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Penny for your Impact.

Uncertainty from economic allocation in LCA

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Allocation

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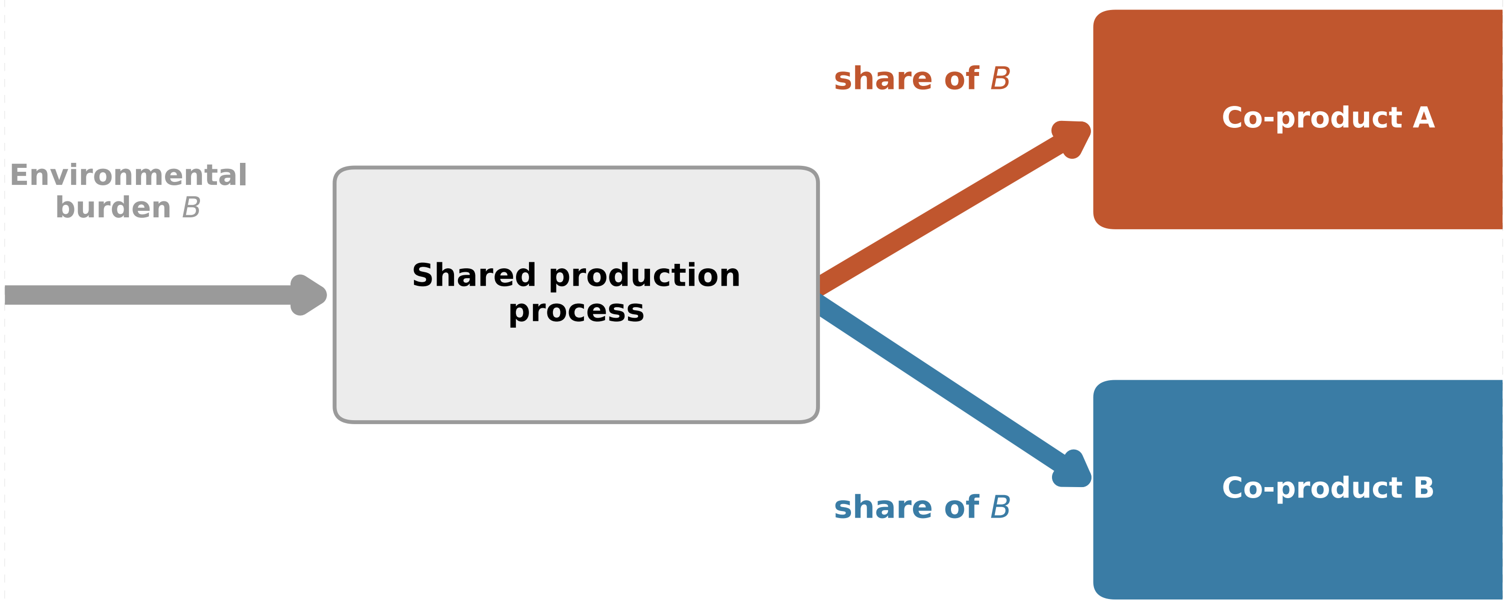
Allocation: your guaranteed discussion starter

Shares can be determined by:

- Physical properties (mass, energy content, ...)
- Economic value
- Causality (binary)

Can be avoided:

