Exploring Resource Efficiency through Individual Supply Chains

Precision and Accuracy in Analysing the Impacts of Apparel

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Background

Accounting for all impacts along the global supply chain becomes increasingly policy relevant:

- Roadmap to a Resource Efficient Europe vision: **EU** should become an sustainable society which **"respects resource constraints and planetary boundaries"**
- Government and the Riksdag of **Sweden** aims to **solve environmental issues** in Sweden "**without increasing environmental** and health **problems beyond Swedens borders**"

EXIOBASE

- EE MRIOs allow to account for the impacts along the global supply chain
- EU fp7 project DESIRE aims to further advance the existing EXIOBASE MRIO
- Currently 48 countries/regions and 200 products
- Is is possible to **simplify the system** for the analysis **by merging regions/countries**?

Current state

Previous studies:

- Andrew et al. 2009. Approximation and Regional Aggregation in MRIO Analysis for National Carbon Footprint Accounting.
- Su et al. 2010. Input output analysis of CO 2 emissions embodied in trade: The effects of spatial aggregation.
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But mostly restricted to:

- Effects of spatial aggregation on the total country footprints
- GHG emissions (water in case of Bouwmeester et al 2013)

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- Effects of spatial aggregation on the total country footprints
- GHG emissions (water in case of Bouwmeester et al 2013)
- Bouwmeester at al:
  - a **"carefully designed spatial aggregation"** can be utilised for a **carbon footprint analysis**
  - shifting the focus to the embodied **water use**, aggregation led to to a **significant underestimation**

Hypothesis

A “true” aggregation (to 2 to 3 regions) which can be used for

1. various impact analysis (carbon, land, water, ...)
2. the analysis of country footprints
3. impact assessment of specific products

can not be found.

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Structure: Investigating EU footprint variation due to spatial aggregation:

1. total footprints of the EU
2. apparel sector footprint of the EU
3. variation in all sectors of the EU

Testing framework

Impacts / accounts (EXIOBASE 2.2 - base year 2007):

1. Global Warming (GWP100)
2. Domestic Extraction (Materials)
3. Water Consumption Blue - Total
4. Land Use
5. Employment
6. Employment: Low-skilled

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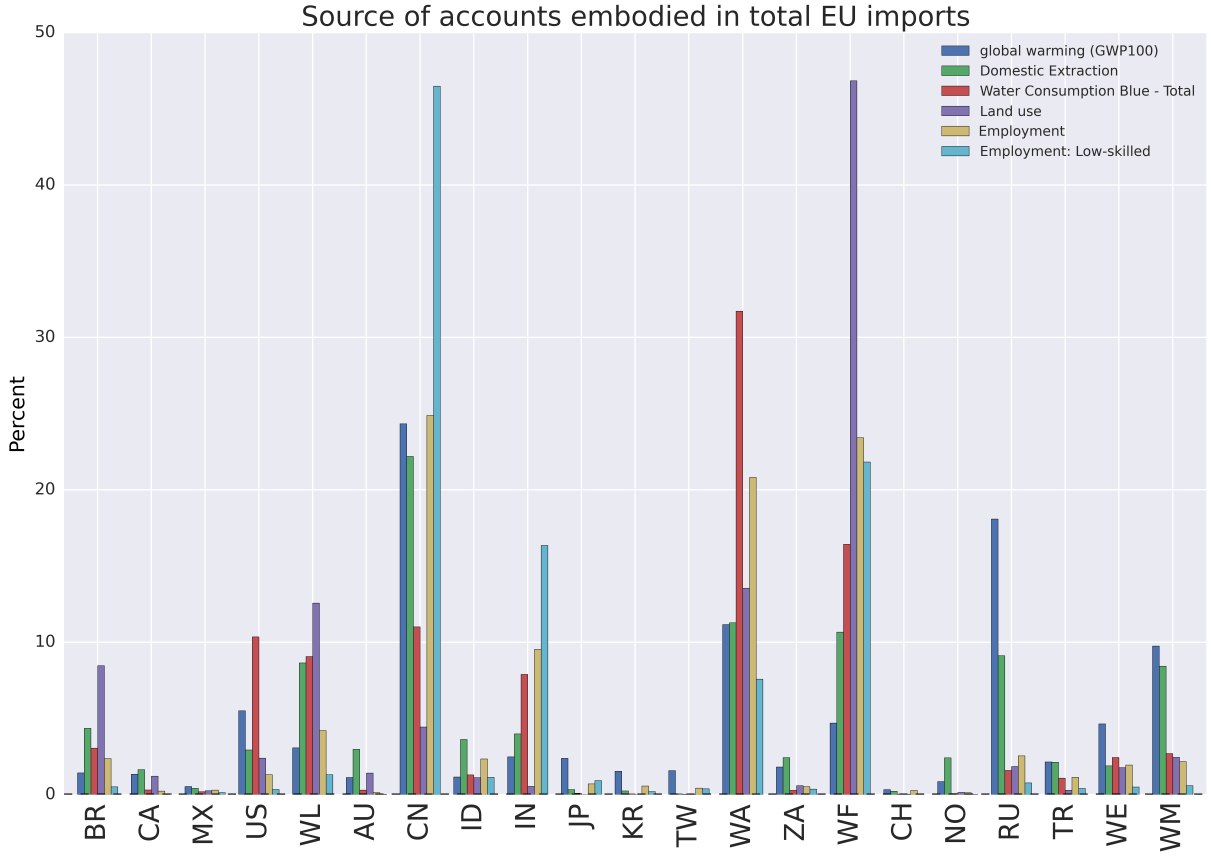
Tested aggregation levels:

