Non-Technical Research Summary

The Carbon Footprint of Capital

Lucas Chancel and Yannic Rehm, December 2023

Link to the full research paper

Source: pexels.com

Summary

- The working paper entitled *"The Carbon Footprint of Capital: Evidence From France, Germany and the US based on Distributional National Accounts"*, by Lucas Chancel[1] and Yannic Rehm[2], presents new estimates on the inequality in individual carbon footprints across wealth groups in the US, Germany and France.

- The paper develops a novel measurement framework for individual carbon footprints, which extends beyond the traditional consumption-based approach. The key novelty is to include in the carbon footprint of individuals not only emissions linked to consumption and personal lifestyle, but also the emissions associated with asset ownership. The study provides insights into how consumption, wealth and asset ownership respectively contribute to the total carbon footprint of individuals at different levels of wealth. The new estimates highlight in which domain the potential to reduce emissions is largest for individuals.

Methodology

- The methodology developed in this study combines standard economic data (such as national accounts that form the basis of GDP statistics), data on air pollution from environmental accounts, as well as information on the distribution of income, wealth and consumption.

- As compared to earlier studies, the

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study allows for a more comprehensive understanding of emissions of different wealth groups of the population, linking emissions not only to consumption and lifestyle decisions, but also to the ownership of various asset classes (such as real estate, equities or pension assets).

- The study defines three main approaches to track emissions on the individual and country level: the consumption, the ownership and the mixed approach. Each method considers emissions from consumption and wealth to different extents (See page **8**).

