CES ifo Working Papers

12520
2026

Original Version: March 2026
This Version: August 2026

Economic Exposure and Climate Policy Support

Inge van den Bijgaart, Jacob Jordaan, Tommaso Felici

CES ifo

Imprint:

CESifo Working Papers

ISSN 2364-1428 (digital)

Publisher and distributor: Munich Society for the Promotion
of Economic Research - CESifo GmbH

Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740

Email office@cesifo.de
https://www.cesifo.org

Editor: Clemens Fuest

An electronic version of the paper may be downloaded free of charge
· from the CESifo website: www.ifo.de/en/cesifo/publications/cesifo-working-papers
· from the SSRN website: www.ssrn.com/index.cfm/en/cesifo/
· from the RePEc website: https://ideas.repec.org/s/ces/ceswps.html

Economic Exposure and Climate Policy Support

Inge van den Bijgaart* Tommaso Felici Jacob A. Jordaan

August 11, 2026

Abstract

This paper quantifies the relationship between economic exposure to climate policies and climate policy support. We develop a stylised theoretical model to decompose exposure through income, energy spending and vehicle use, and identify consistent measures of these channels. Using detailed Dutch administrative data, we document substantial heterogeneity in exposure to climate policy, both across and within income groups. Combining these measures with survey data on climate policy support, we find that higher exposure is robustly associated with lower support for stronger climate policies across all three channels. This negative relationship holds even after accounting for a rich set of socio-demographic, municipality, and climate-belief controls. Further analysis reveals that high electricity rather than high natural gas spending is associated with reduced support, and vehicle fuel efficiency matters more for support than income-adjusted kilometres driven. Income exposure, proxied by the sectoral carbon-intensity of jobs, is particularly salient among older and lower-to-middle educated respondents. The estimated magnitudes are modest: a one-standard-deviation increase in any single exposure channel lowers the probability of support by at most two percentage points. Economic exposure thus emerges as a robust, theoretically grounded determinant of support, shifting it at the margin.

*Utrecht University School of Economics, Utrecht University, the Netherlands. Emails: i.m.vandenbijgaart@uu.nl (Inge van den Bijgaart), t.felici@uu.nl (Tommaso Felici, corresponding author), j.a.jordaan@uu.nl (Jacob A. Jordaan). Corresponding author: Tommaso Felici. We thank Bob Rijkers, Francesco Dalla Longa, Peter Mulder, Linus Mattauch, Theo Konc, Moritz Schwarz and participants at seminars at Utrecht University and TNO, 2025 EAERE Conference, 2025 DEARE Workshop, 2025 PACE Conference, 2026 CESifo Area Conference on Energy and Climate Economics, 14th Mannheim Conference on Energy and the Environment, and Bologna Workshop on the Behavioral Dimensions of Climate Change for their valuable comments and feedback. We further thank CBS for assistance with the data.

Keywords: Climate policy support, economic exposure, distributional effects, political economy, household administrative data, self-interest.
JEL Classification: D78, Q52, Q54, Q58

1 Introduction

Meeting climate targets requires the continued implementation of ambitious climate policies. While major economies such as the EU have articulated net-zero targets, implementing the necessary policies remains a significant challenge. A major hurdle is a lack of public support for such policies (Roberts, 2018; Douenne and Fabre, 2022; Goerg *et al.*, 2025). A well-known manifestation of this is the 2018 French yellow vest protests, which were triggered by a proposed fuel tax hike that was eventually cancelled (Willsher, 2018; Driscoll, 2023). More recently, the European Parliament has witnessed a loss of seats by Green parties (Tash, 2024), and EU farmers have protested against elements of the Green Deal (Abnett *et al.*, 2024).

The economic burdens of climate policies and how they are distributed are a key source of political unease (Forum, 2023; Guardian, 2023). These worries are not unfounded: households differ substantially in their economic exposure, with some groups disproportionately affected. In particular, while differences within income groups are substantial (Cronin *et al.*, 2019; Pizer and Sexton, 2019), low-income households tend to spend a larger share of their income on energy (Peñasco *et al.*, 2021; Shang, 2023; Hochmuth *et al.*, 2026), and are less likely to invest in energy-saving measures such as solar panels and heat pumps (Bigler and Radulescu, 2025; Borenstein and Davis, 2025), also due to potential liquidity constraints (Gerarden *et al.*, 2017). Further, the climate transition puts jobs in carbon-intensive sectors at risk (Weyl and Fabinger, 2013; Ganapati *et al.*, 2020; Calvacanti *et al.*, 2025), with older (Barreto *et al.*, 2024; OECD, 2024) and lower-educated (Consoli *et al.*, 2016; Yip, 2018) workers being particularly vulnerable, and less able to leave carbon-intensive industries due to limited outside options (Curtis *et al.*, 2024).

Despite this clear heterogeneity in exposure to climate policy, research on the determinants of climate policy support has largely focused on attitudinal factors such as climate beliefs and values, perceived fairness, trust in government or political ideology, rather than its economic burden (Holian and Kahn, 2015; Carattini *et al.*, 2017; Bergquist *et al.*, 2022; Köppl and Schratzenstaller, 2023). This paper aims to fill this gap by analysing how economic exposure affects support for a strengthening of climate policies. In other words: do highly-exposed households display lower support, and what type of exposure matters? As such, we provide relevant insights into how the anticipated impacts of climate policies may affect support for these policies to begin with.

To examine this relationship, we first develop a stylised model in which households derive utility from environmental quality and consumption across several goods. Using this model, we show that a strengthening of climate policy reduces utility, and thus support, the higher the share of income spent on goods whose prices rise as a result of the policy, and the greater are expected income losses. This identifies the shares of income spent on energy and personal vehicle transport and carbon intensity of labour income as the relevant determinants of exposure, which we adopt as our primary measures for energy, vehicle and job exposure, respectively. We compute these measures using Dutch administrative data, which we later combine with a 2023 survey on climate policy support with 18,327 respondents. The granularity of the administrative data enables us to further decompose the channels and provide a more nuanced understanding of how different forms of exposure shape public attitudes.

In line with the existing literature, our exposure measures exhibit substantial heterogeneity. In particular, energy and vehicle exposure vary across and within income deciles. For example, the median share of income spent on energy is close to 10% in the bottom income decile, and only 3.5% in the top decile. Within deciles, the variance in exposure is substantial, with the top spenders spending 2.5 to 3 times as much on energy as a share of income as the median in the respective income decile. Heterogeneities in the vehicle channel are both driven by higher levels of vehicle ownership among higher-income households (30% for the bottom decile vs approximately 80% for 6^{th}-10^{th} decile); and substantial heterogeneities in vehicle emissions within income deciles. For labour income (job) exposure, we document that older individuals and those with technical or vocational education tend to be employed in more emission-intensive sectors, whereas younger individuals and those with tertiary (college/university) education display lower exposure.

We find that all theory-consistent measures of economic exposure are negatively associated with support for a strengthening of climate policies. Among households with similar incomes, those that spend more on energy or emit more CO_2 through private transportation are less supportive. Similarly, individuals employed in carbon-intensive sectors exhibit lower support. These relationships persist after controlling for a rich set of controls, which include gender, age, education and climate beliefs, Further analysis provides additional insights. The effect of energy exposure is primarily driven by electricity consumption, while for vehicle exposure, fuel efficiency is the main determinant of support. Finally, the negative relationship between support and employment in the carbon-intensive industry is driven by older workers with intermediate levels of education. Overall, these patterns are consistent with self-interested preferences over climate policy: those who expect to bear a larger burden from stricter policies are less willing to support them.

While our results highlight that exposure is significantly associated with climate policy support in a statistical sense, they also indicate that the magnitude of these associations is modest: a one-standard-deviation increase in any single exposure channel lowers the probability of support by one to two percentage points at most. Differences in climate beliefs, by comparison, are associated with substantially larger differences in support. Economic exposure thus emerges as a robust and theoretically grounded correlate of climate policy support, even if quantitatively modest.

Our analysis adds to a small but growing literature that quantifies the economic correlates of climate policy support. Our main contribution is a more complete characterization of the economic determinants of climate policy support. Most existing work measures exposure through a single channel; where multiple channels are considered, data constraints have limited measurement to imperfect proxies, rather than the household-level budget shares and income risk that our theory identifies as the relevant proxies. Our rich administrative data allow us to construct these theory-consistent measures directly, and to decompose them, revealing which components of exposure matter most for support. This also avoids reporting bias that may affect survey-based measures, as individuals who oppose a policy may overstate their costs Schuitema *et al.* (2010).

Most of this literature considers only a single exposure channel. Epstein and Muehlegger (2024) study a California ballot initiative, and find that individuals were more likely to vote in favour of a repeal of gasoline taxes and vehicle fees if these taxes and fees imposed greater costs on their households. Using survey data from Sweden and Germany, Habla *et al.* (2025) find that those individuals who are more negatively affected by environmentally favourable transportation policies are more likely to oppose them. De Sario *et al.* (2023) and Cavallotti *et al.* (2025) assess the role of labour market exposure in various European countries, and identify a negative relationship between exposure and climate policy support. Notably, Douenne and Fabre (2022) find that support for a carbon tax in France is shaped not only by actual financial gains and losses, but also by households' beliefs about how the scheme would affect their budget, underscoring the relevance of perceived exposure.

To our knowledge, only Dechezleprêtre *et al.* (2025) consider multiple exposure channels. Using survey data spanning 20 countries and 40,000 respondents, their results on the relationship between support and exposure are mixed: while they identify negative correlations between self-reported vehicle usage, gasoline spending, and meat consumption on the one hand, and climate policy support on the other, no significant relationship is found for labour market exposure. Further, households that report high heating expenses are found to be *more* in support of climate policy. Our theoretical framework motivates two key differences relative to Dechezleprêtre *et al.* (2025): we define economic exposure in terms of budget shares rather than levels, and construct consistent exposure measures across energy, transport and labour-market channels, which our administrative data allow us to do in a way that survey-based data typically do not.

Our findings also reinforce insights from a related literature on the political consequences of climate policy. This literature in particular has identified a so-called 'green backlash' (Bosetti *et al.*, 2025), where citizens who have directly experienced the effects of (local) climate policies turn against the politicians who supported such policies and in favour of more extremist parties (Konradt and Mangiante, 2026). Examples are Egli *et al.* (2022) and Stutzmann (2024), who find increased right-wing political support in municipalities with recent coal plant and mine closures in the US and Germany, respectively.

Beyond climate policy, we contribute to a broader literature examining whether policy support is driven by self-interest. This literature spans policies such as congestion charges (Schuitema *et al.*, 2010), financial support for families Elinder *et al.* (2015), and income redistribution Durante *et al.* (2014); Karadja *et al.* (2017). Consistent with our findings, lower expected or realised economic costs are generally associated with greater policy support.

The remainder of the paper is structured as follows: Section 2 provides relevant information on the Dutch institutional context. Section 3 puts forward a stylised model, which we use to inform the subsequent empirical analysis. Section 4 describes the datasets and explores our exposure variables. Sections 5 and 6 present the empirical strategy and results. Finally, Section 7 offers conclusions and discusses policy implications. Additional descriptives, information about variable construction, robustness checks and model derivations can be found in the Appendix.

2 Institutional context: climate policy in the Netherlands

To combat climate change, the Dutch government has committed to mitigating greenhouse gas emissions in line with the EU targets of a 55% reduction by 2030 compared to 1990 levels, and net zero emissions by 2050. Projections however indicate that to reach these targets, a further strengthening of climate policies will be needed (PBL, 2024).

In 2023, the main contributors to greenhouse gas emissions in the Netherlands were industry (31%), transport (18%), electricity (16%) and the built environment (12%) (CBS, 2024a). While the greenhouse gas emission intensity of Dutch GDP is about 15% below the EU average, the manufacturing sector and the energy sector are relatively emission-intensive, due to a comparatively large chemical industry, a low share of nuclear energy and the absence of hydro power (Koops *et al.*, 2022). Key policies to decarbonise the energy and manufacturing sectors include the European Union Emission Trading System and the SDE++ subsidy scheme, which support renewable energy investments and decarbonization of production (OECD, 2021; Anderson *et al.*, 2023). The manufacturing and energy sectors jointly account for about 9% of total employment (CBS, n.d.). Major emitters such as Tata Steel and Shell are considered key producers within their respective value chains. As a result, there are significant political concerns about the impact of climate policy on employment in emission-intensive industries.

Of the 12% emissions from the built environment, about 8.5 percentage points can be directly attributed to residential buildings (CBS, 2024a). These emissions are primarily due to the use of natural gas. While newly-built houses are no longer connected to the gas network, natural gas is still the dominant source of heating; in 2022, 92% of households had a natural gas connection (DNB, 2024). A combination of policies supports the reduction of greenhouse emissions from residential buildings, including increased energy taxes on gas, the Dutch ISDE (Investment Subsidy for Sustainable Energy and Energy Saving) subsidy scheme for home insulation and heat pumps, and reduced VAT on solar panels and net metering. These measures have been particularly successful in incentivising the uptake of solar panels; by 2024, nearly a third of houses had rooftop solar panels installed (Netbeheer Nederland, 2024). Household decarbonisation efforts were accelerated by the 2022 energy crisis. This crisis also revealed stark differences in households' exposure to increased energy prices. About 55% of households were estimated to be financially vulnerable to rising energy costs in 2022 (TNO and CBS, 2024), especially those with flexible-rate contracts or contracts that had to be renewed close to the price peak of September 2022.[1] To mitigate these effects, the government implemented broad compensation policies in 2022: energy taxes were reduced, and all households received a lump sum of €380. Furthermore, low-income households qualified for additional energy subsidies of up to €1300. In 2023, the lump sum and energy tax reductions were replaced by an energy price ceiling; in 2024, only the additional energy subsidies were maintained.