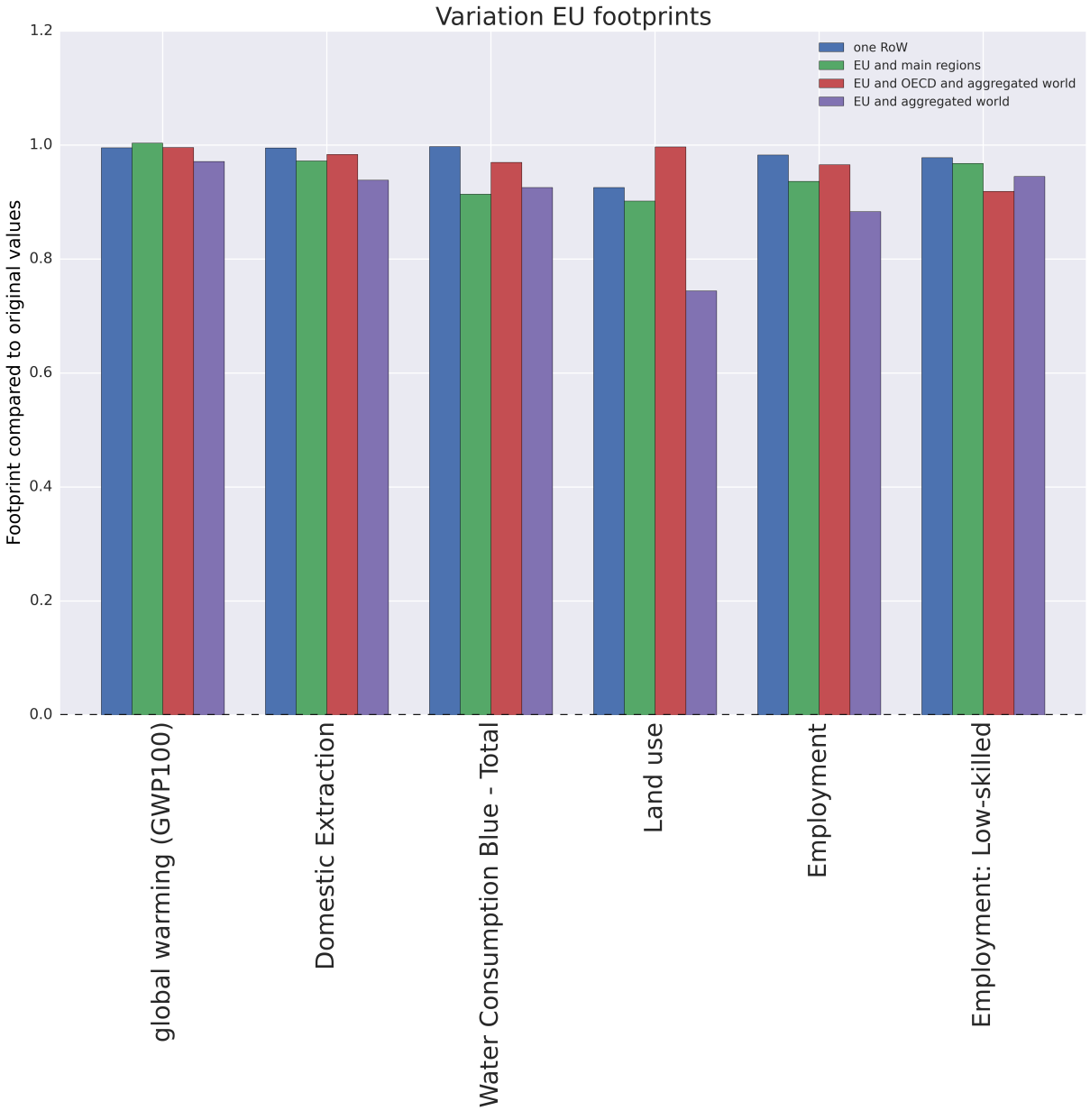
1. Five RoW regions aggregated to one
2. EU, aggregated continents
3. EU, Rest of OECD, Rest of the World
4. EU and the Rest of the World