Key findings

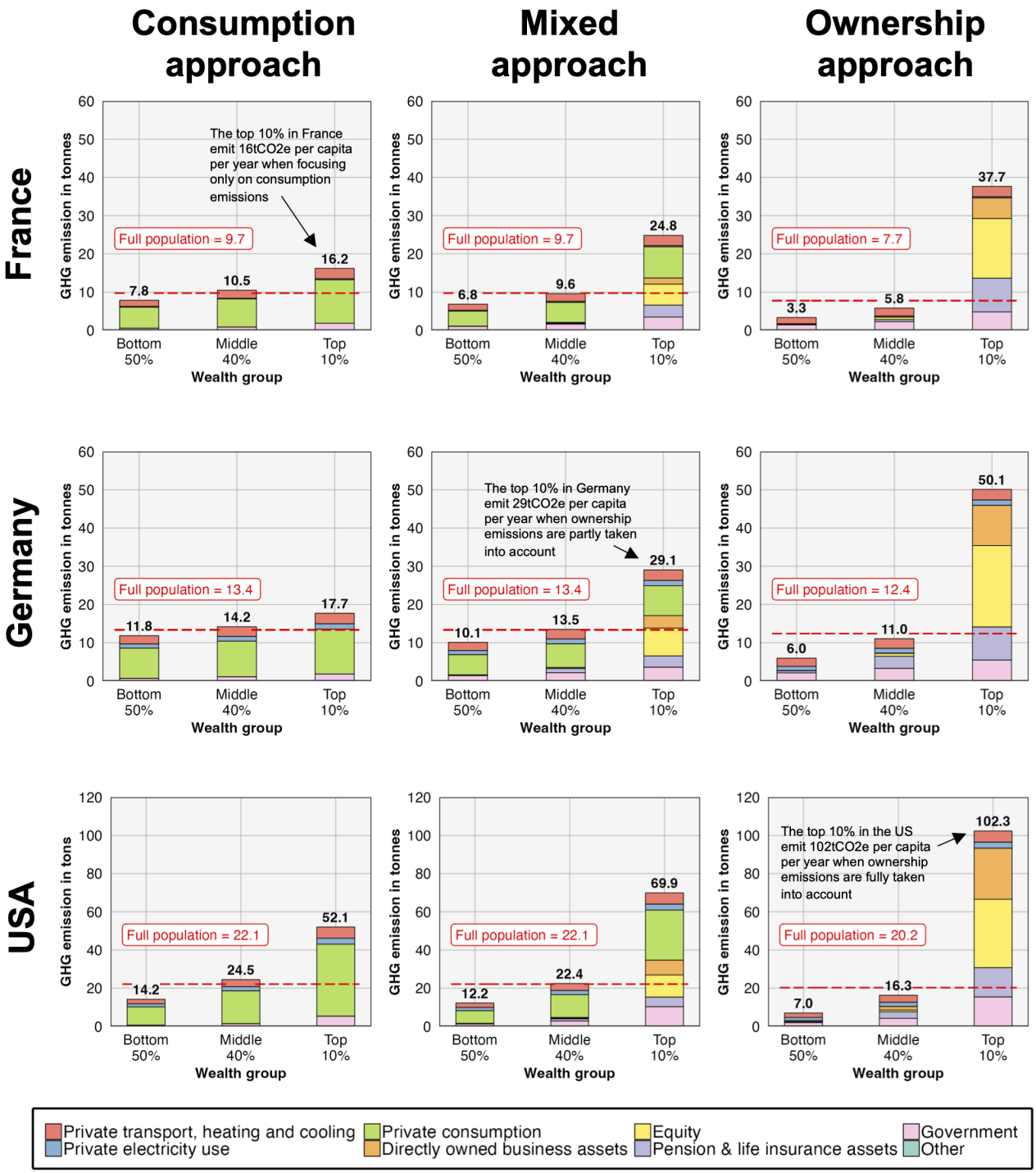
- **Emissions levels**: The wealthiest 10% emitted nearly 38 tonnes of CO2-equivalent (tCO2e, or tonnes) per capita and per year on average in France, 50 tonnes in Germany and 102 tonnes in the US, when ownership emissions are fully taken into account. Instead, when only their consumption emissions are tracked, the footprint of the wealthiest 10% of the population is of 16 tonnes in France, 18 tonnes in Germany, and 52 tonnes in the US. [Figure A]
- **Average emissions**: These numbers contrast with *average* per capita emissions, which are nearly 10 tonnes in France, 13.5 tonnes in Germany (in 2017) and 22 tonnes in the US (in 2019) [Figure A]. Splitting equally the available global carbon budget to comply with the Paris Climate Agreement would imply roughly 2 tonnes per capita.
- **Ownership vs. consumption emissions**: Fully accounting for wealth-related emissions implies that emissions of the wealthiest 10% are 2-3 times greater than estimates based solely on consumption and private lifestyles, significantly altering our perception of emissions. [Figure A]
- **Assets of the wealthy**: In the ownership approach (see page 8) the wealthiest 10% of the population emit 75-80% of all emissions through the assets they own, rather than through their private lifestyle. Focusing solely on direct or indirect consumption emissions may miss a large part of emissions, particularly among the wealthy.
- **Concentration of wealth emissions**: The top 10% account for a majority (70-85%) of emissions related to capital ownership. In fact, inequality in wealth-related emissions appears to be higher than wealth inequality in general, because the wealthiest are found to own assets more carbon intensive than the middle and the poorer segments of society. This contrasts with inequality in consumption-emissions, which is lower than wealth (or income) inequality. [Figure B]
- **Carbon intensity of assets**: Financial assets, particularly equities, are highly emission-intensive. For every million owned in equity, the annual carbon emissions are found 120-150tCO2e in France and Germany, and 75tCO2e per million dollar in the US. Put differently, an equity investment of 100,000 euros or dollar is associated, on average, with 7.5-15tCO2e of emissions per year. [Figure C]

