EPFL

The 74th Swiss LCA Discussion Forum

LCA in the National Research Programme NRP 73 Sustainable Economy

RE: Share

The consumer and environmental potential of the Sharing Economy:

Motives, Barriers and Rebound Effects

Rafael Laurenti
Department of Machine Design
KTH Royal Institute of Technology

HERUS

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rafa@kth.se

Team:
Prof. Dr. Claudia R. Binder – HERUS Lab, EPFL (coordinator)
Prof. Dr. Sebastian Gurtner – Bern University of Applied Sciences
Prof. Dr. Sofia Ritzén – KTH Royal Institute of Technology, Stockholm
Dr. Albert Merino – HERUS Lab, EPFL
Tin Huynh, PhD student EPF-FH
Dr. Rafael Laurenti – KTH

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Partners:
SHARELY
Pumpipumpe
hygglo

HERUS

Overarching goals of the project

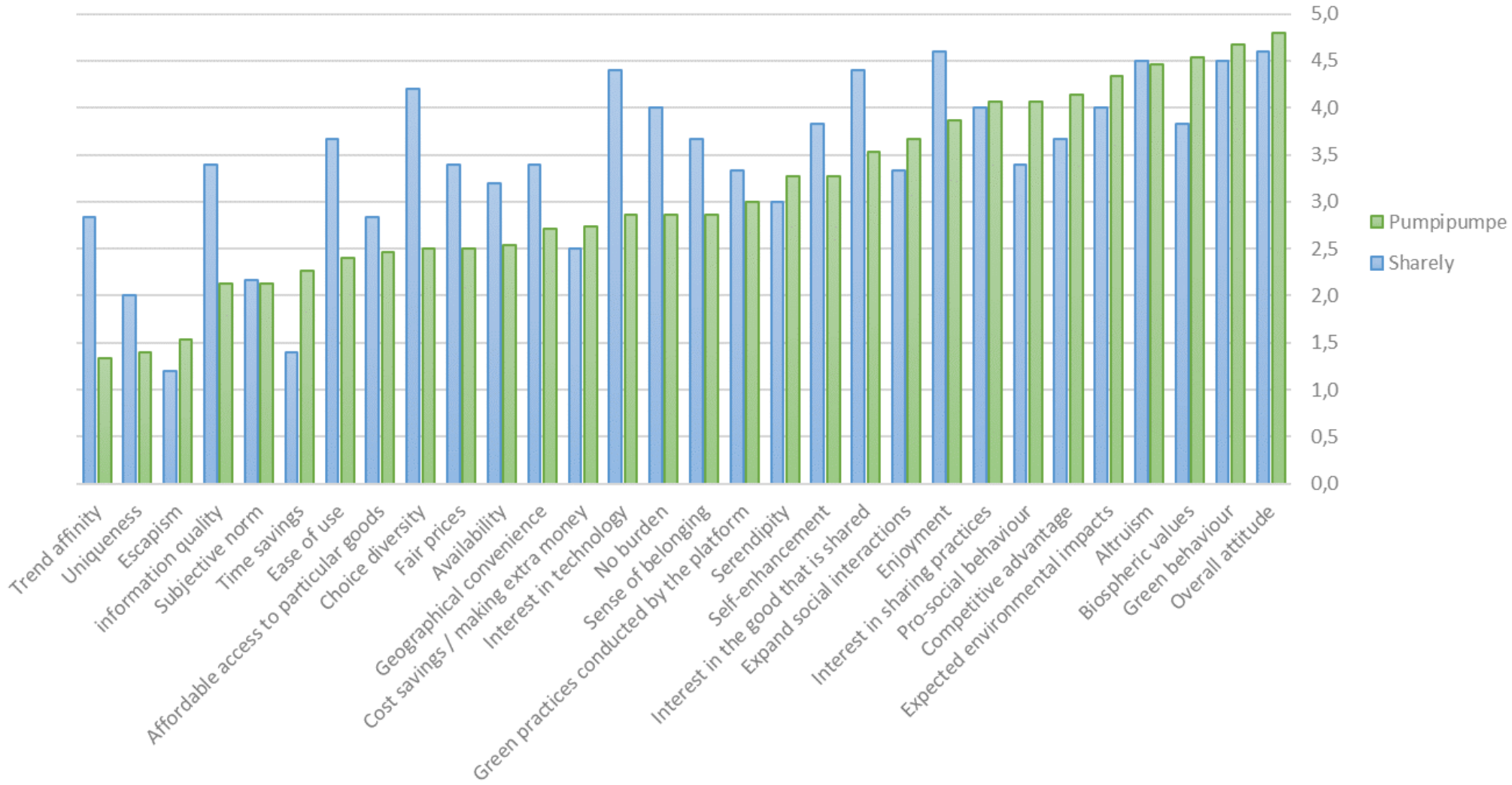
1. Understand both the motivations and the spending activities of sharing platforms' users

