sectional data, which limits our ability to determine causality between variables. While cross-sectional data provide a snapshot of the population at a specific point in time, they cannot capture changes and developments over time. Longitudinal data, on the other hand, would have enabled us to track individuals' support for meat policies over an extended period, facilitating the exploration of temporal trends and changes in opinions and consumption patterns. This would have offered a more comprehensive understanding of how opinions about meat policies evolve over time, providing valuable insights into the dynamics of dietary behaviours.

Another limitation is the reliance on self-reported data for calculating meat and fish consumption. While widely used, self-reported dietary assessments are prone to inaccuracies, often underestimating actual intake levels (Cleghorn et al. 2016; Bedard et al. 2004). To mitigate this issue, we employed the validated SFFFQ developed by Cleghorn et al. (2016), which has been shown to improve the accuracy of dietary assessments. However, the potential for underreporting remains a concern and should be considered when interpreting the results.

Additionally, since vegetarians were excluded, our findings primarily reflect the perspectives of the non-vegetarian population, which may differ in their policy preferences compared to vegetarians or vegans. That being said, vegetarians and vegans do not participate in meat consumption and thus do not contribute to the problem addressed by the policy. Consequently, their exclusion might not significantly impact the study's outcomes. However, including them in future research could provide a broader understanding of societal acceptability, as it is likely that vegetarians and vegans would be more supportive of these policies. Therefore, expanding surveys to include vegetarians and vegans is recommended to capture a more comprehensive view of public opinion.

Moreover, our study did not provide detailed descriptions of the policies, which may have influenced respondents' levels of support. Also, we explore public support for policies before implementation; however, empirical evidence suggests support can shift once policies are enacted. Research indicates that perceptions of policy measures, such as TAX or noSUBS, can change when people encounter the real-world impacts of these policies (Fesefeld et al. 2020). Therefore, while our study provides initial insights, the evolving nature of public opinion emphasizes the importance of continuous assessment and adjustment of policies to ensure their effectiveness and alignment with societal preferences.

6 Conclusion

Our study provides a valuable understanding of public support for policies aimed at reducing meat consumption, particularly through the implementation of meat taxes and the discontinuation of meat subsidies. Despite the potential effectiveness of these interventions in promoting healthier and more sustainable dietary behaviours, our findings reveal nuanced challenges and considerations for policymakers.

We identify the socio-economic, demographic, and value-based factors that correlate with greater support for meat-reduction policies among meat-eaters. Income and education are often assumed to play pivotal roles in shaping attitudes toward policies, particularly fiscal ones like taxes and subsidies. The insignificance of these variables in our study challenges this narrative, suggesting that values or regional differences may be more predictive of policy acceptability. Cross-country variations were evident, indicating a need for tailored approaches to policy implementation across different regions. Education and gender did not emerge as significant predictors, while age played a notable role, with older individuals exhibiting a decreasing likelihood of support for both policies. Tailoring communication based on values, such as environmental benefits or cost savings, could be more effective in shaping public opinion.

By identifying value systems that influence policy support, this research bridges a critical gap in sustainable food policy design. Environmental values and egoistic tendencies were found to increase the odds of support for meat taxes and subsidy cessation, suggesting the importance of framing these interventions within broader environmental and health narratives. Conversely, security concerns and hedonic values decreased the likelihood of support, emphasizing the need for targeted messaging to address perceived barriers.

While cross-sectional data provide some insights, longitudinal studies are needed to capture changes in opinions and behaviours over time. Further, experimental research is necessary to assess whether framing the issue and emphasizing the benefits of interventions could increase the acceptability of effective but unpopular policies.

Policymakers must carefully consider the diverse needs and preferences of different consumer groups and continually assess and adjust policy measures to maintain their efficacy and alignment with societal preferences. Drawing on our findings, they can identify groups less inclined to support meat policies. This understanding enables the development of tailored and effective strategies that align more closely with the opinions and behaviours of diverse demographic groups across Europe.

Abbreviations

AIC Akaike Information Criterion

BIC Bayesian Information Criterion

CZ Czech Republic

DK Do not know or prefer not to respond

ES Spain

EU European Union

FAO Food and Agricultural Organization

FF Food Factors

GHG Greenhouse Gas

GOLM Generalized Ordered Logit Model

LV Latvia

MNLM Multinomial Logit Model

MP Meat Policies

MVOLM Multivariate Ordered Logit Model

noSUBS Meat Subsidy Removal

OLM Ordered Logit Model

OR Odds Ratio

PPS Purchasing Power Standard

PPOM Partial Proportional Odds Model

PT Portugal

SFFFQ Short-Form Food Frequency Questionnaire

TAX Meat Tax Introduction

UK United Kingdom

VAT Value Added Tax

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Competing interests

The authors declare that they have no competing interests.

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A Supplementary Information

A.1 Figures

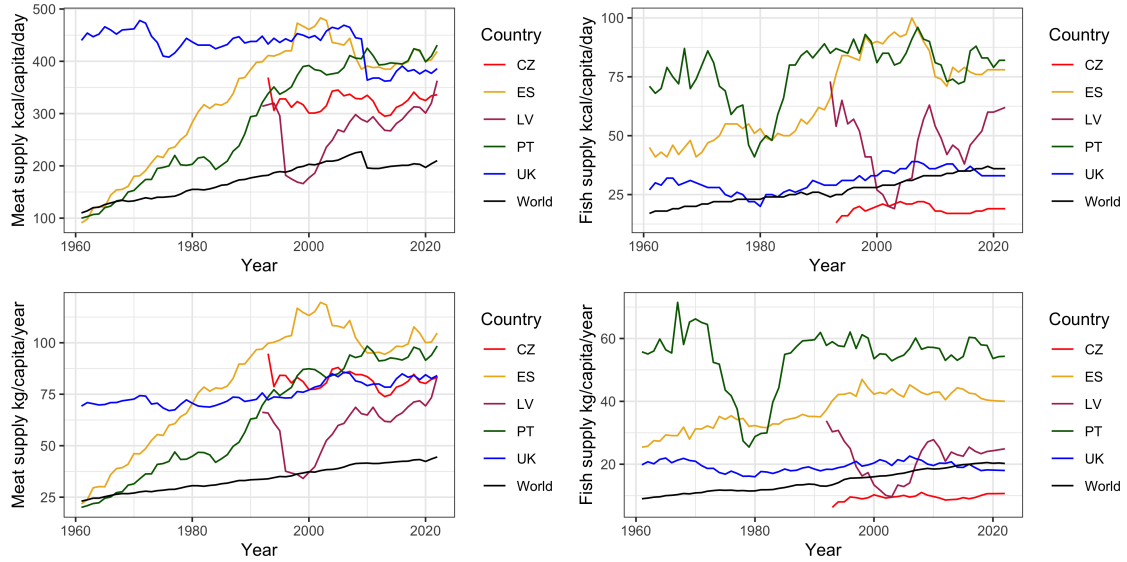


Figure A.1: Long-run trends in meat (left) and fish and seafood (right) supply expressed in kcal/capita/day (top) and kg/capita/year (bottom) by country from 1960 (if applicable) until 2022. Created by authors using data from FAO (2024) for five European countries - Czech Republic (CZ), Spain (ES), Latvia (LV), Portugal (PT), United Kingdom (UK), and global average (World).