Policy implications

- **The need for timely carbon inequality data:** Public debates need to be grounded in sound and up-to-date data on carbon inequalities, which is lacking. Standardized measures to assess the carbon content of investment products and not just of consumption goods must be developed by statistical agencies. As of now, these institutions lack resources, and there is little or no focus on the carbon content of investment products.
- **Enlarging the policy toolkit:** Targeting the carbon content of assets could be an effective strategy in emission reduction, particularly among the wealthier groups. This may include ban on certain types of investments, tax incentives for green investment products, and/or taxes on polluting investments or assets.
- **Fair carbon taxation:** Carbon taxes on consumption typically fall disproportionately on the low-income, low-emitter groups. On the contrary, a carbon tax on the carbon content of assets or of investments, would mainly fall on wealthy emitters. [Figure D]

Figure A. Wealth-related emissions increase top 10% footprints by at least x2 as compared to consumption-only estimates

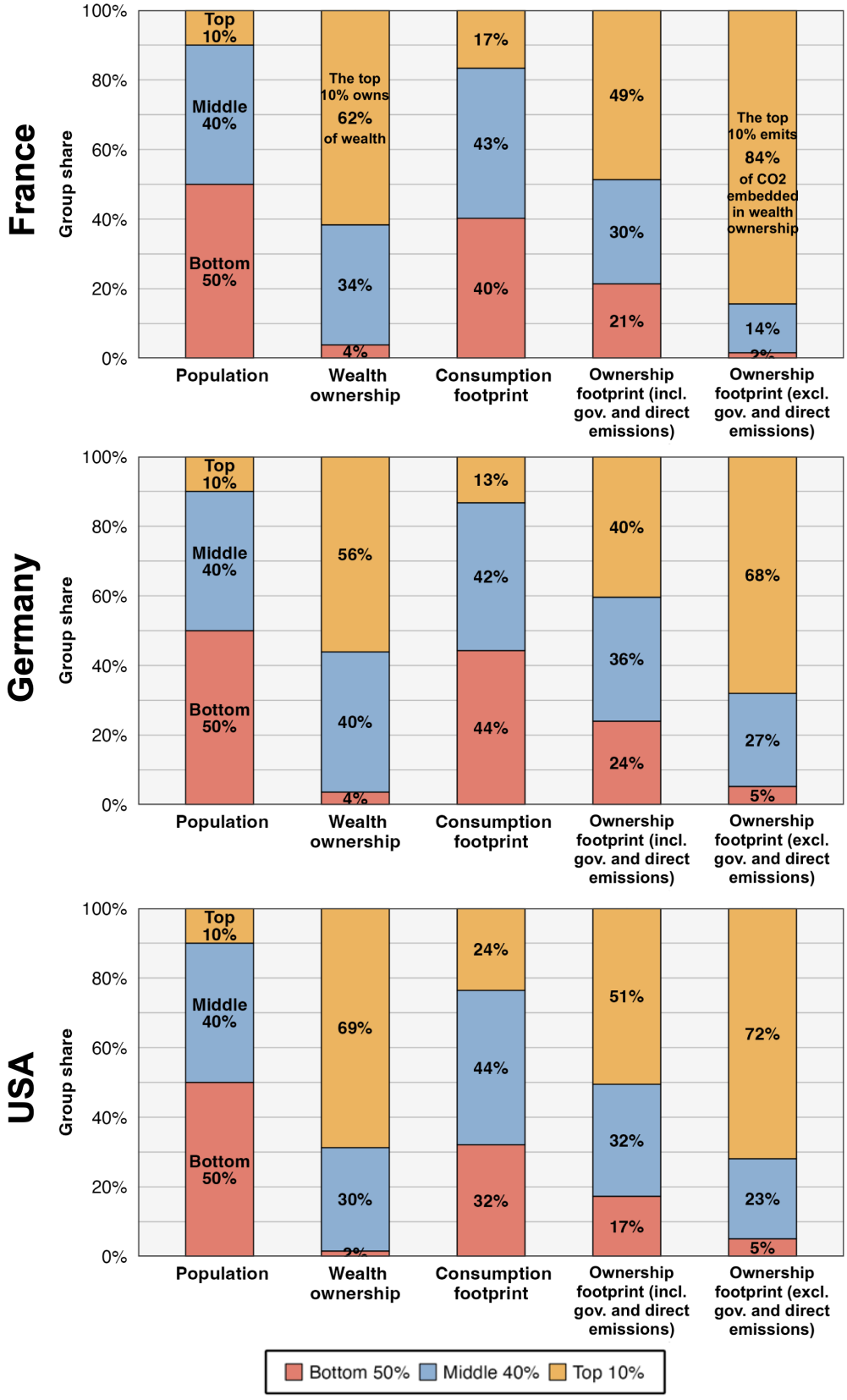
Per capita emissions across wealth groups