EU original results

Account	Territorial	Footprint	Footprint per cap	Unit
Global Warming (GWP100)	5.1e+12	7.22e+12	1.45e+04	kg CO2 eq
Domestic Extraction	7.19e+06	1.33e+07	0.0268	kt
Water Consumption Blue - Total	9.47e+04	2.38e+05	0.000478	Mm3
Land use	3.37e+06	1.38e+07	0.0278	km2
Employment	2.26e+05	4.17e+05	0.000839	1000 p
Employment: Low-skilled	2.39e+04	9.89e+04	0.000199	1000 p



Variation in total EU footprints

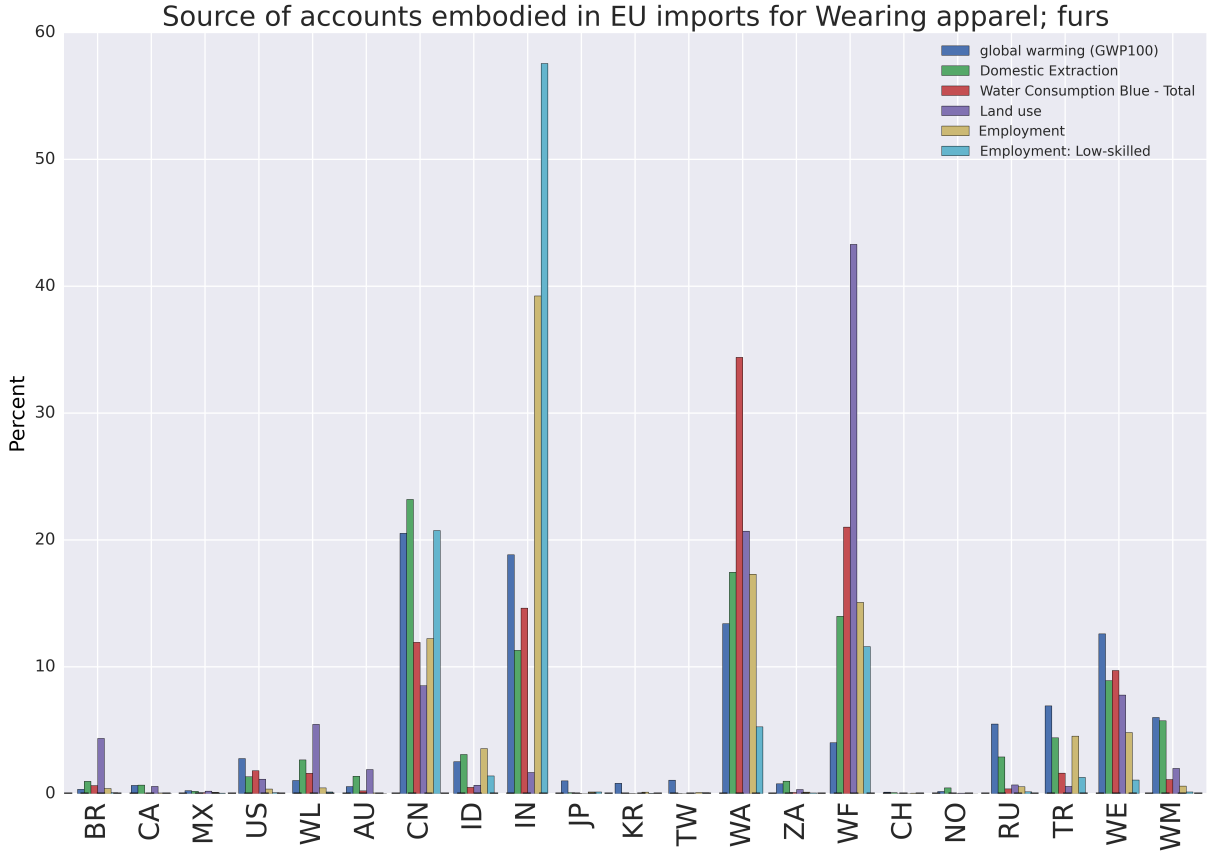


Sector variation: Apparel

- significant increase in the last years
