Industrial Policy for Future

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Motivation 1: Industrial Policy is Back

> *"policies aimed at particular industries (and firms as their components) to achieve outcomes that are perceived by the state to be efficient for the economy as a whole" (Chang 2003)*

- A global "state interventionist turn" (Abels & Bieling 2022)
- Geo-economic motives, but considered key to decarbonize economies (Meckling 2021, Christophers 2024)
- Prominent critique: mere derisking; capital-friendly; all agency is considered residing within the state (Gabor 2023)
- Evaluating industrial policies is hard but urgently necessary (Lane 2020), and much like with the minimum wage literature, a fruitful dialogue between robust empirical work and conceptual innovations could evolve

Motivation 2: Decarbonization's Effect on Labor

- Decarbonization can have an immense effect on labor markets
  $\rightarrow$ This can create huge welfare losses (Haywood et al. 2024)
- We know that a lot of discontent with (market-driven) climate policy is driven by peoples' fear of job loss, or job quality loss
  $\rightarrow$ Rise in votes for the far-right can be driven by changes in the labor market (Heddesheimer et al. 2024)
- There is a lack of empirical metrics to assess the vulnerability of labor markets to decarbonization
  $\rightarrow$ Think about automation: There is already a huge literature! (Acemoglu/Restrepo 2019)

I want to fill this gap with two new(ish) metrics: The Carbon Profile of Occupations based on a firm-level Carbon Content of Jobs (and related metrics)

Metric 1: Carbon Content of Jobs (CCoJ)

Marin/Fona 2023, Graham/Knittel 2024;

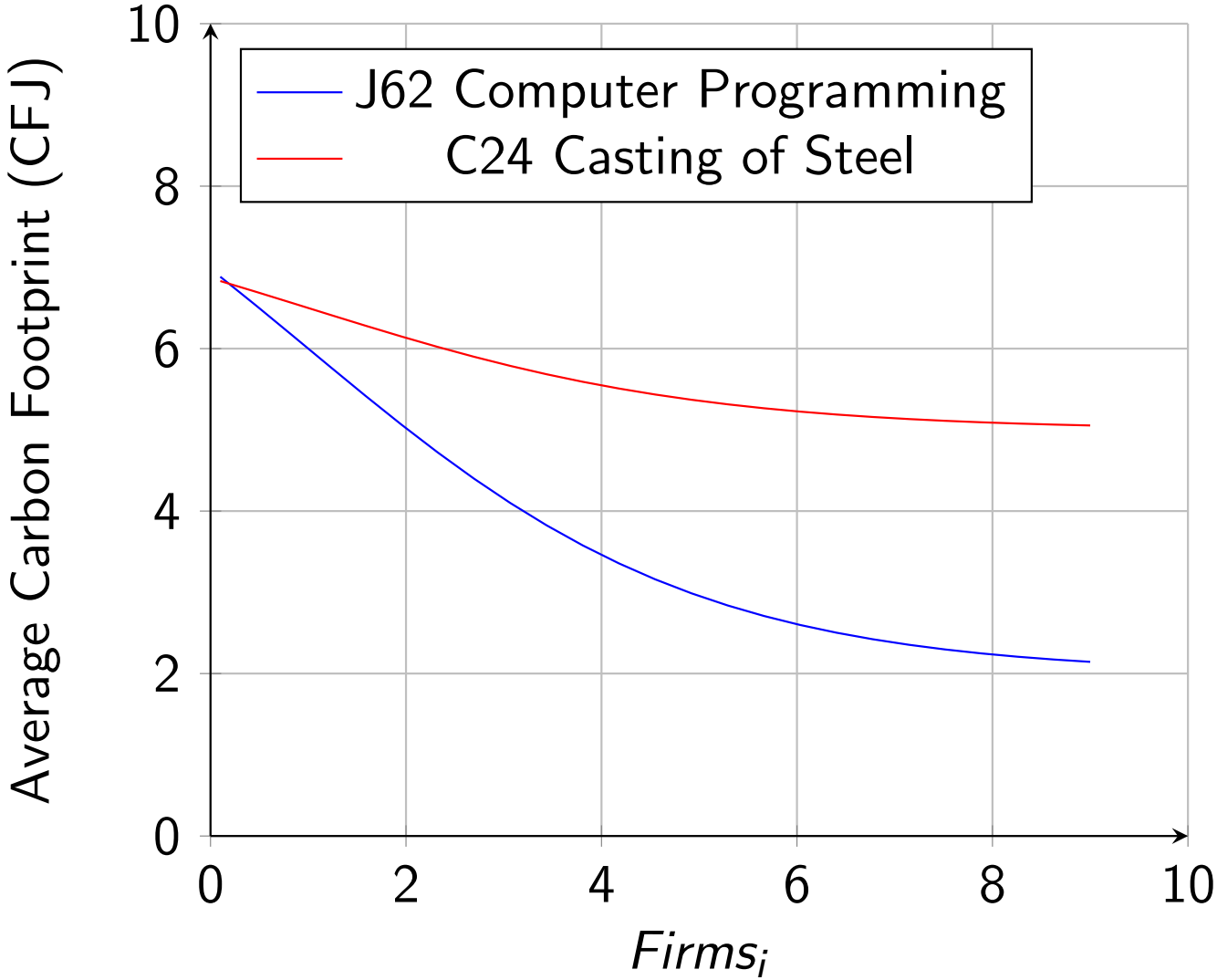
For any job j in firm i, the average carbon content of this job is