2. Estimate the magnitude of potential rebound emanating from re-spending and substitution effects

3. Develop and test positive social change mechanisms to minimize rebound effects of C2C sharing

1. Understand both the motivations and the spending activities of sharing platforms' users

Factors driving the decision to share
(results expressed through a 1-5 Likert scale) – qualitative interviews



3. Develop and test positive social change mechanisms to minimize rebound effects of C2C sharing

- 500 participants from crowd-sourcing platforms
- Diversity in age, gender, education

Behavioral Change Mechanisms

Surface Level

Deep Level

- Motivation
- Capability
- Opportunity

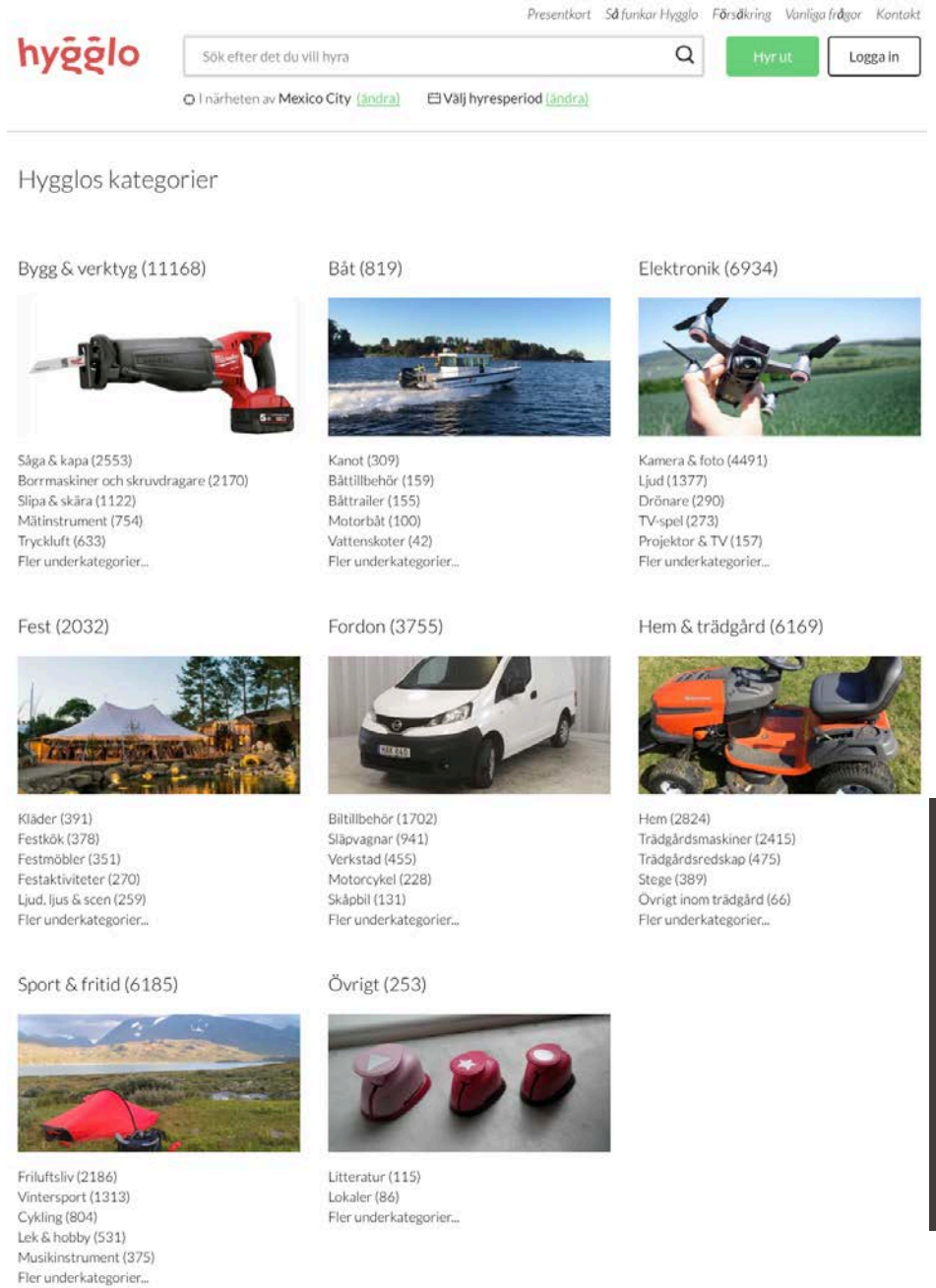
WS 2

1 mechnism each

Online Experiment

- Scenario 1
- Scenario 2
- Scenario 3
- Scenario 4
- Control scenario

Intention to be active in scenario



2. Estimate the magnitude of potential rebound emanating from re-spending and substitution effects

Data from a Swedish consumer-to-consumer online sharing platform

Description of the data (1)