  - increased affluence
  - outsourcing
- particular complex supply chain
- often problematic working conditions

The apparel sector in the EU

account	Territorial	Footprint	Unit
Global Warming (GWP100)	2.35e+09	7.2e+10	kg CO2 eq
Domestic Extraction	0	1.34e+05	kt
Water Consumption Blue - Total	119	3.83e+03	Mm3
Land use	0	1.68e+05	km2
Employment	1.6e+03	1.19e+04	1000 p.
Employment: Low-skilled	141	4.3e+03	1000 p



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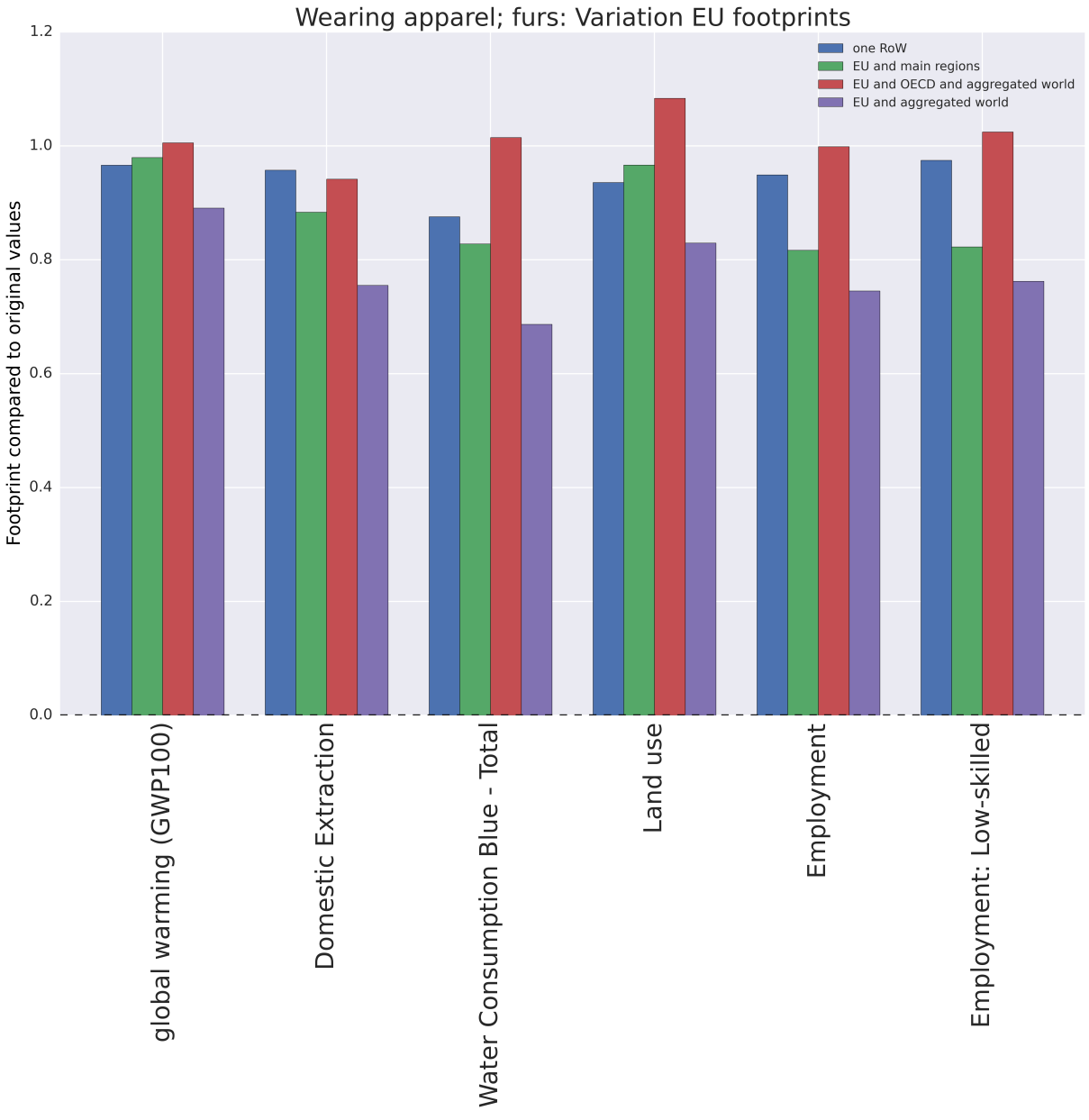