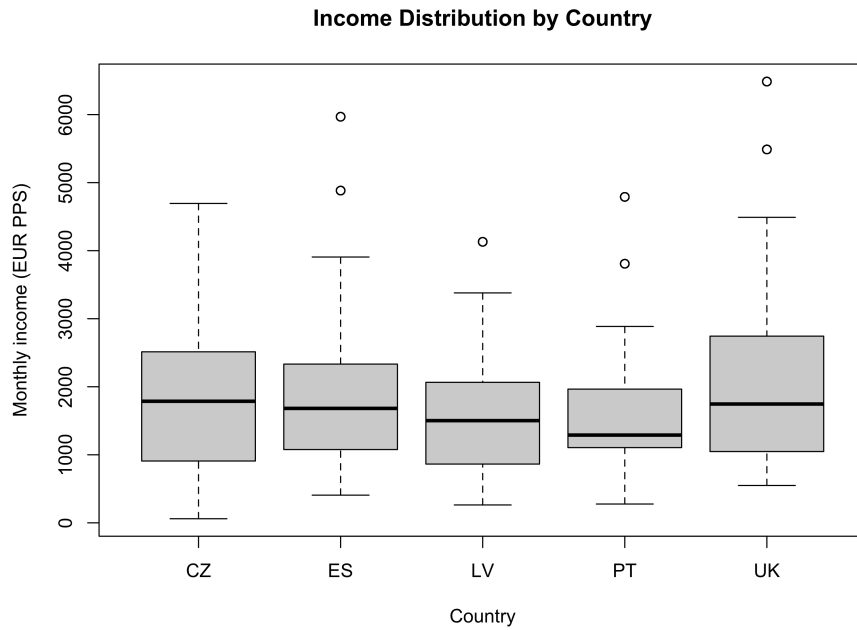


Figure A.2: Income distribution by country (adjusted by purchasing parity to PPS euros): Box Plot.

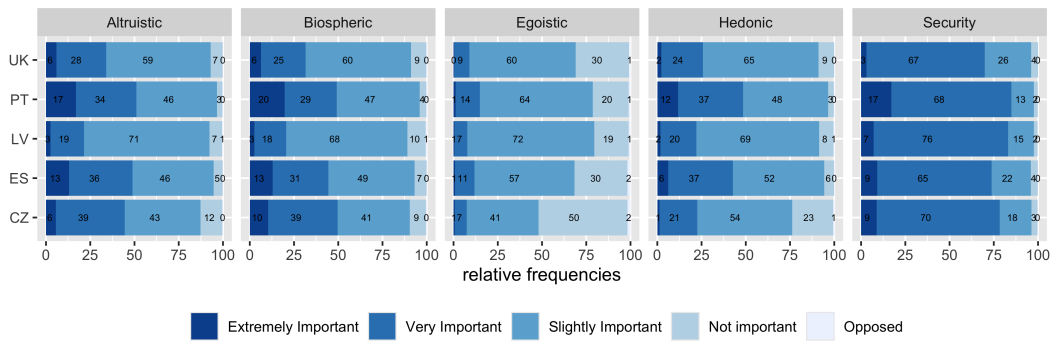


Figure A.3: Relative distribution of value variables by country.

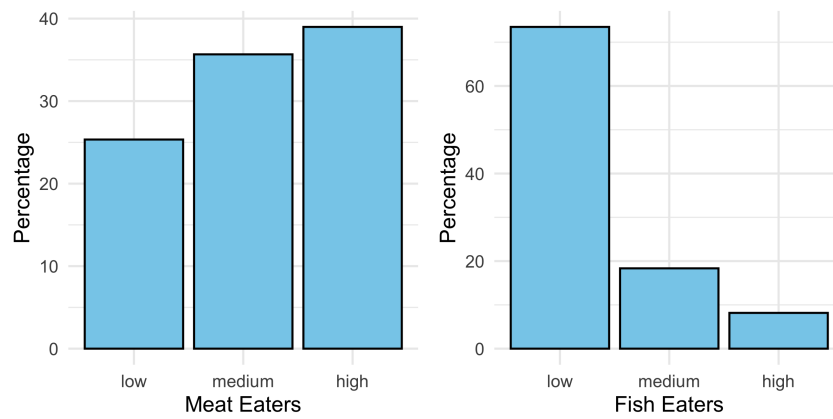


Figure A.4: Relative distribution of meat and fish eaters by consumption level - low (<50 g/day), moderate (50-100 g/day), high (> 100g/day).