Notes: The top 10% in the US emits around 52 tonnes of CO2-equivalent per capita and per year in the consumption approach, nearly 70tCO2e in the mixed approach and 102 tCO2e in the ownership approach. The average emissions calculated for the entire population differ when using the ownership approach compared to other methods, due to the influence of cross-border ownership of companies on national emission totals. See Figure 4 in the main paper, and Methodology section for details.

Figure B. Consumption emissions are less concentrated than income, ownership emissions are more concentrated than wealth

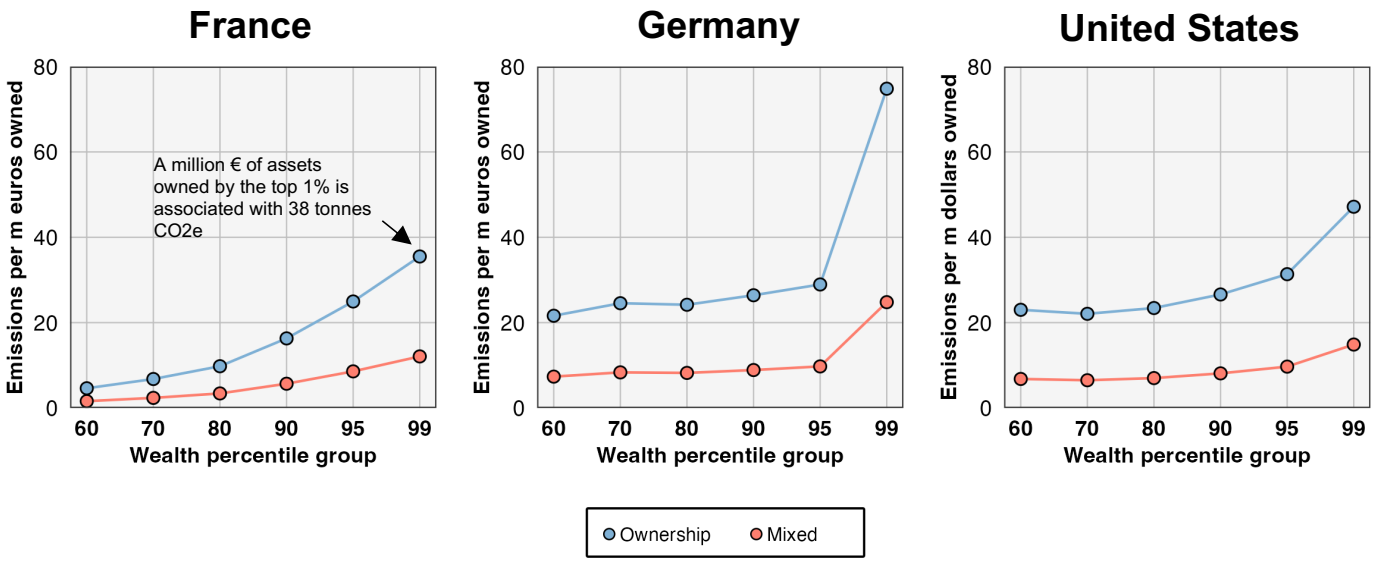
Share of population, wealth ownership and emissions across wealth groups



Notes: The top 10% of the population in France owns 62% of net wealth. It emits 17% of total emissions in the consumption approach, 49% of emissions in the ownership approach (which includes emissions from asset ownership as well as direct and govt. emissions), and 84% of emissions from asset ownership. See Methodology Overview below (p.8) and Fig.1 in the paper.