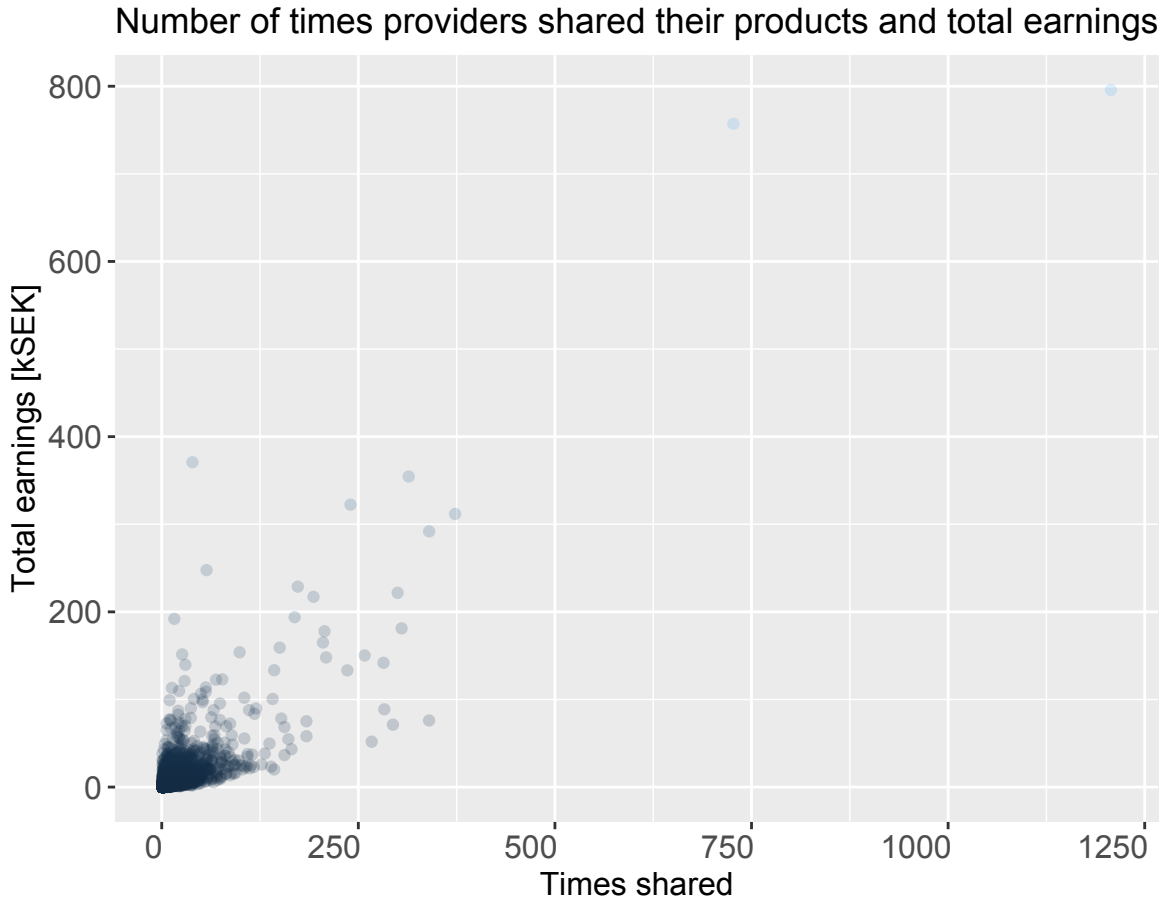
Between August 2016 to December 2019, the platform had 59675 transactions completed, involving 6673 providers, 36645 takers, and 13675 products.

Product	Frequency	Product	Total SEK
Log splitter	290	Motorhome	353211
Utility trailer	253	Cabin boat	230100
Garden tillers	195	Watercraft	222466
Renault clio	176	Mini excavators	190071
Trailer with cover	168	Light truck	187721
Ozone generator	145	Van	172169
Roof box	143	Light truck	144468
Hand trolley	136	Motorhome	143928
Mini excavators	132	Van	141128
Van	128	Van	131100