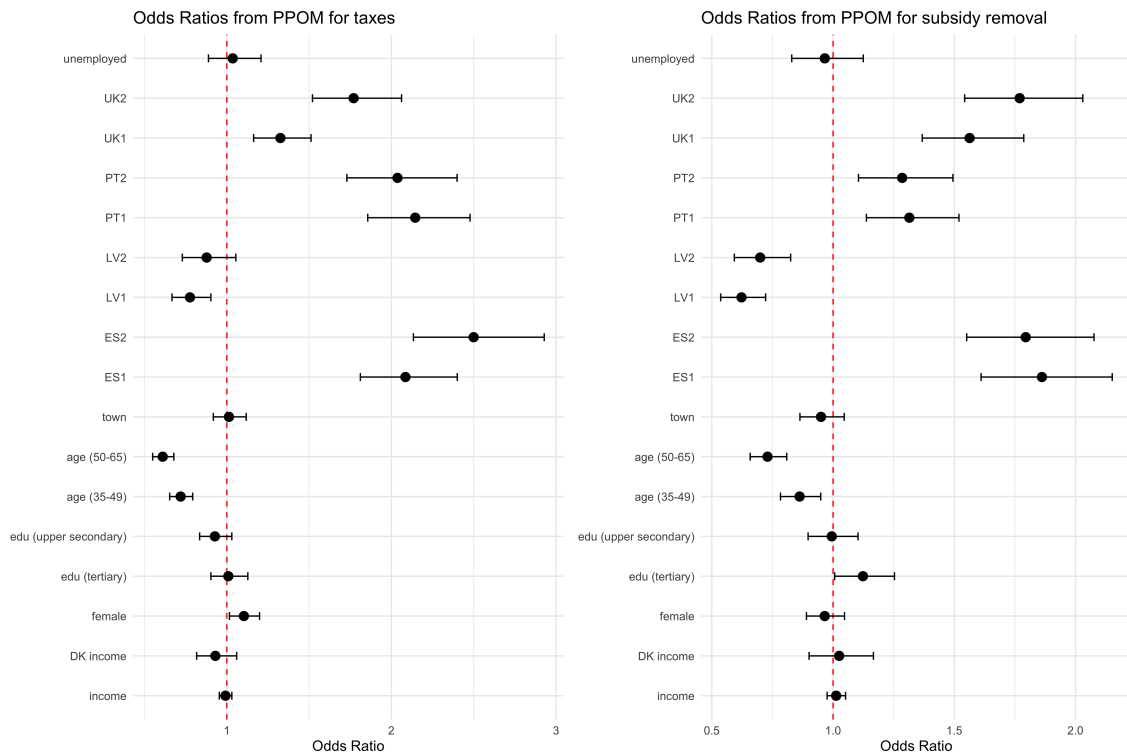


Figure A.5: Odds Ratios from PPOM regression for meat taxes (left) and meat subsidy removal (right). Model with socio-demographics only.

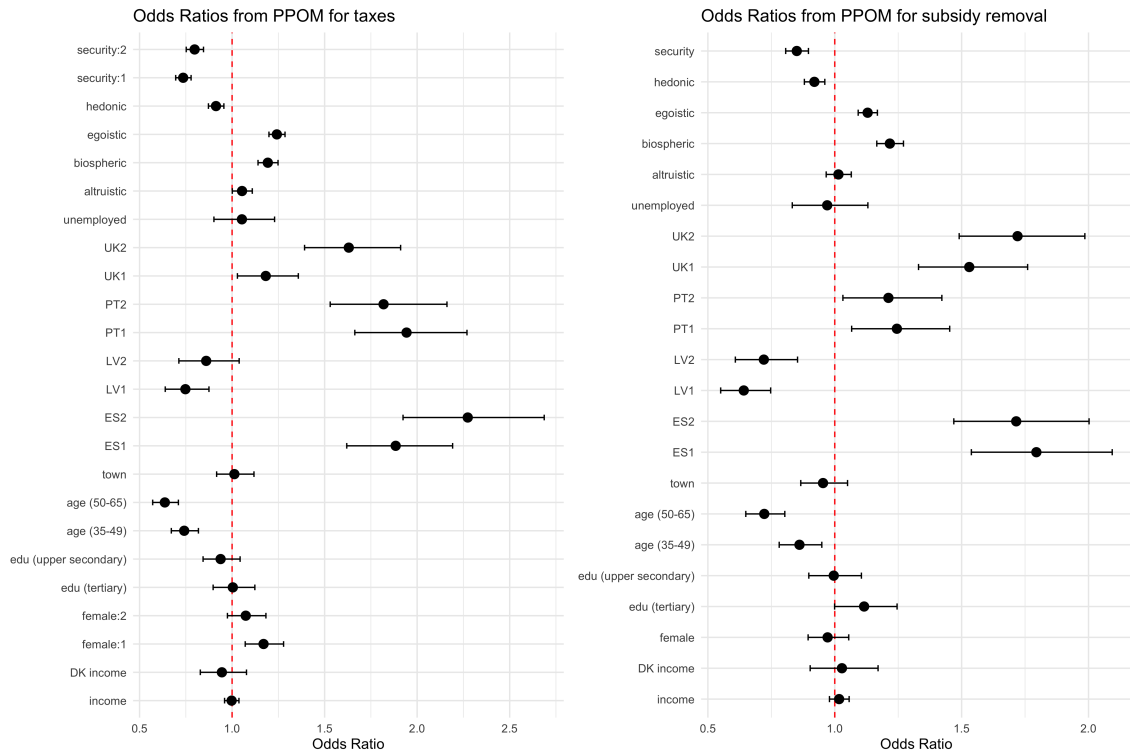


Figure A.6: Odds Ratios from PPOM regression for meat taxes (left) and meat subsidy removal (right). Model with socio-demographics and values.

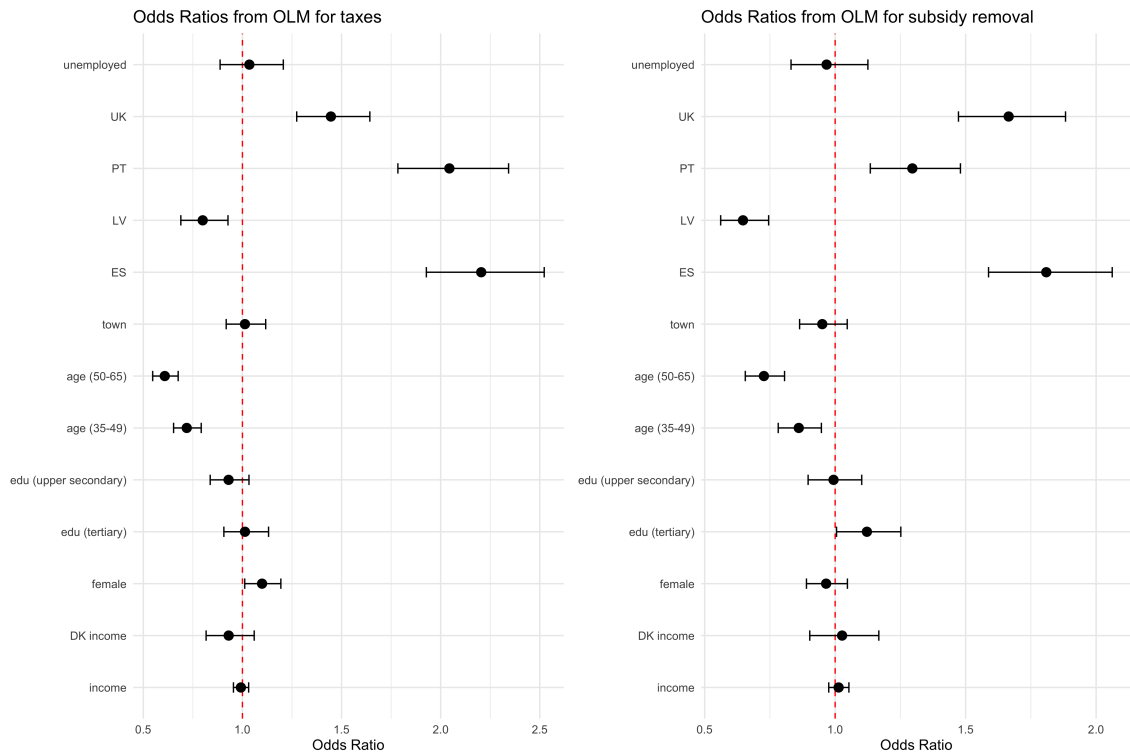


Figure A.7: Odds Ratios from OLM regression for meat taxes (left) and meat subsidy removal (right). Model with socio-demographics only.