$$AverageCarbonContent_{i,j} = \frac{1}{L_i} \times FirmEmissions_i$$

where L_i is the overall number of employees j at this firm i and $FirmEmissions_i$ are the total emissions of this firm.

Similar to the 'ecological footprint' measuring the individual emissions of one *consumer*, this metric measures the emissions of an *individual job* expressed as the average emissions per employee of the firm.

Metric 2: Carbon Profile of Occupations (CPO), Example



E.g. programming might be a low carbon job in most firms, but casting of steel is a carbon intensive job in any firm (although there might be differences in technology, like gas vs induction)

Variations of Metric 2

NB: For different occupations, the list of firms will differ. And if we express firms on the y-axis proportionally to the number of jobs affected, the figure will look more like a step function.

Two metrics which would be similar to the CPO:

- Carbon Profile of Sectors (CPS): Sector on y-axis
- Carbon Profile of Regions (CPR): Region on y-axis
- ...

Ideally, we would transfer the information from the CPO curve into a single number (like the curvature or some weighted average) in order to be able to easily compare the 'vulnerability' of different occupations/sectors/regions etc.

Data Requirements (Specific)

- Firm-level emissions data (e.g. AFiD, E-PRTR, ...)
- Firm-level employment data with detailed occupations data (**IAB data**)
- These two have to be linked for the final data set!
- Ideally, for the alternative metrics, we would need to have information on the sector and the region a firm operates in
- Thinking about a causal question, we might need other variables (such as other firm characteristics, or specific scopes of emissions data)

Data Requirements (General)

In the final data set, for the CPO to give a sensible picture of the actual job market situation, we need ...