Transport constitutes another major source of greenhouse gas emissions. With about 505 passenger cars per 1000 inhabitants, the 2023 vehicle ownership rate in the Netherlands lies below the EU average of 570 (Eurostat, 2024). Although new vehicle sales are increasingly electric, our data indicate that the Dutch passenger car fleet is still dominated by petrol cars (78%), with diesel (10.5%), hybrids (4.5%), battery-electric cars (3.5%), and plug-in hybrids (2%) making up the remainder.

Importantly, the share of electric vehicles is much higher among newly purchased vehicles: 31% of new vehicles are fully electric, and plug-in hybrids have a market share of

[1] Households in the Netherlands can opt for different types of energy contracts that fix gas and electricity prices for 3 months up to 3 years, or subject households to hourly or daily rates. During the energy crisis, energy suppliers temporarily suspended contracts with >1 year fixed prices.

13%. Nearly all of the remaining vehicles (56%) have petrol engines (RVO and Revnext, 2024). In addition to EU-level policies aimed at reducing emissions from passenger vehicles, a series of national measures, including high fuel excise duties, CO_2-based vehicle registration taxes, and incentive schemes for electric vehicles, have contributed to the rapid uptake of electric vehicles. This has led to a broader decline in emissions from passenger cars in the Netherlands: the average emission intensity of new vehicles fell from 120g/km in 2019 to 75g/km in 2023 (RVO and Revnext, 2024).

3 Theoretical framework

To decompose the channels through which climate policy affects household utility, and thereby policy support, we put forward a stylised model. The model explicitly links the distributional impacts of climate policy to household welfare, allowing us to derive theory-consistent measures of economic exposure across energy, vehicle and labour income channels. In the subsequent sections, we use this model to guide our empirical analysis.

We consider heterogeneous households whose utility is a composite of utility from aggregate consumption C_i and environmental quality Q, which we interpret to include any (dis)utility from future climate change:

$$U_i = C_i^{1-\beta_i} Q^{\beta_i}. \tag{1}$$

The $\beta_i \in [0, 1)$ is the weight household i assigns to the environment; if $\beta = 0$ the household only cares about consumption. Aggregate consumption in turn is modelled as a Stone-Geary composite over three goods, housing H_i, personal transport T_i and other consumption Y_i:

$$C_i = (H_i - \gamma_H)^{\alpha_{H,i}} (T_i - \gamma_T)^{\alpha_{T,i}} (Y_i - \gamma_Y)^{\alpha_{Y,i}}, \tag{2}$$

where we allow households to have heterogeneous preferences across goods; $\alpha_{k,i} \geq 0$ for all $k \in \{H, T, Y\}$, with $\alpha_{H,i} + \alpha_{T,i} + \alpha_{Y,i} = 1$. The $\gamma_k \geq 0$ denote subsistence levels, which we assume common across households.

Households take prices p_k as given. With household income I_i, this allows us to write the budget constraint

$$p_H H_i + p_T T_i + p_Y Y_i \leq I_i. \tag{3}$$

In the remainder, we focus on the case where income is more than sufficient to satisfy subsistence levels, i.e., $\gamma_H p_H + \gamma_T p_T + \gamma_Y p_Y < I_i$. We then obtain demand for good k:[2]

$$k_i = \gamma_k + \frac{\alpha_{k,i}}{p_k} \left[I_i - \gamma_H p_H - \gamma_T p_T - \gamma_Y p_Y \right]. \tag{4}$$

Demand for each good has two determinants. First is the level of subsistence consumption γ_k. A higher level of γ_k will increase the demand for good k. Second, once all subsistence levels are satisfied, the household is left with 'discretionary income' $I_i - \gamma_H p_H - \gamma_T p_T - \gamma_Y p_Y$. A share $\alpha_{k,i}$ of discretionary income is then spent on good k_i. As a result, in equilibrium, consumption patterns by low-income households will be primarily governed by the subsistence levels γ_k, with a relatively high share of income spent on goods with a high subsistence need. Spending by high-income households instead is more closely characterised by preference terms $\alpha_{k,i}$; as income $I_i \to \infty$, the shares of income spent on good k will converge to $\alpha_{k,i}$.

One can then substitute these terms into the utility function to obtain indirect utility V_i:

$$V_i = \tilde{C}_i^{1-\beta_i} Q^{\beta_i}, \tag{5}$$

with $\tilde{C}_i = \left[I_i - \gamma_H p_H - \gamma_T p_T - \gamma_Y p_Y \right] \left[\left(\frac{\alpha_{T,i}}{p_T}\right)^{\alpha_{T,i}} \left(\frac{\alpha_{H,i}}{p_H}\right)^{\alpha_{H,i}} \left(\frac{\alpha_{Y,i}}{p_Y}\right)^{\alpha_{Y,i}} \right]$ the utility-maximizing (Marshallian) demand.

Policy support Now consider the potential impacts of climate policy on household utility. Climate policy may affect utility through three channels. First, it may affect the quality of the environment Q. Second and third, it may affect aggregate consumption $\tilde{C}_i$ through its effects on (ii) individual income I_i and (iii) prices p_k.

Now let x denote a climate policy currently in place. Then a household will support a strengthening of this climate policy if it weakly improves household utility V_i, i.e., if the elasticity of utility with respect to policy is positive:

$$\frac{dV_i}{dx}\frac{x}{V_i} = (1 - \beta_i)\frac{d\tilde{C}_i}{dx}\frac{x}{\tilde{C}_i} + \beta_i \frac{dQ}{dx}\frac{x}{Q} \geq 0. \tag{6}$$

From (6) we can immediately draw several conclusions. Focusing on the last term, the household is more likely in support of climate policy if the effect of policy on the environment is positive and large ($\frac{dlQ}{dx}\frac{x}{Q}$>0 and high), and the household has strong environmental preferences as captured by a high β_i. The empirical literature has indeed established a positive relationship between perceptions of policy effectiveness and climate policy support (Baranzini and Carattini, 2017; Uyduranoglu and Ozturk, 2020; Hoyle and Rhodes, 2025). In addition, sociodemographic factors such as gender and education

[2]See Appendix C for derivations.

have been associated with pro-environmental preferences (Bergquist *et al.*, 2022). In our empirical analysis, we control for a set of (proxies for) climate policy attitudes, which include climate change, policy effectiveness, and underlying environmental preferences.

Next, consider the first term, which captures any effects of climate policy through consumption $\tilde{C}_i$. This term can be further decomposed into the effect of policy through income I_i, and prices p_k:

$$\frac{d\tilde{C}_i}{dx}\frac{x}{\tilde{C}_i} = \frac{\partial \tilde{C}_i}{\partial I_i}\frac{I_i}{\tilde{C}_i}\frac{\partial I_i}{\partial x}\frac{x}{I_i} + \frac{\partial \tilde{C}_i}{\partial p_H}\frac{p_H}{\tilde{C}_i}\frac{\partial p_H}{\partial x}\frac{x}{p_H} + \frac{\partial \tilde{C}_i}{\partial p_T}\frac{p_T}{\tilde{C}_i}\frac{\partial p_T}{\partial x}\frac{x}{p_T} + \frac{\partial \tilde{C}_i}{\partial p_Y}\frac{p_Y}{\tilde{C}_i}\frac{\partial p_Y}{\partial x}\frac{x}{p_Y},$$

or equivalently

$$\frac{d\tilde{C}_i}{dx}\frac{x}{\tilde{C}_i} = \underbrace{\varepsilon_{\tilde{C}_i,I_i}\varepsilon_{I_i,x}}_{\text{income effect}} + \sum_{k\in\{H,T,Y\}} \underbrace{\varepsilon_{\tilde{C}_i,p_k}\varepsilon_{p_k,x}}_{\text{price effects}}, \tag{7}$$

where $\varepsilon_{\tilde{C}_i,I_i}$ and $\varepsilon_{\tilde{C}_i,p_k}$ denote the elasticity of $\tilde{C}_i$ with respect to income I_i and p_k, respectively. Similarly, $\varepsilon_{I_i,x}$ and $\varepsilon_{p_k,x}$ denote the climate policy elasticities of income I_i and p_k, respectively.

In the model, higher income raises consumption and thereby utility. This implies an income channel of climate policy, which captures the effect of climate policy on utility through income. This income effect is equal to the elasticity of aggregate consumption with respect to income, $\varepsilon_{\tilde{C}_i,I_i}$, multiplied by the elasticity of income with respect to climate policy, $\varepsilon_{I_i,x}$. One can straightforwardly establish that $\varepsilon_{\tilde{C}_i,I_i} > 0$;[3] the household is then less likely to support climate policy if the effect of policy on income is negative ($\varepsilon_{I_i,x} < 0$), and more so if this negative exposure is large. Empirically, larger negative income effects can be expected if the household is employed in carbon-intensive sectors of production. Further, empirical evidence points to low-skilled and older workers being particularly at risk for job and wage losses as a result of climate policies (Yip, 2018; Barreto *et al.*, 2024). In our empirical analysis, we use the carbon-intensity of the sector of employment as a proxy for labour income (job) exposure, which we further interact with the level of education and age in Section 6.3.

Next, lower prices allow households to purchase more goods and thereby achieve greater utility for a given income. The good k price effect of climate policy on support is then equal to the elasticity of aggregate consumption with respect to the good k price, $\varepsilon_{\tilde{C}_i,p_k}$, multiplied by the elasticity of the price with respect to climate policy, $\varepsilon_{p_k,x}$. We can then use (4) to show that the former is proportional to household consumption of k relative to discretionary income:

[3] In fact, we obtain $\varepsilon_{\tilde{C}_i,I_i} = I_i/(I_i - \gamma_H p_H - \gamma_T p_T - \gamma_Y p_Y) \geq 1$.

$$\varepsilon_{\tilde{C}_i,p_k}\varepsilon_{p_k,x} = -\frac{p_k k_i}{I_i - \gamma_H p_H - \gamma_T p_T - \gamma_Y p_Y}\varepsilon_{p_k,x}. \tag{8}$$

In other words, households experience greater disutility from policy-induced increases in p_k if they spend a larger share of discretionary income on k_i consumption. This insight is agnostic about the relationship between p_k and the climate policy. Empirically however, the effect of climate policy on prices will differ across goods and depend on policy strategies. Many policies, including energy taxes and fuel excise taxes, are designed to incentivise a shift away from carbon-intensive consumption by increasing the effective cost of such consumption. As a result, the effect of policy on prices, captured by $\varepsilon_{p_k,x}$, is likely particularly high for emission-intensive consumption, such as heating from gas, electricity consumption in carbon-intensive grids, or fossil-fuelled passenger transport.

Further, specific policies, such as a carbon tax on fuels, will increase fuel prices in proportion to the CO_2-intensity of the fuel used, and by extension, the price of transport in proportion to the CO_2-intensity of transport.[4] In such a case where the good k price increase due to climate policy is directly proportional to its CO_2 intensity, $\mathrm{CO}_{2,k}$, we have $\partial p_k/\partial x = \theta \mathrm{CO}_{2,k}$, with some $\theta > 0$. Then one can one can write (8) as

$$\varepsilon_{\tilde{C}_i,p_k}\varepsilon_{p_k,x} = -\frac{CO_{2,k} k_i}{I_i - \gamma_H p_H - \gamma_T p_T - \gamma_Y p_Y}\theta x, \tag{9}$$

Equation (9) establishes that, if $\partial p_k/\partial x = \theta \mathrm{CO}_{2,k}$, the price effect of climate policy is proportional to total emissions from good k consumption, relative to discretionary income.

In sum, equation (8) and (9) highlight households who spend a large share of their income on energy, either due to high energy use or low income, are less likely in favor of policies that increase energy cost. Similarly, households who, relative to their income, emit a lot of CO_2 because they drive a lot or own inefficient fossil-fueled vehicles, will experience greater utility cost of increased CO_2 taxes on fuels. Empirically, this motivates measuring exposure through energy and transport consumption as shares of household income, rather than in levels.

It is important to highlight that the framework presented above provides a decomposition of several key climate policy exposure channels. Empirically, household preferences and different measures of exposure are likely correlated. For instance, environmentally conscious households (high β_i) may avoid jobs in carbon-intensive industries as they do not align with their personal values. This makes them less exposed through the income channel (low $\varepsilon_{I_i,x}$). In addition, such households will already show environmentally

[4] This statement only considers direct effects and abstracts from any indirect effects of fuel taxes on e.g., innovation in vehicle fuel efficiency.

friendly behaviour, such as biking instead of driving to work, and adopting solar panels or heat pumps, which reduces price exposure (low $\varepsilon_{\tilde{C}_i,p_k}$). Fully attributing high support to e.g. their low labour income exposure would then be inappropriate. For this reason, we include a series of control variables in our empirical specifications. Specifically, we include proxies for climate beliefs to capture environmental attitudes, municipality fixed effects to account for local effects, and a comprehensive set of socio-demographic characteristics.