Variation in apparel footprints

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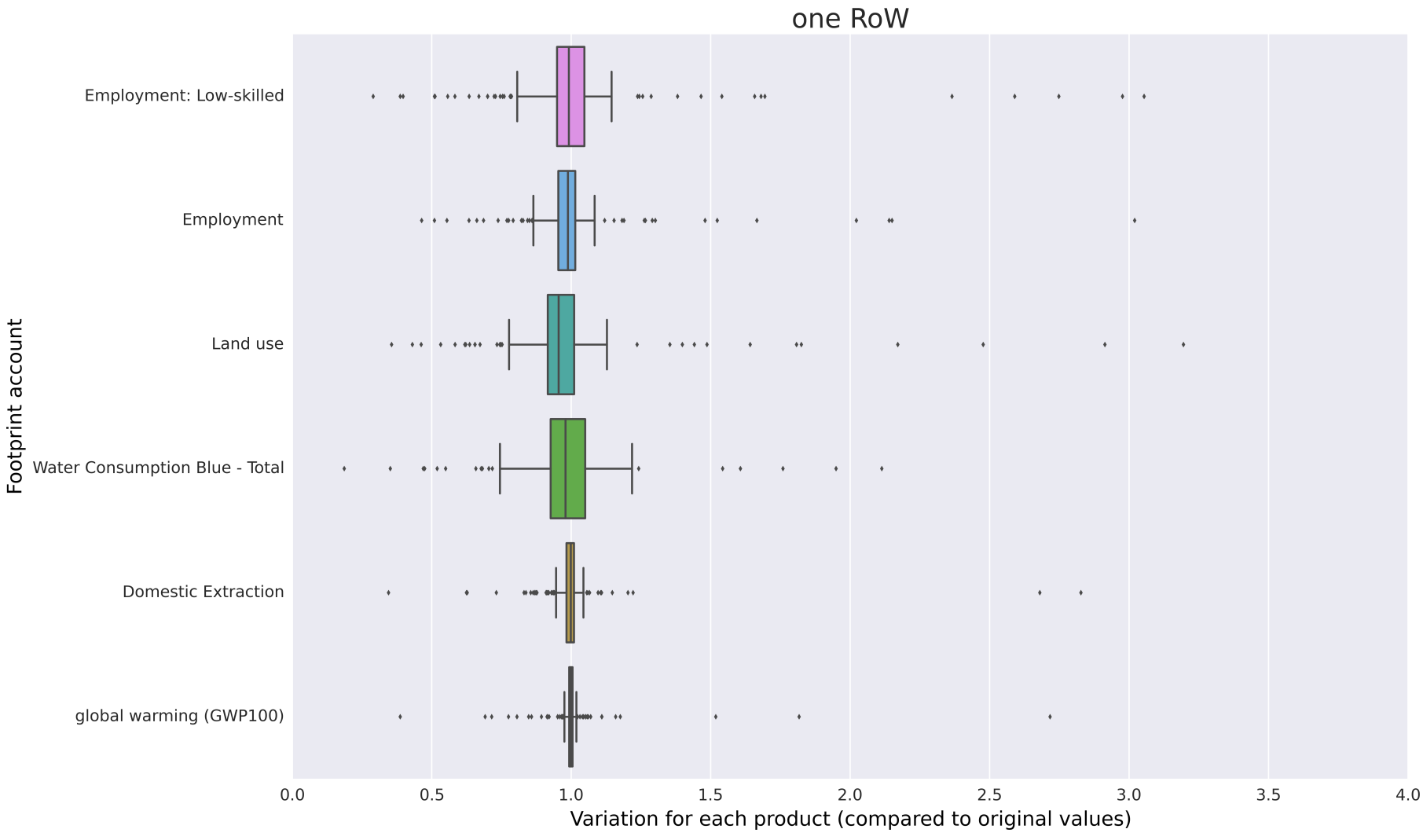