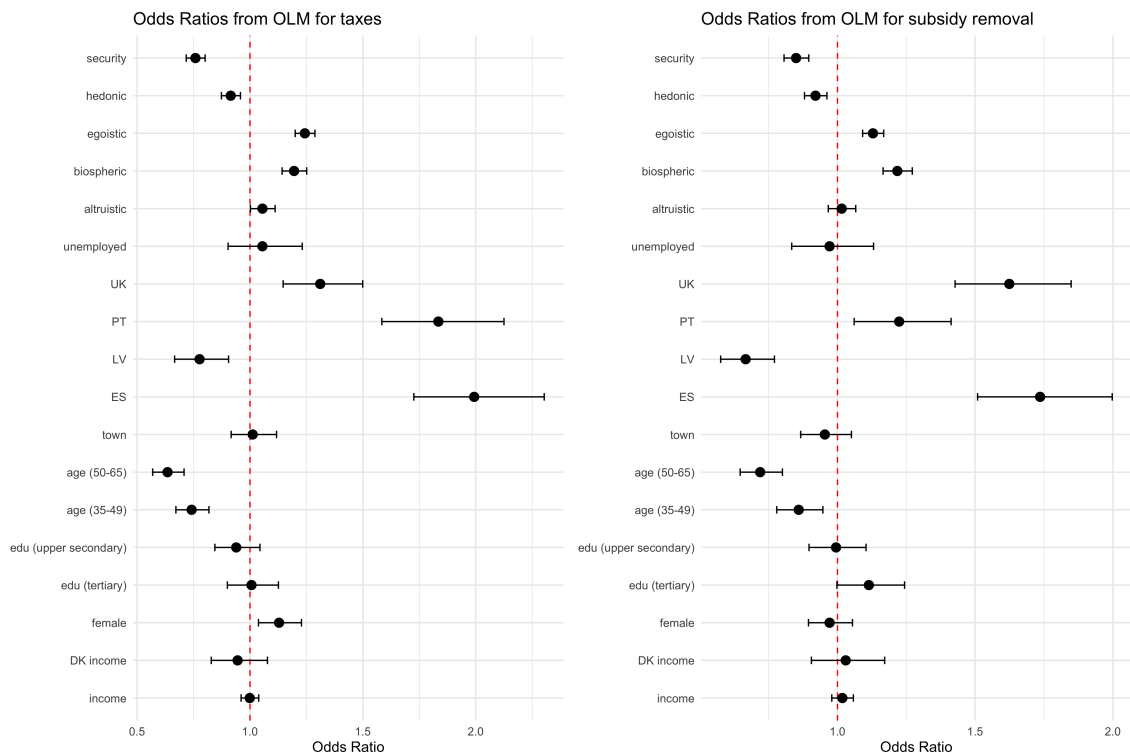


Figure A.8: Odds Ratios from OLM regression for meat taxes (left) and meat subsidy removal (right). Model with socio-demographics and values.

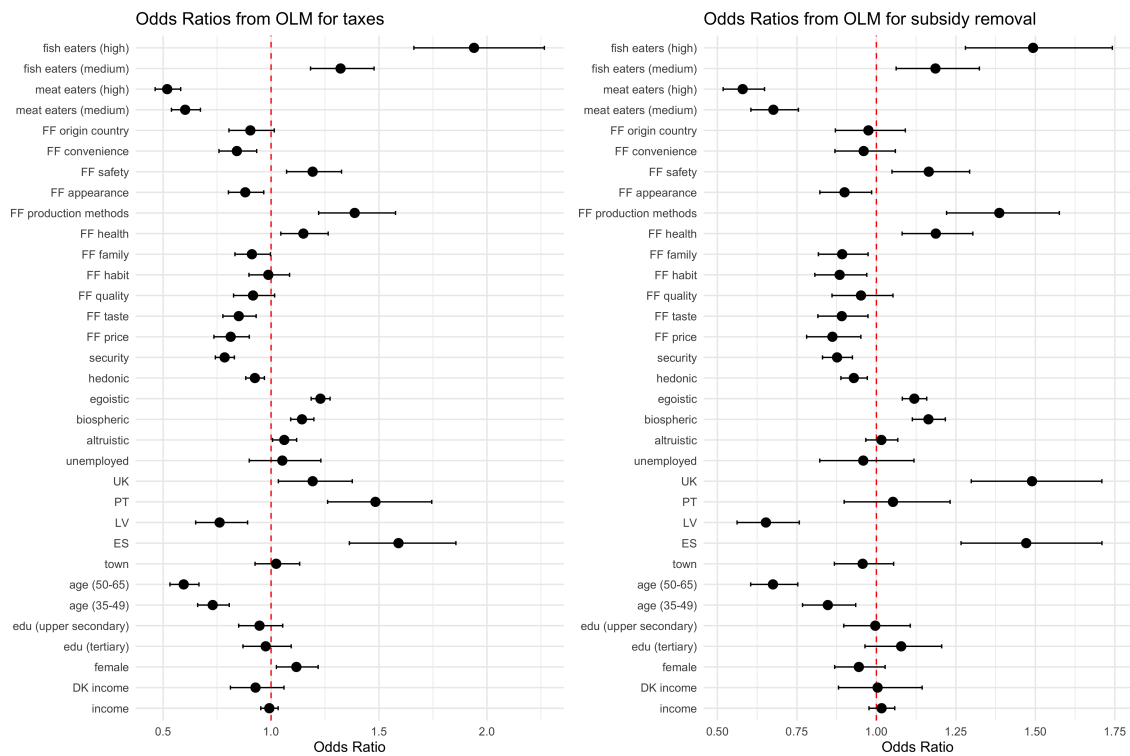


Figure A.9: Odds Ratios from OLM regression for meat taxes (left) and meat subsidy removal (right). Full Model.