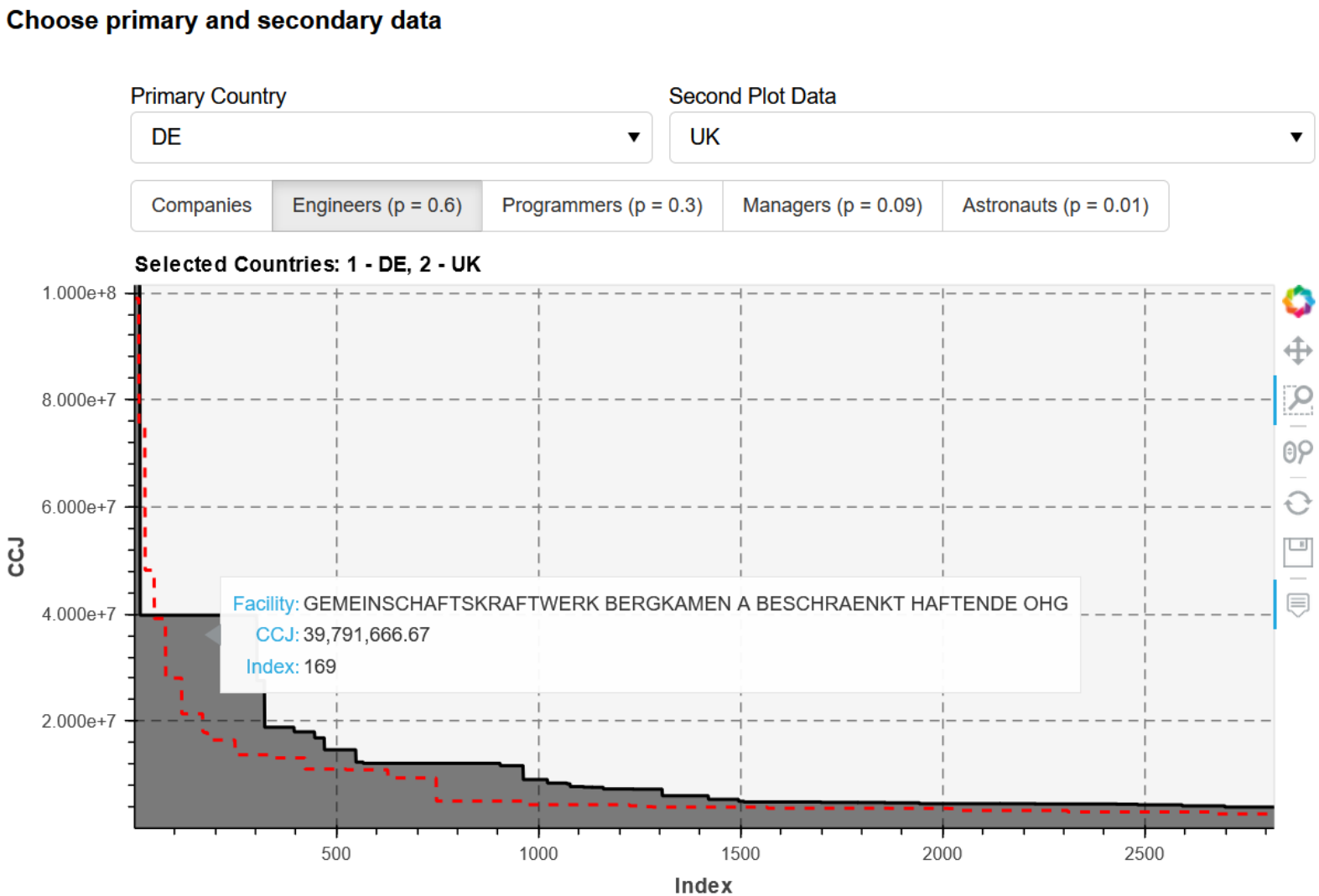
- ... all the large firms, and as many firms as possible
- ... the firms which are most carbon intensive
- ... the firms which have the most employees
- ... both manufacturing and service sector firms: the alternative jobs for an employee from the manufacturing sector could well be in a service sector firm
- ... specifically, we need low carbon intensive firms that employ a large share of employees in occupations in which also high carbon intensive firms have many employees (to get the CPO right)

What We Can Learn From the CPO & Related Measures

We can learn...

- ... which occupations are most affected, and how severely (how many and what alternatives employees have to switch job)
- ... that if, within one occupation, the CPO declines rapidly, employees can relatively easily change to low carbon intensive firms
- ... which sectors or regions are most affected (where sectoral labor market policies or regional/structural policy might need to intervene)
- ... that if, within one sector, the CPO declines rapidly, then there are likely very different levels of carbon-intensity for different technologies deployed

Prototype: Carbon Content of Jobs Calculator



Prototype: Explanation

This prototype[1] uses semi-automatically matched E-PRTR and Orbis data[2] and *simulated occupation shares* (here assumed to be equal in any firm). Thus, interpretation is not really possible. This is just meant to give an overview of how a visualization of the CPO would – in principle – look like with 'real' data. In the version we have, you can already select the drop-down menus and navigate the cursor across the plot to inspect individual firms.