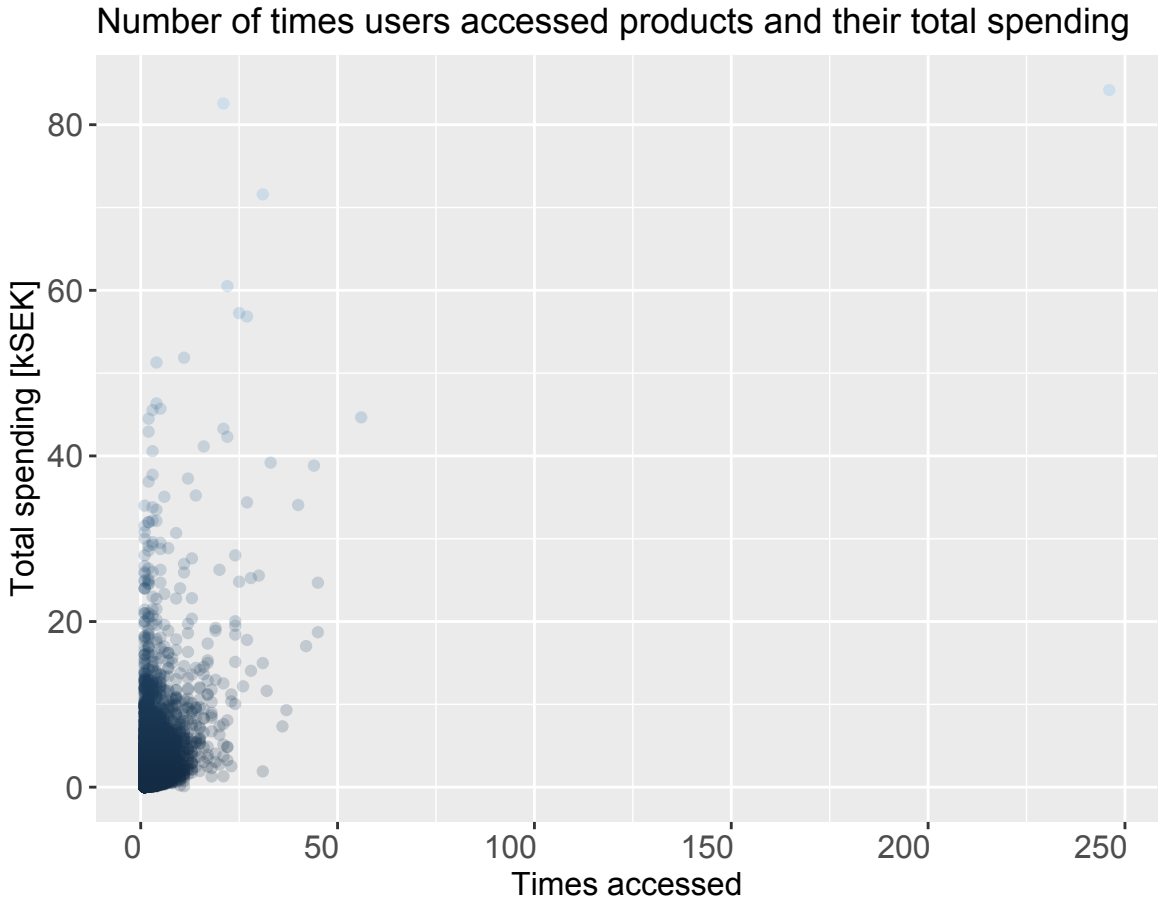
Top 10 most rented products (left) and most profitable products (right).
All transactions sum 38 MSEK.
Note: 1 SEK ~ 0.1 CHF.

Description of the data (2)

a)



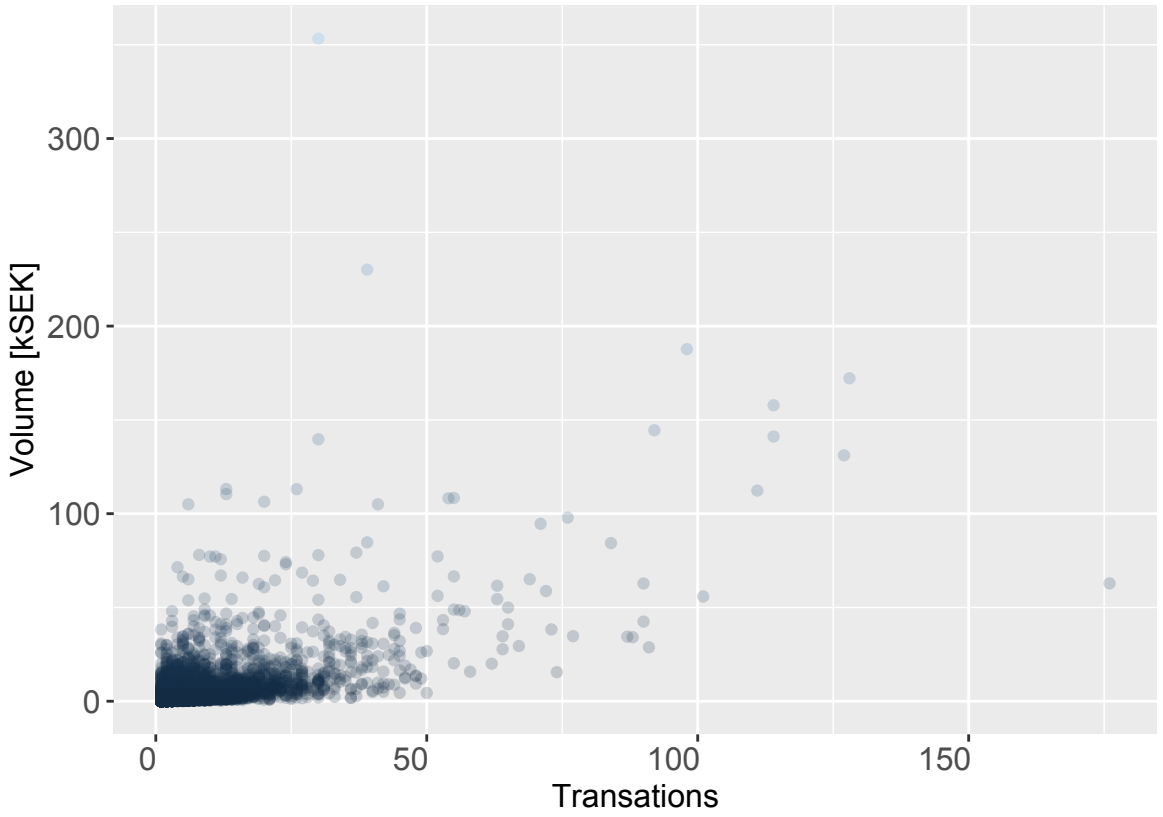
b)