4 Data and descriptive statistics

To examine the relationship between economic exposure and policy support, we require measures for climate policy support and proxies for individual economic exposure. For the former, we use data from a survey on climate policy support; the latter are constructed using administrative data. The primary source of this data is Statistics Netherlands (Centraal Bureau voor de Statistiek, henceforth CBS). The administrative data comprise administrative records on household income,[5] consumption of gas and electricity, vehicle ownership and use, as well as data on individual employment contracts, including the sector of employment. We supplement the vehicle ownership data with data on vehicle fuel type and CO_2 emissions from the Dutch vehicle authority (Rijksdienst voor het Wegverkeer, henceforth RDW). We also combine the employment data with Eurostat NACE Rev.2 sector-level CO_2 emission data (Eurostat, 2025).

Climate policy attitudes and support In 2023, CBS conducted a survey, 'Belevingen' ('Perceptions'), on climate change attitudes and behaviours. The survey inquired about respondents' beliefs and attitudes toward climate change and climate policies. It also included questions on a wide range of consumption (intended) behaviours across the domains of housing, mobility and food consumption, which we do not use in our analyses. The survey was administered from February to April 2023, and collected responses from 18,327 individuals aged 18 and older. Extensive information about the survey, including key summary statistics, aggregated data tables and the questionnaire can be found in CBS (2023); below we discuss the key variables we use in our analysis.[6]

About 94% of survey respondents believe the climate is indeed changing: they answer affirmatively to the question *"Do you think the climate is changing or not?"*. Of those, about 73% of respondents disagree with the statement that *"The Netherlands' impact on*

[5]We use a calculated standardised income, that is disposable income adjusted for household size and composition to make incomes comparable across different types of households.

[6]Note that due to sample weighting in CBS (2023), there may be slight deviations between the summary statistics presented below and in CBS (2023).

climate change is so limited that it does not matter what we do or do not do."[7]

Our main interest is in the respondent's support for a strengthening of climate policy, as articulated by responses to the statement *"The government's climate policy does not go far enough."*. Respondents were asked to either rate their agreement on a five-point scale, ranging from *"strongly agree"*, to *"strongly disagree"*, or respond with *"I do not know"*, or *"no answer"*. Figure 1 presents the responses, where we interpret (strong) agreement with the statement as (strong) support for additional climate policy, and similarly (strong) disagreement as (strong) opposition to additional climate policy. Our interpretation of this question as one about support for additional climate policy is in line with CBS (2023, p. 18), who interpret agreement with this statement as being in favour of more intensive climate policy. As shown in Figure 1, nearly half of the respondents express support for strengthening climate policies, while about a quarter oppose it.

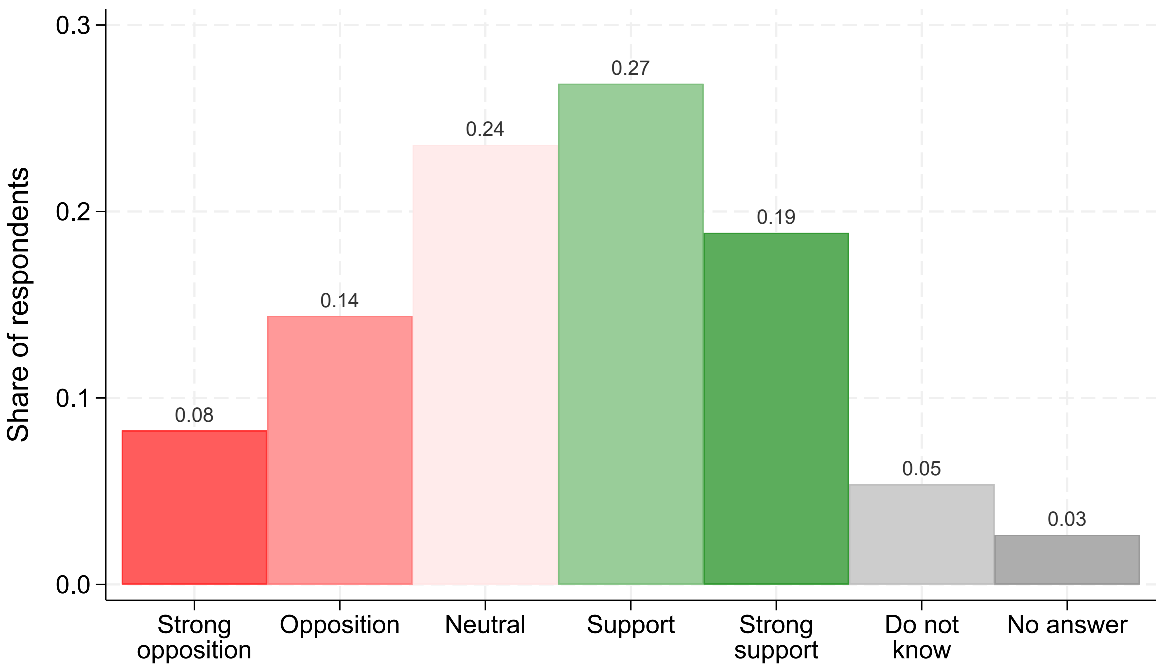


Figure 1: Support for a strengthening of climate policy. Based on 15,341 observations.

Economic exposure to climate policy We aim to relate support for climate policies to respondents' exposure to climate policies. In this section, we describe how the exposure variables are constructed and discuss how exposure varies within the population. The variables correspond directly to the exposure channels derived in the theoretical framework, capturing energy, vehicle, and job-related exposure. Energy and vehicle exposure

[7] See Appendix A for a detailed overview of the relevant survey questions, in Dutch and English.

serve as proxies for the expenditure channels, reflecting potential reductions in households' purchasing power resulting from increases in energy and fuel prices due to climate policies. Job exposure, in turn, is the proxy for the income channel: workers employed in more emission-intensive sectors face a higher risk of income loss through unemployment or wage reductions as climate policies tighten. Using the administrative databases, we estimate these exposure proxies for 7,253,089 Dutch households, which cover more than 90% of the total Dutch population. In line with the survey data, we use data for 2022 to calculate the proxy variables.

Household energy expenditure Motivated by (8), we define the proxy for household i energy exposure as the ratio of energy spending over income:

$$Energy_i = \frac{\sum_{j=gas,electricity} [q_{ij} \times p_j + \text{fixed cost}_j]}{\text{income}_i}, \tag{10}$$

where q_{ij} is the quantity of household i gas or electricity use, p_j is the tax-inclusive energy price per unit (m^3 or kWh), and fixed cost$_{ij}$ is the sum of any fixed delivery charges and deductibles.[8] For prices and cost, we use the 2022 average electricity and gas prices, as well as relevant energy taxes, delivery charges and rebates (CBS, 2025) (see Appendix A.2 for more details) In the baseline analyses, we exclude any temporary rebates that were in place to compensate for the impacts of the energy crisis; we do account for these temporary rebates in a robustness analysis. Our approach generates a proxy for actual expenditures in 2022; we unfortunately do not observe household-level energy prices.

In our data, Dutch households spend on average €165 per month on energy. As a share of household income, spending ranges from 0 to almost 30% of income, with a median of around 5.73% (see Figure 2). Lower-income households tend to spend a larger share of their income on energy; the median share is approximately 10% for the lowest decile, compared to about 3.5% for the highest decile. Beyond these vertical inequalities across households, we also observe substantial horizontal inequalities in energy spending within income deciles, which are especially large for the lowest-income households.

Household emissions from vehicle ownership We define our measure for vehicle exposure in line with (9), as the total household vehicle fuel CO_2 emissions, relative to household income:

[8]As opposed to (8) we divide spending by standardised income instead of discretionary income. While standardised income does adjust for household scale economies (e.g., through the sharing of indivisible costs such as internet subscriptions), it does not explicitly net out subsistence spending. In the empirical analysis, we separately control for income; this partially accounts for subsistence needs, which are most relevant for low-income households.

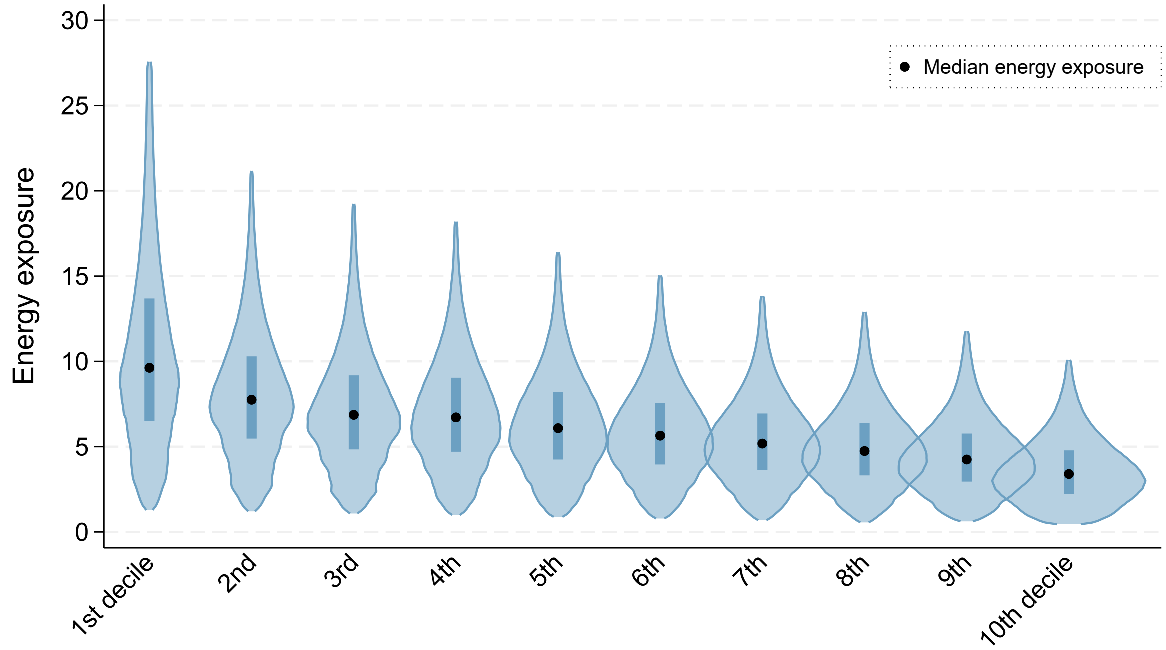


Figure 2: Distribution of energy exposure
The figure displays the distribution of energy exposure computed according to (10). The dark- blue bars represent the 25th–75th percentile range. In accordance with privacy guidelines, we exclude the top and bottom 1% of observations within each decile.

$$Vehicle_{ih} = \frac{\sum_{v \in \mathcal{V}_i} \mathrm{km}_v \times CO_{2,v}}{\mathrm{income}_i}, \tag{11}$$

where $\mathcal{V}_i$ is the set of vehicles owned by household i, km_v is the kilometers driven by vehicle v, with $\mathrm{CO}_{2,v}$ the vehicle emission intensity in grams of CO_2 per km. Fully electric vehicles are classified as zero CO_2. It is relevant to note that the exposure measure does not include private use of leased vehicles and company-owned vehicles.[9]

Figure 3 presents the distribution of vehicle exposure across households in the Netherlands, conditional on the household owning at least one private passenger car. Similar to energy, households in the lowest income decile exhibit the highest median exposure, as well as the greatest within-decile heterogeneity. Median exposure is broadly similar across the remaining income deciles, although the top decile displays slightly lower exposure, driven in part by a higher share of households with zero exposure due to electric vehicle ownership. However, as indicated by the dotted grey line, owning a car correlates with income: only about 30% of low-income households own at least one car, compared to

[9]This is foremost due to data limitations. Still as the related vehicle and fuel expenses are typically borne by the employer rather than the household, it is not evident that these vehicles should be included in the analysis even if data were available.

roughly 80% among high-income households. As a result, while low-income households that do own a car are more exposed, much of the exposure for the group as a whole is mitigated as many households do not own a car to begin with.

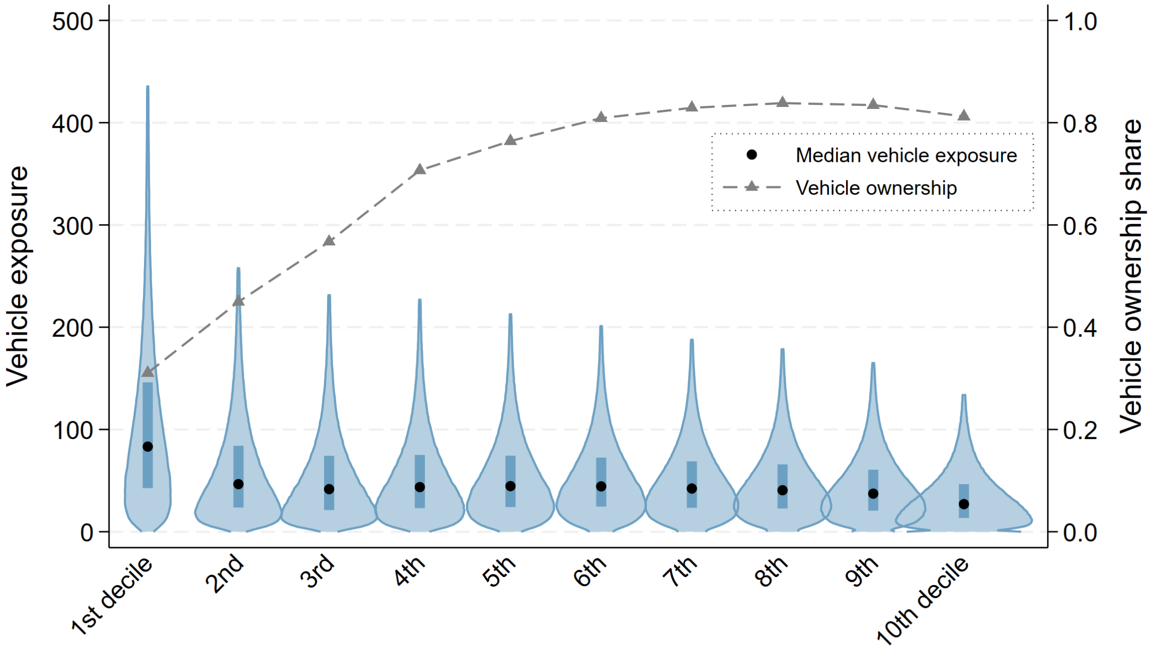


Figure 3: Distribution of vehicle exposure and ownership
The figure displays the distribution of vehicle exposure computed according to (11), conditional on the household owning at least one private vehicle. The dark-blue bars represent the 25th–75th percentile range. In accordance with privacy guidelines, we exclude the top and bottom 1% of observations within each decile. The grey triangles depict the share of vehicle ownership.