Figure C. Ownership emissions intensity rises with wealth

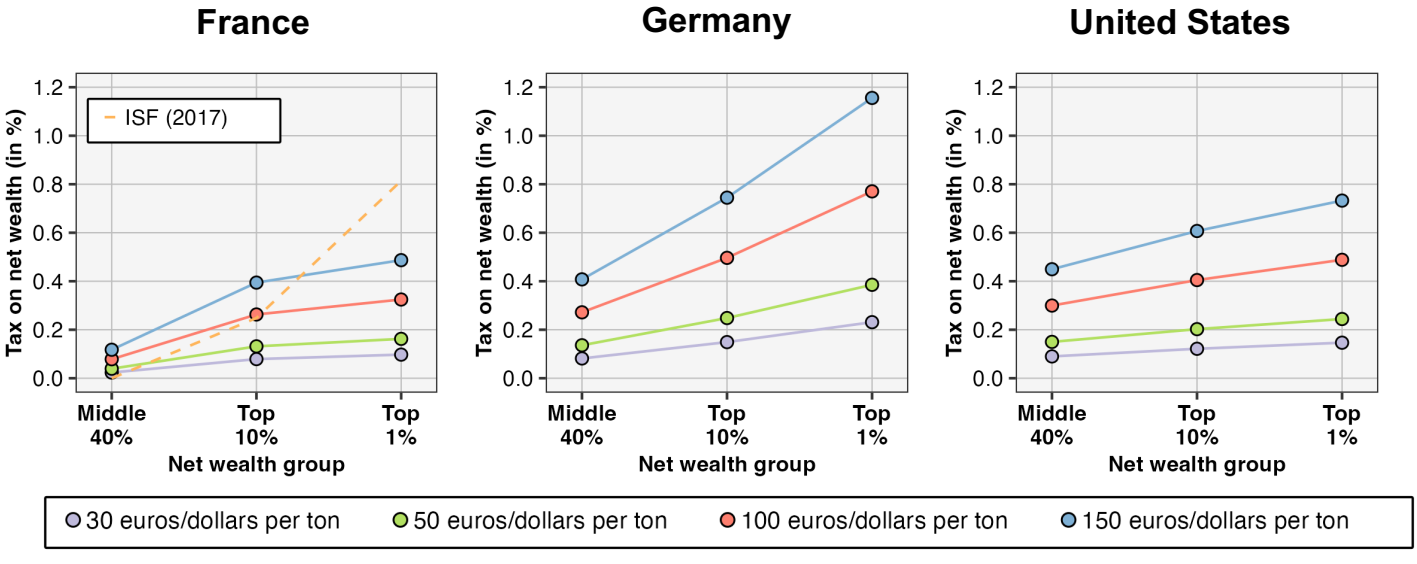
Emissions per million euro or dollar owned across wealth groups



Notes: Wealth percentile group 99 corresponds to the top 1% of the population. Percentile group 95 corresponds to the top 5% minus the wealthiest 1%. Percentile group 90 corresponds to the top 10% minus the wealthiest 5%. See Figure 5 in the main paper.

Figure D. Taxing the carbon content of wealth appears to be progressive, while carbon taxes on consumption typically are not

Effective wealth tax rate paid for various carbon tax rates on wealth-related emissions

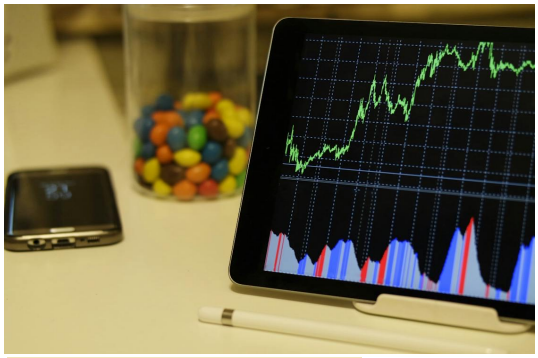


Notes: A carbon tax of 100 dollars per tonne of carbon would be equivalent, on average, to a 0.5% tax on wealth of the top 1% in the US according to the study's benchmark estimates. See Figure 10 and 11 in the main paper.