Description of the data (3)

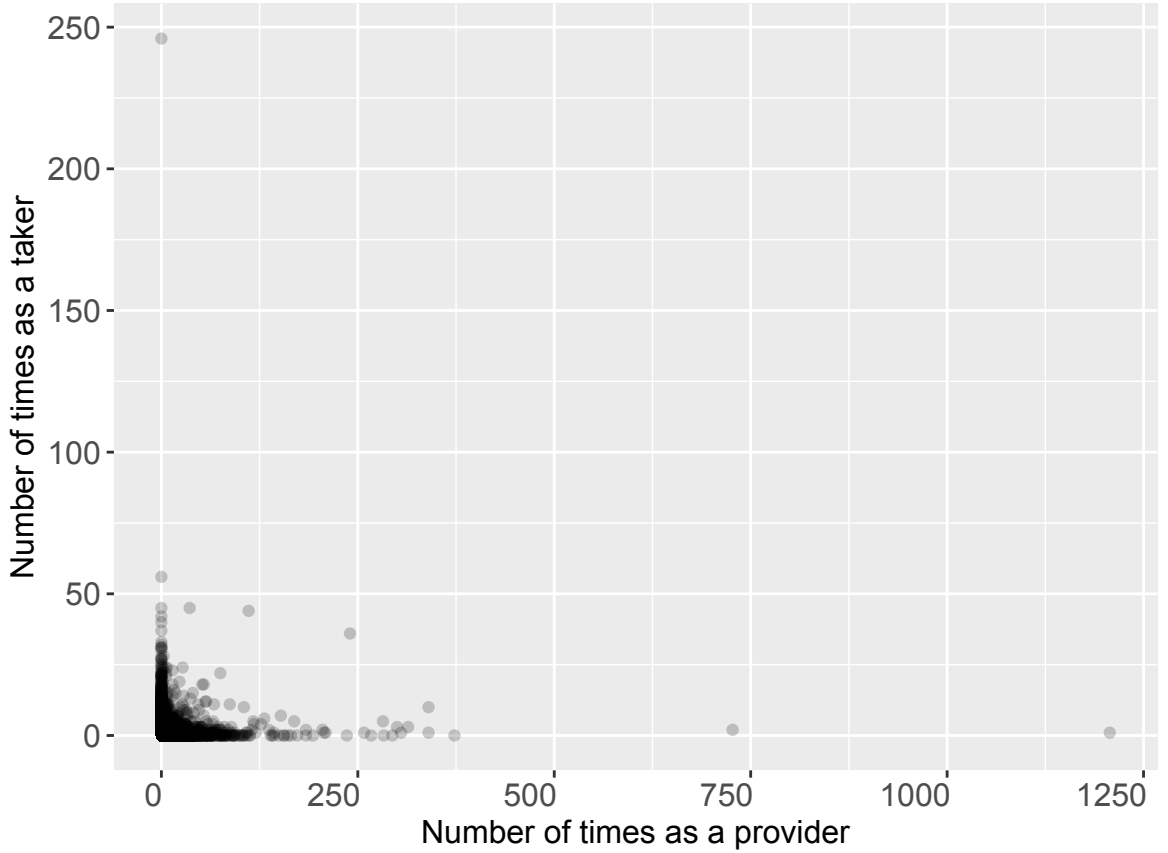
c)

Number of transactions each product had and volume of money they caused



d)

Dual behaviour of users as a provider and a taker



Environmental rebound effects

$$\%ERE = \left(\frac{PS - PE}{PS}\right) * 100$$

PS = potential env. savings of C2C sharing [CO2eq.]