[1] Skillfully built by our RA Jonathan Diez (thanks!).

[2] Kindly shared by Charlotte Bez (thanks!).

Theory of Change: Blue-Green Alliances

Mügge 2022; Kaiser 2023; Lucht/Liebig 2023; Tschenker 2023;

Klage abgelehnt

Leipziger Richterin entscheidet: LVB-Mitarbeiter können ab Freitag streiken

Source: Leipziger Volkszeitung, 29.02.2024 ("Lawsuit rejected. Leipzig judge rules: LVB employees can strike starting Friday")

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Thank you!

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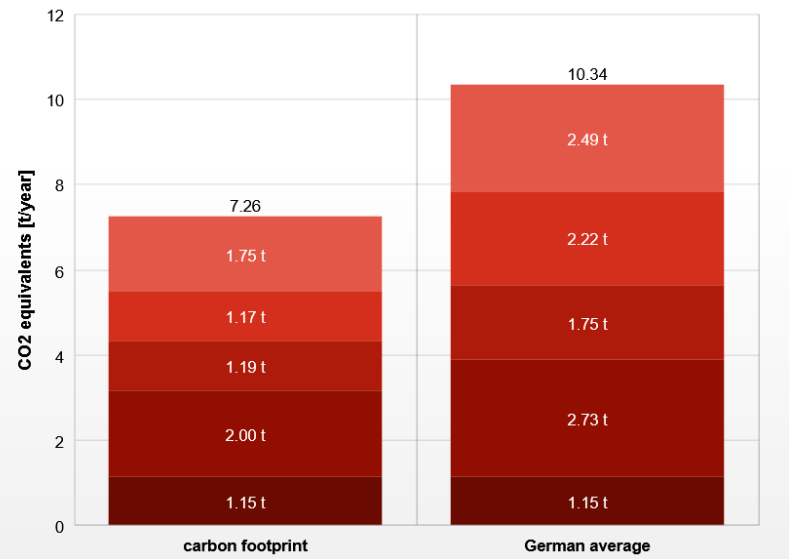
Carbon Footprint Calculator

Carbon footprints in comparison

carbon footprint: **7.27 t**
German average: **10.34 t**



carbon footprint

The *personal carbon footprint* shows how many tonnes of CO_2 equivalents are emitted due to your current lifestyle.

In addition to CO_2, the greenhouse gases methane and nitrous oxide are taken into account, which are converted into CO_2 equivalents with the corresponding climate impact. The additional non-CO_2-related climate impact of flying is also taken into account.

In order to assess your carbon footprint, the *German average* is always displayed for comparison.

- Housing & Electricity
- Transportation & Travel
- Food
- Miscellaneous Consumption
- Public Consumption

Recent Revival

Meckling 2021; Branstetter 2022; BMWK 2022;

- US: Inflation Reduction Act, Chips and Science Act
- EU: Net Zero Industry Act, Green Deal Industrial Plan
- China: Made in China 2025
- Germany: CCfD, 'Green Lead Markets', Industrial Electricity Price, Hydrogen Strategy, AI Strategy etc.
- ...

Industrial Policy: The Theory (in Favor)

- Underinvestment Due to Market Failures
  - Basic Research and Development
  - Human Skills
  - Public Goods
- Externalities like Emissions
- Infant-Industries
- Transformation Requires Coordination
- ...

Industrial Policy: The Theory (Against)

- Political Economy: Capture by Powerful Industries
- The Knowledge Problem: Difficulty of Targeting
- Inefficiencies: Sustaining Unproductive Firms
- De-risking Paradigm: Carrots without Sticks
- ...

Industrial Policy: "The evidence is mixed"

OECD 2022; Lane 2022;

- Criscuolo et al. (2019): IV
- Kim et al. (2021): DiD
- Bronzini/Iachini (2014): RDD
- Mar/Massard (2021): Matching
- Lane (2022): TWFE
- ...

$\rightarrow$ Either infant industry or very regional industrial policy