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Greenwich Papers in Political Economy

Can A Wealth Tax Reduce CO_2 Emissions in Europe?

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This version: October 8, 2025

No: GPERC103

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Keywords: wealth tax, wealth distribution, environmental effect, CO2 emissions

Acknowledgments: We are grateful to Arthur Apostel, Jakob Kapeller and Bernhard Schütz for valuable feedback, and to HFCS for data provision. We gratefully acknowledge the use of Pareto-adjusted HFCS data based on Kapeller et al. (2023). We thank the Hans-Böckler Foundation for research funding based on grant 2021-554-2. The usual disclaimers apply.

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1: Introduction

Climate change and wealth inequality are deeply interconnected. On the one hand, high-net-worth households emit more CO_2 than low-net-worth households on average (Büchs et al., 2024; Chancel, 2022).[1] On the other hand, wealth inequality and the resulting political influence of wealthy elites may impede the adoption of climate measures. Indeed, research has shown that more equal societies are more likely to implement green policies (Apeti et al., 2025; Apostel and O'Neill, 2022; Knight et al., 2017). There is also increasing evidence that climate policies can have adverse distributional effects, which should be mitigated through complementary redistribution measures (Klenert and Mattauch, 2016; Markkanen and Anger-Kraavi, 2019; Owen and Barrett, 2020; Sommer et al., 2022). Ecological economists have thus argued that climate policies should focus on top emitters who are also at the top of the wealth distribution (Otto et al., 2019).

Against this background, wealth taxes appear to be a promising policy tool – they target high-net worth top emitters, can cushion inequality-enhancing effects of climate policies, and reduce wealth inequality and potentially political capture by wealthy elites. Furthermore, they generate additional revenue to finance the Green Transition while maintaining fiscal sustainability (Hickel et al., 2022; Kapeller et al., 2023). Yet, research on the impact of wealth taxation on carbon emissions is limited to a single article by Apostel and O'Neil (2022), hereafter AON22, who estimate the effect of a one-off wealth tax on CO_2 emissions in Belgium.

We analyse the potential of a wealth tax to reduce CO_2 emissions from a micro perspective through two transmission channels. The first channel is based on the effect of wealth taxes on consumption of top wealth holders and ensuing CO_2 emissions – labelled *consumption channel*. The second channel is based on AON22 and Knight et al. (2017), and estimates the effect of wealth taxes on wealth inequality and subsequently on CO_2 emissions. We label this the *inequality channel*.

When analysing the inequality channel we go beyond AON22 by first, extending the simulation to a 10-year horizon under an annual wealth tax to analyse long-run effects, second, presenting simulations that take heterogenous rates of return of assets and differences in portfolio allocation along the wealth distribution into account, and third, extending the analysis to 22 European countries.[2] We also adjust AON22's approach of modelling behavioural effects of wealth taxes to make it more relevant to our context of a reoccurring annual wealth tax.

We are the first to empirically analyse the consumption channel. This transmission mechanism is narrower than the inequality channel, but more precisely identified through well-established country-specific estimates of the marginal propensity to consume (MPC) out of wealth along the wealth distribution, as well as country-specific estimates of the marginal effect of consumption on CO_2 emissions. We provide estimates for this channel for six European countries (Belgium, Cyprus, Germany, Spain, France, and Italy) due to limited data availability for country-specific MPCs out of wealth.

[1] Since 2009 the differences in CO_2 emissions between high- and low-income households within the same country explains a larger share of global emissions inequality than the between-country dimension, i.e. differences in emissions between the average citizen of high- and low-income countries (Chancel, 2022).
[2] Austria, Belgium, Cyprus, Germany, Estonia, Finland, France, Greece, Croatia, Hungary, Ireland, Italy, Lithuania, Luxembourg, Latvia, Malta, Netherlands, Poland, Portugal, Slovenia, Slovakia, Spain.

Our analysis consists of three steps. First, we obtain consistent data on the wealth distribution for 22 European Union (EU) countries from the European Central Bank's Household Finance and Consumption Survey (HFCS). The HFCS suffers from differential non-response resulting in a downward bias in top wealth holdings. We account for this by using corrected data based on Pareto estimations of the top wealth tail provided by Kapeller et al. (2023). Second, we simulate the effect of various tax models on net wealth at the household level over one- and ten-year horizons. Our tax models draw on existing literature (Kapeller et al., 2023; Piketty, 2020) and range from mildly progressive approaches (starting at a 1% wealth tax for net wealth over €1 million) to strongly progressive approaches (with a top marginal tax rate of 90%). We start with simulations where net wealth grows by a fixed rate over time, and provide extensions that account for heterogenous rates of return of different asset classes (financial wealth, housing, etc.) and household-specific portfolio allocation based on HFCS data, thereby integrating recent evidence on differential growth rates of wealth along the wealth distribution (Fagereng et al., 2020). We also account for behavioural responses to wealth taxes, such as changes in saving behaviour or bequest incentives, based on estimates from Jakobsen et al. (2020). Third, we obtain the effect of changes in wealth on CO_2 emissions by multiplying the simulated change in (top) wealth (shares) with our estimates for the consumption and inequality channel.

We show that a wealth tax has the potential to significantly reduce CO_2 emissions. Based on the inequality channel, a one-off wealth tax reduces annual CO_2 emissions by between 0.4% to 1.5% relative to annual emissions in 2017. This is comparable to previous estimates by AON22 for Belgium. Importantly, the effect increases significantly over a ten-year horizon because inequality diverges strongly between the 'no-tax' scenario and a counterfactual where a wealth tax is introduced. Based on our preferred ten-year simulation for the inequality channel (using Pareto-corrected data, heterogenous rates of return, and including behavioural effects), we find that annual CO_2 emissions would be between 7.5% to 14.7% lower after ten years if a wealth tax were implemented in the first year. The range of values depends on the progressivity of the tax – the more progressive the wealth tax, the larger the reduction in CO_2 emissions. The effect differs strongly across countries, depending on the effectiveness of the wealth tax to reduce top wealth shares, ranging from 2.5% in Latvia to 27.7% in Luxembourg. These estimates depend significantly on whether heterogenous rates of return of wealth components and behavioural effects are accounted for, and on the adjustment of the HFCS data for differential non-response. Neglecting differential rates of return, behavioural effects, and non-response bias reduces the effect by approximately 0.8 percentage points, 4.7 percentage points, and 3.9 percentage points, respectively.

For the consumption channel, effects are smaller on average. According to our preferred estimate (Pareto-corrected data, heterogenous rates of return, no behavioural effects), annual CO_2 emissions are between 1.5% – 3.6% lower in year 10 if an annual wealth tax is introduced 10 years prior.[3] Again, results differ significantly across countries, depending on the effectiveness of the wealth tax, as well as country-specific differences in the MPC out of wealth along the wealth distribution and the CO_2-intensity of consumption. The one-year effect of the consumption channel is in the region of 0.09% to 0.47%. As before, effects are smaller when net wealth components grow homogenously, or when data is not corrected for differential non-response.

Our analysis provides a new perspective on the link between distributional and climate policies by analysing whether distributional policies can have positive climate effects. This complements existing

[3] We prefer estimates without behavioural effects for the consumption channel due to potential feedback effects on consumption emissions as discussed in Section 4.3.

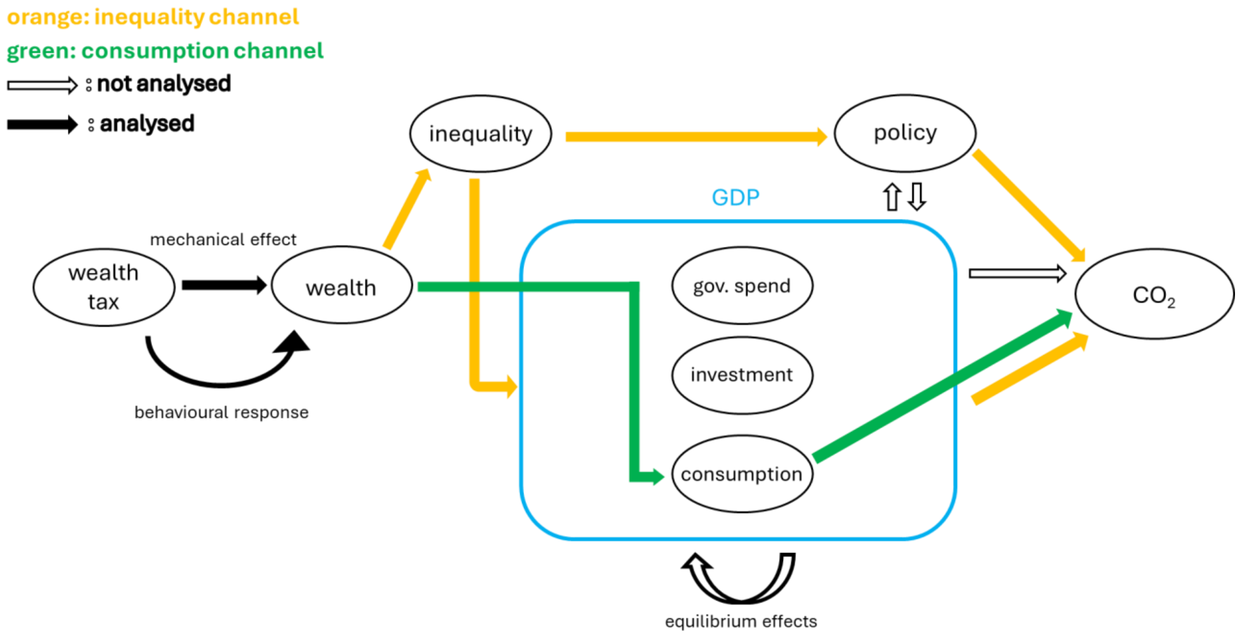
research analysing adverse distributional effects of climate policies (e.g. Klenert and Mattauch, 2016). We find that wealth taxes reduce emissions by targeting high-net worth emitters, and thus plausibly contribute to reducing emissions inequality. By reducing wealth inequality, they make the adoption of climate policies more likely and can help reduce adverse distributional effects of other climate measures such as carbon taxes – a consideration that is gaining increasing political relevance (Sommer et al., 2022). Lastly, although not analysed in this article, their revenues have substantial potential for funding the Green Transition, since annual wealth tax revenue estimates based on the data used in this article range from 1% to 16% of the joint GDP of the 22 EU countries in our sample (Kapeller et al., 2023, Table 6). While the estimated effect sizes show that wealth taxes are not a silver bullet, this article provides clear evidence for synergies between distributional and climate policies.

The rest of the paper is structured as follows. Section 2 introduces our approach to modelling wealth dynamics, clarifies the causal mechanism behind the inequality and the consumption channel, and presents new estimates of the effect of changes in wealth on CO_2 emissions. Section 3 briefly discusses the literature on wealth inequality and differential non-response bias, before introducing the bias correction applied in this article. Section 4 brings these analyses together by providing estimates of the effect of various wealth tax proposals on CO_2 emissions via the consumption and inequality channel. Section 5 concludes.

