

Article presentation :

Chancel L., Rehm Y., The Carbon Footprint of Capital:
Evidence from France, Germany and the US based on
Distributional Environmental Accounts

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Sciences Po

Outline

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2. Related Literature
3. Data Sources and Methodology
4. Carbon Footprint of the Capital
5. The Distribution of Carbon Footprints
6. Discussion
7. Conclusion

Introduction

1. Introduction

Related Literature

2. Related Literature

Data Sources and Methodology

3. Data Sources and Methodology

Carbon Footprint of the Capital

4. Carbon Footprint of the Capital

4.1 Capital emissions by industry and institutional sector

4.2 Capital emissions by asset class

4.3 The role of foreign capital in national emissions

Capital emissions by industry and institutional sector

Industries :

- Agriculture and mining
- Energy, water and waste
- Manufacturing
- Transport
- Real estate and construction
- Health and education
- Public administration
- Services

Results :

- Manufacturing as the largest emitting sector in FR and DE
- Agriculture and mining as the largest emitting sector in the US
- Agriculture and mining as the most carbon-intensive sector
- Similar carbon intensity for the manufacturing sector
- Difference in definition for the Real Estate and Construction sector

Following : Table 1, Emission intensities by industry groups

Capital emissions by industry and institutional sector

Industry	Mixed			Ownership		
	tCO2e/ m euros capital	tCO2e/ m euros value-added	million tCO2e	tCO2e/ m euros capital	tCO2e/ m euros value-added	million tCO2e
Panel A. France (2017)						
Agriculture and mining	65.5	291.9	10.9	528.4	2,354.9	87.8
Energy, water and waste	85.8	562.0	27.1	150.6	987.0	47.6
Manufacturing	120.0	212.9	49.6	230.2	408.4	95.1
Transport	38.3	103.1	9.8	163.5	440.5	41.7
Real estate and construction	0.8	20.4	7.7	1.0	24.7	9.3
Health and education	0.3	0.6	0.2	19.0	34.5	10.3
Public administration	0.1	1.1	0.2	3.2	30.6	4.9
Services	6.7	9.7	7.7	30.2	44.0	35.0
Panel B. Germany (2017)						
Agriculture and mining	84.0	568.3	18.2	335.3	2,269.7	72.8
Energy, water and waste	113.5	912.2	81.0	289.4	2,326.2	206.6
Manufacturing	96.6	131.9	87.9	232.6	317.8	211.7
Transport	24.0	116.0	14.9	161.9	783.5	100.5
Real estate and construction	0.8	15.5	7.0	1.2	23.2	10.5
Health and education	0.3	0.9	0.3	8.7	28.7	10.2
Public administration	0.3	1.8	0.3	4.9	30.7	5.5
Services	4.0	6.6	6.9	22.2	36.5	38.1
Panel C. United States (2019)						
Agriculture and mining	97.3	641.7	297.9	534.9	3,526.6	1,637.3
Energy, water and waste	146.7	1,262.1	455.3	431.4	3,710.8	1,338.6
Manufacturing	117.7	214.7	508.1	205.7	375.2	887.7
Transport	105.7	254.8	179.1	359.1	865.8	608.6
Construction	158.4	69.7	62.9	212.5	93.6	84.4
Services and other industries	0.9	4.1	65.5	6.6	30.2	477.5

Capital emissions by asset class

Assets :

- Housing assets
- Business assets
- Equities
- Pension assets
- Fixed income assets

Results :

- Equity is the most polluting asset class.
- Pension assets are the second most polluting asset class.
- Business assets are the third most polluting asset class.
- Housing has an important market valuation, but emits little.
- Important intensity of pension assets for Germany.

In clear, there exist important differences between types of assets.