PE = potential env. effects [CO2eq.]

PE = potential env. impact of economic gains (providers) +
potential env. impact of economic savings (takers)

Adapted from:

Makov, T., & Font Vivanco, D. (2018). Does the Circular Economy Grow the Pie? The Case of Rebound Effects From Smartphone Reuse. *Frontiers in Energy Research*, *6*(May), 1–11. https://doi.org/10.3389/fenrg.2018.00039

Warmington-Lundström, J., & Laurenti, R. (2020). Reviewing circular economy rebound effects: The case of online peer-to-peer boat sharing. *Resources, Conservation & Recycling: X*, *5*, 100028. https://doi.org/https://doi.org/10.1016/j.rcrx.2019.100028

Potential env. impact of economic gains (providers)

$$PE_{providers} = \text{Earnings of providers} * CFM_{Sweden}$$

CFM = carbon footprint multiplier (GHG emissions per economic unit)

Carbon footprint multiplier (CFM) for the Swedish consumption (1)

EXIOBASE3 (latest version year 2011) and Pymrio
200 consumption categories

$$CFM_i = \frac{FE_i}{IFE_i}$$

FE_i = Final expenditure by households in a consumption category [M.EUR]

IFE_i = Environmental impact of final expenditure per monetary unit per consumption category [kg CO2eq. per M.EUR]

Stadler, K., Wood, R., Bulavskaya, T., Södersten, C.-J., Simas, M., Schmidt, S., … Tukker, A. (2018). EXIOBASE 3: Developing a Time Series of Detailed Environmentally Extended Multi-Regional Input-Output Tables. *Journal of Industrial Ecology*, *22*(3), 502–515. https://doi.org/10.1111/jiec.12715

Stadler, K. (2015). Pymrio - a Python module for automating input output calculations and generating reports. Adjunct Proceedings of the 29th EnviroInfo and 3rd ICT4S Conference, 235. Retrieved from https://github.com/konstantinstadler/pymrio

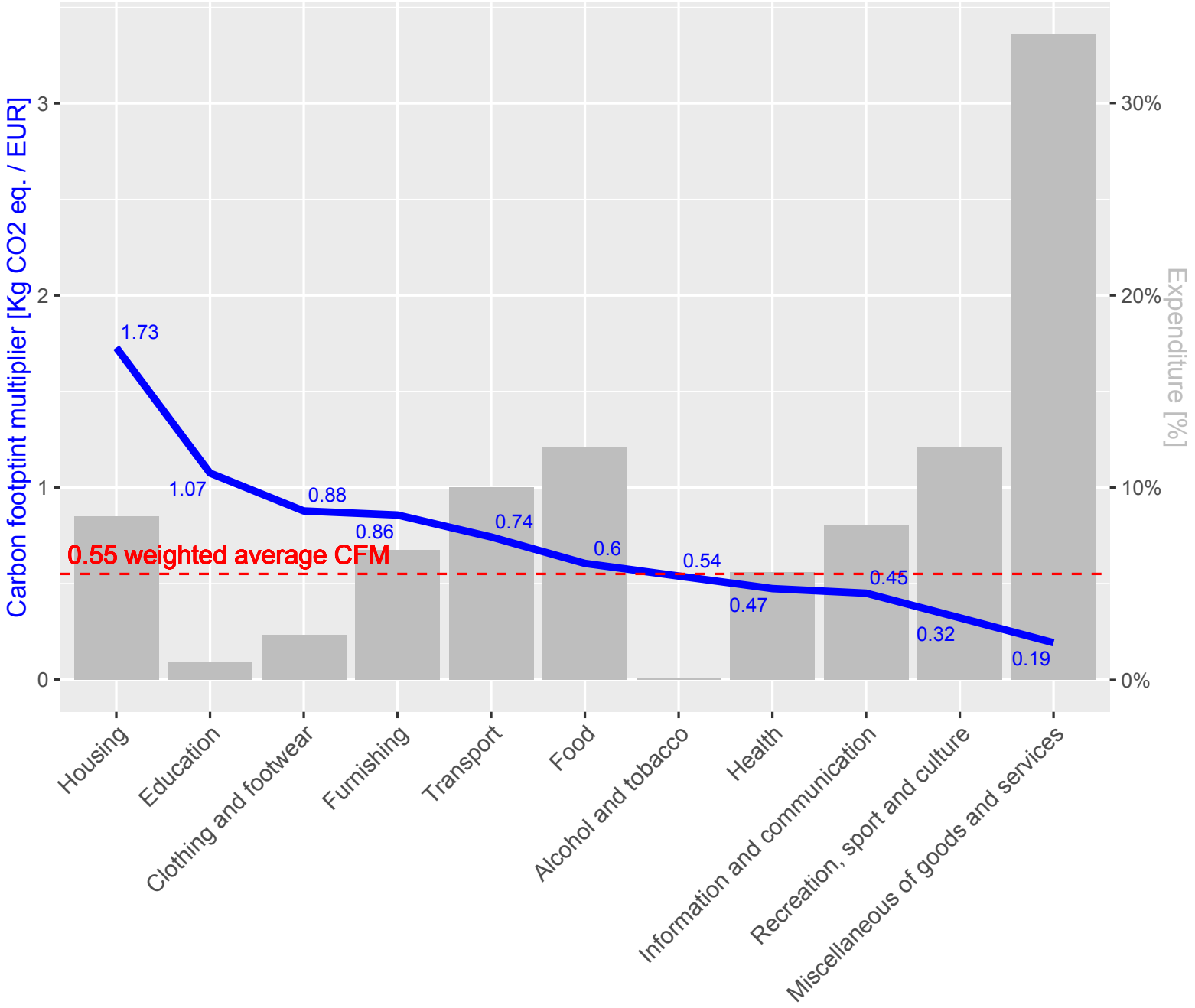
Carbon footprint multiplier (CFM) for the Swedish consumption (2)