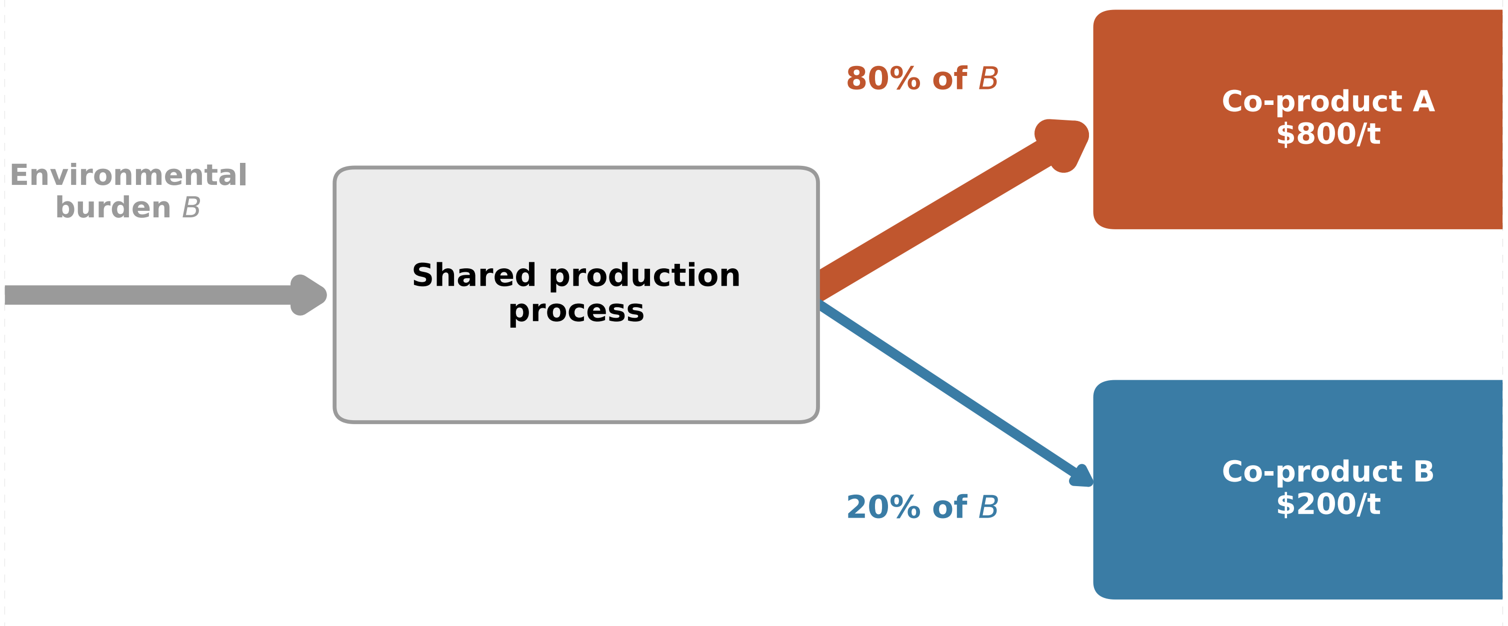
- e.g. system expansion



Economic Allocation

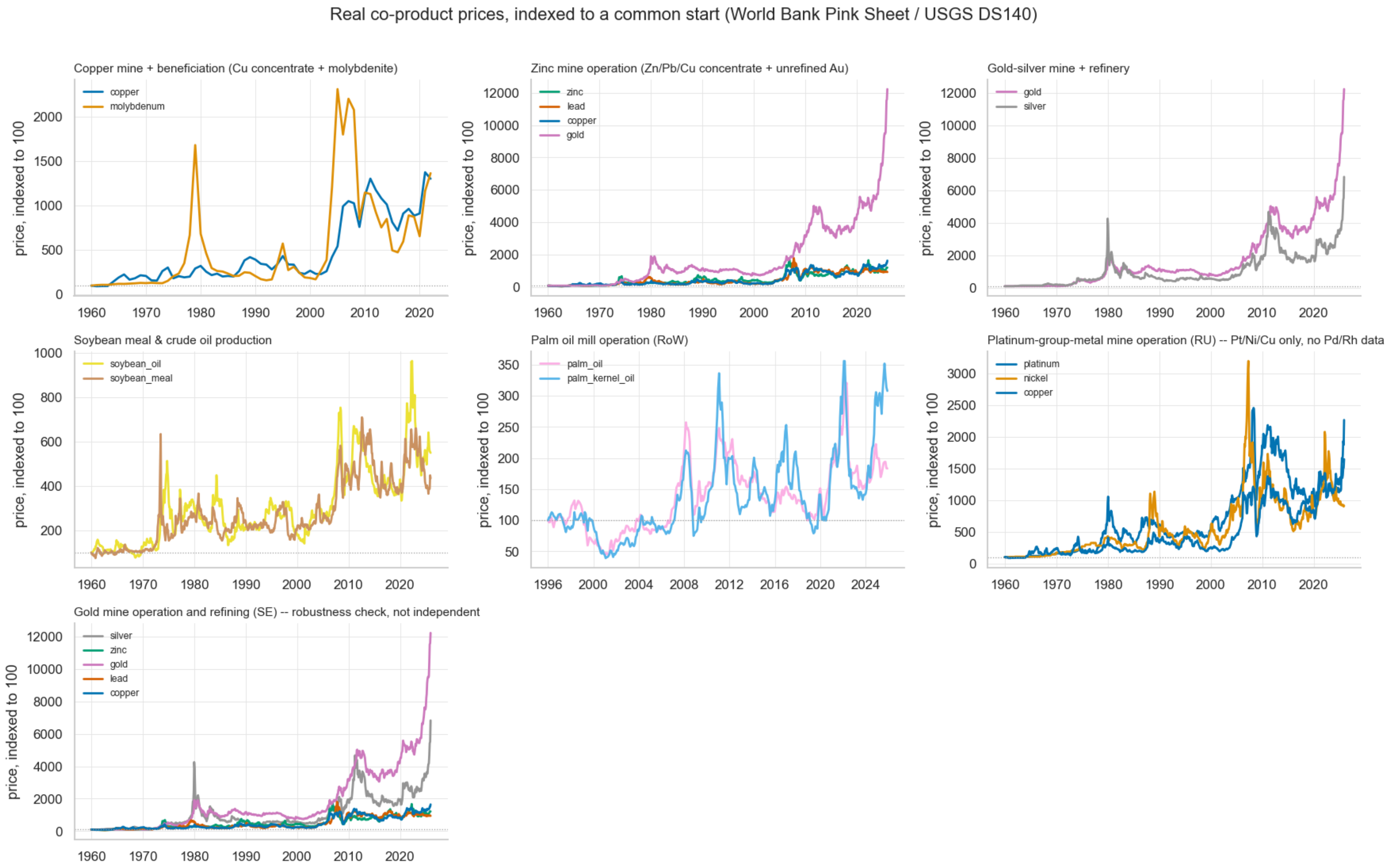
Critics: prices aren’t physical; allocation shouldn’t depend on markets.

Proponents: prices can capture real economic drivers and product functionality that mass/energy allocation misses.



Economic Allocation Uncertainty

- Prices are variable
- Markets for co-products can move semi-independently
- Leads to allocation share uncertainty
- Relevant uncertainty?



Can we quantify the uncertainty due to economic allocation.

Method pipeline

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Identify co-products

Find ecoinvent activities allocated by price. (502 activities, 1221 coproducts in v3.10)