Household employment and sector emissions To capture the notion that layoffs and consequent income losses are more likely to occur in high carbon-intensity sectors, we consider the CO_2 emission intensity of the household sectors of employment. Specifically, our job exposure variable is the CO_2 emissions per value added in the NACE Rev.2 sector that members of household i are employed in, weighted by the share of total wage income earned from each employer, where we include the five highest-income employment contracts:

$$Job_i = \frac{\sum_{n \in \mathcal{N}_i} Wage_{in} CO_{2,s(n)}}{\sum_{n \in \mathcal{N}_i} Wage_{in}}, \tag{12}$$

where $Wage_{jn}$ denotes wage from job n, with $\mathcal{N}_i$ the set of up to five highest-earning jobs, and $CO_{2,s(n)}$ the kg of CO_2 emissions per unit of value added of the sector corresponding to job n. We compute exposure measures for 10,412 respondents. The above measure does not capture employment exposure through self-employment or other forms of income. To still account for this in our later estimation, we exploit additional employment information from the administrative data, including controls for the following respondent employment categories: *wage-income employee*, *director-major shareholder*, *benefit-recipient*, *pensioner*, *students with or without income* and *other*[10]. In a robustness analysis we consider only the respondent's jobs, as opposed to their household's, in the computation of (12).

Figure 4 displays our measure for job exposure by the highest levels of survey respondents' education in the Dutch educational system and age. Several patterns emerge. To start, highly-educated respondents tend to have lower household job exposure (see Panel a).[11] This is particularly clear when comparing university-educated respondents to those with only pre-vocational secondary education (VMBO) or secondary vocational education (MBO), with the latter group exhibiting roughly twice the exposure of the former. Within-group heterogeneity is also comparatively large for this higher-exposure group. Exposure is relatively flat across age (Panel b), with somewhat greater heterogeneity in the higher age groups.

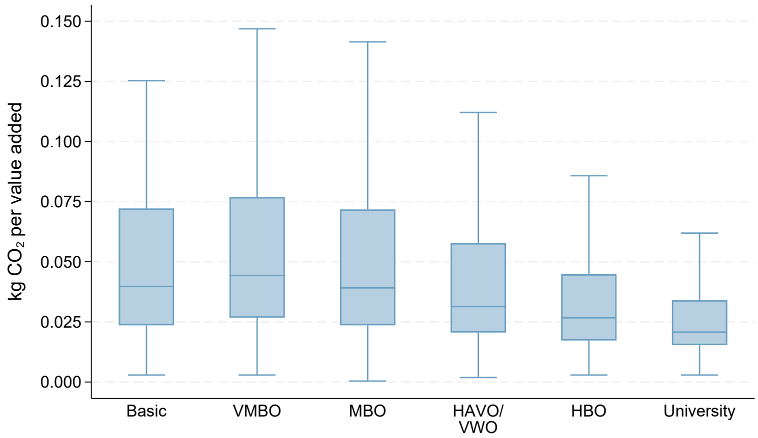
Broadly speaking, the patterns in Figure 4 are in line with with those documented in the literature, which typically finds that older individuals and those with less formal education but more technical skills are more exposed to the labour market repercussions of climate policies (Yip, 2018; Barreto *et al.*, 2024).[12]

Final dataset Our final dataset includes the following information: (i) support for a strengthening of climate policies and climate beliefs; (ii) measures of economic exposure to climate policies through household energy use, private vehicle use and jobs: equations (10)-(12); and (iii) socio-demographic information, including respondent age, gender, level of education, and municipality of residence. After dropping missing values and minor inconsistencies (see Appendix A.3), we get a final sample of 15,208 observations.

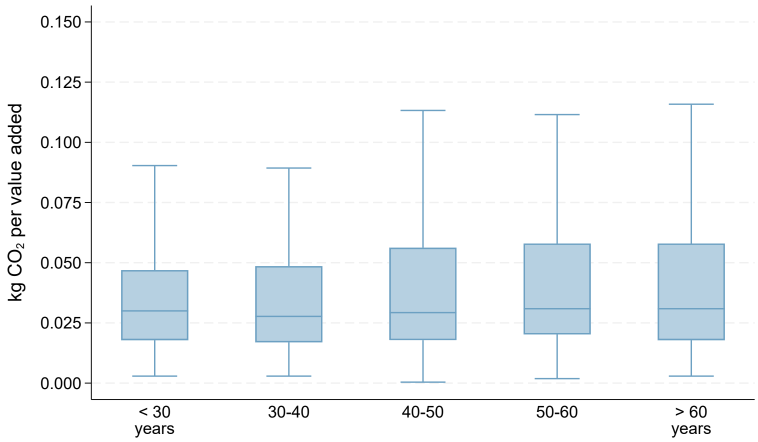
[10]A discrepancy between job exposure and employment category can occur when salaried income exists in the household, while the respondent's main income source is non-salaried, which leads to individuals being classified in one category but still showing salaried income.

[11]Education in the Netherlands follows a tracked system after primary school, which is not straightforward to classify. VMBO provides preparatory vocational education, typically leading to MBO, the secondary vocational system focused on applied skills. HAVO graduates usually enter HBO, which are universities of applied sciences emphasising applied training, while VWO graduates enter academically-oriented research universities. This creates a mixed situation, as MBO graduates have obtained more formal specialized education than HAVO/VWO students, yet the latter will likely end up with more advanced terminal degrees. Classification is further clouded by the fact that a minority of VWO graduates choose to enter HBO, and likewise HAVO graduates may opt for an MBO degree. Vice versa, students may transfer 'up', for example by attending university after obtaining a HBO degree.

[12]It is important to note that we link household exposure to respondent age and education, instead of considering own individual exposure.



(a) *education*



(b) *age*

Figure 4: Distribution of job exposure over education and age.
The figure displays job exposure computed according to (12), conditional on at least one household member having a salaried job. In accordance with privacy guidelines, we exclude the top and bottom 1% of observations within each decile.

It is relevant to note that our resulting sample is not fully representative of the Dutch population. In particular, it is wealthier and more highly educated: in our sample, 45% of respondents have completed higher education (HBO or University) versus 36% in the population (CBS, 2024b). Mean household income standardised is €41,400 versus €36,000 in our initial population. Finally, while the average age of the Dutch population over 18 years old is around 50 years, the sample average age is 56 years (CBS, 2022).

To obtain an initial impression of the relationship between exposure and support, Figure 5 presents the raw relationship between policy support and the exposure measures, where we standardise the exposure measures using Z scores to enhance comparability. The figure clearly shows a negative relationship across all three dimensions of exposure: higher exposure is associated with lower support. In the next section, we examine this relationship in greater detail.

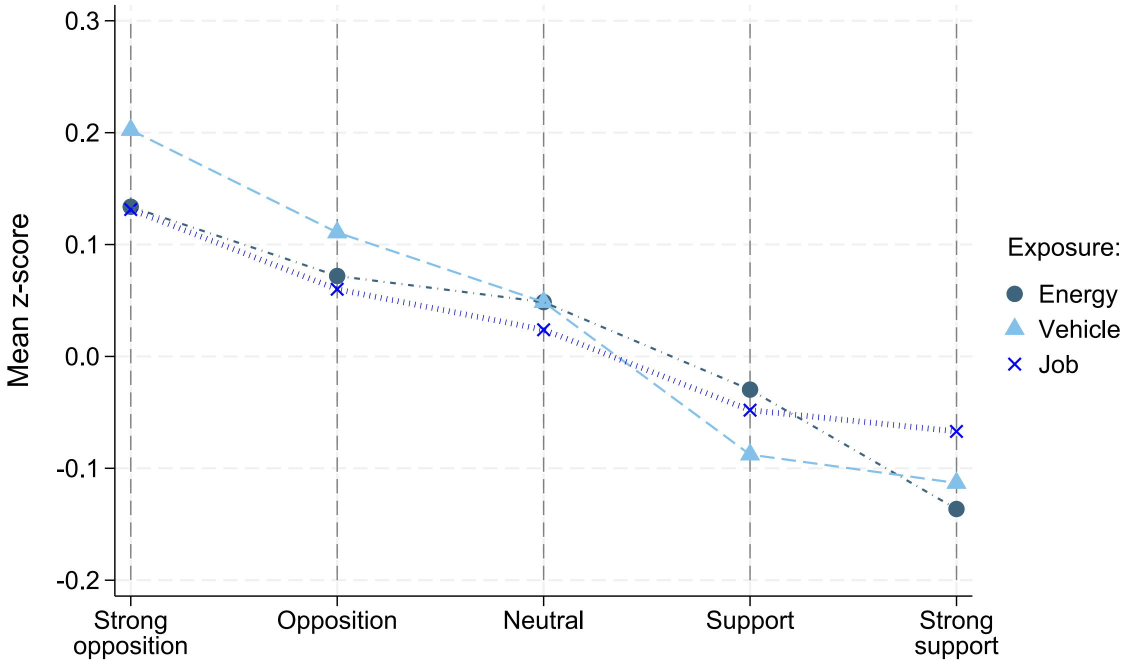


Figure 5: Relationship between climate policy support and measures of exposure.

5 Empirical analysis

5.1 Estimation strategy

To assess the relationship between climate policy exposure and public support, we specify a binary response model. We define a variable $Policy\ support_i$ that takes the value 0 for respondent i if they indicate *strong opposition*, *opposition*, or *neutrality* toward a strengthening of climate policies, and 1 if they express *support* or *strong support*. Based on this classification, 49% of households are coded as supporting a strengthening of the policy.

We estimate our baseline binary decision using a logit model, where we adopt the following specification:

$$\begin{aligned} Policy\ support_i = \beta_0 + \beta_1 Energy_i + \beta_2 Vehicle_i \\ + \beta_3 Job_i + \delta' \boldsymbol{Z}_i + \theta' Climate\ Beliefs_i + \gamma_m + \varepsilon_i, \end{aligned} \tag{13}$$

where the variables $Energy_i$, $Vehicle_i$ and Job_i are our exposure measures given by equations (10)-(12). As exposure may be correlated with other determinants of support, such as environmental preferences and socio-demographic characteristics, we additionally introduce a set of control variables, described below. The vector Z_i contains socio-demographic characteristics, including the log of the respondent's income, age, age squared and education dummies, as well as controls for employment categories, as described in the previous section. We additionally include a series of 'climate beliefs' dummies, which capture whether the respondent believes that climate is changing or not, and when they do believe in it, the extent to which Dutch climate policies matter in fighting climate change. Municipality fixed-effects, γ_m, are included to account for local effects; we also cluster standard errors at the municipality level. These controls mitigate an important source of endogeneity in our setting: an unobserved preference for environmental quality, β_i, which may simultaneously influence climate policy support and economic exposure. The climate-belief and policy-effectiveness dummies serve as proxies for this preference, while the municipality fixed effects absorb spatially correlated confounders such as local political culture and access to public transport. Although these controls cannot rule out all sources of confounding, they help us obtain a cleaner estimate of the association between economic exposure and policy support.

In Appendix B.1 we present a series of robustness analyses, including specifications where respondents who are neutral towards a strengthening of climate policies are either omitted or reclassified as support and multilevel logit estimations.

5.2 Main results

The results for our baseline specifications are presented in Table 1. Column (1) reports a specification including all our exposure variables. In columns (2)–(4), we consecutively add each set of control variables separately to assess their specific impact on exposure. Column (5) presents our preferred specification, which includes all variables simultaneously. Column (6) drops income, while column (7) reports estimates from a specification in which all continuous variables are standardised using z-scores, allowing for direct comparability across exposure measures.

We find that all three exposure variables are negatively and significantly associated with climate policy support. In other words, higher exposure, through expenditure and income channels, is associated with reduced support for climate policies. Comparing across specifications, this relationship weakens but remains significant once we control for socio-demographic characteristics (2), municipality fixed effects (3), climate beliefs (4), and their combination (5). This robustness across specifications suggests that the negative association between exposure and support illustrated in Figure 5 is not solely driven by these observed confounders.