2: The effects of changes in wealth on CO_2 emissions

This section presents our approach to modelling the effect of changes in wealth on CO_2 emissions. To guide the discussion, the directed graph (DG) in Figure 1 provides an overview of the different causal channels, which are explained in more detail in the remainder of the section. The first two arrows from 'wealth tax' to 'wealth' are discussed in Section 2.1, which lays out our approach to modelling the effect of wealth taxes on wealth dynamics. Section 2.2. introduces new estimates for the effect of wealth on CO_2 emissions along the consumption channel (green arrows), while Section 2.3 presents our approach to modelling the inequality channel (orange arrows). Section 2.4 discusses some of the causal effects of wealth taxes on CO_2 emissions that are omitted from our analysis (hollow black arrows).

Figure 1: Directed Graph for the effect of wealth taxes on CO_2 emissions



2.1 Wealth taxes and wealth dynamics

The first step in analysing the effect of wealth taxes on CO_2 emissions is to quantify the impact of taxes on household wealth (ΔW_i). To calculate post-tax wealth we apply the following procedure. First, wealth of household i W_i grows with growth rate R throughout the year, before being taxed at the end of the period. For a tax model with $u + 1$ tax brackets, defined by u thresholds $S_1, \ldots, S_u$ wealth above each threshold S_j is taxed at rate τ_j and the tax rate below the first threshold is $\tau_0 = 0\%$, meaning the first threshold sets the exemption threshold. This yields the following law of motion for W_i, where $S_{j+1} > W_i(1 + R) > S_j$:

$$W_{i,t+1} = W_{i,t}(1+R) - \left[\sum_{x=1}^{j}(S_x - S_{x-1})\tau_{x-1}\right] - \left[W_{i,t}(1+R) - S_j\right]\tau_j \qquad (1)$$

The first term on the right-hand side represents the growth at rate R and the terms in square brackets subtract the tax due.

A crucial question is how the introduction of a wealth tax will affect behaviour and specifically saving decisions and bequests. Behavioural effects will be negligible for a one-off tax with a valuation date before its announcement, since behavioural adjustments (such as changes in savings) will not influence tax liability. In contrast, behavioural responses will be important for an annual tax over 10 years. Jakobsen et al. (2020) outline three behavioural channels. First, wealth taxes lower the return on wealth, inducing households to shift consumption to earlier in life. Second, they increase the price on bequests. Both mechanisms disincentivise wealth accumulation and reduce wealth beyond the mechanical effect of taxation. Third, wealth taxes reduce lifetime resources, and as such incentivise a fall in consumption and an increase in saving – and consequently wealth – over the lifetime.[4] Empirical research generally finds a net negative behavioural effect of wealth taxes on wealth, implying that the first two effects dominate the third (see Iacono and Smedsvik, 2024, for a review of different studies). As a result, the tax base is reduced by more than the tax revenue, implying that wealth of top wealth holders and wealth inequality decrease by more than solely the mechanical effect of the tax.[5]

We model the behavioural effect by assuming that wealth above tax threshold S_j is reduced by a fraction b_j due to lower saving in response to the wealth tax. This gives the following law of motion for household wealth W_i, where $S_{j+1} > W_i(1+R) > S_j$:

$$W_{i,t+1} = W_{i,t}(1+R) - \left[\sum_{x=1}^{j}(S_x - S_{x-1})(\tau_{x-1} + b_{x-1})\right] - \left[W_{i,t}(1+R) - S_j\right](\tau_j + b_j) \quad (2)$$

How large should b be? Various studies have estimated behavioural responses to wealth taxes, but coefficients vary significantly and are highly dependent on the tax scheme and the institutional context (Iacono and Smedsvik, 2024). As AON22, we rely on elasticity estimates in Jakobsen et al. (2020), which is one of the few studies that provides estimates for annual wealth taxes focusing on saving behaviour rather than tax evasion, which is inherently difficult to estimate.[6] In Jakobsen et al. (2020, Table III, rows 2 and 3) the behavioural effect explains between 1/3 to 2/3 of the total effect of the tax rate on wealth (the rest being explained by the mechanical effect of the tax), depending on the identification strategy, the location of the households in the wealth distribution, and the assumed rate of return, among other factors. Thus, a reasonable assumption is that $b_j = \tau_j$, where j is the relevant tax bracket, implying that the behavioural effect acts as a doubling of the marginal tax rate and explains 50% of the total effect on wealth.[7] In line with existing literature (Apostel and O'Neill, 2022; Jakobsen et al., 2020), this assumes stronger behavioural effects at the top of the wealth distribution.

We analyse the dynamic effects of a wealth tax over a 10 year period as well as the static effect of a one-off tax. For the latter we assume a valuation date before the tax announcement, to avoid behavioural

[4] Taking into account the efficiency gains of wealth taxes over capital income taxation under heterogeneous return can change this assessment (Guvenen et al., 2023). We abstract from modelling such efficiency gains.

[5] In contrast, tax evasion might imply that wealth is reduced by less than the mechanical effect, as part of the tax base is undeclared or hidden in tax havens, out of reach of the tax authorities. This is the approach followed by AON22, as discussed in detail in Section 2.3.

[6] We disregard studies exploiting municipal variation in wealth taxes (e.g. Iacono and Smedsvik, 2024), as we are interested in a national tax. These studies usually estimate larger behavioural effects, implying that our final results can be seen as a lower bound. We also do not use estimates based on bunching methods as it has been argued that these approaches do not capture all behavioural responses. For these reasons, and also for comparability with AON22, we prefer the estimates in Jakobsen et al. (2020). See AON22 and Iacono and Smedsvik (2024) for a discussion of potential methodological issues with alternative estimates of behavioural effects.

[7] Table III in Jakobsen et al. (2020) reports effects based on 30-year simulations while our long-run model spans 10 years. Analyses for an 8-year period are reported in the online appendix of Jakobsen et al. (2020, Figure A.IV) and show a significantly larger share that is explained by the behavioural effect (between 79% to 89%, depending on the specification used). As such our approach can be considered a lower bound. On the other hand, Jakobsen et al. (2020) argue that their estimate does not capture tax evasion or avoidance. Accounting for this would reduce the behavioural effect, as part of the wealth is not taxed. For this reason we consider our approach a good compromise between capturing the saving effect (which reduces wealth beyond the mechanical effect) and the evasion and avoidance effects (which increases post tax wealth relative to a no-avoidance and no-evasion baseline). Note also that, due to the non-linear structure of the wealth tax, setting $b_j = \tau_j$ does not imply that wealth is reduced by exactly twice as much relative to simulations without the behavioural effect.

responses (see above). For a one-off tax no dynamic effects are required and we can obtain the change in wealth due to the tax by using equation (1) with $R = 0$. For the annual tax over 10 years we start by assuming a homogenous growth rate of net wealth $R = 5\%$. We regard this as a reasonable point of departure in line with Jakobsen et al. (2020).

However, there is strong empirical evidence that returns differ across asset classes (Jordà et al., 2019; Siegel, 2022) and that portfolio composition varies systematically along the income and wealth distribution. Benhabib et al. (2019) further show that returns that are increasing with wealth are essential to generate the heavy upper tails observed in empirical wealth distributions. We therefore extend our 10-year dynamic specification to allow for heterogeneous rates of return R_i, where each household's growth rate on wealth depends on its portfolio composition (see Table 1). In this setup, returns vary across asset types, and households differ in their asset composition, reflecting differences in risk appetite. The interaction of these factors generates heterogeneous returns on wealth by household.[8] We disaggregate personal wealth into six asset classes: housing, equity, savings accounts, financial investments, debt, and other assets. We take returns on housing and equity from Jordà et al. (2019, Tables VII and X) and calculate the return on financial investment as $r_{fin} = 0.5(r_{equity}) + 0.25(r_{housing}) + 0.25(r_{bills})$, where r_{equity}, $r_{housing}$, and r_{bills} is the average of post-1980 return on these asset classes for France, Germany, Italy, Netherlands and Spain from Jordà et al. (2019). We set the return on saving to 1% and the growth rate of debt, which is relevant for calculating net wealth, to 2%. Other wealth, a diverse 'catch-all' category, has a return of 0% in our simulations.

Table 1: Growth rates (%) of wealth components used in simulations

	Simulation 1: Homogenous growth rate	Simulation 2: Heterogeneous growth rate
Housing		5.10%
Equity		10.52%
Savings account		1.00%
Financial investment		7.22%
Debt		2.00%
Other		0.00%
Net wealth	**5%**	**Household specific**

Notes: Returns on housing and equity are from Jordà et al. (2019, Tables VII and X). Return on financial investment: $r_{fin} = 0.5(r_{equity}) + 0.25(r_{housing}) + 0.25(r_{bills})$, where r_{equity}, $r_{housing}$, and r_{bills} is the average post-1980 return on these asset classes for France, Germany, Italy, Netherlands and Spain from Jordà et al. (2019). Other rates of return are set by the authors.

For ease of demonstration and consistency, the 10-year simulations are calculated as deviations from a counterfactual wealth scenario without a tax: $W_{i,t}^{noTax} = W_{i,0}(1 + R)^t$, so that for household i:

$$\Delta W_{i,t} = W_{i,t} - W_{i,t}^{noTax} \tag{3}$$

[8] For simplicity, we abstract from other determinants of wealth growth, such as saving rate differences. For high-net-worth households – the main group affected by the wealth tax – the growth of wealth is well approximated by the (weighted) return on assets, since savings have a negligible effect.

Consequently $\Delta W_{i,t}$ is zero for households below the tax threshold. For the one-off tax, $W_{i,t}^{noTax}$ is equal to wealth in 2017, the year of our wealth data from the HFCS. Consequently, for the one-off tax, $\Delta W_{i,t} = W_{i,postTax} - W_{i,2017}$.

2.2 Consumption channel

The first channel, identified by green arrows in Figure 1, captures the direct effect of changes in wealth on consumption (c) of the taxed households. It consists of two sub-channels: First, a reduction in wealth (due to the tax) decreases consumption expenditure of top wealth holders, because consumption depends on wealth (green arrows from wealth to consumption). The effect size is determined by the marginal propensity to consume (MPC) out of wealth. Second, lower consumption leads to a decline in consumption-related emissions (green arrow from consumption to CO_2). Thus, we estimate the marginal effect of wealth (W) on CO_2 emissions via the consumption channel $\left(\frac{\partial CO_2}{\partial W}_{Cons}\right)$ as the product of the MPC out of wealth $\left(\frac{\partial c}{\partial W}\right)$ and the marginal effect of consumption on CO_2 emissions $\left(\frac{\partial CO_2}{\partial c}\right)$:

$$\frac{\partial CO_2}{\partial W}_{Cons} = \frac{\partial c}{\partial W} \times \frac{\partial CO_2}{\partial c} \tag{4}$$

A rich literature estimates the MPC out of wealth. One of the key findings is that the MPC varies along the wealth distribution (Arrondel et al., 2019; Garbinti et al., 2020b). For example, Garbinti et al. (2020b), report an MPC for the bottom 50% of wealth holders of 0.046 in Germany, meaning that out of every additional € in wealth, 4.6 Cents are consumed, while the MPC decreases to 0.006 for the top wealth decile.[9] Table 2 provides the MPCs for six countries (Belgium, Cyprus, Germany, Spain, France, and Italy), which we use in our simulations.[10]

Table 2: Marginal propensity to consume (MPC) out of wealth along the wealth distribution

	BE	CY	DE	ES	IT	FR
at the mean	0.023	0.005	0.008	0.016	0.046	0.005
p0-p49	0.057	0.027	0.041	0.057	0.063	0.036
p50-p69	0.076	0.036	0.030	0.060	0.068	0.009
p70-p89	0.027	0.013	0.037	0.027	0.042	0.008
p90-p100	0.014	0.004	0.006	0.010	0.024	0.005

Notes: MPCs used to estimate the consumption channel. Values for France are based on Arrondel et al. (2019, Table 4). Values for other countries are based on Garbinti et al. (2020, Table 5).