Figure E. Splitting the remaining global carbon budget equally across the world population would imply about 2 tonnes CO2e per person per year
Carbon footprint of various consumption of investment categories

Each item is worth 2 tonnes of CO2e in the consumption or ownership approach

Four steaks per week over a year



Owning $20,000 of equity

New-York – Paris return economy ticket

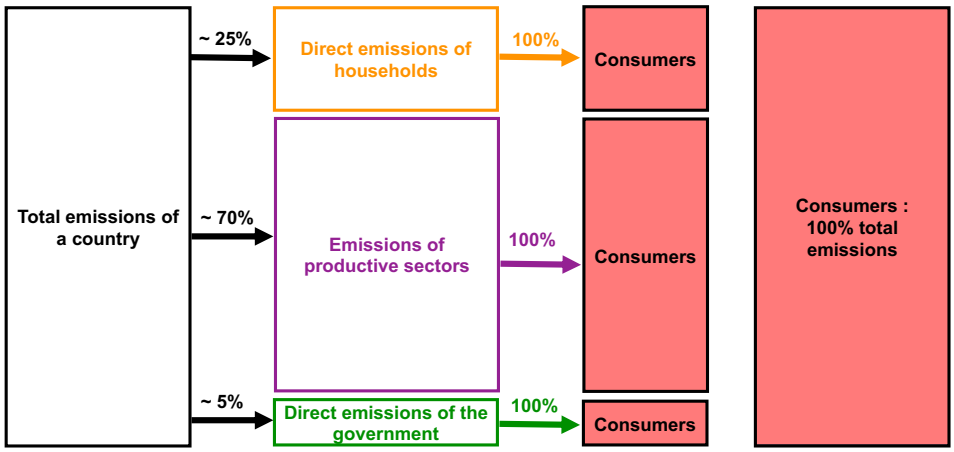
Heating 90m2 with natural gas over a year

Notes: four steaks per week (600g) over a year are worth about 2 tonnes of CO2-equivalent (2tCO2e) in the consumption approach, and zero emissions in the ownership approach (in this approach these emissions are attributed to the owners of firms producing the steaks). Holding an equity investment valued between 13,000 and 26,000 dollars or euros in a fund that mirrors the general performance of the stock market is associated with 2tCO2e in France, Germany or the US in the ownership approach, and 0 tonne in the consumption approach. Heating 90m2 with natural gas (reference appartment in northern France) emits around 2tCO2e in the consumption and in the ownership approach (direct emissions are associated with consumers in both approaches). A Paris-New York economy return flight releases around 2tCO2 per passenger in the consumption approach. Data from EPA Carbon Footprint Calculator, C-level flight calculator, myclimate.org, Poore & Nemecek (2018) and from this paper, see Methodology section.