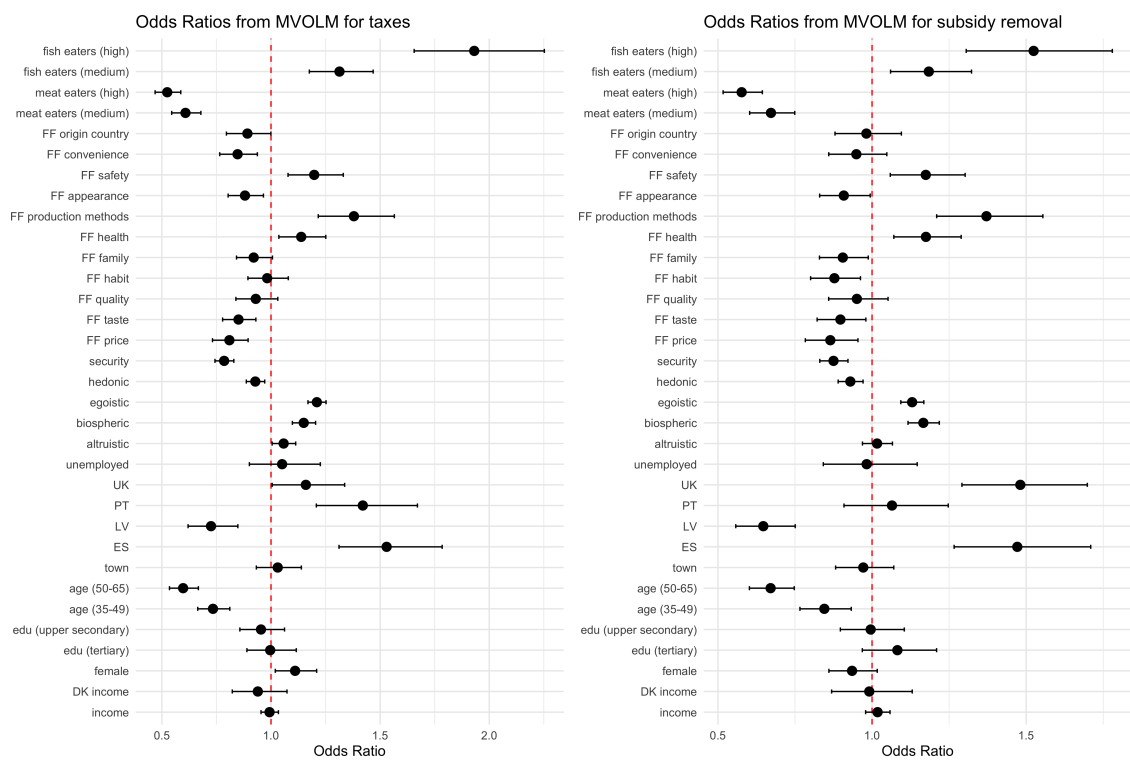


Figure A.10: Odds Ratios from MVOLM regression for meat taxes (left) and meat subsidy removal (right). Full Model.

A.2 Tables

Table A.1: The number of completed questionnaires in the pilot and the main wave, the number of excluded non-valid observations, and the final sample (excluding non-valid observations).

	Pilot	Main wave	Non-valid	Final sample
Czech Republic	212	1,926	119	2,019
Latvia	282	1,646	146	1,782
Portugal	246	1,584	172	1,658
Spain	323	1,964	220	2,067
United Kingdom	315	2,702	197	2,820
Total	1,378	9,822	854	10,346

Table A.2: Relative frequencies of respondents' opinions on the introduction of a meat tax and meat subsidy removal. DK stands for 'did not know' or 'did not want to answer'.

	DK	opposed	neutral	support
meat tax introduction	12	48	15	25
meat tax introduction		55	18	28
meat subsidy removal	16	35	18	31
meat subsidy removal		41	22	37

Table A.3: Summary of categorical and binary data used in the analysis, presenting both unconditional proportions (All) and conditional proportions for the Czech Republic (CZ), Spain (ES), Latvia (LV), Portugal (PT), and the United Kingdom (UK), expressed as percentages. The dataset consists of 10,070 observations.

Variable	Coding Name	All	CZ	ES	LV	PT	UK
Gender (binary)							
Female	female	51	51	50	54	47	54
Age (categorical)							
18-34 yrs	base	33	31	30	33	36	35
35-49 yrs	age_cat335-49 yrs	38	38	42	35	40	34
50-65 yrs	age_cat350-65 yrs	29	31	28	32	24	31
Education (categorical)							
Primary & lower secondary	base	30	43	39	9	38	21
Upper secondary	edu_cat3upper secondary	38	37	27	58	34	39
Tertiary	edu_cat3tertiary	32	20	34	33	28	40
Municipality size (binary)							
Town or City	town_cat2town	75	62	87	69	77	79
Economic factors (dummy variables)							
DK_income	DK_income	14	13	9	21	15	13
Unemployed	unemployed	8	3	16	6	11	6
Food factors (dummy variables)							
Price	FF.price	76	77	65	84	85	74
Taste	FF.taste	58	61	52	60	28	75
Quality	FF.quality	74	73	75	73	80	71
Habit	FF.habit	31	45	28	35	28	23
Family	FF.family	38	38	39	37	47	31
Health	FF.health	35	30	41	29	47	29
Production methods	FF.production.methods	14	9	16	14	18	16
Appearance	FF.appearance	55	69	52	62	60	42
Safety	FF.safety	24	14	30	27	33	20
Convenience	FF.convenience	25	26	22	25	15	32
Origin country	FF.origin.country	19	29	15	23	18	11
Meat eaters (categorical)							
Low	base	23	29	20	21	16	27
Medium	meat_eatersmedium	37	37	40	34	32	38
High	meat_eatershigh	40	33	39	45	52	35
Fish eaters (categorical)							
Low	base	73	93	55	87	49	76
Medium	fish_eatersmedium	19	5	30	10	33	18
High	fish_eatershigh	8	1	16	3	17	6

Table A.4: Summary statistics of continuous variables in the analysis. The dataset consists of 10,070 observations.

Variable	Coding Name	Unit	mean	sd	min	max	imputed
Income	inc.1000	1,000 EUR	1.86	1.16	0.06	6.49	1384
Altruistic	altru	9-point scale	4.84	1.36	-1	7	2733
Biospheric	biosph	ranging from 7	4.78	1.43	-1	7	2742
Egoistic	egoist	(of supreme importance)	3.02	1.36	-1	7	2747
Hedonic	hedon	to 0 (not important)	4.45	1.33	-1	7	2749
Security	secur	-1 (opposed to my values)	5.26	1.19	-1	7	2730

Table A.5: Distribution of segmentation and categorical explanatory variables by meat policy (MP) clusters. The last column shows the p-value of the Chi-square test for the association between each variable and MP clusters.