[9] Other findings include different MPCs out of different asset classes, e.g. housing vs. financial wealth, as well as that consumption effects differ between positive and negative wealth shocks. For example, Garbinti et al. (2020) find that consumption effects are larger for wealth losses relative to wealth gains in Spain and Italy, while relative effect sizes between financial and housing wealth show no clear pattern. We abstract from these issues as we are only focusing on wealth losses (due to the tax) and a tax targeting all components of wealth.

[10] The estimates from Garbinti et al. (2020) are averages from two regressions (using either 8 or 14 asset classes in the HFCS) from an instrumental-variable strategy that is based on household asset allocation in earlier waves and asset price growth that is exogenous to household-level asset allocation. Estimates from Arrondel et al. (2019) do not include an IV strategy, but are demonstrated to be robust to endogeneity concerns in the appendix of the article.

In contrast to the MPC out of wealth, there are no readily available estimates of the marginal effect of consumption on CO_2 emissions $\left(\frac{\partial CO_2}{\partial c}\right)$. Most studies instead estimate the consumption *elasticity* of CO_2 emissions and subsequently assume that this elasticity is the same across the distribution (see Pottier, 2022, for a comprehensive review of the literature). However, some studies find varying elasticities, as discussed in detail in appendix A.1.

We compare different methods to estimate $\left(\frac{\partial CO_2}{\partial c}\right)$. Our preferred approach is based on data from Bruckner et al. (2022), who provide estimates of the carbon footprint (CO_2 emissions) and carbon intensity (CO_2 emissions in kg per USD spent)[11] by expenditure bins (i.e. along the expenditure distribution) for a large set of countries based on data from the World Bank and the Global Trade Analysis Project (GTAP 10). Importantly, this data only includes CO_2 emissions and abstracts from other greenhouse gas emissions, which implies the same for our estimates of the consumption channel. We estimate the following regression to obtain the marginal effect of consumption on CO_2:

$$CO_{2_\mathrm{i}} = \alpha + \beta c_i + \varepsilon_i \tag{5}$$

where CO_2 is the carbon footprint (in Mt CO_2) and c_i is consumption by expenditure bin i.[12] β is our coefficient of interest $\left(\frac{\partial CO_2}{\partial c}\right)$.[13] To account for the possibility that β can vary along the consumption (and hence also the wealth) distribution we run four different regressions: i) β_{mean} for the whole dataset (by country) which gives us the average β; ii) β_{top10} for the top 10% of the expenditure bins by country; iii) $\beta_{bottom90}$ for the bottom 90% of the expenditure bins; iv) quantile regressions for percentiles 50, 75, and 90, which produce three different estimates of β. Coefficients are always estimated very precisely and are almost the same across all four methods – for example the difference between $\beta_{mean,DEU}(= 0.459)$ and $\beta_{top10,DEU}(= 0.458)$ for Germany is only in the third decimal point and even smaller for most other countries. Results for β_{mean} and β_{top10} are reported in Table 3. Unsurprisingly, such small differences have no effect on our final estimate for the effect size of the consumption channel ($\partial CO_2/\partial W_{cons}$), and consequently we use β_{mean} for our analysis.[14]

[11] Bruckner et al. (2022) use USD, while our MPC out of wealth (Table 2) are computed in Euro. We account for this in the simulations for the consumption channel by multiplying results with the $/€ exchange rate.

[12] A similar approach is followed in the review article by Pottier (2022) to generate comparable estimates across different studies.

[13] Consumption data is not provided by Bruckner et al. (2022), and is calculated as $c_i = \frac{\text{Carbon Footprint}_\mathrm{i}}{\text{Carbon Footprint intensity}_\mathrm{i}} = \frac{CO2_i}{\frac{CO2_i}{cons_i}}$. Before running the regression, we clean the data following Bruckner et al. (2022) by dropping empty expenditure bins that are generated due to the way the World Bank database assigns consumption, and by checking that the number of bins match the number of bins reported in the supplementary material. We also reproduce the elasticities in Bruckner et al. (2022, supplementary material) as a robustness check.

[14] Note that we are estimating β along the *expenditure* distribution, while the MPC out of wealth (Table 2) vary along the *wealth* distribution. If we had found that β varies along the expenditure distribution, we would have had to assume that the expenditure and the wealth distribution match in order to calculate the overall effect of changes in wealth on emissions along the consumption channel. However, given that β is effectively constant along the expenditure distribution, this is of little concern.

Table 3: Marginal effect of consumption on CO_2 emissions by country

	BE	CY	DE	ES	IT	FR
β_{mean}	0.555	0.334	0.459	0.325	0.410	0.368
β_{top10}	0.555	0.334	0.458	0.325	0.409	0.368

Notes: Own calculations. Data based on Bruckner et al. (2022).

Combining estimates of the MPC out of wealth along the wealth distribution and estimates of the marginal effect of consumption on CO_2 emissions, we finally obtain the marginal effect of changes in wealth on CO_2 emissions along the wealth distribution according to the consumption channel. Results are reported by country in Table 4 and are used in our simulations in Section 4.

Table 4: Consumption Channel – Marginal effect of changes in wealth on CO_2 emissions

	BE	CY	DE	ES	IT	FR
at the mean	0.013	0.002	0.004	0.005	0.019	0.002
p0-p49	0.032	0.009	0.019	0.018	0.026	0.013
p50-p69	0.042	0.012	0.014	0.020	0.028	0.003
p70-p89	0.015	0.004	0.017	0.009	0.017	0.003
p90-p100	0.007	0.001	0.003	0.003	0.010	0.002

Notes: Marginal effects of changes in wealth on CO_2 emissions are reported at the mean as well as for various percentiles of the wealth distribution as indicated in column 1. They are the results of multiplying MPCs out of wealth (Table 2) and the marginal effect of consumption on CO_2 (Table 3). The variation along the distribution is solely driven by the variation of the MPC out of wealth within each country, as the CO_2 effect of consumption expenditure is constant along the distribution.

To cross-validate these estimates we conduct further robustness tests based on data supplied by Hardadi et al. (2021) for Germany (Section A.2 in the appendix). Hardadi et al.'s dataset allows to estimate the marginal effect of consumption on CO_2 emissions along the income distribution (rather than the expenditure distribution as in Table 3). We analyse four different ways to obtain the marginal effect of changes in wealth on CO_2 emissions $\left(\frac{dG}{dW}\right)$ and confirm that differences between the approaches are negligible.

Finally, to calculate the annual CO_2 effects for the 10-year simulations we multiply the change in household wealth $\left(\Delta W_{i,t}\right)$ as the result of a wealth tax with the marginal effect of wealth on CO_2 emissions $\left(\frac{\partial CO_2}{\partial W}_{Cons}\right)$ from Table 4:

$$\frac{\Delta CO_{2_{Cons}}}{CO_{2_{Cons}}} = \frac{\sum_{i=1}^{n}\left(\Delta W_i \times \frac{\partial CO_2}{\partial W}_{Cons} \times s_i\right)}{CO_{2_{Cons}}} \tag{6}$$

We sum over all n households in our sample and use the HFCS survey weights (s_i) to scale up the sample data to population quantities. Results are reported as %-deviations from a no-tax scenario $\mathrm{CO}_{2_{Cons}}$, where $\mathrm{CO}_{2_{Cons}} = \mathrm{CO}_{2_{2017}} + \Delta\mathrm{CO}_{2_{noTax}}$. $CO_{2_{2017}}$ are CO_2 emissions from household consumption in 2017 obtained from the World Inequality Database (WID; Alvaredo et al., 2024) (matching the year of our HFCS wealth data), and $\Delta CO_{2_{noTax}} = \Sigma_i \left(\Delta W_{i,10}^{noTax} \times \frac{\partial CO_2}{\partial W_{Cons}} \times s_i\right)$, where

$\Delta W_{i,10}^{noTax}$ is the change in wealth that would have occurred in the absence of wealth taxes ($\Delta W_{i,10}^{noTax} = W_{i,2017}(1+R)^{10} - W_{i,2017}$; see Section 2.1). Hence, our 10-year results show us by how much annual emissions in year 10 would be lower if individual wealth would have grown according to the 'tax scenario' rather than the 'no-tax scenario'. Since the reported CO_2 effects are deviations from a no-tax scenario, the crucial assumption is that all changes in emissions that are not caused by the consumption channel (e.g. exogenous changes in technology), affect emissions by the same amount between the tax and the no-tax scenario. Notably, for the one-off tax we have $\Delta W_{i,0}^{noTax} = 0$, and as such $CO_{2_{cons}} = CO_{2_{2017}}$. Hence, results for a one-off tax can also be interpreted as percentage deviations from household consumption emissions in 2017.[15]

2.3 Inequality channel

The inequality channel, indicated by orange arrows in Figure 1, consists of two steps. First, a wealth tax can reduce wealth inequality, and indeed this is often the core motivation for its introduction $\left(\frac{\partial ineq}{\partial W}\right)$. The decline in wealth inequality can subsequently affect CO_2 emissions through various sub-channels $\left(\frac{\partial CO_2}{\partial ineq}\right)$, of which we highlight three. First, some studies have argued that societies with lower wealth inequality are less politically polarised (arrow from 'inequality' to 'policy'). This makes it easier to introduce climate policies which require a compromise between different political groups (Apeti et al., 2025; Apostel and O'Neill, 2022; Cushing et al., 2015). Second, lower wealth inequality might contribute to the reduction in the political influence of top wealth holders. High net-worth individuals benefit more from polluting activities through company ownership and larger consumption baskets and have a greater ability to bear the negative externalities associated with climate change. Reducing wealth inequality can reduce the political influence of wealthy individuals and thus facilitate the introduction of climate policies (Apostel and O'Neill, 2022; Boyce, 2007; Downey and Strife, 2010). In line with these arguments Apeti et al. (2025) find a negative effect of wealth inequality on the level of democracy and the number of introduced climate policies. Third, a wealth tax and subsequent changes in inequality can affect the composition of GDP (arrow from inequality to the blue box labelled GDP). Taxing wealth not only changes the consumption behaviour of the individuals who are taxed (as in the consumption channel), but can also affect expenditure and composition consumption of lower wealth households due to "keeping up with the Joneses" consumption patterns. The impact of affluent households on consumption spending across the income and wealth distribution has been documented in the literature (Schulz and Mayerhoffer, 2023; van Treeck, 2014). This argument is closely related to the consumption channel above, but emphasises the effect of wealth *inequality* on average consumption, rather than the direct effect of wealth taxes on consumption of taxed households. Therefore, the inequality channel partially operates through its impact on household consumption spending (AON22).