The coefficient estimates on exposure can be interpreted as the change in probability

Table 1: Economic exposure and policy support

	Policy support						
	(1) Exposure	(2) Socio-demographic	(3) Municipality fixed effects	(4) Beliefs	(5) All controls	(6) Income omitted	(7) Standardized coefficients
Energy exposure	−0.0109*** (0.0013)	−0.0101*** (0.0013)	−0.0086*** (0.0012)	−0.004*** (0.0011)	−0.005*** (0.0013)	−0.0019* (0.0012)	−0.0172*** (0.0046)
Vehicle exposure	−0.000 92*** (0.0001)	−0.0006*** (0.0001)	−0.000 62*** (0.0001)	−0.000 58*** (0.0001)	−0.000 29*** (0.00009)	−0.000 25*** (0.00009)	−0.0121*** (0.0039)
Job exposure	−0.0653*** (0.0134)	−0.0386*** (0.0116)	−0.0538*** (0.0125)	−0.042*** (0.0098)	−0.0252*** (0.0092)	−0.0275*** (0.0093)	−0.0096*** (0.0035)
Income (logged)		−0.0676*** (0.0126)			−0.0574*** (0.0115)		−0.0253*** (0.0051)
Female		0.0635*** (0.0075)			0.0242*** (0.0068)	0.0254*** (0.0069)	0.0242*** (0.0068)
Age		−0.0067*** (0.002)			−0.0068*** (0.0017)	0.0085*** (0.0016)	−0.1072*** (0.0272)
Age squared		0.000 09*** (0.00002)			0.000 08*** (0.00002)	0.0001*** (0.00002)	0.1432*** (0.0285)
Education (Base level: *Basic education*)							
VMBO		−0.0881*** (0.0298)			−0.0722*** (0.0265)	−0.0722*** (0.0263)	−0.0709*** (0.0265)
MBO		−0.0778*** (0.0324)			−0.0944*** (0.028)	−0.0991*** (0.0276)	−0.0944*** (0.028)
HAVO/VWO		0.0471 (0.0338)			−0.0213 (0.0304)	−0.0294 (0.0298)	−0.0213 (0.0304)
HBO		0.0976*** (0.03)			0.0016 (0.0272)	−0.0094 (0.0267)	0.0016 (0.0272)
University		0.2722*** (0.0308)			0.1121*** (0.0277)	0.0953*** (0.027)	0.1121*** (0.0277)
Climate beliefs (Base level: *Climate does not change*)							
Climate changes - policy ineffective				0.0802*** (0.0161)	0.0767*** (0.0175)	0.0753*** (0.0175)	0.0767*** (0.0175)
Climate changes - policy somewhat effective				0.1549*** (0.0156)	0.1491*** (0.0169)	0.1476*** (0.0171)	0.1491*** (0.0169)
Climate changes - policy very effective				0.5385*** (0.0162)	0.4943*** (0.0173)	0.4926*** (0.0174)	0.4943*** (0.0173)
Alternative income source dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality fixed effects	No	No	Yes	No	Yes	Yes	Yes
Observations	15,208	15,208	15,208	15,208	15,208	15,208	15,208

Results from a logit model. Coefficients reported represent average marginal effects. In column 7, continuous variables are z-standardised. Standard errors (in parentheses) are clustered at the municipality level. Categories indicating missing information for education and climate beliefs are not shown. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

(in percentage points) of supporting the policy. For example, in our preferred specification (5), a 1 percentage point increase in the share of income spent on energy reduces the probability of supporting policy change by 0.5 percentage points.

In column (6), we re-estimate our baseline specification, omitting the control for income. This particularly affects the size and significance of the estimated coefficient for energy exposure. This result indicates that the negative relationship between energy exposure and policy support is particularly driven by variation in exposure among households with similar incomes, rather than by differences across income groups.

Finally, column (7) indicates that energy exposure has the strongest relationship with policy support, followed by vehicle and job exposure. In particular, a one-standard-deviation increase in energy, vehicle, and job exposure is associated with a decline in the probability of support of approximately 1.7, 1.2, and 1.0 percentage points, respectively. These magnitudes are modest, particularly when compared to the role of climate beliefs. Among respondents who believe the climate is changing, moving from the belief that Dutch policy is ineffective to the belief that it is somewhat effective raises the probability of support by about 7 percentage points, while moving further to the belief that Dutch policy is very effective raises it by an additional 35 percentage points. These results indicate that economic self-interest is a statistically robust and theoretically predicted determinant of support, but a quantitatively secondary one: differences in exposure account for only a limited share of the variation in policy support, most of which is associated with attitudes and beliefs.

The signs and significance of our control variables are consistent with estimates from the existing literature, which does not consider explicit exposure measures (Bergquist *et al.*, 2022): women and more highly educated individuals are generally more supportive of climate policies, as are those who believe climate change is real and that policy is effective. The latter estimates align with evidence that perceived policy effectiveness is among the strongest correlates of climate policy support (Bergquist *et al.*, 2022). As for income, we find a negative effect. This is in line with the mixed evidence in the literature; while the meta-analysis by Bergquist *et al.* (2022) establishes a weak positive relationship, several large recent studies find either insignificant Eckert *et al.* (2025) or negative Dechezleprêtre *et al.* (2025) relationships. This variation likely reflects country-specific factors, where income can capture both the ability to adapt to climate policies Bigler and Radulescu (2025); Borenstein and Davis (2025) but also the greater carbon footprints of high-income households Chancel (2022). This evidence further casts doubt on the common practice of treating income as a proxy for exposure, underscoring the importance of our approach of constructing more direct measures of exposure, rather than inferring it from income alone.

6 Examining exposure channels

Across all three exposure channels, greater exposure to climate policy is associated with lower levels of climate policy support. In the following section, we provide additional insights by examining each channel in more detail.

6.1 Energy exposure

In our baseline specification, we proxy households' exposure to climate policy through energy expenditures by using total household energy spending relative to income. Dutch households typically receive a single energy bill that reports the combined cost of gas and electricity consumption. The energy transition entails a gradual shift toward electrification of household energy use, through for instance the replacement of gas boilers with electric heat pumps. This transition is incentivised not only by subsidies for heat pumps, but also by increasing taxes on gas. Hence, it is plausible that attitudes toward climate policy are driven primarily by the gas component of energy expenditures. Conversely, electricity may be less easily substituted both in the short and long run, and the necessary strengthening of the electricity grid is expected to triple users' cost (Autoriteit Consument & Markt (ACM), 2024). Finally, households may simply not be fully informed about the composition of their energy bills (Allcott 2011).

To examine the relative importance of gas and electricity use, we decompose the energy exposure measure (10) in a gas and electricity component.[13] We then re-estimate the specification with all controls (column (5) in Table 1), using the decomposed exposure measure. Results are presented in the first column of Table 2, where we display estimated coefficients only for the exposure measures. Our estimates indicate that gas use is not a key driver of the negative relationship between energy expenditure and policy support. In fact, the relationship appears to be fully driven by electricity cost, with the cost of gas use showing no significant association with policy support.

The second and third columns of Table 2 consider alternative measures of exposure to increasing energy cost motivated by the experiences of the 2021-2022 energy crisis. This crisis revealed that low-income households living in poorly insulated homes were hit hardest by rising costs. To capture such exposure, the second column considers home energy efficiency. We use data from TNO (Mulder *et al.*, 2023), who use data about a dwelling's characteristics to estimate the energy a home typically requires to heat. The 15% worst-performing dwellings are classified as *very low energy efficiency*, while homes between the 15th and 50th percentile are classified as *low energy efficiency*. We find that those individuals living in very low-efficiency homes are 3.4 percentage points less likely

[13] See Appendix A.2 for further details and descriptives.

to support a strengthening of climate policies relative to those residing in high-efficiency homes.

The third column considers energy poverty. Following TNO and CBS (2024), we classify a household as energy-poor if its income does not exceed 130% of the low-income threshold (a standard measure computed by CBS), its financial assets fall within the bottom 90% nationally, and it either spends more than 10% of its income on energy or resides in a dwelling with very low or low energy efficiency. We find no statistically significant relationship between energy poverty and climate policy support. This null result should however be interpreted with caution. Only 3% of households are classified as energy poor in our sample,[14] which limits our ability to obtain precise estimates.

Table 2: Energy exposure and policy support

	Policy support		
	(1) Gas and electricity	(2) House quality	(3) Energy poverty
Gas exposure	-0.0016 (0.0018)		
Electricity exposure	-0.0126*** (0.0026)		
House quality (Base level: *High energy efficiency*)			
Low energy efficiency		0.0144 (0.0092)	
Very low energy efficiency		-0.0342*** (0.0121)	
Energy poverty			0.0210 (0.0251)
Vehicle exposure	-0.00029*** (0.00009)	-0.00033*** (0.0001)	-0.00034*** (0.0001)
Job exposure	-0.0250*** (0.0092)	-0.0226*** (0.0092)	-0.0228*** (0.0092)
Other control variables	Yes	Yes	Yes
Constant	Yes	Yes	Yes
Municipality dummies	Yes	Yes	Yes
Observations	15,208	14,504	14,504

Results from a logit model. Coefficients reported represent average marginal effects. Standard errors (in parentheses) are clustered at the municipality level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6.2 Vehicle exposure

Our proxy for exposure through private vehicle use is the ratio of yearly household grams of CO_2 emissions from private vehicle use to total income (see (11)). To obtain further

[14] This is the result of our sample being relatively high-income. In the population, approximately 6.2% of households are energy poor.

insight into observable determinants of such exposure, we decompose this proxy into fuel efficiency and km intensity, defined as the ratio of km driven to income:

$$Vehicle_{ih} = \underbrace{\frac{\sum_{v\in\mathcal{V}_i} \mathrm{km}_v \times CO_{2,v}}{\sum_{v\in\mathcal{V}_i} \mathrm{km}_v}}_{\text{fuel efficiency}} \underbrace{\frac{\sum_{v\in\mathcal{V}_i} \mathrm{km}_v}{\mathrm{income}_i}}_{\text{km intensity}}, \tag{14}$$

We then re-estimate our preferred specification (column (5) in Table 1), replacing the measure for vehicle exposure by its components in (14). Results are reported in Table 3, where we again report only the estimated coefficients for the exposure measures. Column (1) shows that while the estimated coefficient is negative for both components, only the CO_2 efficiency is significant, suggesting that this drives the negative (and significant) coefficient for vehicle exposure. In columns (2) and (3) we consider dummies for the primary fuel type, which we define as the fuel used for the largest share of kilometres driven by the household, instead of the vehicle CO_2 efficiency. The estimates in (2) show that owning a gasoline car is associated with a 1.88 percentage point decrease in support of climate policy compared to not owning a car. For diesel vehicles, this decrease is even larger (6.52 percentage points), whereas owning an electric vehicle corresponds to a 9.68 percentage point increase in support. Column (3) still reports a null relationship between total kilometres intensity and policy support, while fuel type displays a similar pattern compared to column (2), even if gasoline becomes not significant. Overall, these results suggest that attitudes toward climate policies are shaped more by the fuel efficiency of the vehicles that people drive rather than by how intensively they use them.

A plausible explanation for this is that policies aimed at reducing CO_2 emissions from vehicle use come in many shapes and forms. Beyond CO_2 taxes on fuels, which would increase the cost of driving in proportion to the vehicle's CO_2 efficiency and kilometres driven, policy makers in the Netherlands additionally impose registration and circulation taxes which directly depend on, or correlate strongly with, the vehicle's CO_2 emissions per kilometre. Simultaneously, we cannot rule out some degree of reverse causality in the latter estimates, where in particular climate-concerned households opt to purchase electric vehicles.

6.3 Job exposure

In the previous section we established that a higher level of job exposure is associated with lower climate policy support. In this section, we examine whether this relationship depends on respondents' level of education or age. This analysis is motivated by a recent empirical research showing that it is in particular lower-educated and older workers who appear to be more affected by the green transition and the shift towards low-carbon

Table 3: Vehicle exposure and policy support

	Policy support		
	(1) Decomposition	(2) Fuel	(3) Fuel and km intensity
Energy exposure	-0.0049*** (0.0013)	-0.0051*** (0.0013)	-0.0051*** (0.0013)
Vehicle CO_2 efficiency	-0.00021*** (0.00006)		
Km intensity	-0.0078 (0.0148)		-0.0067 (0.0161)
Fuel type (Base level: *No private car*)			
Gasoline		-0.0188** (0.0094)	-0.0163 (0.0176)
Diesel		-0.0652*** (0.0152)	-0.0612*** (0.0176)
(Plug-in) Hybrid		-0.0004 (0.0166)	0.0025 (0.018)
Electric		0.0968*** (0.0323)	0.0100*** (0.0316)
Other		-0.0145 (0.0166)	-0.0109 (0.037)
Job exposure	-0.0248*** (0.0092)	-0.0244*** (0.0093)	-0.0244*** (0.0093)
Other control variables	Yes	Yes	Yes
Constant	Yes	Yes	Yes
Municipality dummies	Yes	Yes	Yes
Observations	15,208	15,208	15,208

Results from a logit model. Coefficients reported represent average marginal effects. Standard errors (in parentheses) are clustered at the municipality level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

industries (Yip, 2018; Barreto *et al.*, 2024).

In Figure 6 we present the average marginal effect of job exposure at different levels of education and age from our preferred specification (Table 1, column (5)) where we additionally add either an interaction term between job exposure and education (Panel a) or between job exposure and age and age square (Panel b).[15] Age and education are observed at the respondent level; to ensure conceptual consistency we estimate these marginal effects using job exposure at the *respondent* (instead of household) level, using the three highest-income jobs.[16]

The results presented in Figure 6 show that the negative association between job

[15]The coefficients from non-linear models with interactions are not directly interpretable. Following Ai and Norton (2003), we present marginal effects of job exposure for different levels of education and age.