Method pipeline

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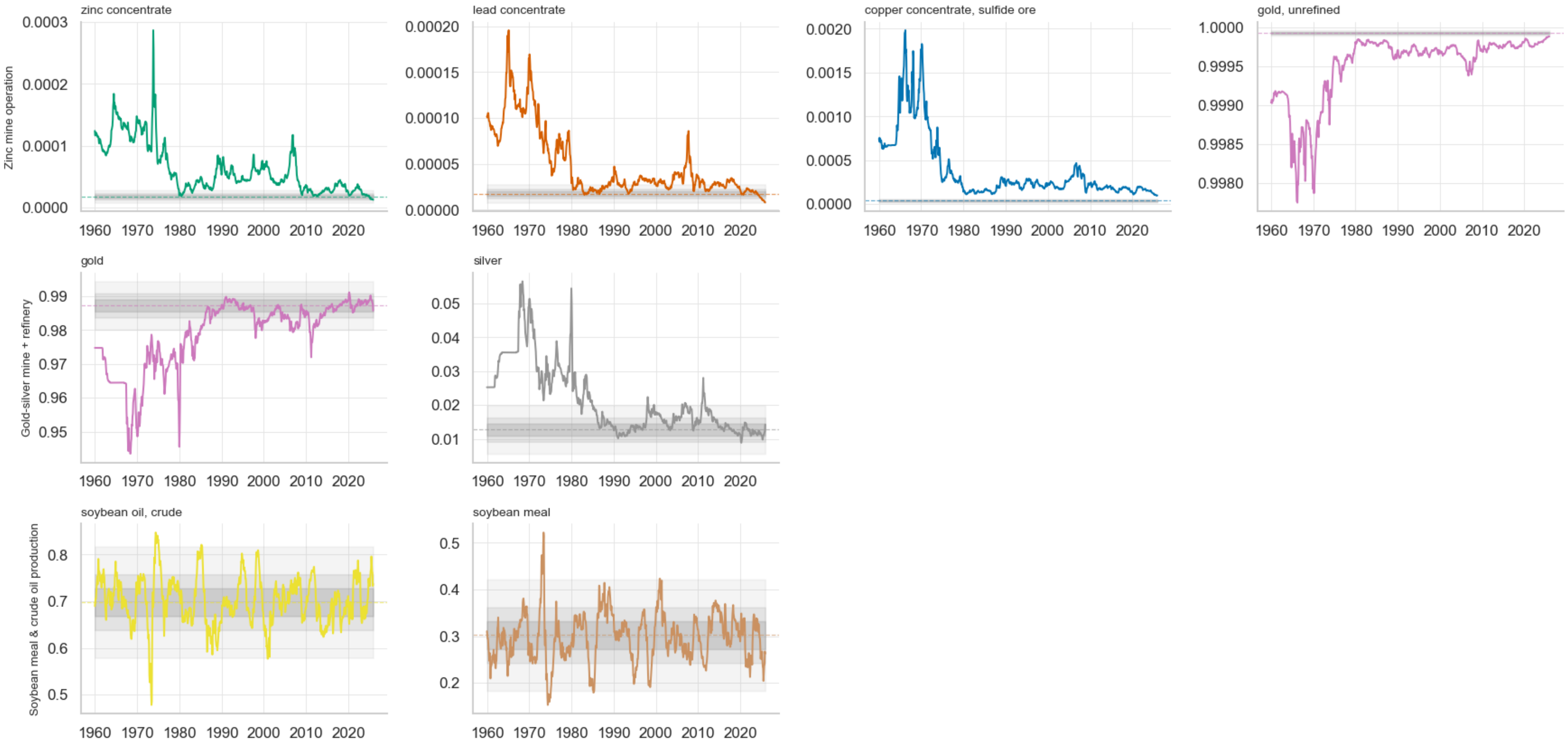
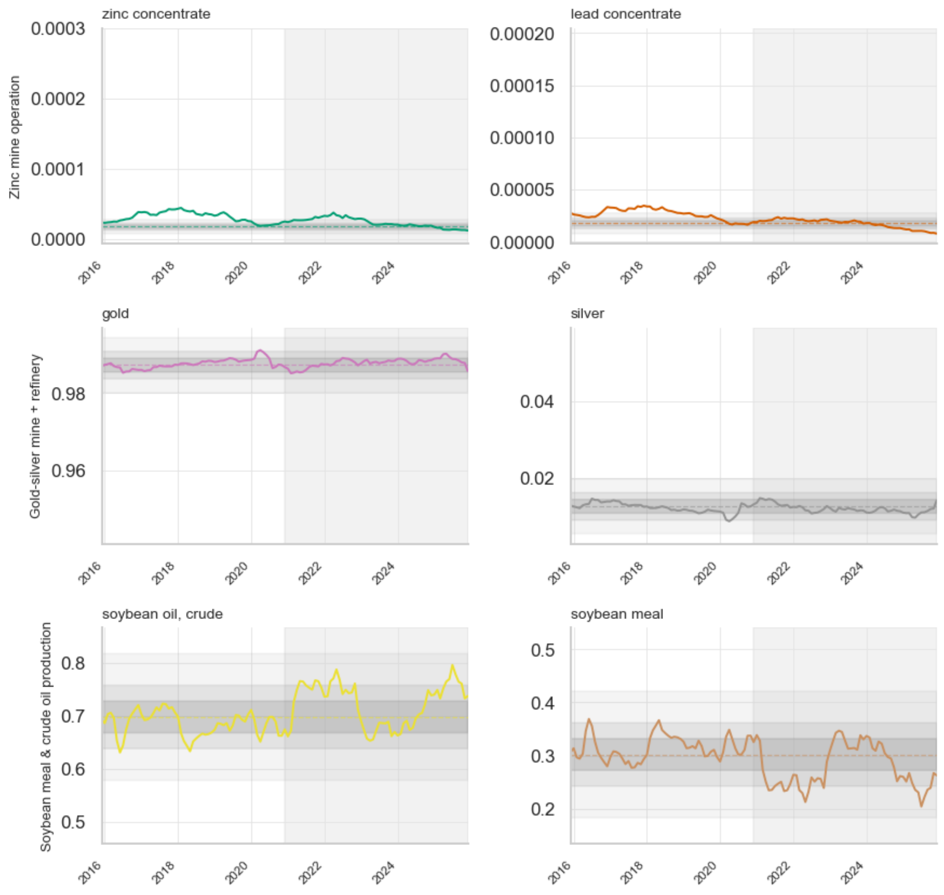
1. **Identify co-products**
   Find ecoinvent activities allocated by price. (502 activities, 1221 coproducts in v3.10)
2. **Validate price variance**
   Compare real historic commodity price dispersion against the assumed 10/20/40% SD
3. **Perturb prices**
   Resample allocation-shares with maxent_disaggregation for correlated sampling. Use global price variance.
4. **Inject into Brightway MC**
   Rescale exchanges and inject as custom datapackage, using sequential sampling
5. **Analyse results**
   Compare allocation-driven uncertainty against other uncertainty sources