[15] The assignment of CO_2 emissions impacts the estimated environmental impact of wealth taxes. Total emissions can be decomposed into emissions resulting from consumption, investment, and government expenditure, including government consumption and public investment (Chancel, 2022). Consumption emissions include direct emissions, such as the CO_2 released when driving a car, as well as indirect emissions, such as the emissions imbedded in the consumption of goods and services. Investment emissions result from investment goods, i.e. machines that are used for production. Governments or NGOs can purchase either investment or consumption goods. Our estimate for $CO_{2_{2017}}$ for the consumption channel focuses on the sum of direct and indirect household consumption emissions, abstracting from investment and government or NGO emissions. This focus reflects that the consumption channel is derived from the effect of wealth on consumption (final demand in Bruckner et al., 2022) of top wealth holders. These considerations are only relevant for the consumption channel, because the inequality channel is reported as a %-deviation from a no-tax baseline based on the elasticity of Knight et al. (2017), and therefore does not require an explicit estimate for $CO_{2_{2017}}$ (see Section 2.3).

While there are several analyses of the relationship between income inequality and emissions (see Apeti et al., 2025; Gürer and Weichenrieder, 2024, and literature cited therein), the only study that estimates the effect of wealth inequality on CO_2 emissions empirically is Knight et al. (2017). They regress wealth inequality, measured by the wealth share of the top decile, on consumption-based CO_2 emissions, controlling for gross domestic product (GDP) per capita and income inequality, measured by the Gini coefficient. They also find that income inequality is not related to emissions once wealth inequality is controlled for. Importantly, by controlling for GDP Knight et al. (2017) take into account how changes in inequality might affect the composition of GDP (e.g. a shift away from luxury goods), but abstract from potential equilibrium effects (see discussion in Section 2.4). They rely on a country panel dataset including 26 high-income countries, spanning the years 2000-2010 and obtain an elasticity of 0.795 using the within-estimator. We emphasise that these are solely CO_2 emissions and thus neglect other greenhouse gas emissions, in line with our estimates of the consumption channel based on data from Bruckner et al. (2022).

To estimate the CO_2 emissions resulting from wealth taxes based on the inequality channel over 10 years, we first simulate the effect of a wealth tax on the wealth share of the top 10% ($\Delta Top10$) based on HFCS data using ΔW_{it}, as defined in equation (3). Equivalently to the consumption channel, $\Delta Top10 = Top10_{Tax} - Top10_{noTax}$, where $noTax$ and Tax indicate the top 10% wealth share in the simulation based on the absence of a wealth tax or a tax scenario. Subsequently, we use the elasticity $\epsilon_{Top10} = \frac{\partial CO_2/CO_2}{\partial Top10/Top10}$ from Knight et al. (2017) to obtain emission reductions from a wealth tax relative to a no-tax scenario:

$$\frac{\Delta CO_{2_{Ineq}}}{CO_{2_{Ineq}}} = \frac{\Delta Top10}{Top10_{noTax}} \times \epsilon_{Top10} \tag{7}$$

Equivalent to the consumption channel, our 10-year results show us by how much annual emissions in year 10 would be lower if the top 10% wealth share would have changed according to the 'tax scenario' rather than the 'no-tax scenario'. Again, we assume that all changes in emissions that are not caused by changes in inequality affect emissions equally in the tax and the no-tax scenario. For the one-off wealth tax, $\Delta Top10$ is the deviation from the top 10% wealth share in 2017 ($\Delta Top10 = Top10_{Tax} - Top10_{2017}$), implying that results can be interpreted as deviations from 2017 emissions. This approach was used by AON22 who find a reduction of between 0.1% and 0.6% of emissions due to a one-off wealth tax in Belgium in simulations that do not account for behavioural effects of wealth taxes.

In a subset of their results, AON22 adjust for potential behavioural responses to wealth taxes. Accounting for such effects is essential for our simulations over a 10-year horizon, but our approach differs in two important ways. First, AON22 double-count the mechanical effect of the wealth tax, which leads them to underestimate the reduction in the top wealth share – and thus the distributional and environmental effects. Specifically, they apply the elasticity from Jakobsen et al. (2020) to reduce the tax base and then mechanically apply the tax to this reduced base. However, Jakobsen et al.'s elasticity already reflects both behavioural and mechanical effects. Applying the mechanical effect again therefore understates revenues, wealth reduction at the top, and associated environmental impacts. While this bias is likely minor in the case of AON22's one-off wealth tax, correcting it is crucial for our analysis of a recurring annual wealth tax.

Second, AON22 assume that the behavioural effect is primarily driven by tax evasion or avoidance. Evasion lowers tax liabilities, meaning post-tax wealth is higher than under a purely mechanical calculation; as a result, the decline in the top 10% wealth share, and the corresponding CO_2 effect, appear smaller. Because there are no estimates of evasion in response to a one-off wealth tax, AON22 rely on Jakobsen et al.'s (2020) elasticity for a recurring tax, noting that the true effect would likely be smaller. Yet, Jakobsen et al. explicitly argue that their estimate mainly captures changes in saving behaviour, not evasion. They show that lowering the tax rate increases wealth by more than the mechanical effect alone, implying that saving behaviour drives the response. By symmetry, introducing a wealth tax reduces wealth not only mechanically (through the tax liability) but also behaviourally (through reduced savings). This mechanism works in the opposite direction to AON22's evasion-based interpretation. In our simulations, we therefore model behavioural responses as changes in saving behaviour, following Jakobsen et al. (2020) (see Section 2.1). However, we use estimates at the lower bound of those reported in Jakobsen et al. to take into account that evasion would reduce the behavioural response based on a reduction in savings.

2.4 Other channels

Several other channels through which a wealth tax affects CO_2 emissions are indicated in Figure 1 and briefly discussed here for completeness but are beyond the scope of this article. One concerns the effect of wealth taxes on investment. Two arguments have been presented (AON22). First, a wealth tax might reduce investment spending due to the reduced (net-of-tax) rate of return. Lower investment spending contributes to lower growth and therefore to fewer emissions. Second, a fall in the return on investment might induce investors to search for higher yielding assets. If these assets are also characterized by higher productivity, this might result in an increase in economic growth, thus increasing both consumption and investment-related emissions. While this is a growing research field (Chancel and Rehm, 2023), considerable uncertainty remains relating to the direction and size of the effect of wealth taxes on investment and the effect of investment on CO_2 emissions.

Another channel works via the effect of wealth taxes on government emissions. Insofar as a wealth tax transfers income from wealth holders to the government, it could lead to an increase in government expenditure and associated emissions. On the other hand, tax revenues could be used to create carbon sinks or fund the Green Transition, thereby reducing emission intensity of private investment and consumption in the medium run. Our assumption is that the government uses the additional funds to invest carbon-neutrally or to run lower deficits, thus keeping government emissions constant. We also abstract from a potential reduction in carbon intensity due furthering of green technology financed by tax revenues.

Both investment and government spending effects are indicated with the hollow black arrow from GDP to CO_2 in Figure 1, while the bidirectional arrows between GDP and the 'policy' node indicate the feedback effects between economic activity and policy, such as government spending in response to business cycles. We additionally abstract from all open-economy effects of wealth taxes, given a lack of evidence on how wealth taxes would impact the trade balance.

Lastly, effects of a wealth tax on the individual components of GDP will affect equilibrium output (indicated by the hollow arrow below the blue box). For example, a reduction in consumption due to a wealth tax would decrease effective demand, possibly inducing a further reduction in investment. Similarly, changes in wealth inequality might affect equilibrium output. We abstract from these equilibrium effects and focus instead on partial effects of wealth taxes via the consumption and the inequality channel. The main reason is that, as discussed above, the relevant estimates that we obtain from the literature ($\partial c/\partial W$ and ϵ_{Top10}) are partial effects from regressions that control for income or GDP, thus blocking any potential equilibrium effects.

3: Wealth distribution and non-response bias in Europe

To effectively estimate the environmental potential of wealth taxes we need to first obtain reliable estimates for the wealth distribution. This requires us to address two challenges: First, due to the heavy-tailed nature of wealth distributions (Benhabib et al., 2019; Gabaix et al., 2016; Wildauer et al., 2023) survey data tends to underestimate the tail of the distribution simply due to the small number of high-net-worth households in the population which nevertheless significantly affect aggregate wealth. Overcoming this 'non-observation' problem (Eckerstorfer et al., 2016) requires either to adjust the survey design (and weights) by using external information to identify high-net-worth households prior to data collection (Bricker et al., 2016; Kennickell, 2017; Osier, 2016) or to exploit the second theorem of extreme value theory (Balkema and de Haan, 1974; Pickands, 1975) and model the tail as a Generalized Pareto distribution. Second, high net-worth households tend to be less willing to participate in wealth surveys for various reasons (Kennickell, 2017; Osier, 2016; Vermeulen, 2016). This 'non-response' problem leads to biased Pareto tail models and requires separate remedies, four of which gained prominence in the literature. The first is to avoid the problem altogether and use data not subject to this shortcoming. In practice this means capitalizing dividends and interest payments obtained from tax records (Alvaredo et al., 2018; Bricker et al., 2016; Garbinti et al., 2020a). While households have less room to avoid filing tax returns, tax evasion and avoidance pose a problem for this approach. In addition, the choice of capitalization rates and the assumption of homogenous returns strongly influence the results (Fagereng et al., 2016). The second is based on using external information to identify high-net-worth households prior to data collection. This does not only remedy non-observation but also non-response problems. Being able to identify affluent households prior to data collection allows for oversampling and properly adjusted survey weights such that the reweighted sample can be used to correctly represent the population. In practice external information means using capitalized income tax data like in the case of the Survey of Consumer Finances (Kennickell, 2017) or using publicly available information on stock ownership as in the context of the German Socioeconomic Panel (Schröder et al., 2019). The third approach is to use information from journalists' rich lists on the assets of high-net-worth households and households to anchor the estimation of Pareto tail models (Vermeulen, 2016). This approach crucially depends on the quality of the rich list data used. The fourth approach is to explicitly model the survey selection process of high net-worth households and adjust the Pareto tail of the data accordingly (Tippet and Wildauer, 2025).

Since our focus is on EU countries, we use the Household Finance and Consumption Survey (HFCS), which is coordinated by the European Central Bank and forms the only household-level data source which covers most of the EU. To the best of our knowledge Kapeller et al. (2023) is the only source which provides estimates of the wealth distribution on a methodologically consistent basis for all countries covered by the HFCS.[16] This is the dataset we use. They way in which Kapeller et al. (2023)

[16] We do not use the harmonized series provided by Blanchet and Martinez-Toledano (2023) because their data for Germany stems from Albers et al. (2020) which is likely to significantly underestimate the wealth

deal with the outlined non-observation and non-response problems is by applying the rich list approach developed by Vermeulen (2016). This approach is the same taken by AON22 for Belgium which means this methodological choice yields consistency with our most important point of reference in the literature.[17] Alternative approaches such as using tax data are not available for the full set of HFCS countries. The effect of the rich list correction and specifically the top 1% wealth share is reported in Kapeller et al. (2023, Table 3). We refer the interested reader there for additional details.