Variable	Strong Opponents	Mixed Neutrals	Strong Supporters	p-value
Meat tax introduction				<0.001
Opposed	3006 (68%)	1426 (32%)	0 (0%)	
Neutral	221 (15%)	1282 (85%)	0 (0%)	
Support	0 (0%)	0 (0%)	2387 (100%)	
Meat subsidy removal				<0.001
Opposed	3227 (93%)	0 (0%)	226 (6.5%)	
Neutral	0 (0%)	1553 (86%)	249 (14%)	
Support	0 (0%)	1155 (38%)	1912 (62%)	
Income				0.416
Stated	2833 (39%)	2390 (33%)	2123 (29%)	
Not stated	394 (40%)	318 (33%)	264 (27%)	
Gender				0.088
Male	1690 (40%)	1396 (33%)	1180 (28%)	
Female	1537 (38%)	1312 (32%)	1207 (30%)	
Education				<0.001
Primary & lower secondary	899 (38%)	791 (33%)	692 (29%)	
Tertiary	1003 (37%)	868 (32%)	847 (31%)	
Upper secondary	1325 (41%)	1049 (33%)	848 (26%)	
Age				<0.001
18-34 yrs	953 (34%)	853 (31%)	962 (35%)	
35-49 yrs	1211 (39%)	1073 (34%)	832 (27%)	
50-65 yrs	1063 (44%)	782 (32%)	593 (24%)	
Type of residence				0.004
country	820 (41%)	680 (34%)	521 (26%)	
town	2407 (38%)	2028 (32%)	1866 (30%)	
Country				<0.001
CZ	698 (44%)	583 (37%)	312 (20%)	
ES	479 (28%)	556 (33%)	656 (39%)	
LV	763 (55%)	368 (27%)	247 (18%)	
PT	534 (37%)	439 (30%)	489 (33%)	
UK	753 (34%)	762 (35%)	683 (31%)	
Unemployed				0.084
No	2987 (39%)	2502 (33%)	2173 (28%)	
Yes	240 (36%)	206 (31%)	214 (32%)	
Food factors				
Price	2588 (41%)	2046 (32%)	1698 (27%)	<0.001
Taste	1958 (41%)	1574 (33%)	1282 (27%)	<0.001
Quality	2420 (39%)	2053 (33%)	1799 (29%)	0.766
Habit	1142 (44%)	783 (30%)	684 (26%)	<0.001
Family	1304 (41%)	1009 (32%)	852 (27%)	0.001
Health	1005 (34%)	975 (33%)	971 (33%)	<0.001
Production methods	349 (29%)	385 (32%)	467 (39%)	<0.001
Appearance	1927 (41%)	1580 (34%)	1197 (25%)	<0.001
Safety	713 (35%)	649 (31%)	704 (34%)	<0.001
Convenience	877 (42%)	699 (34%)	503 (24%)	<0.001
Origin country	643 (40%)	512 (32%)	453 (28%)	0.539
Meat eaters				<0.001
Low	579 (31%)	593 (32%)	686 (37%)	
Medium	1181 (39%)	1040 (34%)	818 (27%)	
High	1467 (43%)	1075 (31%)	883 (26%)	
Fish eaters				<0.001
Low	2483 (42%)	1973 (33%)	1486 (25%)	
Medium	555 (34%)	519 (32%)	558 (34%)	
High	189 (25%)	216 (29%)	343 (46%)	

Table A.6: Mean (standard deviation) of continuous explanatory variables by meat policy (MP) clusters. The last column shows the p-value of the Kruskal-Wallis test for the association between each variable and MP clusters.

Variable	Coding Name	Strong Opponents	Mixed Neutrals	Strong Supporters	p-value
Income	inc.1000	1.87 (1.16)	1.92 (1.14)	1.93 (1.23)	0.118
Altruistic	altru	4.79 (1.39)	4.84 (1.33)	4.96 (1.34)	<0.001
Biospheric	biosph	4.68 (1.49)	4.82 (1.38)	4.96 (1.39)	<0.001
Egoistic	egoist	2.95 (1.33)	2.94 (1.31)	3.32 (1.41)	<0.001
Hedonic	hedon	4.48 (1.36)	4.40 (1.30)	4.58 (1.31)	<0.001
Security	secur	5.36 (1.16)	5.26 (1.16)	5.21 (1.24)	<0.001

Table A.7: PPOM results on respondent opinions regarding the introduction of a meat tax, categorized as opposed (base category), neutral, or supportive. Full Model.

	Coef	SE	OR	p value
(Intercept):1	0.86	0.15	2.37	0.00
(Intercept):2	-0.50	0.15	0.61	0.00
income	-0.01	0.02	0.99	0.66
DK_income	-0.07	0.07	0.93	0.29
female:1	0.14	0.05	1.16	0.00
female:2	0.07	0.05	1.07	0.18
edu (tertiary)	-0.03	0.06	0.97	0.61
edu (upper secondary)	-0.06	0.06	0.94	0.30
age (35-49)	-0.32	0.05	0.73	0.00
age (50-65)	-0.52	0.06	0.60	0.00
town	0.02	0.05	1.02	0.66
ES:1	0.42	0.08	1.52	0.00
ES:2	0.58	0.09	1.78	0.00
LV:1	-0.30	0.08	0.74	0.00
LV:2	-0.19	0.10	0.82	0.05
PT:1	0.45	0.09	1.57	0.00
PT:2	0.39	0.10	1.47	0.00
UK:1	0.09	0.08	1.09	0.24
UK:2	0.35	0.09	1.42	0.00
unemployed	0.05	0.08	1.05	0.54
altruistic	0.06	0.03	1.06	0.03
biospheric	0.13	0.02	1.14	0.00
egoistic	0.20	0.02	1.23	0.00
hedonic	-0.08	0.02	0.92	0.00
security:1	-0.27	0.03	0.76	0.00
security:2	-0.19	0.03	0.82	0.00
FF.price	-0.21	0.05	0.81	0.00
FF.taste:1	-0.20	0.05	0.82	0.00
FF.taste:2	-0.10	0.05	0.91	0.07
FF.quality	-0.09	0.05	0.91	0.09
FF.habit	-0.02	0.05	0.98	0.75
FF.family	-0.10	0.05	0.91	0.03
FF.health	0.14	0.05	1.15	0.00
FF.production.methods	0.33	0.07	1.39	0.00
FF.appearance:1	-0.08	0.05	0.92	0.09
FF.appearance:2	-0.20	0.05	0.82	0.00
FF.safety:1	0.12	0.06	1.13	0.03
FF.safety:2	0.26	0.06	1.29	0.00
FF.convenience	-0.17	0.05	0.84	0.00
FF.origin.country	-0.10	0.06	0.90	0.09
meat eaters (medium)	-0.50	0.06	0.60	0.00
meat eaters (high)	-0.65	0.06	0.52	0.00
fish eaters (medium)	0.28	0.06	1.32	0.00
fish eaters (high)	0.65	0.08	1.92	0.00
Log-likelihood	-8203.933			

Note: XXX:1 represents the comparison between being opposed and being neutral or supportive, while XXX:2 compares being opposed or neutral versus being supportive.

Table A.8: PPOM results on respondents' opinions regarding the removal of meat subsidies, categorized as opposed (base category), neutral, or supportive. Full Model.