Methodology Overview

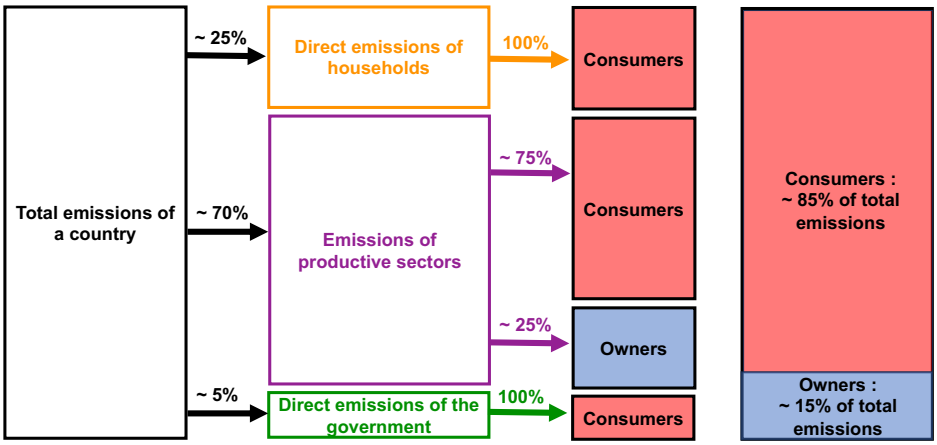
Three approaches to measure individual carbon footprints

Consumption approach



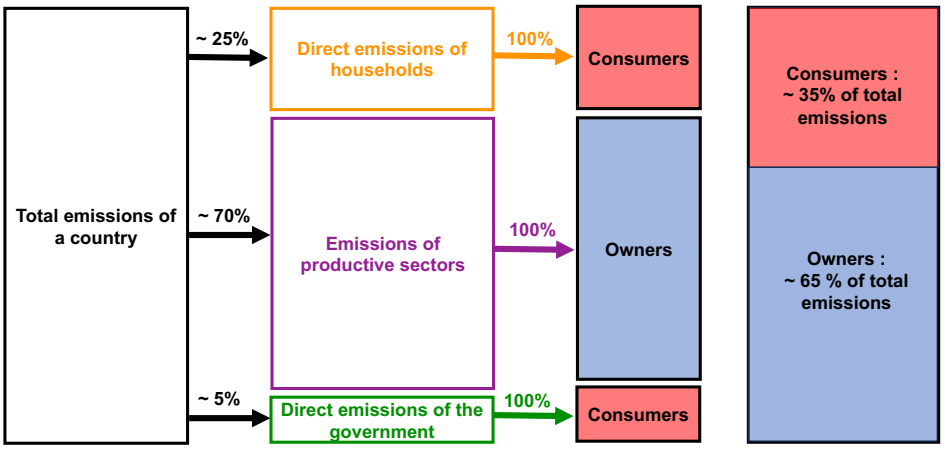
Notes: In the « consumption approach » to carbon footprint measurement, emissions of productive sectors are entirely attributed to consumers. The various shares presented are indicative. Actual values depend on country specific data and the methodological framework used. **Source**: Chancel and Rehm 2023

Mixed approach



Notes: In the « mixed approach » to carbon footprint measurement, 75% of the direct emissions of productive sectors (e.g. emissions from cement industry or from agriculture) are attributed to consumers, and 25% to owners. The various shares presented are indicative. The actual values depend on country specific data and the methodological framework used. Some emissions of productive sectors are owned by the government and are attributed to consumers rather than to private owners. **Source**: Chancel and Rehm 2023

Ownership approach



Notes: In the « ownership approach » to measure individual carbon footprints, 100% of the direct emissions of productive sectors (e.g. emissions from cement industry or from agriculture) are attributed to firms' owners. The various shares presented are indicative. The actual values depend on country specific data and the methodological framework used. A part of the productive sector is owned by the government. Related emissions are attributed to consumers rather than to private owners. **Source**: Chancel and Rehm 2023

About the authors

Lucas Chancel is a Visiting Associate Professor at the Harvard Kennedy School and an Associate Professor at Sciences Po. He is also Co-Director of the World Inequality Lab at the Paris School of Economics. His work focuses on global economic inequality, climate inequalities and economic policy. Click to learn more.

Yannic Rehm is a doctoral student at the Paris School of Economics. His work focuses on questions linked to taxation, inequality and climate change. Click to learn more.

Link to the Stone Program in Wealth Distribution, Inequality, and Social Policy at the Harvard Kennedy School

Link to the Center for Research on Social inequalities at Sciences Po

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