4: Results: Emissions effects of various wealth tax scenarios

This section first introduces the different tax models before presenting the simulated CO_2 effect of a wealth tax introduced in one year (one-off tax) and effects of an annual wealth tax after 10 years, as well as extensions based on differential growth rates for individual wealth components.

4.1 Wealth tax models and application

We consider three different wealth tax models based on Kapeller et al. (2023). The tax base for all models is household net wealth, meaning the value of all assets minus the value of all outstanding liabilities. Mildly progressive Model A (equivalent to Model II in Kapeller et al., 2023), imposes a tax rate of 1% on net wealth beyond €1 million (leaving 97% of EU22 households exempt), a tax rate of 2% beyond €2 million (corresponding to the richest 1% of all EU22 households, which is roughly 1.9 million households) and finally a tax rate of 3% on net assets beyond €5 million (corresponding to the richest 0.3% of all EU22 households, which is roughly 550,000 households). The tax rates in Model A are below the rates of return on most asset classes (see Section 2.1), and as such this model is unlikely to reverse the historical trend of increasing wealth inequality (Kapeller et al., 2023). Thus, we have three thresholds $(S_1, S_2, S_3) = (10^6; 2 \times 10^6;\ 5 \times 10^6)$ and four tax rates $(\tau_0, \tau_1, \tau_2, \tau_3) = (0\%, 1\%, 2\%, 3\%)$ for tax Model A resulting in the following law of motion for household i with wealth W_i and $S_3 > W_i(1+R) > S_2$ based on equation (1):

$$W_{i,t+1} = W_{i,t}(1+R_i) - (S_2 - S_1)\tau_1 - [W_{i,t}(1+R_i) - S_2]\tau_2 \tag{8}$$

Model B (labelled strongly progressive and equivalent to Model III in Kapeller et al., 2023) has a higher exemption threshold but tax rates increase faster to a higher top marginal tax rate relative to Model A. Net assets beyond €2 million are taxed with a rate of 2%, which means 99% of all households are exempt. The rate increases to 3% beyond €5 million (richest 0.3% or 550,000 households), 5% beyond €10 million (richest 0.1% or 220,000 households), 7% beyond €50 million (richest 0.01% or 23,000 households), 8% beyond €100 million (richest 0.005% or 9000 households) and the final bracket levies a rate of 9% on net assets beyond €500 million (richest 0.001% or 1200 households). Tax rates in the highest brackets of this model are similar to the average rates of return along the wealth distribution, and as such this model is expected to reduce wealth inequality over time (Kapeller et al., 2023). We

concentration in Germany when compared to higher quality results provided by Schröder et al. (2019). The latter are very close to the distribution data we use. For a detailed discussion see Kapeller et al. (2023, Table 4).

[17] One of the most relevant differences between the Pareto adjustment in Kapeller et al. (2023) and AON22 is that the latter split every entry on the rich list by 4, while Kapeller et al. (2023) treat each observation on the rich list as one household.

don't reproduce the resulting law of motion for the remaining two tax models and instead refer to the general formula in section 2.1.

Model C (Wealth Cap Model, equivalent to Model IV in Kapeller et al., 2023, and based on Piketty, 2020) represents a distinct framework by structuring tax brackets as multiples of average net wealth (approximately €260,000 for EU22, based on Pareto-adjusted data). A tax of 0.1% applies to wealth exceeding 0.5 times average wealth, increasing to 1% for wealth above twice the average, to 2% for holdings exceeding five times the average, and reaching 60% and 90% for net wealth surpassing 1,000 and 10,000 times the average, respectively – the latter corresponding to around €2.6 billion. Given the highly skewed distribution of wealth, Model C would still exempt 59% of households from taxation, despite applying the lowest rate starting at half the average wealth. It is distinguished by exceptionally high marginal tax rates on the wealthiest households, significantly surpassing typical rates of return on net wealth. As such, it is anticipated to substantially reduce existing wealth inequality. Model C effectively imposes a wealth cap at 1,000 times the average wealth, approximately €260 million since achieving returns in excess of 60% consistently over time is not realistic. When modelling a behavioural response to Model C, we deviate from our approach of setting $b_j = \tau_j$ in equation (2) for the two highest tax brackets, because this is infeasible with top marginal tax rates of 60% and 90%. Instead, the behavioural effect has been set to 30% and 9% respectively for the two highest brackets. This means that the combined effect of the tax and the behavioural effect ($b_j + \tau_j$) reaches 90% and 99% in the last two tax brackets of Model C. Table 5 summarises the different tax models.

Table 5: Tax models

	Model A 'mildly progressive'	Model B 'strongly progressive'	Model C 'wealth cap'	
Approach	Progressive rate – slowing growth of inequality	Progressive rate – reducing inequality	Progressive rate – introducing a wealth cap	
% of population exempt	97%	99%	59%	
Tax threshold	**Tax rates**	**Tax rates**	**Tax brackets**	**Tax rates**
€1 million ≈ top 3% or 5.4 million households	1%		0.5 times average wealth	0.1%
€2 million ≈ top 1% or 1.9 million households	2%	2%	2 times average wealth	1%
€5 million ≈ top 0.3% or 550,000 households	3%	3%	5 times average wealth	2%
€10 million ≈ top 0.1% or 220,000 households	3%	5%	10 times average wealth	5%
€50 million ≈ top 0.01% or 23,000 households	3%	7%	100 times average wealth	10%
€100 million ≈ top 0.005% or 9,000 households	3%	8%	1000 times average wealth	60%
€500 million ≈ top 0.001% or 1200 households	3%	10%	10,000 times average wealth	90%

Note: Adopted from Kapeller et al. (2023). Average wealth in the EU22 is €260,000 (based on Pareto tail amended data). The tax brackets for model C therefore start at €130,000 (0.5 times average); €520,000 (2 times the average); €1.3 million (5 times the average); €2.6 million (10 times the average); €26 million (100 times the average); €260 million (1000 times the average) and €2.6 billion (10,000 times the average).

4.2 Effects of a one-off wealth tax

While our focus is on a dynamic analysis of the effects of different wealth tax models on CO_2 emissions, we start with a static analysis of a one-off wealth tax for simplicity and comparability to the existing literature (AON22). A key advantage of a one-off wealth tax is that it can be introduced with a valuation date in the past which means households can't reduce their tax liability by changing their savings behaviour or asset allocation. This is why we don't take behavioural effects into account for the one-off tax simulation.

Consumption Channel: Results for a 1-year simulation based on the consumption channel are presented in Table 6. We present only results based on HFCS data with Pareto-correction in the main text, while results based on raw HFCS data are delegated to the appendix Table A.2. Annual CO_2 emissions are between 0.09%-0.47% lower on average across the six countries, relative to annual 2017 household emissions, depending on the tax model used. Emission effects vary significantly across different tax models, and increase with the progressivity of the tax model. Results also vary significantly across countries, based on the initial wealth distribution and the effectiveness of a wealth tax, as well as different estimates for the marginal effect of wealth on CO_2 emissions in Table 4. Spain and France have the lowest value of 0.04% for Model A, while Italy exhibits the largest effect with a reduction in annual emissions by 0.84% relative to 2017 for Model C. These effects are significantly smaller when wealth data is not corrected for differential non-response, as evidenced in appendix Table A.2. Without bias correction the average effect is merely between 0.03% to 0.09%, with a minimum of 0.01% (for Cyprus) and a maximum value of 0.18% for Belgium. We report consumption channel results where the behavioural effect is accounted for in appendix Table A.3 for completeness but emphasise that behavioural responses should be mitigated by setting a valuation date in the past.

Table 6: CO_2 effects of a one-off wealth tax – consumption channel

Country	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)
BE	0.15%	0.23%	0.74%
CY	0.05%	0.10%	0.36%
DE	0.07%	0.13%	0.52%
ES	0.04%	0.05%	0.13%
FR	0.04%	0.07%	0.24%
IT	0.16%	0.25%	0.84%
Mean	**0.09%**	**0.14%**	**0.47%**
Heterogeneous growth rates	No	No	No
Behavioural effects	No	No	No

Notes: Reductions in annual CO_2 emissions due to the introduction of a one-off wealth tax based on the consumption channel. Numbers are %-deviations from 2017 household emissions. Own calculations based on Pareto-corrected HFCS wealth data and estimates for the consumption channel as reported in Table 4.

Inequality channel: Results for the inequality channel are reported in Table 7. Based on the inequality channel, annual CO_2 emissions are on average between 0.36% to 1.49% lower relative to a no-tax scenario for the 22 countries in our sample, when the Pareto-corrected wealth data is used but no behavioural effects are assumed. Results in Table 7 show the same pattern as Table 6 for the consumption channel in that CO_2 effects generally increase with the progressivity of the tax model. Some few exceptions (e.g. Latvia (LV) for Model A vs Model B) are driven by the higher tax-free wealth threshold in Model B, and arise in countries that have many households above the first threshold of Model A, but below the first threshold of Model B. Again, there is significant variation by country, driven solely by the effectiveness of the tax in reducing the top 10% wealth share (as the elasticity of CO_2 emissions to the 10% wealth share is set to 0.795 for all countries). Latvia exhibits the smallest effects with a CO_2 reduction of 0.09% relative to a no tax scenario (Model B), while Luxembourg (LU) has the largest effect with 3.50% (Model C), followed closely by Austria (3.43%). Effects are significantly smaller when the raw HFCS data is used (Table A.4), again confirming the relevance of the Pareto adjustment. Results including behavioural effects are reported in Table A.5 for completeness but are less relevant for a one-off tax.

Reassuringly, our results are similar in magnitude to estimates by AON22, the only comparable study that analyses the inequality channel for Belgium. Apostel and O'Neill (2022, Table 7) find a reduction of between 0.09% to 0.6% of 2017 emissions, when not accounting for the behavioural effect (see Section 2.1 and 2.3 for how our modelling of the behavioural effect differs from AON22). In contrast, we find that CO_2 emissions are between 0.5% to 2.41% lower relative to a no-tax scenario in Belgium. Differences are mainly driven by the structure of the tax models, given that all our models are significantly more progressive than the models discussed by AON22, but also partly by minor differences in the adjustment for differential non-response in the wealth data (see Section 3).

Table 7: CO_2 effects of a one-off wealth tax – inequality channel

Country	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)
AT	0.41%	0.77%	3.43%
BE	0.50%	0.76%	2.41%
CY	0.46%	0.86%	3.34%
DE	0.39%	0.68%	2.86%
EE	0.32%	0.35%	0.60%
FI	0.30%	0.28%	0.62%
FR	0.39%	0.62%	2.32%
GR	0.28%	0.42%	0.97%
HR	0.39%	0.43%	0.72%
HU	0.24%	0.21%	0.47%
IE	0.42%	0.46%	0.82%
IT	0.41%	0.65%	2.23%
LT	0.20%	0.15%	0.41%
LU	0.64%	1.15%	3.50%
LV	0.12%	0.09%	0.25%
MT	0.57%	0.74%	1.09%
NL	0.35%	0.58%	2.07%
PL	0.32%	0.30%	0.62%
PT	0.34%	0.56%	1.84%
SI	0.28%	0.35%	0.74%
SK	0.31%	0.27%	0.61%
ES	0.30%	0.35%	0.88%
Mean	**0.36%**	**0.50%**	**1.49%**
Heterogeneous growth rates	No	No	No
Behavioural effects	No	No	No

Notes: Reductions in annual CO_2 emissions due to the introduction of a one-off wealth tax based on the inequality channel. Numbers are %-deviations from 2017 household emissions. Own calculations based on Pareto-corrected HFCS wealth data and an elasticity of CO_2 emissions to the top 10% wealth share of 0.795 (Knight et al., 2017).