Capital emissions by asset class

Table 2. Asset classes and emission intensity per million \$/EUR owned (ownership-based approach)

Asset class	France (2017)			Germany (2017)			USA (2019)		
	b euros owned	million tCO ₂ e	tCO ₂ e/m euros owned	b euros owned	million tCO ₂ e	tCO ₂ e/m euros owned	b dollars owned	million tCO ₂ e	tCO ₂ e/m dollars owned
Housing assets	6,808.5	0.3	0.1	6,901.2	0.5	0.1	36,475.5	260.8	7.2
Business assets	727.9	38.3	52.6	1,036.7	90.4	87.2	6,748.4	966.5	143.2
Equities	1,528.7	123.2	80.6	1,332.7	203.7	152.9	17,553.6	1,314.4	74.9
<i>Domestic</i>	<i>1,183.9</i>	<i>83.1</i>	<i>70.2</i>	<i>808.2</i>	<i>117.5</i>	<i>145.4</i>	<i>13,965.3</i>	<i>1,118.4</i>	<i>80.1</i>
<i>Abroad</i>	<i>344.8</i>	<i>40.1</i>	<i>116.4</i>	<i>524.6</i>	<i>86.2</i>	<i>164.4</i>	<i>3,588.3</i>	<i>196.0</i>	<i>54.6</i>
Pension assets	2,026.9	75.4	37.2	1,351.5	197.6	146.2	31,564.2	1,015.9	32.2
Fixed-income assets	1,552.8	0.0	0.0	2,579.9	0.0	0.0	17,363.7	0.0	0.0

Note: Emissions correspond to the average emissions of an individual who owns the asset for one year. The table presents household sector ownership-based emissions and does not include government-owned assets. Emissions attributed to assets based on the approach explained in the paper (ownership-based approach). The value of total assets owned is sourced from Eurostat national balance sheets (France and Germany) and from distributional national accounts released by Piketty et al. (2018) for the United States. Pension assets include life insurance assets.

The role of foreign capital in national emissions

- In France and in the US, equity held abroad represents about 20-25% of owned equities.
- In Germany, equity held abroad represents about 40% of owned equities.
- Foreign equity held by French and German citizens are more carbon intensive than those owned by the US citizens.

The Distribution of Carbon Footprints

The Distribution of Carbon Footprints

5. The Distribution of Carbon Footprints

5.1 Emissions rise with income and wealth

5.2 Emissions intensity rises with wealth

5.3 The weight of capital emissions among top groups

Emissions rise with income and wealth

Generally :

- Emissions are positively correlated with wealth.
- Consumption approach : carbon inequalities are less concentrated than income.
- Mixed-based approach : carbon inequalities are as concentrated as income.
- Ownership approach : carbon inequalities are more concentrated than wealth.

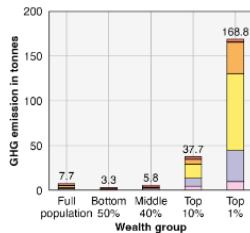
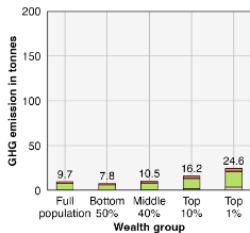
International comparison :

- The US are more carbon inequal than Germany, which is more carbon inequal than France.
- The majority of the US emit as much as the top of the distribution of France and Germany in the two first approaches.
- The top French group emits less despite owning more of the national equity than their German counterpart.

Emissions rise with income and wealth

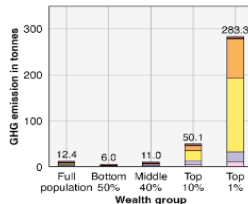
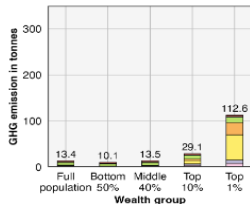
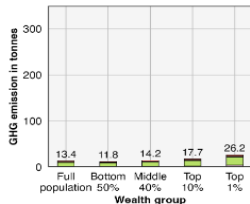
Figure 5. Per capita emissions by wealth group

Panel A. France

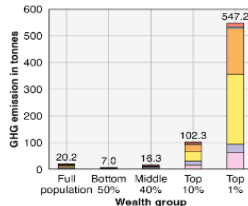
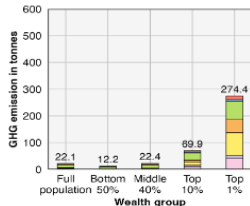
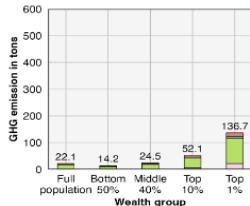