	Coef	SE	OR	p value
(Intercept):1	1.02	0.14	2.78	0.00
(Intercept):2	-0.28	0.14	0.76	0.05
income	0.02	0.02	1.02	0.42
DK_income	0.00	0.07	1.00	0.97
female	-0.06	0.04	0.94	0.18
edu (tertiary)	0.08	0.06	1.08	0.17
edu (upper secondary)	-0.00	0.05	1.00	0.97
age (35-49)	-0.16	0.05	0.85	0.00
age (50-65)	-0.39	0.06	0.68	0.00
town	-0.04	0.05	0.96	0.37
ES:1	0.45	0.08	1.56	0.00
ES:2	0.34	0.08	1.40	0.00
LV:1	-0.45	0.08	0.64	0.00
LV:2	-0.38	0.09	0.69	0.00
PT:1	0.12	0.09	1.12	0.18
PT:2	-0.01	0.09	0.99	0.90
UK:1	0.35	0.08	1.42	0.00
UK:2	0.44	0.08	1.55	0.00
unemployed	-0.04	0.08	0.96	0.60
altruistic	0.01	0.03	1.01	0.58
biospheric	0.15	0.02	1.16	0.00
egoistic	0.11	0.02	1.12	0.00
hedonic:1	-0.11	0.02	0.89	0.00
hedonic:2	-0.03	0.02	0.97	0.27
security	-0.13	0.03	0.87	0.00
FF.price	-0.15	0.05	0.86	0.00
FF.taste	-0.12	0.05	0.89	0.01
FF.quality	-0.05	0.05	0.95	0.34
FF.habit	-0.13	0.05	0.88	0.01
FF.family	-0.12	0.04	0.89	0.01
FF.health	0.17	0.05	1.19	0.00
FF.production.methods	0.32	0.07	1.38	0.00
FF.appearance:1	-0.06	0.05	0.94	0.20
FF.appearance:2	-0.15	0.05	0.86	0.00
FF.safety	0.15	0.05	1.16	0.00
FF.convenience	-0.04	0.05	0.96	0.43
FF.origin.country:1	-0.10	0.06	0.91	0.12
FF.origin.country:2	0.06	0.06	1.06	0.35
meat eaters (medium)	-0.39	0.06	0.68	0.00
meat eaters (high)	-0.54	0.06	0.58	0.00
fish eaters (medium)	0.17	0.06	1.18	0.00
fish eaters (high)	0.40	0.08	1.49	0.00
Log-likelihood	-8632.313			

Note: XXX:1 represents the comparison between being opposed and being neutral or supportive, while XXX:2 compares being opposed or neutral versus being supportive.

Table A.9: OLM results on respondents' opinions regarding the introduction of a meat tax and the removal of meat subsidies, categorized as opposed (base category), neutral, or in support. Full Model.

	meat tax	meat subsidy removal
income	−0.008 (0.021)	0.016 (0.020)
DK.income	−0.075 (0.068)	0.004 (0.067)
female	0.111** (0.044)	−0.057 (0.043)
edu (tertiary)	−0.025 (0.058)	0.075 (0.057)
edu (upper secondary)	−0.055 (0.055)	−0.004 (0.053)
age (35-49)	−0.315*** (0.051)	−0.166*** (0.050)
age (50-65)	−0.519*** (0.058)	−0.393*** (0.056)
town	0.023 (0.051)	−0.044 (0.050)
ES	0.464*** (0.079)	0.386*** (0.077)
LV	−0.272*** (0.080)	−0.427*** (0.076)
PT	0.394*** (0.083)	0.051 (0.080)
UK	0.176** (0.073)	0.398*** (0.070)
unemployed	0.051 (0.080)	−0.042 (0.079)
altruistic	0.059** (0.027)	0.016 (0.025)
biospheric	0.134*** (0.024)	0.152*** (0.023)
egoistic	0.206*** (0.018)	0.113*** (0.018)
hedonic	−0.078*** (0.024)	−0.074*** (0.023)
security	−0.242***	−0.132***
<i>Note:</i> *p<0.1; **p<0.05; ***p<0.01		

Table A.10: OLM results on respondents' opinions regarding the introduction of a meat tax and the removal of meat subsidies, categorized as opposed (base category), neutral, or in support. Full Model. Continued.

	meat tax	meat subsidy removal
	(0.029)	(0.027)
FF.price	-0.207***	-0.149***
	(0.051)	(0.050)
FF.taste	-0.162***	-0.115**
	(0.046)	(0.045)
FF.quality	-0.087*	-0.050
	(0.053)	(0.051)
FF.habit	-0.013	-0.123***
	(0.049)	(0.047)
FF.family	-0.093**	-0.114**
	(0.046)	(0.045)
FF.health	0.139***	0.171***
	(0.049)	(0.048)
FF.production.methods	0.327***	0.327***
	(0.065)	(0.065)
FF.appearance	-0.127***	-0.105**
	(0.047)	(0.046)
FF.safety	0.176***	0.152***
	(0.054)	(0.053)
FF.convenience	-0.173***	-0.041
	(0.053)	(0.051)
FF.origin.country	-0.101*	-0.025
	(0.059)	(0.058)
meat eaters (medium)	-0.508***	-0.392***
	(0.057)	(0.056)
meat eaters (high)	-0.656***	-0.546***
	(0.058)	(0.057)
fish eaters (medium)	0.279***	0.170***
	(0.057)	(0.056)
fish eaters (high)	0.663***	0.401***
	(0.079)	(0.079)
Observations	8,868	8,505

Note:

*p<0.1; **p<0.05; ***p<0.01

Table A.11: Odds ratios and significance of estimates from the MNLM regression on respondents' support for the introduction of a meat tax and the removal of meat subsidies, categorized as opposed, neutral (base category), in support, or DK (do not know). Model with socio-demographics only.

	Meat tax			Meat subsidy removal		
	Opposed	Support	DK	Opposed	Support	DK
(Intercept)	3.0059***	1.2837.	0.8294	1.904***	1.5544***	0.8427
income	1.0159	1.0056	0.9199*	1.0259	1.038	0.9129*
DK_income	1.0603	0.9562	2.143***	0.9457	0.9543	2.0198***
female	0.8418**	0.9275	1.3934***	0.9345	0.892.	1.4938***
edu (tertiary)	1.0738	1.1074	0.5878***	0.983	1.1258	0.6084***
edu (upper secondary)	1.0418	0.9465	0.6786***	1.0066	0.9988	0.7065***
age (35-49)	1.1125	0.7292***	1.1728.	0.9924	0.8159**	1.14
age (50-65)	1.4059***	0.7883**	1.3571**	1.2147**	0.8266*	1.2231*
town	1.0083	1.0383	0.9725	1.0171	0.9567	0.9907
ES	0.6992***	1.8926***	0.9054	0.6527***	1.3726***	0.9047
LV	1.3725**	1.1224	1.4517**	1.5974***	0.9787	1.6245***
PT	0.5381***	1.3013*	0.4257***	0.82*	1.13	0.4906***
UK	1.0945	1.8643***	1.0159	0.8547.	1.5805***	1.1363
unemployed	0.9833	1.0261	1.0958	1.0203	0.967	0.9695

Note:

*p<0.1; **p<0.05; ***p<0.01

Table A.12: Odds ratios and significance of estimates from the MNLM regression on respondents' support for the introduction of a meat tax and the removal of meat subsidies, categorized as opposed, neutral (base category), in support, or DK (do not know). Model with socio-demographics and values.