4.3 Effects of a wealth tax over 10 years with heterogenous rates of return

Results for a one-off wealth tax are non-negligible but relatively small given the EU target to be carbon neutral by 2050. For this reason, we are particularly interested in effects over a longer time horizon, such as an annual wealth tax over 10 years. One-year results cannot be simply compounded to estimate a 10-year effect due to the non-linear structure of the wealth tax and its effect on wealth accumulation – instead, we run our tax model recursively for 10 periods. In this simulation we also account for different household-level asset portfolio structure as well as heterogeneous rates of return across different asset classes based on Table 1 (see Section 2.1).

Consumption channel: Based on the consumption channel, annual CO_2 emissions are between 1.54% to 3.63% lower relative to a no-tax scenario in year 10 across the six countries, assuming no change in the accumulation behaviour of households (Table 8, columns 1-3). Put differently, these results compare how wealth would have developed without a wealth tax with a counterfactual wealth projection that includes a wealth tax, ten years after its implementation. The reduction in CO_2 emissions is calculated by multiplying the difference in household-level wealth in year 10 between the tax and no-tax scenario with our estimate for the consumption channel (Table 4). Results show the same pattern as the one-off simulations, with CO_2 effects increasing with progressivity of the tax models. France again exhibits the lowest CO_2 effect, with a reduction of 0.75% of CO_2 emissions relative to a no-tax scenario for Model A, while Belgium exhibits the largest effect with a reduction in emissions by 6.45% relative to a no-tax scenario for Model C. Effect sizes are significantly smaller when wealth data is not corrected for differential non-response, as evidenced in Table A.6, columns 1-3 in the appendix. Without bias correction the average effect is between 0.68%-1.81%, with a minimum of 0.28% (for Cyprus) and a maximum value of 3.65% for Belgium.

10-year simulations where net wealth grows at 5% (i.e. without heterogenous growth rates for individual components) produce smaller effects, with an average CO_2 reduction of 1.31% to 3.13% across all countries, based on the Pareto-corrected data without behavioural effects (Table A.7 in the appendix). This is about 15% below the baseline results in columns 1-3 of Table 8, demonstrating the inequality-enhancing effect of differential growth rates, due to high-wealth households holding higher-yielding assets, and consequently the higher effectiveness of the wealth tax.

We present consumption channel results where the behavioural effect is accounted for in columns 4-6 of Table 8 for completeness but emphasise that they should be treated as indicative only. On the one hand, due a positive MPC out of wealth, a reduction in wealth leads to a decrease in consumption – this is the effect captured in Table 8, columns 1-3. On the other hand, according to the behavioural effect outlined in Section 2.1, the introduction of a wealth tax can incentivise a reduction in saving, thus increasing consumption. To what extend this would compensate the decrease in consumption due to the tax is unclear. There would be policy space to guarantee a lower emission intensity of this tax-induced consumption, for example by imposing new climate laws such as a tax on CO_2-intensive consumption goods or even banning certain goods with high emissions. This is the assumption behind the results presented in columns 4-6 of Table 8 – they account for a behavioural effect that reduces the tax base beyond the mechanical effect of the tax (due to lower saving), but the assumption is that this 'behaviourally-driven' reduction in savings happens without additional tax-induced consumption-based emissions. Taken at face value, effect sizes including behavioural adjustment are almost twice as large, with an average reduction in CO_2 emissions by between 2.74% to 5.34% across all countries depending on the tax model. Without Pareto-corrections, the CO_2 emissions decrease by between 1.23% to 3.11% (columns 4-6, Table A.6 in the appendix).

Table 8: Annual CO_2 effects after 10 years – consumption channel

Country	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)
BE	2.78%	3.73%	6.45%	4.94%	5.88%	9.60%
CY	0.99%	1.55%	2.47%	1.75%	2.38%	3.39%
DE	1.31%	1.92%	3.28%	2.33%	2.97%	4.65%
ES	0.88%	0.94%	1.93%	1.57%	1.55%	3.14%
FR	0.75%	1.00%	1.77%	1.34%	1.57%	2.60%
IT	2.53%	3.41%	5.88%	4.50%	5.36%	8.65%
Mean	**1.54%**	**2.09%**	**3.63%**	**2.74%**	**3.28%**	**5.34%**
Heterogeneous growth rates	Yes	Yes	Yes	Yes	Yes	Yes
Behavioural effects	No	No	No	Yes	Yes	Yes

Notes: Percentage reduction in annual household CO_2 emissions after 10 years due to the introduction of a wealth tax (see Section 2.2). Own calculations based on Pareto-corrected HFCS wealth data and estimates for the consumption channel as reported in Table 4.

Inequality channel: Table 9 presents equivalent results for the inequality channel based on Pareto-corrected data and heterogenous rates of return. Equivalent to Table 8 above, we present results with and without the behavioural effect. After 10 years, annual CO_2 emissions are 3.92% to 8.87% lower on average across all countries and tax models relative to a no-tax scenario when no behavioural effects are assumed (columns 1-3 in Table 9).[18] However, we prefer simulations that account for behavioural effects for the inequality channel because we interpret this channel as mainly driven by the political capture of wealthy elites, in line with the existing literature (AON22; Apeti et al., 2025). When behavioural effects are taken into account the effect is between 7.53% to 14.66% on average (columns 3-6 in Table 9). These estimates are our preferred baseline figures. The reduction in CO_2 emissions is calculated by multiplying the percentage difference in the top 10% wealth share in year 10 between the tax and no-tax scenario with the elasticity from Knight et al. (2017).

[18] While the effect is larger than the consumption effect, the numbers are not directly comparable as they are both reported as deviations from emissions in a ‘no-tax counterfactual’, which differs between the consumption and the inequality channel scenario.

Table 9: Annual CO_2 effects after 10 years – inequality channel

Country	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)
AT	3.93%	6.98%	12.11%	7.92%	12.50%	18.89%
BE	5.38%	7.50%	12.31%	10.34%	12.81%	19.63%
CY	4.61%	8.13%	13.58%	9.38%	14.79%	21.70%
DE	4.04%	6.25%	10.78%	7.85%	10.67%	16.63%
EE	3.33%	4.04%	6.31%	6.54%	7.54%	11.78%
FI	3.66%	3.63%	6.90%	6.85%	6.45%	12.44%
FR	4.10%	5.57%	9.80%	7.75%	9.26%	15.26%
GR	2.81%	3.75%	6.17%	5.11%	6.15%	9.75%
HR	4.28%	5.21%	7.82%	8.18%	9.40%	13.88%
HU	2.86%	2.84%	5.33%	5.37%	5.12%	9.48%
IE	4.77%	5.36%	8.56%	9.18%	9.62%	15.27%
IT	4.28%	5.91%	10.20%	8.04%	9.83%	15.91%
LT	2.77%	2.42%	5.51%	5.21%	4.54%	9.95%
LU	5.96%	11.56%	17.98%	12.08%	21.02%	27.72%
LV	1.66%	1.40%	3.31%	3.10%	2.46%	5.69%
MT	5.63%	7.55%	10.73%	11.15%	14.05%	19.46%
NL	4.04%	6.08%	10.27%	7.75%	10.29%	15.97%
PL	3.54%	3.48%	6.51%	6.64%	6.26%	11.58%
PT	3.76%	5.52%	9.31%	7.10%	9.16%	14.35%
SI	3.45%	4.14%	7.18%	6.41%	6.99%	11.93%
SK	3.70%	3.61%	6.96%	6.95%	6.57%	12.49%
ES	3.63%	3.92%	7.45%	6.81%	6.70%	12.68%
Mean	**3.92%**	**5.22%**	**8.87%**	**7.53%**	**9.19%**	**14.66%**
Heterogeneous growth rates	Yes	Yes	Yes	Yes	Yes	Yes
Behavioural effects	No	No	No	Yes	Yes	Yes

Notes: Percentage reduction in annual household CO2 emissions after 10 years due to the introduction of a wealth tax (see Section 2.3). Own calculations based on Pareto-corrected HFCS wealth data and an elasticity of CO_2 emissions to the top 10% wealth share of 0.795 (Knight et al., 2017).

Effect sizes follow the familiar pattern in that they generally increase with the progressivity of the tax model. In terms of variation by country, Latvia again exhibits the smallest effects with a CO_2 reduction of between 1.40% to 5.69% relative to a no tax scenario depending on the tax model used and whether behavioural effects are accounted for, while Luxembourg has the largest effect size with 27.72% in the wealth cap model (Model C with behavioural effects), followed by Cyprus, Belgium and Malta. As in Table 7, effect size differences for these simulations are driven solely by the effectiveness of the tax in reducing the top 10% wealth share, as the elasticity of CO_2 emissions to the 10% wealth share is set to 0.795 for all countries.

Equivalently to results for the consumption channel, using data without Pareto-correction (but still accounting for differential rates of return) significantly reduces effect sizes to an average of 2.62%-5.93% without behavioural effects and 4.66%-10.56% with behavioural effects (Table A.8 in the appendix). Effect sizes are only partially driven by accounting for heterogenous rates of return of different assets – simulations where net wealth grows by 5% independent of the asset composition result in an average CO_2 reduction of 3.82% to 8.45% without behavioural effects, and 7.28% to 13.91% with behavioural effects, i.e. about 7% below the baseline (Table A.9 in the appendix).

5: Conclusion

This article analyses how a wealth tax, an instrument primarily designed to reduce wealth inequality, affects CO_2 emissions. We analyse two causal channels, the first based on the effect of wealth taxes on consumption expenditure of high-wealth households, the second based on the effect of lower wealth inequality on emissions. Our analysis adds to the existing literature by analysing two transmission channels, extending the analysis to 22 EU countries, simulating the effects of an annual wealth tax over 10 years rather than a one-off wealth tax and accounting for heterogenous rates of return across households.

We find that, depending on the tax model, an annual wealth tax has the potential to reduce annual CO_2 emissions by between 1.5%-3.6% relative to a no-tax scenario after 10 years for the consumption channel. This increases to between 3.9% to 8.9% for the inequality channel, and rises further to between 7.5% to 14.7% when behavioural effects of wealth taxes are taken into account. We also provide estimates for emission effects of a one-off wealth tax, which are comparable to previous results by AON22 for Belgium. These findings have two important implications. First, even seemingly small one-off effects can become substantial over a time horizon of 10 years. Second, effect sizes are highly dependent on the progressivity of the tax model, and big changes in the wealth distribution generate large climate effects. This implies that the decision to abstain from introducing a wealth tax will be costly not only from the perspective of higher inequality but also the environment, and these costs increase with time.