What is a realistic price ratio variability



What is a realistic price ratio variability



- No good general answer, even in limited data (mining, agriculture)
- Between 10-20% reasonable based on real world data examples.
- Run 10%,20%,40% to show the range of possible impact

Uncertainty is non-negligible

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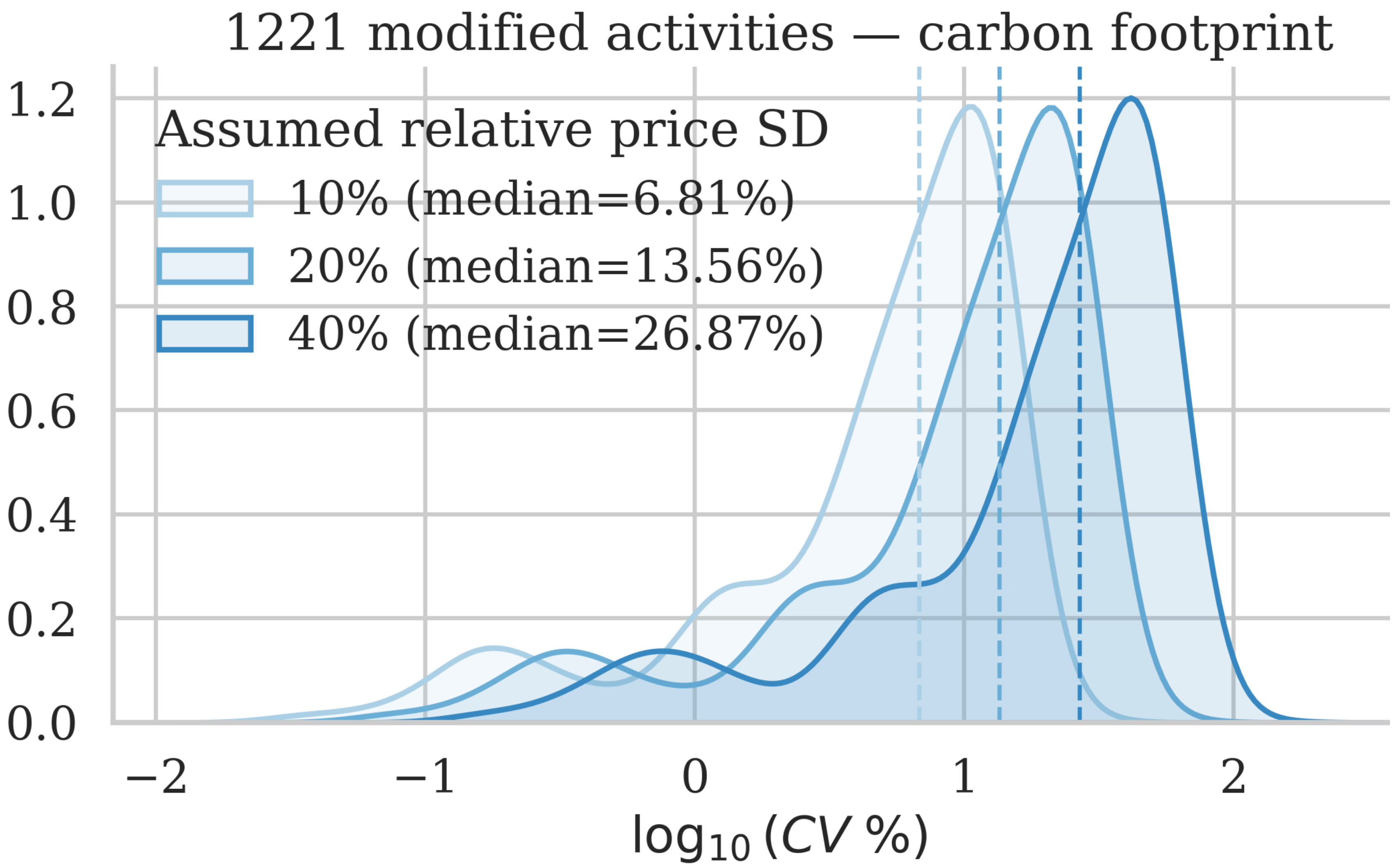
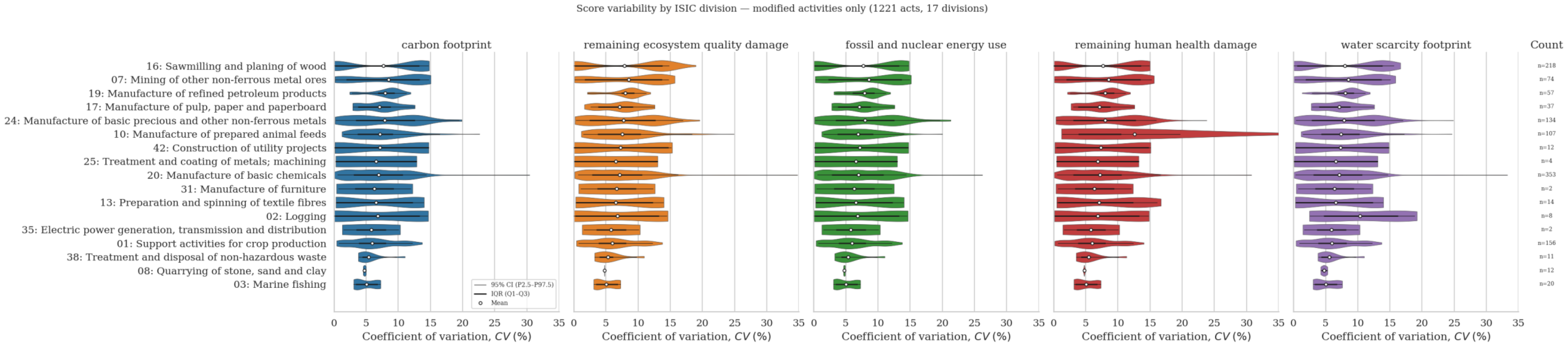
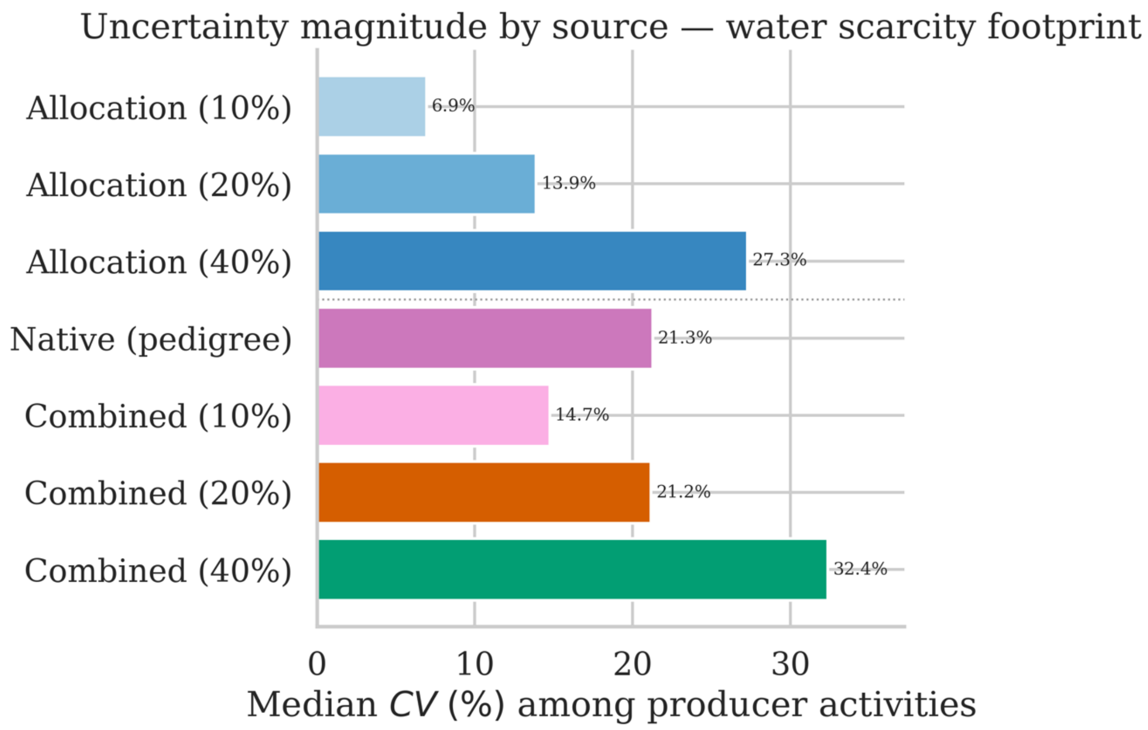
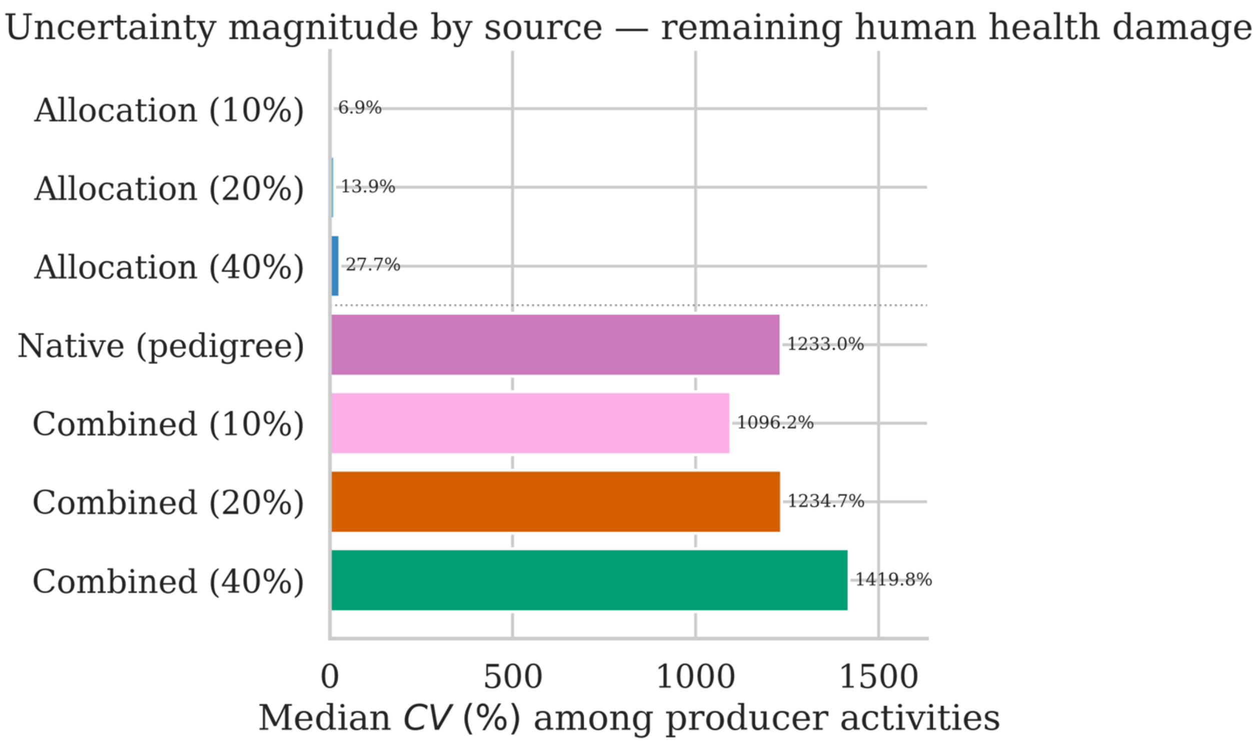