200 EXIOBASE3 consumption categories -> 12 COICOP categories

Weighted average CFM for each of the 12 COICOP categories

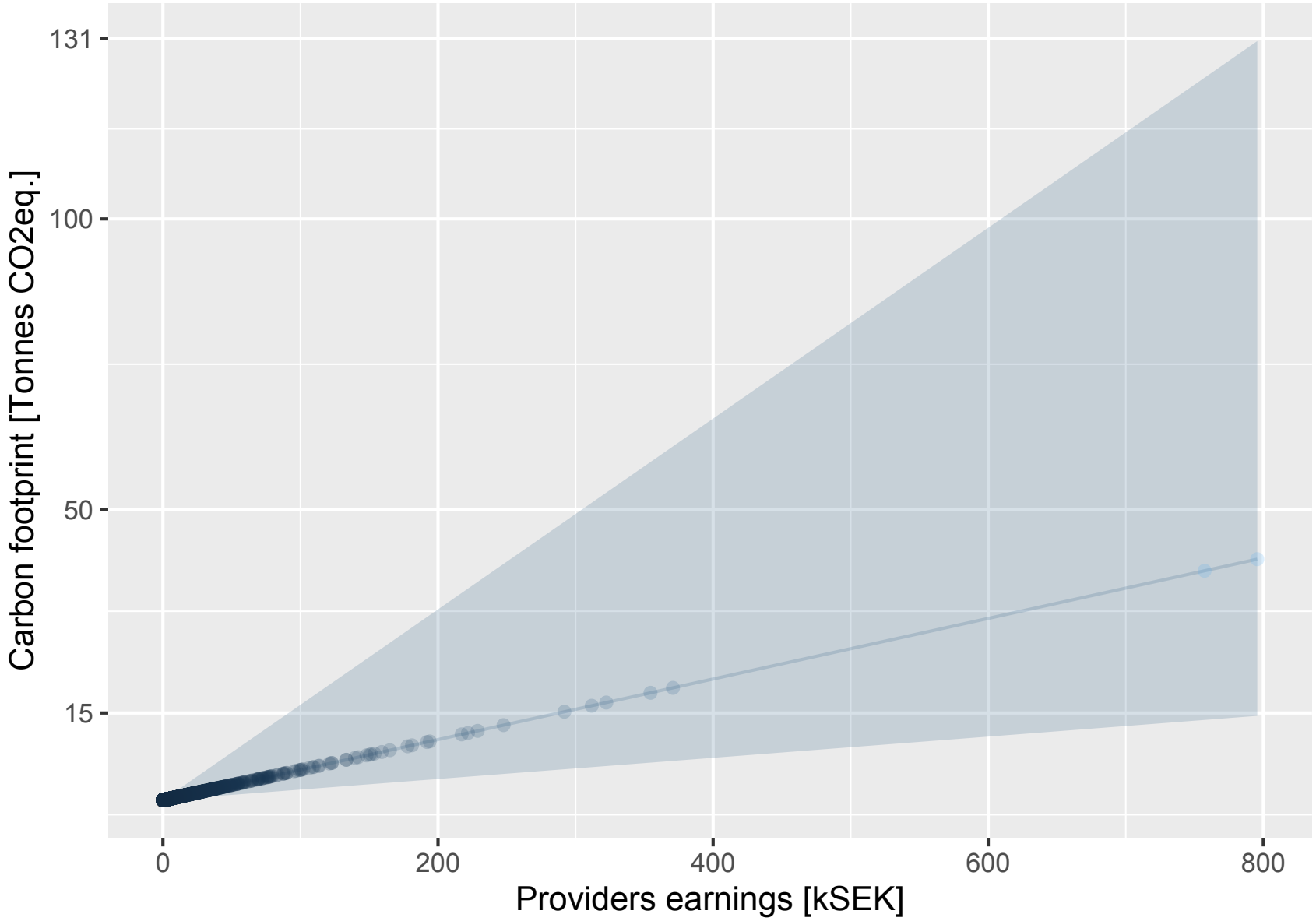
Weighted average CFM for all consumption categories