Future research can improve our analysis in various ways. First, our results are based on the assumption that proceedings of the wealth tax do not affect CO2 emissions. This assumption hinges on the government's decisions to assure emissions-neutral expenditure of the tax revenue (e.g. by using the revenue to reduce deficits). Future studies could simulate how government investment of wealth tax revenues according to investment plans to achieve Net Zero by 2050 affect emissions and thus take the CO_2 effects of tax revenues into account. Crucially, government investment in the Green Transition might have important feedback effects, for example by reducing the CO_2 intensity of investment and consumption. Second, further research is required to take into account second round CO_2 effects of wealth taxes on private investment and consumption behaviour. The challenge is to allow for heterogeneity at the household level like we do in this article (heterogeneous MPCs, differential rates of return, behavioural response varies by tax threshold) while capturing multiplier and equilibrium effects in a fully-fledged integrated assessment model. This has not been done in the current literature. Third, to improve simulations we require estimates of the behavioural effects of wealth taxes for more countries and wealth tax proposals. It would be particularly useful to obtain estimates for the behavioural effect of taxes on wealth above the tax threshold rather than the effect of taxes on total wealth. Similarly, there is a need for further estimates of the effect of wealth inequality on CO_2 emissions, to corroborate results from Knight et al. (2017).

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Appendix

A.1: Varying marginal effects of expenditure on CO_2 emissions

Several studies have found evidence that the expenditure elasticity of CO_2 emissions varies along the income distribution. Duarte et al. (2012) find an increasing expenditure elasticity of CO_2 emissions along the income distribution in Spain, while Cohen et al. (2005) find this elasticity to be bell-shaped in Brazil. Baiocchi et al. (2010) find a U-shaped income elasticity of emissions along the income distribution in the UK, suggesting that the expenditure elasticity has a similar form, due to the strong correlation between income and expenditure.

A constant expenditure elasticity of CO_2 emissions $\left(\epsilon^{c}_{CO_2}\right)$ does not imply that the *marginal* effect of an additional € spent on consumption is constant across all households . Recall that $\epsilon^{c}_{CO_2}$ is defined as:

$$\epsilon^{c}_{CO_2} = \frac{\left(\frac{\partial CO_2}{\partial c}\right)_p}{\left(\frac{CO_2}{c}\right)_p} \tag{A.1}$$

where $\frac{\partial CO_2}{\partial c}$ is the marginal effect, while $\left(\frac{CO_2}{c}\right)$ is the average emission intensity of €1 spent in percentile p of the wealth distribution (so-called environmental footprint *intensity*). Consequently, the marginal effect will vary proportionally to the footprint intensity of consumption if $\epsilon^{c}_{CO_2}$ is constant along the distribution. Whether high-wealth households have a higher footprint intensity than low-wealth households is ambiguous. There are various reasons to assume that they do, since, as Hardadi et al. (2021) show for Germany, the consumption bundle of high-income households contains a higher proportion of high-emitting goods and services such as flights and other long-distance transport that is rarely consumed by poorer households. On the other hand, low-income/wealth households spend a larger share of their income on heating and energy, some of the most carbon intensive expenditure items, while high net-worth households spend more on services with lower emissions intensity. Similarly, the ‘quality effect’ might reduce the environmental footprint of high-wealth households if they, for example, consume locally or ecological food with lower emission intensity, or if they buy higher quality products that are more expensive, thus reducing emissions per € spent (Hardadi et al., 2021; Pottier, 2022).[19]

Hardadi et al. (2021) estimate the environmental footprint intensity of German households along the income distribution and find an inverted U-shape: footprint intensity increases up to the median of the income distribution and declines thereafter until the 98th percentile. The expenditure share on housing, which increases until a household income of €3600–5000 per month and decreases steadily afterward, is the main driver of this trend. Importantly, footprint intensity increases again from the 98th percentile, suggesting that the top income earners do have a higher footprint intensity than any other income group (Hardadi et al., 2021, Supporting Information S3). However, overall the footprint intensity of the lowest income groups is 12% below the mean, while the footprint intensity of the highest income groups is 8% above the mean. This suggest that, while the marginal effect of an additional € spent varies along the income distribution, and thus likely also along the wealth distribution, it does so only moderately.

[19] For example, a high net-worth household buying one shirt worth €100 might have a lower footprint intensity than a low net-worth household buying 5 shirts worth €20 each.

A.2: Estimating the marginal effect of changes in wealth on CO_2 emissions for Germany

In this section we discuss alternative approaches to estimating the marginal effect of changes in wealth on CO_2 emissions. According to equation (4) in the main text, the overall effect is calculated by multiplying the marginal propensity to consume out of wealth (MPC: $\frac{\partial c}{\partial W}$) and the marginal effect of consumption on CO_2 emissions $\left(\frac{\partial CO_2}{\partial c}\right)$:

$$\frac{\partial CO_2}{\partial W}_{Cons} = \frac{\partial c}{\partial W} \times \frac{\partial CO_2}{\partial c} \tag{4}$$

The main issue with estimates of $\frac{\partial CO_2}{\partial c}$ is that several studies (e.g. Bruckner et al., 2022; Hardadi et al., 2021) provide the consumption elasticity of CO_2 emissions $e^{c}_{CO_2}$, but we are interested in the marginal effect. Below we discuss four methods to estimate $\frac{\partial CO_2}{\partial c}$.

The first option (**Method 1**) is to use the average environmental footprint $\left(\overline{\frac{CO_2}{c}}\right)$ and calculate the marginal effect as:

$$\left(\frac{\partial CO_2}{\partial c}\right) = e^{c}_{CO_2} \times \left(\overline{\frac{CO_2}{c}}\right) \tag{A.2}$$

This approach obviously neglects potential differences of the marginal effect of consumption on CO_2 emissions along the income distribution.

Alternatively, we can assume that the deciles of the income and/or wealth distribution coincide and rely on environmental footprint intensity by decile to calculate marginal effects, thus taking varying marginal effects of consumption on emissions into account (**Method 2**). In this case, we calculate the marginal effect as:

$$\left(\frac{\partial CO_2}{\partial c}\right)_p = e^{c}_{CO_2} \times \left(\frac{CO_2}{c}\right)_p \tag{A.3}$$

A third approach (**Method 3**) is to estimate the marginal effect from available data on consumption and CO_2 emissions by income group. This data is provided by Hardadi et al. (2022, Supplementary Material S3) for Germany. More specifically, as in the main text and following Pottier (2022), we run a regression of the form:

$$CO_{2_i} = \alpha + \beta c_i + \varepsilon_i \tag{5}$$

where c_i now is the average annual expenditure of income group i (rather than expenditure group as in the main text). $\beta = \partial CO_2/\partial c$ is our coefficient of interest, which is now computed directly without having to convert elasticities into marginal effects. Observations are weighted by the number of people in each income group. This is equivalent to the approach we use for our simulations as discussed in Section 2.2, with the core difference that our baseline estimate is based on data from Bruckner et al. (2022) rather than Hardadi et al. (2022).

Lastly, equation (5) can be estimated separately for income groups that match deciles, thus providing estimates for β that vary by income group **(Method 4)**. For example, equation (A.4) exemplifies an estimate for β_{top10}, the coefficient for the highest income decile.

$$CO_{2_{\mathrm{i,top10}}} = \alpha + \beta_{top10} c_{i,top10} + \varepsilon_i \qquad (A.4)$$

β coefficients for other deciles are estimated equivalently. This is the same approach that we discuss in the main text when comparing β_{mean} and β_{top10} in Table 3.

Table A.1 reports results for all four approaches for Germany. The main takeaway is that the four methods produce very similar results for the marginal CO_2 effect of consumption. Table A.1 demonstrates that the marginal effect of wealth on GHG emissions via the consumption channel varies substantially along the wealth distribution. Importantly, this is primarily driven by differences in the MPC out of wealth (see Table 2 in section 2.2) rather than differences in the environmental footprint intensity. For example, an increase in wealth by €1 for the bottom half of the wealth distribution (p0-p49), increases annual greenhouse gases (GHG) by between 0.0229 to 0.0311 kg CO_2 equivalent (CO_2e) in Germany, depending on the method used. This declines 10-fold to 0.0033-0.0037 in the top wealth decile. These coefficients are significantly larger than those reported in Table 4 in the main text because Hardadi et al. (2021) take all GHG into account whereas emissions from Bruckner et al. (2022) are limited to CO_2. We prefer estimates based on Bruckner et al. (2022), as this allows us to apply a consistent approach across countries.

Table A.1: The marginal effect of increasing wealth by 1€ on annual GHG (CO_2e) emissions in kg, by percentile of the wealth distribution in Germany

	Method 1	Method 2	Method 3	Method 4
at the mean	0.0022		0.0023	
p0-p49	**0.0229**	0.0229	0.0239	0.0311
p50-p69	0.0168	0.0174	0.0175	0.0198
p70-p89	0.0204	0.0209	0.0213	0.0133
p90-p100	0.0034	0.0033	0.0035	0.0037

Notes: Data on the marginal effect of consumption on CO_2 emissions $\left(\frac{\partial CO_2}{dc}\right)$ comes from Hardadi et al. (2022). Data on the MPC along the wealth distribution $\left(\frac{\partial c}{\partial W}\right)$ comes from Garbinti et al. (2020b), see Table 2 in the main text.

A.3: Additional Results

Table A.2: CO_2 effects of a one-off wealth tax – consumption channel (raw HFCS data)

	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)
BE	0.06%	0.05%	0.18%
CY	0.01%	0.01%	0.04%
DE	0.02%	0.01%	0.06%
ES	0.04%	0.04%	0.11%
FR	0.02%	0.02%	0.05%
IT	0.03%	0.01%	0.10%
Mean	**0.03%**	**0.02%**	**0.09%**
Heterogeneous growth rates	No	No	No
Behavioural effects	No	No	No

Notes: Reductions in annual CO_2 emissions due to the introduction of a one-off wealth tax based on the consumption channel. Numbers are %-deviations from 2017 household emissions. Own calculations based on HFCS wealth data without Pareto adjustment and estimates for the consumption channel as reported in Table 4.

Table A.3: CO_2 effects of a one-off wealth tax – consumption channel (incl. behavioural effects)

Country	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)
BE	0.30%	0.46%	1.24%	0.12%	0.09%	0.36%
CY	0.11%	0.19%	0.56%	0.03%	0.02%	0.07%
DE	0.15%	0.26%	0.78%	0.04%	0.03%	0.12%
ES	0.08%	0.10%	0.24%	0.07%	0.07%	0.22%
FR	0.08%	0.13%	0.38%	0.03%	0.03%	0.10%
IT	0.31%	0.49%	1.36%	0.05%	0.03%	0.20%
Mean	**0.17%**	**0.27%**	**0.76%**	**0.06%**	**0.05%**	**0.18%**
Behavioural effect	Yes	Yes	Yes	Yes	Yes	Yes
Heterogeneous growth rates	No	No	No	No	No	No
Data adjustment	Pareto-corrected HFCS data			Raw HFCS data		

Notes: Reductions in annual CO_2 emissions due to the introduction of a one-off wealth tax based on the consumption channel. Numbers are %-deviations from 2017 household emissions. Own calculations based on HFCS wealth data and estimates for the consumption channel as reported in Table 4.