Emissions rise with income and wealth

Panel B. Germany



Panel C. United States



(a) consumption-based approach

(b) mixed-based approach

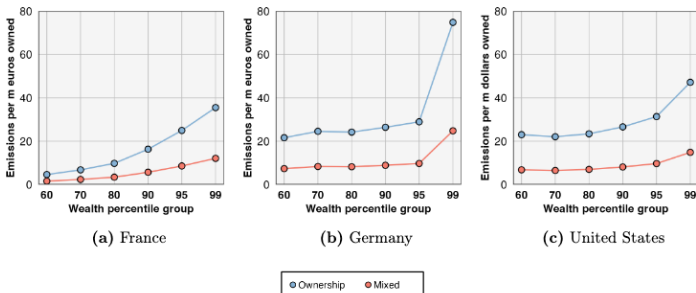
(c) ownership-based approach



Emissions intensity rises with wealth

Average emission intensity tends to increase alongside with wealth at the very top of the distribution. This explains the greater concentration of carbon emissions compared to wealth.

Figure 6. Average annual emissions in tonnes per million dollars or euros owned



The weight of capital emissions among top groups

- Importance of the emissions of top groups.
- Emissions of the top 1% (p.36) :

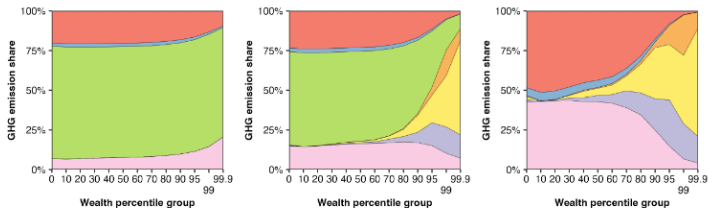
Countries	Consumption	Ownership	Multiplication in tCO ₂ e
France	2.5%	21.5%	6
Germany	2%	22.3%	11
US	6.2%	26.9%	16

- Key role of Capital ownership in the determinant of the top of the distribution.
- Structure of the emissions alongside the wealth distribution.

The weight of capital emissions among top groups

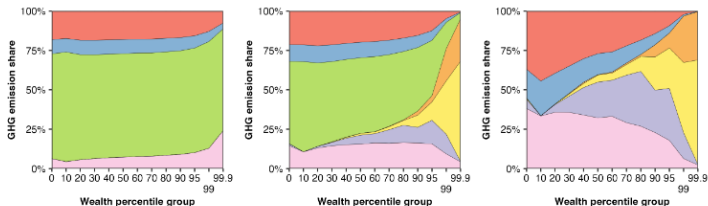
Figure 7. Breakdown of emissions according to the three approaches

Panel A. France

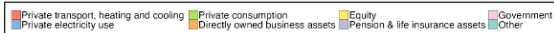
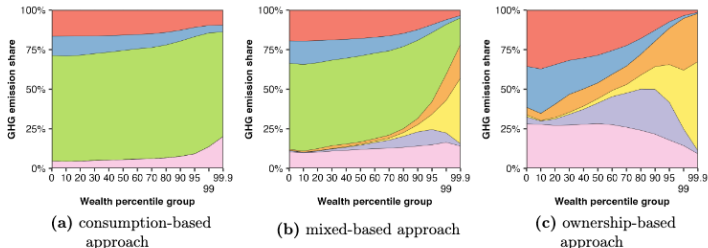


The weight of capital emissions among top groups

Panel B. Germany



Panel C. United States



Discussion

6. Discussion

6.1 Sensitivity of the results to assumption

6.2 Scope and limitations of the data and footprinting approaches

6.3 How our estimates compare to earlier work

6.4 Stylized facts on inequality and emissions

6.5 Distributional properties and revenue estimates for a carbon wealth tax

Sensitivity of the results to assumption

test

Include Figure 8.

Scope and limitations of the data and footprinting approaches

- Limitations linked to data Sources
- Carbon footprints and individual responsibility

How our estimates compare to earlier work

Stylized facts on inequality and emissions

Stylized facts.

Distributional properties and revenue estimates for a carbon wealth tax

Conclusion

7. Conclusion