[16]As shown in Appendix B.2, re-estimating our preferred specification from Table 1 using respondent job exposure rather than household job exposure yields qualitatively similar results, with a slightly more pronounced estimated effect of job exposure on support.

exposure and policy support is indeed concentrated among lower-educated and older respondents. Specifically, Panel (a) shows that, except for respondents whose highest level of education is VMBO (pre-vocational secondary education), the adverse effect of job exposure on climate policy support declines with higher levels of education. In other words, among lower-educated respondents, job exposure is more negatively associated with support for climate policies, whereas for respondents with higher vocational (HBO) and university education, this relationship is not statistically significant. The only exception is the VMBO group, for whom higher job exposure is associated with greater support for climate policies.[17]

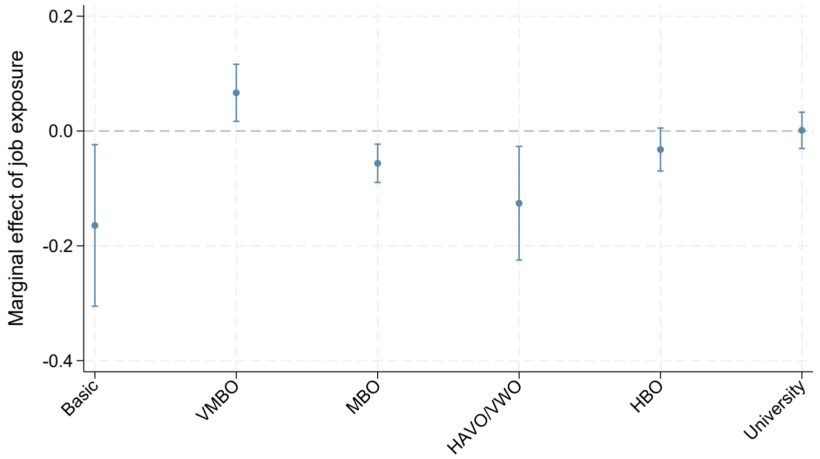
Panel (b) shows the average marginal effect of job exposure across age groups. The adverse effect of job exposure on support for climate policy increases with age. It is statistically insignificant for respondents up to age 45, but becomes negative and statistically significant among older individuals. This pattern suggests that the negative relationship between job exposure and climate policy support is primarily driven by older workers.

A plausible explanation is that older individuals are more likely to be employed in carbon-intensive sectors and to possess more specialised, sector-specific skills, while facing fewer opportunities for retraining as they approach retirement. Consequently, they may perceive higher risks of job or income loss, which translates into lower support for climate policies that are likely to induce industrial restructuring. Finally, we observe that the estimated effect becomes statistically insignificant again around age 65, which is close to the statutory retirement age of 67. This is consistent with the idea that concerns about labour-market adjustment diminish as individuals exit the workforce.

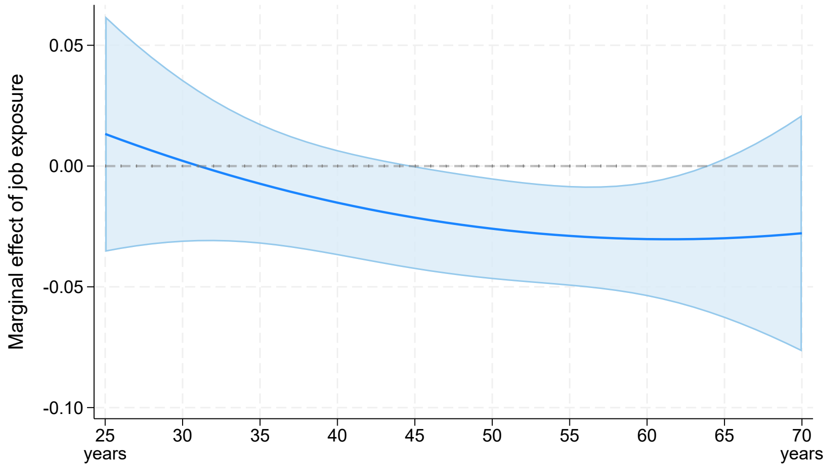
7 Concluding comments

A decade after the signing of the Paris Climate Agreement, global climate policy continues to face the challenge of reconciling ambitious mitigation goals with political constraints. While EU greenhouse gas emissions have declined, increasing geopolitical tensions have shifted attention away from environmental targets towards strategic autonomy. High energy prices have squeezed household budgets, and concerns have grown about the economic burdens of the policies needed to meet mitigation targets. Low-income households appear particularly vulnerable, as they already spend a larger share of their income on energy, and more face the labour market repercussions of the green transition. These con-

[17] A possible explanation for this finding is that individuals with this level of education are qualified for a broad range of practical and technical occupations, spanning both more and less carbon-intensive activities. The Dutch vocational education system encompasses diverse fields such as technology, business, health, agriculture, and various services. For this reason, this coefficient should be interpreted with caution.



(a) *Education*



(b) *Age*

Figure 6: Effect of job exposure by education and age. The figures display estimates and 90% intervals. Panel (a) omits estimates for respondents for whom we do not observe the education level.

cerns underscore the importance of understanding how economic burdens shape public support for climate policy.

Our analysis shows that households' support for stronger climate measures varies systematically with their economic exposure to climate policy. Using linked survey and administrative data, we quantify heterogeneity in theory-consistent exposure measures across three channels and document that greater exposure is associated with lower climate policy support. Across the different channels, household exposure to energy (particularly electricity consumption), relates to lower policy support. Transport-related exposure also plays an important role, primarily through the fuel efficiency of the vehicles owned rather than the distances driven. Labour-market exposure is most strongly associated with lower support among older and lower-educated workers, consistent with evidence that these groups are particularly vulnerable to climate policy impacts. At the same time, the estimated magnitudes are modest in absolute terms: a one-standard-deviation increase in any single exposure channel moves the probability of support by only about one to two percentage points, compared to a much larger effect of climate beliefs. Economic self-interest thus shifts support at the margin rather than dominating it.

These findings nonetheless suggest implications for climate policy design: policies that mitigate cost exposure may raise support at the margin. Examples include compensation schemes targeted at electricity-intensive households, incentives that lower the cost of adopting cleaner vehicles, and retraining and mobility programmes for workers in carbon-intensive sectors.

From a broader perspective, our findings relate directly to debates on the political economy of climate change, by highlighting that opposition to further climate policies need not solely reflect misinformation or ideological resistance, but also rational responses to economic risks. This suggests that policy packages should explicitly recognise and address the impact of climate policies on households and workers, and in particular the heterogeneity therein. Climate strategies that ignore these differences may encounter greater resistance, whereas those that explicitly address them will be more effective in enhancing and sustaining support for long-run climate change strategies.

Our study highlights several avenues for future research. Our measures of household energy costs, vehicle-related emissions and job exposure capture three key channels through which climate policies are likely to affect. Yet other factors, such as proximity to public transport and housing characteristics, including the use of heat pumps and quality of insulation, create additional variation in exposure that our current study cannot fully capture. Access to richer administrative and geo-spatial data would allow for more comprehensive assessments of these factors and help identify which heterogeneities are most relevant for understanding public support. Finally, although we consistently document a negative relationship between our theory-consistent measures of exposure and support for climate policies, the current literature still fails to document clear causal effects. Future research that credibly isolates how changes in exposure for specific measures affect policy support across different channels would further strengthen the policy relevance of our findings.

Declarations

Funding This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Competing interests The authors have no competing interests to declare that are relevant to the content of this article.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process The authors disclose that generative artificial intelligence tools (ChatGPT, Claude) were used for assistance in editing text. Further, we have used the Refine.ink tool for AI-generated feedback on our manuscript.

Data availability The analysis in this paper relies on non-public administrative microdata from Statistics Netherlands (Centraal Bureau voor de Statistiek, CBS), which the authors are not permitted to share. Under the Dutch Statistics Netherlands Act, CBS may grant access to these microdata for statistical or scientific research purposes, and access is structured such that authorised external researchers can consult the microdata only within the secure online environment of CBS, by means of a remote-access facility. The underlying records cannot be downloaded or exported, and CBS assesses all research output for disclosure risk before it may be published.

The data are nonetheless available to other researchers under the same conditions that applied to us. Access is granted to researchers at departments, organisations or institutions authorised by the Director General of Statistics; these include Dutch universities, institutes for scientific research, organisations for policy advice or policy analysis, and statistical authorities in other EU countries. Institutions that do not currently hold an authorisation may apply for one. A project application specifies the purpose of the project, the research questions and the datasets required, and is assessed by CBS for feasibility and compliance with the General Data Protection Regulation (GDPR). Once an agreement is reached, a project contract is drawn up, together with a confidentiality statement for each researcher; fees apply. The application procedure is described at `https://www.cbs.nl/en-gb/our-services/customised-services-microdata/microdata-conducting-your-own-research`, and enquiries may be directed to CBS Microdata Services (microdata@cbs.nl).

Code availability All code used to construct the exposure measures, to assemble the estimation sample, and to produce every table and figure in the paper and its appendix can be made available on request.

References

ABNETT, K., BIESEMANS, B. and OULICHKI, H. (2024). Main farming groups shun brussels protest against eu green policies. *Reuters*.

AI, C. and NORTON, E. C. (2003). Interaction terms in logit and probit models. *Economics letters*, **80** (1), 123–129.

ALLCOTT, H. (2011). Consumers' perceptions and misperceptions of energy costs. *American Economic Review*, **101** (3), 98–104.

ANDERSON, B., CAMMERAAT, E., DECHEZLEPRÊTRE, A., DRESSLER, L., GONNE, N., LALANNE, G., GUILHOTO, J. M. and THEODOROPOULOS, K. (2023). Designing policy packages for a climate-neutral industry: A case study from the netherlands. *Ecological Economics*, **205**, 107720.

AUTORITEIT CONSUMENT & MARKT (ACM) (2024). Eerlijke verdeling kosten elektriciteitsnet nog belangrijker door verwachte forse stijging nettarieven. Webpage. Accessed 2026-01-29. Available at: `https://www.acm.nl/nl/publicaties/acm-eerlijke-verdeling-kosten-elektriciteitsnet-nog-belangrijker-door-verwachte-forse-stijging-nettarieven`.

BARANZINI, A. and CARATTINI, S. (2017). Effectiveness, earmarking and labeling: testing the acceptability of carbon taxes with survey data. *Environmental Economics and Policy Studies*, **19**, 197–227.

BARRETO, C., FLUCHTMANN, J., HIJZEN, A., LOMBARDI, S., BENNETT, P., BERTHEAU, A., CHAN, W., GORSHKOV, A., HAMBUR, J., JOHNSTONE, N. *et al.* (2024). *The "clean energy transition" and the cost of job displacement in energy-intensive industries*. Tech. rep., Organisation for Economic Co-operation and Development (OECD).

BERGQUIST, M., NILSSON, A., HARRING, N. and JAGERS, S. C. (2022). Meta-analyses of fifteen determinants of public opinion about climate change taxes and laws. *Nature Climate Change*, **12** (3), 235–240.

BIGLER, P. and RADULESCU, D. (2025). Environmental, redistributive, and revenue effects of policies promoting fuel-efficient and electric vehicles. *Journal of the Association of Environmental and Resource Economists*, **12** (5), 1059–1096.

BORENSTEIN, S. and DAVIS, L. W. (2025). The distributional effects of us tax credits for heat pumps, solar panels, and electric vehicles. *National Tax Journal*, **78** (1), 263–288.

Bosetti, V., Colantone, I., De Vries, C. E. and Musto, G. (2025). Green backlash and right-wing populism. *Nature Climate Change*, pp. 1–7.

Calvacanti, T., Hasna, Z. and Santos, C. (2025). Climate change mitigation policies: Aggregate and distributional effects. *The Economic Journal*, **135** (668), 1341–1387.

Carattini, S., Baranzini, A., Thalmann, P., Varone, F. and Vöhringer, F. (2017). Green taxes in a post-paris world: are millions of nays inevitable? *Environmental and Resource Economics*, **68**, 97–128.

Cavallotti, E., Colantone, I., Stanig, P. and Vona, F. (2025). Green collars at the voting booth: Material interest and environmental voting.

CBS (2022). Population pyramid. Accessed: 2026-01-29.

— (2023). Routing vragenlijst belevingen 2023. Accessed: 2025-01-27.

— (2024a). Emissies van broeikasgassen; ipcc. `https://opendata.cbs.nl/portal.html?_la=nl&_catalog=CBS&tableId=85669NED&_theme=241`, cBS StatLine. Accessed on 2025-07-18.

— (2024b). An increasing number of dutch people have completed higher education. `https://www.cbs.nl/en-gb/news/2024/41/an-increasing-number-of-dutch-people-have-completed-higher-education?utm_source=chatgpt.com`, accessed: 2026-01-08.

— (2025). Gemiddelde energietarieven voor consumenten. Accessed: 2025-10-13.

— (n.d.). Werkgelegenheidsstructuur. `https://www.cbs.nl/nl-nl/visualisaties/dashboard-arbeidsmarkt/banen-werkgelegenheid/toelichtingen/werkgelegenheidsstructuur`, accessed: 2025-07-18.

Chancel, L. (2022). Global carbon inequality over 1990–2019. *Nature Sustainability*, **5** (11), 931–938.

Consoli, D., Marin, G., Marzucchi, A. and Vona, F. (2016). Do green jobs differ from non-green jobs in terms of skills and human capital? *Research Policy*, **45** (5), 1046–1060.

Cronin, J. A., Fullerton, D. and Sexton, S. (2019). Vertical and horizontal redistributions from a carbon tax and rebate. *Journal of the Association of Environmental and Resource Economists*, **6** (S1), S169–S208.