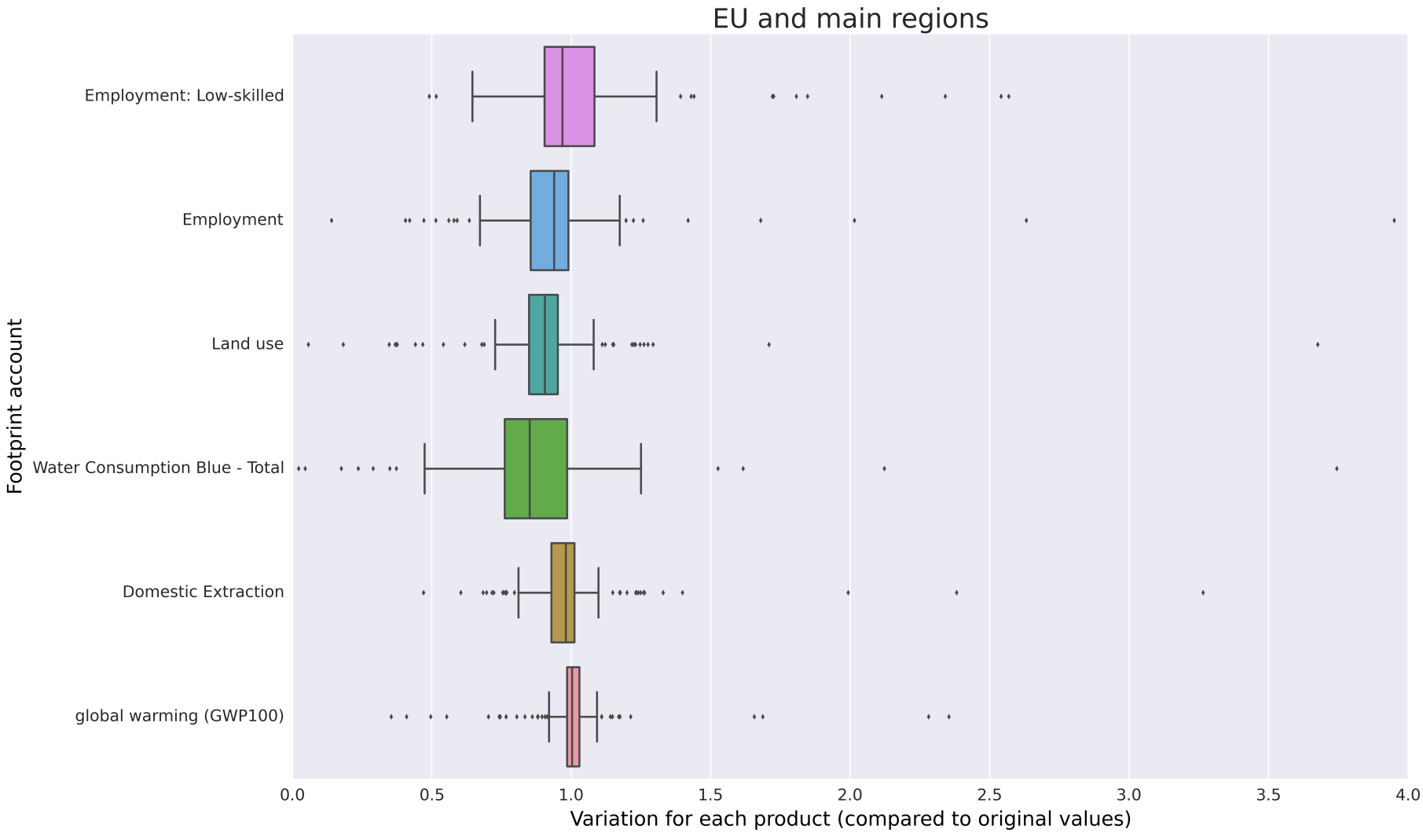
- Huge variation for the analysis of the apparel sector
- Is that specific to that sector?