	Meat tax			Meat subsidy removal		
	Opposed	Support	DK	Opposed	Support	DK
(Intercept)	1.5509**	0.7068.	0.912	1.1733	0.8143	0.9774
income	1.0013	0.9934	0.9188*	1.0104	1.0282	0.9135*
DK_income	1.0381	0.9549	2.1374***	0.9311	0.9517	2.023***
female	0.8112***	0.9289	1.3936***	0.9209	0.885*	1.4937***
edu (tertiary)	1.0651	1.0866	0.592***	0.9727	1.1094	0.6109***
edu (upper secondary)	1.0193	0.9325	0.6786***	0.9886	0.9828	0.7033***
age (35-49)	1.0872	0.7386***	1.18.	0.9971	0.8235**	1.1481
age (50-65)	1.3393***	0.7911**	1.365**	1.2185*	0.8267*	1.2301*
town	1.0055	1.0336	0.9732	1.0097	0.949	0.989
ES	0.745**	1.8041***	0.9187	0.6381***	1.2817*	0.8809
LV	1.4087**	1.1103	1.4335**	1.5268***	0.9701	1.609***
PT	0.5509***	1.1791	0.4358***	0.7734*	0.9966	0.4855***
UK	1.2138*	1.8444***	1.0196	0.8643	1.559***	1.1104
unemployed	0.9832	1.045	1.0981	1.0275	0.9752	0.9674
altruistic	0.9387.	0.9906	1.0204	0.966	0.9813	1.0347
biospheric	0.9033**	1.1231**	0.9215.	0.9077**	1.1578***	0.9535
egoistic	0.8918***	1.1571***	0.9725	0.9605.	1.1133***	0.9441.
hedonic	1.0867**	0.9753	1.0067	1.116***	1.0082	1.0382
security	1.3199***	0.9612	1.0472	1.1664***	0.9511	0.9861

Note:

*p<0.1; **p<0.05; ***p<0.01

Table A.13: Odds ratios and significance of estimates from the MNLM regression on respondents' support for the introduction of a meat tax and the removal of meat subsidies, categorized as opposed, neutral (base category), in support, or DK (do not know). Full Model.

	Meat tax			Meat subsidy removal		
	Opposed	Support	DK	Opposed	Support	DK
(Intercept)	0.8465	1.0493	1.0262	0.8049	1.2997	1.1051
income	0.9962	0.976	0.9432	1.0101	1.0236	0.9352.
DK_income	1.0345	0.9231	2.2049***	0.9345	0.9289	2.0821***
female	0.8159**	0.9166	1.4104***	0.9372	0.8711*	1.5173***
edu (tertiary)	1.0877	1.0737	0.6253***	0.9916	1.098	0.6376***
edu (upper secondary)	1.0083	0.937	0.6934***	0.9857	0.9907	0.7209***
age (35-49)	1.0906	0.724***	1.1989.	1.0037	0.8143**	1.1563.
age (50-65)	1.3948***	0.7602**	1.4562***	1.2672**	0.7984**	1.2909**
town	0.9866	1.0286	0.9981	1.0066	0.9515	1.0162
ES	0.8656	1.5822***	0.9725	0.7486**	1.2093.	0.9761
LV	1.3986**	1.0634	1.4448**	1.553***	0.949	1.6621***
PT	0.6443***	1.0613	0.4814***	0.8971	0.951	0.5533***
UK	1.2418*	1.6555***	0.9603	0.9273	1.493***	1.1048
unemployed	0.9678	1.0402	1.0909	1.019	0.9681	0.9665
altruistic	0.9316.	0.9875	1.0138	0.9637	0.9799	1.0279
biospheric	0.9212*	1.0897*	0.9497	0.9235*	1.1201***	0.9757
egoistic	0.8922***	1.1449***	0.9713	0.9621	1.1072***	0.9437.
hedonic	1.0782*	0.9809	1.0157	1.1134***	1.0172	1.0507
security	1.2996***	0.9813	1.0654	1.1547***	0.9727	1.0067
FF.price	1.2333**	0.9659	1.019	1.1336.	0.9378	1.0132
FF.taste	1.3039***	1.0953	1.0819	1.1161.	0.9696	0.9676
FF.quality	1.0385	0.9403	0.7621**	1.0263	0.9741	0.8912
FF.habit	1.0434	1.0442	0.9438	1.1348.	0.982	1.0182
FF.family	1.1625*	1.058	1.1373	1.1156.	0.977	1.1235
FF.health	0.9208	1.0976	0.927	0.8713*	1.0835	0.8848
FF.production.methods	0.8214*	1.2047.	0.8291	0.8344.	1.2293*	0.826
FF.appearance	0.9256	0.7635***	0.7726**	0.9374	0.8188**	0.7552***
FF.safety	1.0224	1.2896**	0.9614	0.9799	1.1824*	0.912
FF.convenience	1.1585*	0.9431	0.9551	1.0014	0.9491	0.9366
FF.origin.country	1.226*	1.1181	0.957	1.235*	1.1931*	1.0724
meat eaters (medium)	1.3233***	0.7073***	0.825.	1.0721	0.6641***	0.8135*
meat eaters (high)	1.5164***	0.685***	0.8599	1.2796**	0.6599***	0.7752**
fish eaters (medium)	0.8345*	1.1667.	0.8113.	0.8316*	1.0245	0.8286.
fish eaters (high)	0.7012**	1.5666***	0.844	0.7265**	1.2009.	0.6663**

Note:

*p<0.1; **p<0.05; ***p<0.01

Table A.14: Comparative statistics for meat taxes - Akaike Information Criterion (AIC) and Log Likelihood.

Model	AIC			Log Likelihood		
	OLM	PPOM	MNLM	OLM	PPOM	MNLM
Model 1	17171.72	17132.45	24236.95	-8570.86	-8547.23	-12076.47
Model 2	16890.61	16831.37	23928.17	-8425.30	-8389.68	-11907.09
Full Model	16563.44	16495.86	23547.90	-8246.72	-8203.93	-11671.95

Table A.15: Comparative statistics for meat subsidy removal - Akaike Information Criterion (AIC) and Log Likelihood.

Model	AIC			Log Likelihood		
	OLM	PPOM	MNLM	OLM	PPOM	MNLM
Model 1	17763.71	17758.35	26117.87	-8866.86	-8860.18	-13016.93
Model 2	17605.73	17600.64	25917.01	-8782.86	-8776.32	-12901.50
Full Model	17383.90	17348.63	25659.73	-8656.95	-8632.31	-12727.87

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