Curtis, E. M., O'Kane, L. and Park, R. J. (2024). Workers and the green-energy transition: Evidence from 300 million job transitions. *Environmental and Energy Policy and the Economy*, **5** (1), 127–161.

De Sario, G., Marin, G. and Sacchi, A. (2023). Citizens' attitudes towards climate mitigation policies: The role of occupational exposure in eu countries. *Kyklos*, **76** (2), 255–280.

Dechezleprêtre, A., Fabre, A., Kruse, T., Planterose, B., Sanchez Chico, A. and Stantcheva, S. (2025). Fighting climate change: International attitudes toward climate policies. *American Economic Review*, **115** (4), 1258–1300.

DNB (2024). *Energy affordability back to pre-crisis levels*. Tech. rep., De Nederlandsche Bank.

Douenne, T. and Fabre, A. (2022). Yellow vests, pessimistic beliefs, and carbon tax aversion. *American Economic Journal: Economic Policy*, **14** (1), 81–110.

Driscoll, D. (2023). Populism and carbon tax justice: The yellow vest movement in france. *Social Problems*, **70** (1), 143–163.

Durante, R., Putterman, L. and Van der Weele, J. (2014). Preferences for redistribution and perception of fairness: An experimental study. *Journal of the European Economic Association*, **12** (4), 1059–1086.

Eckert, L., Stagl, S. and Schemel, B. (2025). Social acceptance of climate policies: Insights from austria. *Ecological Economics*, **237**, 108708.

Egli, F., Schmid, N. and Schmidt, T. S. (2022). Backlash to fossil fuel phase-outs: the case of coal mining in us presidential elections. *Environmental Research Letters*, **17** (9), 094002.

Elinder, M., Jordahl, H. and Poutvaara, P. (2015). Promises, policies and pocketbook voting. *European Economic Review*, **75**, 177–194.

Epstein, L. and Muehlegger, E. (2024). *Ideology, Incidence and the Political Economy of Fuel Taxes: Evidence from the California 2018 Proposition 6*. Tech. rep., National Bureau of Economic Research.

Eurostat (2024). Passenger cars in the eu. `https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Passenger_cars_in_the_EU#Source_data_for_tables_and_graphs`, accessed on 2025-07-18.

Eurostat (2025). Air emissions intensities by nace rev. 2 activity. Online data code: env_ac_aeint_r2. Accessed: 2024-04-09.

Forum, W. E. (2023). *Fostering Effective Energy Transition 2023 Edition*. Tech. rep.

Ganapati, S., Shapiro, J. S. and Walker, R. (2020). Energy cost pass-through in us manufacturing: Estimates and implications for carbon taxes. *American Economic Journal: Applied Economics*, **12** (2), 303–342.

Gerarden, T. D., Newell, R. G. and Stavins, R. N. (2017). Assessing the energy-efficiency gap. *Journal of economic literature*, **55** (4), 1486–1525.

Goerg, S., Pondorfer, A. and Stöhr, V. (2025). Public support for more ambitious climate policies: Empirical evidence from germany. *Ecological Economics*, **231**, 108538.

Guardian (2023). A green transition that leaves no one behind': world leaders release open letter.

Habla, W., Kokash, K., Löfgren, Å., Straubinger, A. and Ziegler, A. (2025). Self-interest and support for climate-related transport policy measures in germany and sweden. *Transportation Research Part D: Transport and Environment*, **144**.

Hochmuth, P., Krusell, P. and Mitman, K. (2026). Distributional consequences of becoming climate-neutral. *The Economic Journal*, p. ueag004.

Holian, M. J. and Kahn, M. E. (2015). Household demand for low carbon policies: Evidence from california. *Journal of the Association of Environmental and Resource Economists*, **2** (2), 205–234.

Hoyle, A. and Rhodes, E. (2025). Explaining public support for net-zero climate policy instruments: Perceptions of distributive fairness under competing frames. *Energy Policy*, **203**, 114644.

Karadja, M., Mollerstrom, J. and Seim, D. (2017). Richer (and holier) than thou? the effect of relative income improvements on demand for redistribution. *Review of Economics and Statistics*, **99** (2), 201–212.

Konradt, M. and Mangiante, G. (2026). The unequal costs of carbon pricing: Economic and political effects across european regions. *The Economic Journal*, p. ueaf133.

Koops, O., Melief, H., Schenau, S., Schoenaker, N. and van Rossum, M. (2022). Broeikasgassen in de nederlandse economie. https://www.cbs.nl/nl-nl/longread/de-nederlandse-economie/2022/broeikasgassen-in-de-nederlandse-economi e?onepage=true#c-Samenvatting, centraal Bureau voor de Statistiek. Accessed on 2025-07-18.

Köppl, A. and Schratzenstaller, M. (2023). Carbon taxation: A review of the empirical literature. *Journal of Economic Surveys*, **37** (4), 1353–1388.

Mulder, P., Dalla Longa, F. and Straver, K. (2023). Energy poverty in the netherlands at the national and local level: A multi-dimensional spatial analysis. *Energy Research & Social Science*, **96**, 102892.

Netbeheer Nederland (2024). Netbeheerders zien aantal huishoudens met zonnepanelen verder groeien in 2023. Accessed: 2025-01-09.

OECD (2021). *Policies for a Carbon-Neutral Industry in the Netherlands*. Paris: OECD Publishing.

OECD (2024). *Employment Outlook 2024: The Net-Zero Transition and the Labour Market*. Tech. rep., Organisation for Economic Co-operation and Development (OECD), accessed: 2025-10-08.

PBL (2024). *Klimaat- en Energieverkenning 2024*. The Hague, Netherlands: Planbureau voor de Leefomgeving.

Peñasco, C., Anadón, L. D. and Verdolini, E. (2021). Systematic review of the outcomes and trade-offs of ten types of decarbonization policy instruments. *Nature Climate Change*, **11** (3), 257–265.

Pizer, W. A. and Sexton, S. (2019). The distributional impacts of energy taxes. *Review of Environmental Economics and Policy*.

Roberts, D. (2018). Washington votes no on a carbon tax — again. *Vox*.

RVO and Revnext (2024). Trendrapport nederlandse markt personenauto's: Feiten, cijfers en ontwikkelingen. editie 2024. https://www.rvo.nl/documenten/trendrapport-nederlandse-markt-personenautos-editie-2024, commissioned by the Ministry of Infrastructure and Water Management. Published on 28 June 2024. Accessed on 2025-07-18.

Schuitema, G., Steg, L. and Forward, S. (2010). Explaining differences in acceptability before and acceptance after the implementation of a congestion charge in stockholm. *Transportation Research Part A: Policy and Practice*, **44** (2), 99–109.

Shang, B. (2023). The poverty and distributional impacts of carbon pricing: Channels and policy implications. *Review of Environmental Economics and Policy*, **17** (1), 64–85.

Stutzmann, S. (2024). *The electoral consequences of the coal phase-out in Germany*. Tech. rep., Working Paper Series.

Tash, B. (2024). Cost of going green sparks backlash from europe's voters. *BBC*.

TNO and CBS (2024). Methodedocument monitor energiearmoede 2019-2022. `https://www.cbs.nl/nl-nl/longread/aanvullende-statistische-diensten/2024/methodedocument-monitor-energiearmoede-2019-2022?onepage=true`, cBS StatLine. Accessed on 2025-10-09.

TNO and CBS (2024). *Energiearmoede in Nederland 2019-2023*. Tech. Rep. TNO 2024 R10801, TNO.

Uyduranoglu, A. and Ozturk, S. S. (2020). Public support for carbon taxation in turkey: drivers and barriers. *Climate Policy*, **20** (9), 1175–1191.

Weyl, E. G. and Fabinger, M. (2013). Pass-through as an economic tool: Principles of incidence under imperfect competition. *Journal of Political Economy*, **121** (3), 528–583.

Willsher, K. (2018). Macron scraps fuel tax rise in face of gilets jaunes protests. *The Guardian*.

Yip, C. M. (2018). On the labor market consequences of environmental taxes. *Journal of Environmental Economics and Management*, **89**, 136–152.

A Data and descriptive statistics

A.1 Belevingen survey questions

Below we list the relevant questions from the CBS *Belevingen* survey concerning policy support, climate awareness and policy effectiveness. We provide first the question the respondents received in Dutch, followed by the English translation.

Policy support

Question (Dutch):
In hoeverre bent u het eens of oneens met de volgende stellingen? "Het klimaatbeleid van de overheid gaat niet ver genoeg."

Antwoorden:
1. Helemaal eens
2. Eens
3. Niet eens, niet oneens
4. Oneens
5. Helemaal oneens
6. Weet ik niet
7. Geen antwoord

Question (English):
To what extent do you agree or disagree with the following statement? "The government's climate policy does not go far enough."

Answers:
1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree
6. I don't know
7. No answer

Climate awareness

Question (Dutch):
Denkt u dat het klimaat wel of niet aan het veranderen is?

Antwoorden:
1. Ja, zeker wel
2. Ja, waarschijnlijk wel
3. Nee, waarschijnlijk niet
4. Nee, zeker niet
5. Weet ik niet

Question (English):
Do you think the climate is changing or not?

Answers:
1. Yes, definitely
2. Yes, probably
3. No, probably
4. No, definitely
5. I don't know

Policy effectiveness

Respondents who answered 'yes, definitely' or 'yes, probably' to the previous question on whether they believe the climate is changing were subsequently asked to answer the following question regarding policy effectiveness:

Question (Dutch):
In hoeverre bent u het eens of oneens met de volgende stellingen? "De invloed van Nederland op de klimaatverandering is zo beperkt, dat het niet uitmaakt wat we doen of laten."

Antwoorden:
1. Helemaal eens
2. Eens
3. Niet eens, niet oneens
4. Oneens
5. Helemaal oneens
6. Weet ik niet
7. Geen antwoord

Question (English):
To what extent do you agree or disagree with the following statement? "The influence of the Netherlands on climate change is so limited that it does not matter what we do or fail to do."

Answers:
1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree
6. I don't know
7. No answer

A.2 Energy exposure - data construction

Equation 10 specifies the energy exposure measure. Below, we provide further details concerning our computations.

Cost components

Energy price p_j We use average gas and electricity prices in the Netherlands from CBS (2025): €1.365 per m^3 of gas and €0.2865 per kWh of electricity. In our final sample, for approximately 15% of households, we observe negative electricity use, which is likely due to the presence of a sizable number of rooftop solar panels.[18][19] Under the Dutch net metering policies, households are charged only for net use, which we use in (10). Compensation for net electricity supply differs across contracts but is generally very low. Hence, we truncate any negative supply to zero.

[18] As households with solar panels deliver energy to the grid on sunny days, annual electricity demand from the grid may deviate from net electricity use (demand net of supply).

[19] Note that in line with the sample being wealthier, the statistics presented in these sections slightly differ from the Dutch population.

Fixed cost$_{ij}$ We distinguish four types of fixed cost components: fixed cost of the gas and electricity connection, structural energy cost reimbursement, and temporary compensation policies following the energy crisis.

The fixed cost component of gas connections is dependent on gas use and grid operators, which depend on the household location. An overview of cost is provided in Table A.1 below; in our computations, we use the average cost given the household gas use as provided in the bottom row. We assume households with zero energy use have no gas connection and hence pay no fixed connection cost. The only exception applies to households whose dwelling is connected to district heating. In these cases, although the data report zero gas consumption, we still assign them the fixed gas costs.

Firm	**0–499m^3**	**500–4,000m^3**	**>4,000m^3**
Liander	144.68	200.20	311.23
Enexis	131.34	177.30	269.27
Stedin	137.11	185.25	281.31
Coteq	130.09	177.79	273.20
Rendo	137.67	185.55	281.31
Westland infra	128.44	169.20	250.71

Table A.1: Gas fixed cost (€ per year) per consumption category for the six main energy suppliers in the Netherlands.

For electricity, we use a fixed cost from CBS (2025): €322.77 per connection.

All households receive an energy cost reimbursement of €403.88. Following the energy crisis, two additional lump-sum compensations were introduced in 2022: a €380 payment granted to all households, and an additional €1,300 payment for those with income below 120% of the policy poverty line. Since these transfers were communicated to be temporary, we do not account for them in our baseline specifications, but consider them only in the robustness analysis (see Section B.2).

Connections with multiple households Statistics Netherlands records energy use data at the address level. In our data, 2.7% of households share a common address. In these cases, we attribute the electricity and gas consumption of each household based on the household's share of total residents at the address.

Robustness checks in which we exclude these households are presented in the robustness analysis (see Section B.2).

Gas and electricity exposure In section 6.1 we separately define exposure to gas and electricity cost. For this computation, we allocate the €403.88 energy cost reimbursement based on the gas and electricity's relative share in total energy expenditure in the Netherlands.

Figure A.1 presents the distribution of this decomposition across income deciles. It highlights that across income deciles, the majority of the household energy bill can be attributed to gas use. The concentration of households with zero gas expenditure reflects households without a gas connection. The bunching of households at certain low levels of electricity costs distribution reflects households with net-zero or -negative electricity consumption, who face only fixed costs.