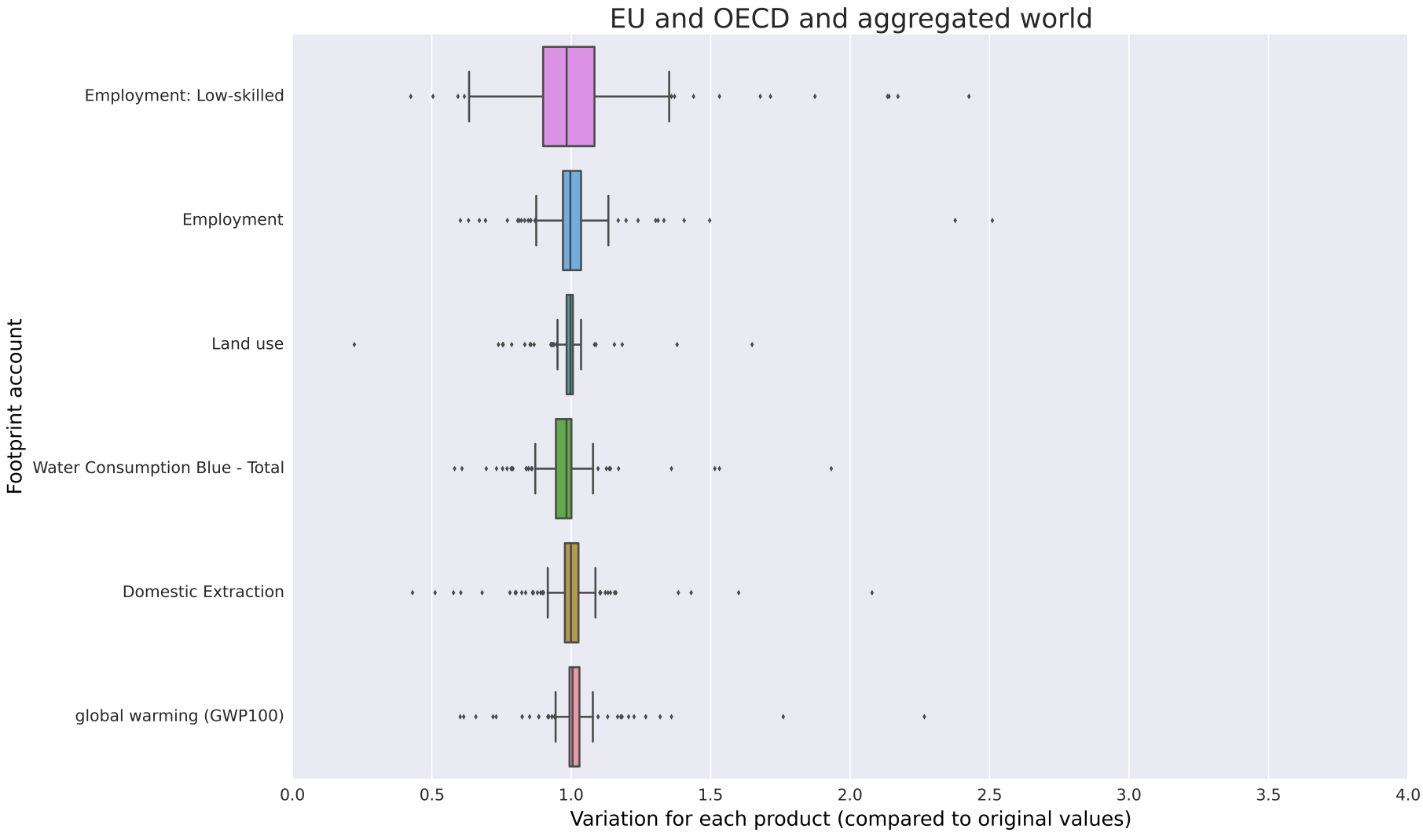
Overall product variations - own RoW



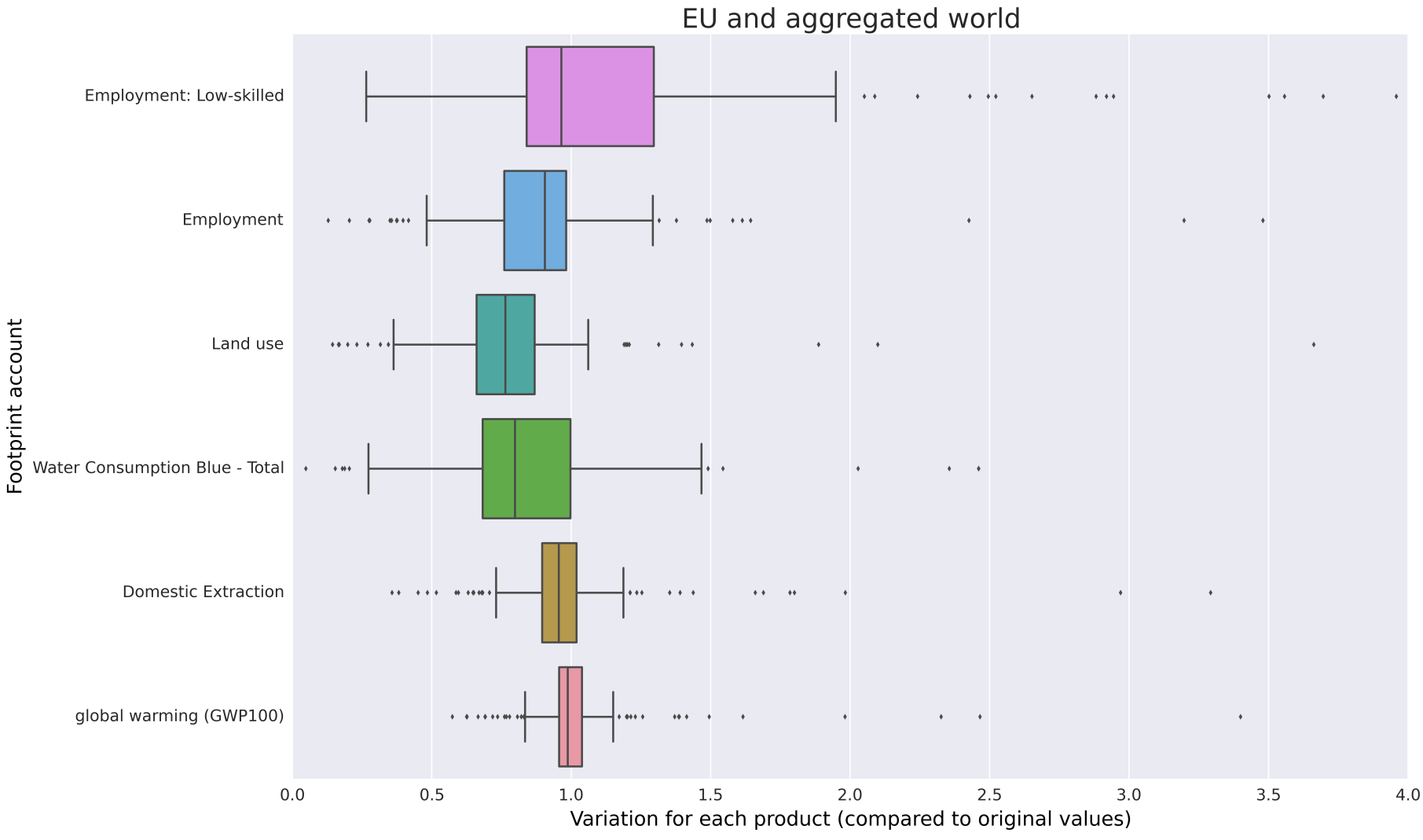
Overall product variations - main regions



Overall product variations - EU, OECD, RoW



Overall product variations - EU and one region



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- perhaps more impacts

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