Not homogeneously spread but no significant clustering



How does it compare?





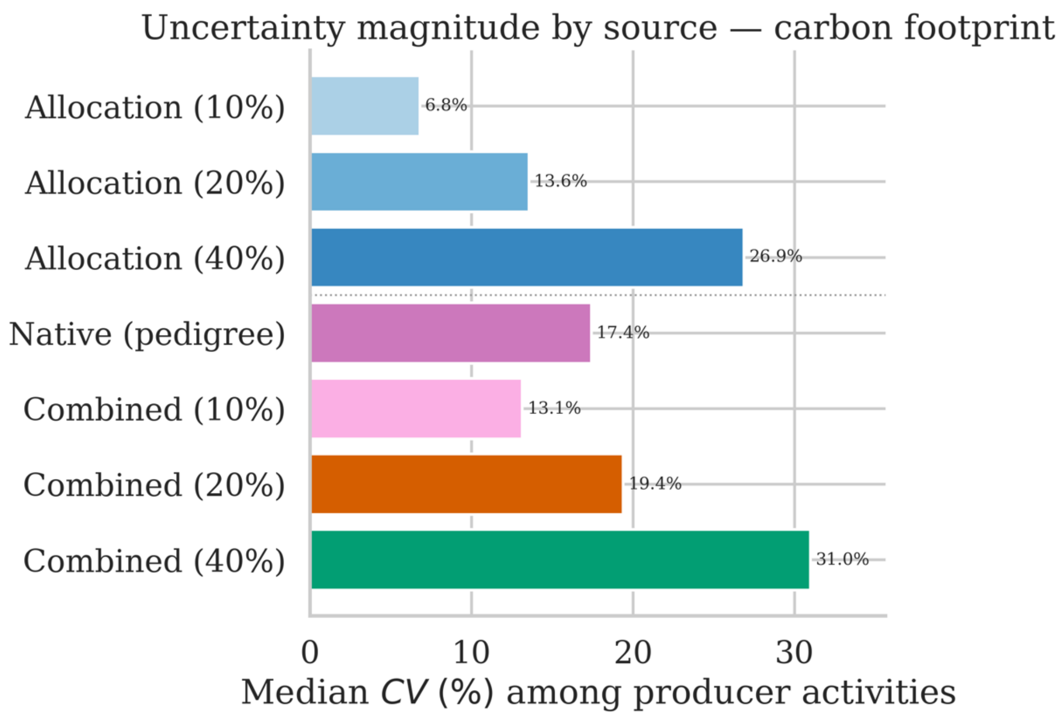
Limitations & Outlook

- Price variance calibrated on limited sample of real-world data
- Uniform price variance despite evidence that it varies by activity

- Literature comparison to allocation method choice
- Case study to investigate real-world relevance

Take away

Price-driven allocation uncertainty is real, comparable to “standard” LCA uncertainty.



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