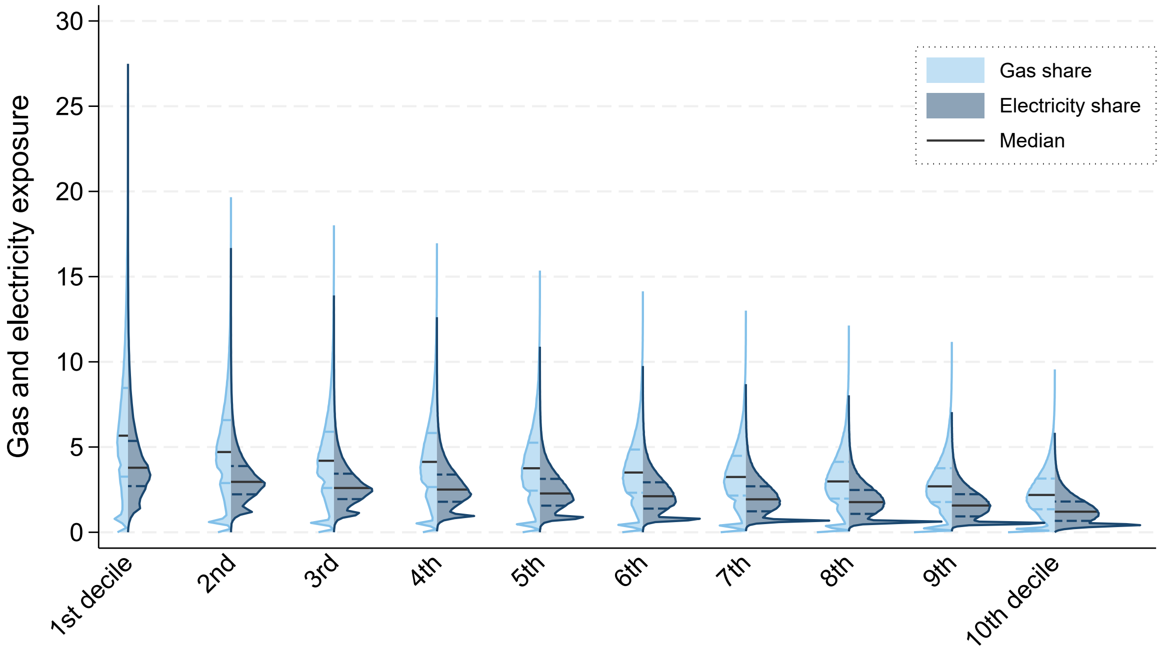


Figure A.1: Household gas and electricity exposure
The figure displays the distribution of gas and electricity exposure for 7,253,089 Dutch households. The dot lines represent the 25th–75th percentile range. In accordance with privacy guidelines, we exclude the top and bottom 1% of observations within each decile.

A.3 Final database

The Belevingen survey collected responses from 18,327 respondents. After merging this data with the CBS administrative data and RDW vehicle ownership data and dropping observations for inconsistencies or missing information, we obtain a final sample of 15,208 observations. While we cannot disclose for privacy reasons how many observations were dropped at each stage, observations were dropped for the following reasons:

- Respondents who answered "No answer" or "I don't know" to policy support;

- Respondents who did not report their gender;
- Respondents with missing income or energy data;
- Respondents employed in sectors with missing job exposure information;
- Respondents with an energy exposure in the top or bottom 1% of the population;
- Respondents with a vehicle exposure in the top 1% of the population.

Among the remaining 15,208 respondents, we recover missing information on CO_2 emissions per kilometre for 3.6% of vehicles. Missing values are imputed using the fuel efficiency of a vehicle with the same brand, fuel type, and year of registration, selecting the model with the closest weight and restricting the match to cases where the weight differs by no more than 5%. In Appendix B.2, we conduct a robustness check in which these imputed observations are excluded.

A.4 Descriptive statistics

The following Tables (A.2 and A.3) present descriptive statistics for the primary variables used in this study.

	Selected percentiles of the distributions							
Variable	**1%**	**25%**	**50%**	**75%**	**99%**	**Mean**	**Std.**	**Unit**
Policy support	1	3	3	4	5	3.36	1.27	Number
Energy exposure	0.62	3.54	5.32	7.6	17.44	5.94	3.47	Energy share of income
Vehicle exposure	0	11.03	32.58	60.15	192.59	42.03	41.9	Grams of CO_2 share of income
Job exposure	0	0	0.02	0.04	2.07	0.1	0.38	Kg of CO_2 per value added
Income	13,364	28,766	37,455	47,949	121,308	41,420	28,361	Euro
Female	0	0	0	1	1	0.46	0.50	1 = Female
Age	23	44	57	68	86	55.92	15.72	Number
Gas exposure	0	2.1	3.35	4.87	11.92	3.71	2.45	Gas share of income
Electricity exposure	0.29	1.08	2.01	2.99	7.02	2.23	1.5	Electricity share of income
Vehicle CO_2 efficiency	0	90.14	118.42	147	238	108.59	61.38	Vehicle's grams of CO_2 per km
Km intensity	0	0.1	0.26	0.47	1.35	0.32	0.31	Km driven share of income

Table A.2: Summary statistics for the continuous variables (15,208 observations).

Category	Frequency	Percent
Education		
Missing	268	1.76%
Basic	324	2.13%
VMBO	3,349	22.02%
MBO	3,362	22.1%
HAVO/VWO	1,051	6.91%
HBO	4,148	27.27%
University	2,706	17.79%
Climate beliefs		
No info if climate changes	254	1.67%
Climate does not change	566	3.72%
Climate changes but no info on impact	218	1.43%
Climate changes - policy ineffective	3,338	21.95%
Climate changes - policy somewhat effective	2,712	17.87%
Climate changes - policy very effective	8,120	53.39%
Income source		
Employee	7,273	47.82%
Self-employed	1,026	7.93%
Director-major shareholder	277	1.82%
Benefit recipient	912	6%
Pension	4,573	30.07%
Students with or without income	647	4.25%
Other	500	3.29%

Table A.3: Frequencies of the categorical variables (15,208 observations).

B Robustness analysis

B.1 Robustness - alternative dependent variable

In our estimations, we consider climate policy support as a dependent variable, where we consider a respondent supportive of climate policy if they answered *'agree'* or *'strongly agree'* to the statement *"The government's climate policy does not go far enough."*. Individuals who answered *'neither agree nor disagree'*, *'disagree'* or *'strongly disagree'* were considered as not supportive of climate policy. In this section, we re-estimate 13 under two alternative definitions of support. In addition, to allow for heterogeneity in the effect of exposure for different categories of support, we estimate an ordered logit model. Overall, our key result, that greater economic exposure is associated with reduced support for all three exposure categories, is maintained.

B.1.1 Alternative definitions of support

We consider two alternative definitions of climate policy support. In the first, we exclude from the analysis the 26.13% of respondents who are *'neutral'* to the statement *"The government's climate policy does not go far enough."* As a result, respondents categorised as in opposition to climate policy now include only those who *'strongly oppose'* or *'oppose'* them. Results are presented in column (1) of Table B.1. In columns (2), we instead categorise the *'neutral'* respondents as in support of climate policy. The results are robust to this change: the coefficients of the exposure variables remain statistically significant and with the same interpretation of column (5) in Table 1, with higher exposure meaning a lower level of support for each exposure channel.

Table B.1: Economic exposure and policy support - reclassifying policy support

	Policy support	
	(1) Dropping neutral	(2) Neutral as support
Energy exposure	-0.0055^{***} (0.0012)	-0.0049^{***} (0.001)
Vehicle exposure	$-0.000\,29^{***}$ (0.0001)	$-0.000\,22^{***}$ (0.00008)
Job exposure	-0.0204^{**} (0.0081)	-0.0148^{**} (0.0069)
Other control variables	Yes	Yes
Constant	Yes	Yes
Municipality dummies	Yes	Yes
Observations	11,215	15,186

Results from a logit model. Coefficients reported represent average marginal effects. Standard errors (in parentheses) are clustered at the municipality level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

B.1.2 Ordered support variable

The survey allowed respondents to not only express support or opposition to a strengthening of climate policy, but also the degree to which they support or not (e.g., support vs strong support). To examine more precisely how exposure relates to the full distribution of support, we re-estimate specification (13) using an ordered logit model with five ordered response categories, ranging from strong opposition to strong support. The results are presented in Table B.2.

The estimated coefficients are broadly consistent with the binary model. For all exposure measures, higher exposure increases the probability of expressing opposition or neutrality to climate policies. It conversely reduces the likelihood of expressing support, in particular, strong support.

Table B.2: Economic exposure and policy support through an ordered logit model

	Policy support		
	Energy exposure	Vehicle exposure	Job exposure
Strong opposition	0.0021***	0.000 08***	0.0080***
	(0.0004)	(0.00003)	(0.0027)
Opposition	0.0022***	0.000 08***	0.0082***
	(-0.00004)	(0.00003)	(0.0028)
Neutral	0.0013***	0.000 05***	0.0049***
	(0.0003)	(0.00002)	(0.0017)
Support	−0.0015***	−0.000 06***	−0.0057***
	(0.0013)	(0.00002)	(0.0019)
Strong support	−0.0040***	−0.000 15***	−0.0154***
	(0.0008)	(0.00005)	(0.0052)
Control variables		Yes	
Constant		Yes	
Municipality dummies		Yes	
Observations		15,208	

Results from an ordered logit model. Coefficients reported represent average marginal effects. Standard errors (in parentheses) are clustered at the municipality level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

B.2 Robustness - alternative specifications

We assess the robustness of our main findings by estimating a set of alternative models that differ either in their specification or in how the data is treated. The results are presented in Table B.3.

In columns (1) and (2) we drop all respondents with a household income in the lowest and highest income deciles compared to the Dutch population, respectively. This addresses potential outliers at both ends of the income distribution and accounts for the possibility that some low-income households may in fact hold substantial wealth that is not directly observable in our data. Column (3) also checks for the effect of personal job exposure used in 6.3, using just the top three income-jobs at the personal level. For 3.6% of the Dutch car fleet, we had missing CO_2 emissions, which we recovered as specified in A.3. In column (4), we omit those observations from our regression. In column (5), we omit the 2.7% observations for which we do not directly observe, but estimate energy use as they share an address with another household. In column (6), we estimate a multilevel logit model where we group at the municipality level. Finally, in (7) and (8), we estimate models where we consider the additional energy compensation (respectively €380 and

€1,300) given to households.

Overall, our results are robust to these changes. They do, however, appear sensitive to dropping observations with income in the highest decile: doing so reduces the (absolute) size of all estimated marginal effects, and renders the effect of job exposure insignificant. This suggests that while climate policy exposure is related to support across the income distribution, this relationship is particularly strong for high-income respondents.

Table B.3: Robustness checks for economic exposure

	F. Policy support							
	(1) 1st decile	(2) 10th decile	(3) Personal job	(4) Missing CO_2 car data	(5) Sharing address	(6) Multilevel logit	(7) Energy compensation	(8) Energy compensation
Energy exposure	-0.0061^{***} (0.0014)	-0.0043^{***} (0.0014)	-0.0046^{***} (0.0014)	$-0.000\,49^{***}$ (0.0013)	-0.0052^{***} (0.0013)	-0.005^{*} (0.0012)	-0.0051^{***} (0.0014)	-0.005^{***} (0.0012)
Vehicle exposure	$-0.000\,34^{***}$ (0.0001)	$-0.000\,27^{***}$ (0.0001)	$-0.000\,26^{***}$ (0.0001)	$-0.000\,29^{***}$ (0.00009)	$-0.000\,31^{***}$ (0.00009)	$-0.000\,29^{***}$ (0.00009)	$-0.000\,29^{***}$ (0.00009)	$-0.000\,28^{***}$ (0.00009)
Job exposure	-0.0245^{***} (0.0094)	-0.0169 (0.0104)	-0.0271^{***} (0.0097)	-0.0204^{**} (0.0101)	-0.0267^{***} (0.0094)	-0.0252^{***} (0.0097)	-0.0252^{***} (0.0092)	-0.025^{***} (0.0092)
Other control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,588	12,911	14,679	15,208	14,973	15,208	15,208	15,208

Results from a logit model. Coefficients reported represent average marginal effects. Standard errors (in parentheses) are clustered at the municipality level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C Model derivations

Good k demand To determine the indirect utility function, we first write the Lagrangian for maximising the utility of household i, (1), subject to its budget constraint, (3):

$$L = \left[(H_i - \gamma_H)^{\alpha_{H,i}}(T_i - \gamma_T)^{\alpha_{T,i}}(Y_i - \gamma_Y)^{\alpha_{Y,i}}\right]^{\beta} E^{1-\beta} + \lambda_i \left(I_i - p_H H_i - p_T T_i - p_Y Y_i\right),$$

where λ_i is the Lagrange multiplier associated with the budget constraint. From here we obtain the following first-order conditions for k_i, with $k \in \{H, T, Y\}$. As we focus on the interior solution where income is sufficient to satisfy subsistence consumption, we set them equal zero:

$$\frac{\partial L}{\partial k_i} = \alpha_{k,i} \frac{\beta}{k_i - \gamma_k} \left[(H_i - \gamma_H)^{\alpha_{H,i}}(T_i - \gamma_T)^{\alpha_{T,i}}(Y_i - \gamma_Y)^{\alpha_{Y,i}}\right]^{\beta} E^{1-\beta} - \lambda_i p_k = 0.$$

From here we obtain:

$$\frac{Y_i - \gamma_Y}{k_i - \gamma_k} = \frac{\alpha_{Y,i}}{\alpha_{k,i}} \left(\frac{p_Y}{p_k}\right)^{-1}.$$

To derive good k equilibrium demand (4), we substitute the above term back in to the budget constraint (3) and use $\alpha_{H,i} + \alpha_{T,i} + \alpha_{Y,i} = 1$.