Carbon footprint multiplier and percentage of expentiture per consumption category



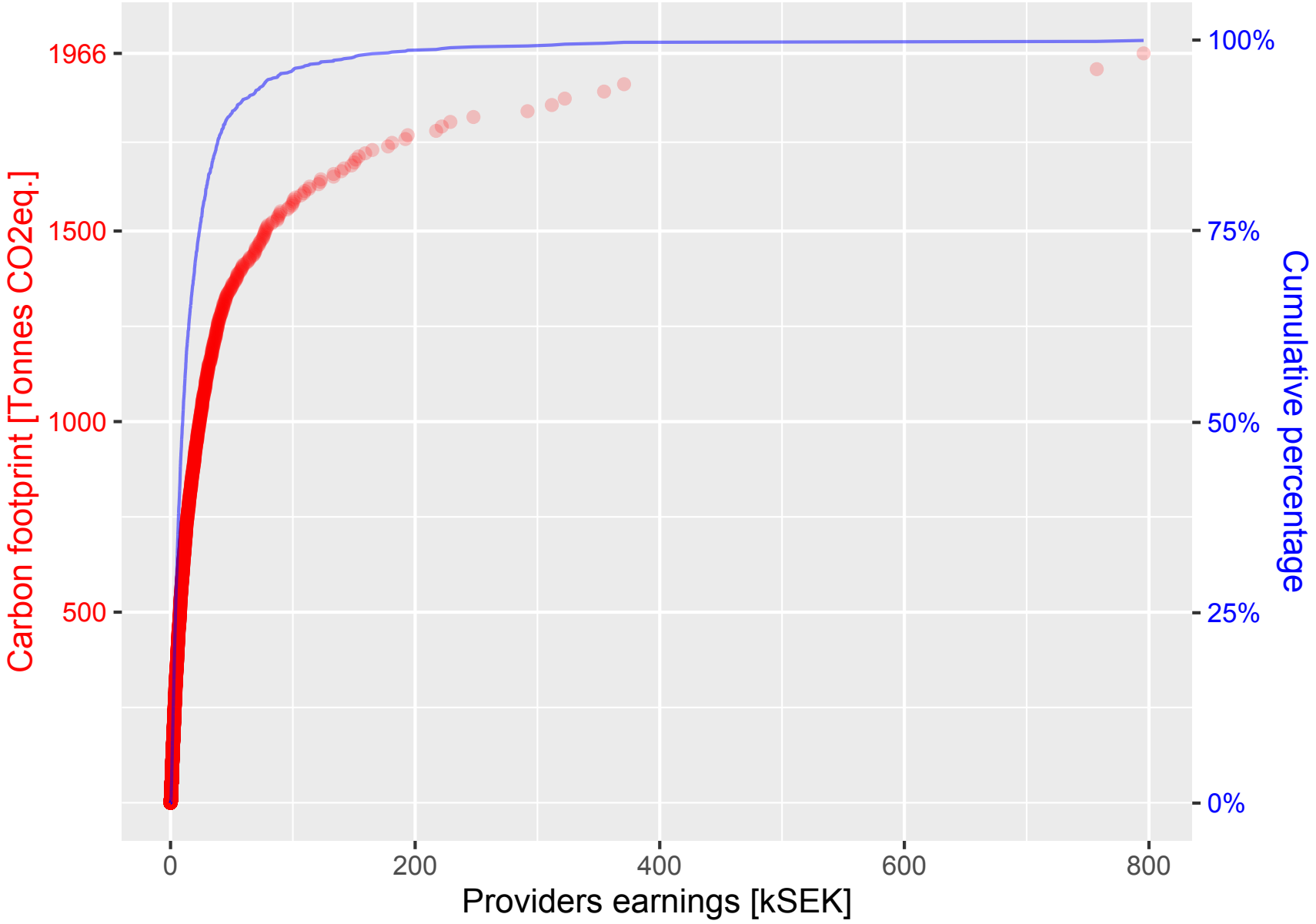
Re-spending effect of providers' earnings

Range of possible carbon footpring



Cumulative impact from providers' earnings

calculated using the weighted avegare carbon footprint multiplier



Reflections and challenges ahead

1. Importance of aggregated effects from a LCA/system perspective

2. Difficulty to precise how people spend marginal earnings (large uncertainty)

3. Challenge of estimating the env. savings from sharing of a very large number of products (+13000)

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Thank you!

rafa@kth.se

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