Table A.4: CO_2 effects of a one-off wealth tax – inequality channel (raw HFCS data)

Country	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)
AT	0.29%	0.32%	0.74%
BE	0.33%	0.25%	0.75%
CY	0.38%	0.32%	0.78%
DE	0.21%	0.16%	0.53%
EE	0.17%	0.14%	0.42%
FI	0.16%	0.10%	0.45%
FR	0.24%	0.22%	0.63%
GR	0.01%	0.00%	0.09%
HR	0.17%	0.14%	0.44%
HU	0.10%	0.07%	0.28%
IE	0.32%	0.28%	0.71%
IT	0.13%	0.07%	0.41%
LT	0.03%	0.00%	0.16%
LU	0.62%	0.86%	1.42%
LV	0.04%	0.04%	0.14%
MT	0.40%	0.34%	0.87%
NL	0.19%	0.16%	0.48%
PL	0.08%	0.05%	0.25%
PT	0.25%	0.25%	0.56%
SI	0.14%	0.10%	0.38%
SK	0.06%	0.03%	0.22%
ES	0.28%	0.28%	0.76%
Mean	**0.21%**	**0.19%**	**0.52%**
Heterogeneous growth rates	No	No	No
Behavioural effects	No	No	No

Notes: Reductions in annual CO_2 emissions due to the introduction of a one-off wealth tax based on the inequality channel. Numbers are %-deviations from 2017 household emissions. Own calculations based on HFCS wealth data without Pareto adjustment and an elasticity of CO_2 emissions to the top 10% wealth share of 0.795 (Knight et al., 2017).

Table A.5: CO_2 effects of a one-off wealth tax – inequality channel (incl. behavioural effects)

Country	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)
AT	0.83%	1.58%	5.38%	0.59%	0.65%	1.50%
BE	1.00%	1.55%	4.08%	0.67%	0.51%	1.52%
CY	0.94%	1.77%	5.59%	0.76%	0.63%	1.59%
DE	0.78%	1.38%	4.43%	0.42%	0.32%	1.08%
EE	0.64%	0.72%	1.23%	0.35%	0.27%	0.85%
FI	0.60%	0.57%	1.25%	0.31%	0.21%	0.90%
FR	0.78%	1.26%	3.71%	0.48%	0.44%	1.26%
GR	0.57%	0.84%	1.78%	0.02%	0.00%	0.19%
HR	0.79%	0.87%	1.46%	0.35%	0.29%	0.88%
HU	0.47%	0.42%	0.95%	0.21%	0.14%	0.56%
IE	0.85%	0.93%	1.66%	0.64%	0.55%	1.44%
IT	0.82%	1.31%	3.65%	0.26%	0.14%	0.82%
LT	0.41%	0.30%	0.83%	0.07%	0.01%	0.32%
LU	1.29%	2.35%	6.18%	1.25%	1.75%	2.90%
LV	0.23%	0.18%	0.50%	0.08%	0.08%	0.28%
MT	1.14%	1.50%	2.23%	0.81%	0.67%	1.77%
NL	0.70%	1.18%	3.38%	0.38%	0.31%	0.97%
PL	0.65%	0.59%	1.25%	0.16%	0.09%	0.50%
PT	0.69%	1.13%	3.10%	0.50%	0.49%	1.14%
SI	0.55%	0.70%	1.44%	0.29%	0.20%	0.77%
SK	0.63%	0.55%	1.24%	0.12%	0.06%	0.44%
ES	0.60%	0.70%	1.66%	0.56%	0.57%	1.50%
Mean	**0.73%**	**1.02%**	**2.59%**	**0.42%**	**0.38%**	**1.05%**
Heterogeneous growth rates	No	No	No	No	No	No
Behavioural effects	Yes	Yes	Yes	Yes	Yes	Yes
Data adjustment	Pareto-corrected HFCS data			Raw HFCS data		

Notes: Reductions in annual CO_2 emissions due to the introduction of a one-off wealth tax based on the inequality channel. Numbers are %-deviations from 2017 household emissions. Own calculations based on HFCS wealth data and an elasticity of CO_2 emissions to the top 10% wealth share of 0.795 (Knight et al., 2017).

Table A.6: Annual CO_2 effects after 10 years – consumption channel (raw HFCS data, heterogeneous returns)

Country	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)
BE	1.46%	1.26%	3.65%	2.62%	2.19%	6.30%
CY	0.30%	0.28%	0.77%	0.54%	0.49%	1.33%
DE	0.47%	0.39%	1.36%	0.85%	0.68%	2.38%
ES	0.83%	0.85%	2.05%	1.49%	1.42%	3.39%
FR	0.40%	0.36%	1.01%	0.72%	0.62%	1.70%
IT	0.62%	0.38%	2.01%	1.14%	0.69%	3.58%
Mean	**0.68%**	**0.59%**	**1.81%**	**1.23%**	**1.01%**	**3.11%**
Heterogeneous growth rates	Yes	Yes	Yes	Yes	Yes	Yes
Behavioural effects	No	No	No	Yes	Yes	Yes

Notes: Percentage reduction in annual household CO2 emissions after 10 years due to the introduction of a wealth tax (see Section 2.2). Own calculations based on HFCS wealth data without Pareto correction and estimates for the consumption channel as reported in Table 4.

Table A.7: Annual CO_2 effects after 10 years – consumption channel (Pareto corrected data, homogenous returns)

Country	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)
BE	2.30%	3.00%	5.43%
CY	0.79%	1.23%	1.98%
DE	1.12%	1.62%	2.84%
ES	0.70%	0.72%	1.59%
FR	0.65%	0.87%	1.57%
IT	2.30%	3.09%	5.38%
Mean	**1.31%**	**1.75%**	**3.13%**
Heterogeneous growth rates	No	No	No
Behavioural effect	No	No	No

Notes: Percentage reduction in annual household CO2 emissions after 10 years due to the introduction of a wealth tax (see Section 2.2). Own calculations based on Pareto-corrected HFCS wealth data and estimates for the consumption channel as reported in Table 4.

Table A.8: Annual CO_2 effects after 10 years – inequality channel (raw HFCS data, heterogeneous returns)

Country	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)
AT	3.54%	3.97%	7.87%	6.72%	6.89%	13.55%
BE	4.39%	3.80%	8.30%	8.28%	6.83%	15.01%
CY	4.48%	4.22%	8.36%	8.59%	7.68%	15.31%
DE	2.84%	2.33%	6.00%	5.35%	4.21%	10.90%
EE	2.46%	2.28%	5.17%	4.62%	4.08%	9.39%
FI	2.36%	1.74%	5.41%	4.39%	3.12%	9.75%
FR	3.07%	2.76%	6.60%	5.75%	4.83%	11.61%
GR	0.22%	0.03%	1.46%	0.43%	0.06%	2.78%
HR	2.47%	2.33%	5.26%	4.54%	4.08%	9.25%
HU	1.56%	1.32%	3.63%	2.88%	2.36%	6.42%
IE	4.05%	3.70%	7.74%	7.69%	6.65%	13.95%
IT	1.91%	1.16%	4.82%	3.57%	2.13%	8.71%
LT	0.99%	0.44%	2.75%	1.89%	0.85%	5.00%
LU	6.41%	9.73%	14.34%	12.47%	17.03%	24.42%
LV	0.71%	0.69%	1.91%	1.29%	1.17%	3.39%
MT	4.89%	4.57%	9.28%	9.27%	8.28%	16.92%
NL	2.76%	2.42%	5.90%	5.17%	4.31%	10.68%
PL	1.10%	0.72%	3.01%	2.03%	1.31%	5.38%
PT	3.13%	3.26%	6.58%	5.84%	5.73%	11.60%
SI	2.24%	1.84%	5.12%	4.15%	3.27%	9.14%
SK	1.14%	0.67%	3.19%	2.13%	1.25%	5.74%
ES	3.55%	3.64%	7.77%	6.65%	6.30%	13.40%
Mean	**2.74%**	**2.62%**	**5.93%**	**5.17%**	**4.66%**	**10.56%**
Heterogeneous growth rates	Yes	Yes	Yes	Yes	Yes	Yes
Behavioural effects	No	No	No	Yes	Yes	Yes

Notes: Percentage reduction in annual household CO2 emissions after 10 years due to the introduction of a wealth tax (see Section 2.3). Own calculations based on HFCS wealth data without Pareto correction and an elasticity of CO_2 emissions to the top 10% wealth share of 0.795 (Knight et al., 2017).

Table A.9: Annual CO_2 effects after 10 years – inequality channel (Pareto corrected data, homogenous returns)

Country	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)	Model A (mildly progressive)	Model B (strongly progressive)	Model C (wealth cap)
AT	4.30%	7.28%	12.53%	8.49%	12.61%	19.14%
BE	5.30%	7.13%	11.86%	10.09%	12.05%	18.80%
CY	4.91%	8.41%	14.01%	9.88%	15.02%	22.11%
DE	4.09%	6.21%	10.75%	7.87%	10.49%	16.43%
EE	3.35%	3.76%	6.19%	6.42%	6.83%	11.45%
FI	3.31%	3.10%	6.40%	6.16%	5.49%	11.45%
FR	4.10%	5.58%	9.85%	7.72%	9.20%	15.21%
GR	2.80%	3.74%	6.12%	5.08%	6.13%	9.65%
HR	4.07%	4.61%	7.22%	7.67%	8.19%	12.99%
HU	2.60%	2.40%	4.86%	4.85%	4.31%	8.66%
IE	4.61%	4.89%	8.06%	8.80%	8.66%	14.54%
IT	4.26%	5.85%	10.13%	7.97%	9.66%	15.73%
LT	2.34%	1.92%	4.73%	4.41%	3.60%	8.33%
LU	6.38%	11.15%	16.34%	12.69%	20.06%	25.90%
LV	1.42%	1.03%	2.74%	2.64%	1.81%	4.88%
MT	5.91%	7.57%	10.69%	11.51%	13.78%	19.17%
NL	3.63%	5.29%	9.10%	6.91%	8.86%	14.16%
PL	3.52%	3.42%	6.43%	6.58%	6.15%	11.32%
PT	3.49%	4.96%	8.53%	6.51%	8.13%	13.08%
SI	2.92%	3.32%	6.09%	5.37%	5.56%	10.08%
SK	3.40%	3.20%	6.42%	6.33%	5.79%	11.29%
ES	3.34%	3.45%	6.90%	6.24%	5.87%	11.73%
Mean	**3.82%**	**4.92%**	**8.45%**	**7.28%**	**8.56%**	**13.91%**
Heterogeneous growth rates	No	No	No	No	No	No
Behavioural effects	No	No	No	Yes	Yes	Yes

Notes: Percentage reduction in annual household CO2 emissions after 10 years due to the introduction of a wealth tax (see Section 2.3). Own calculations based on Pareto-corrected HFCS wealth data and an elasticity of CO_2 emissions to the top 10% wealth share of 0.795 (Knight et al., 2017).