Optimal Carbon Policy from Supply Chain Analysis

Robbie Andrew

Glen Peters

CICERO Senter for klimaforskning www.cicero.uio.no
Center for International Climate and Environmental Research - Oslo

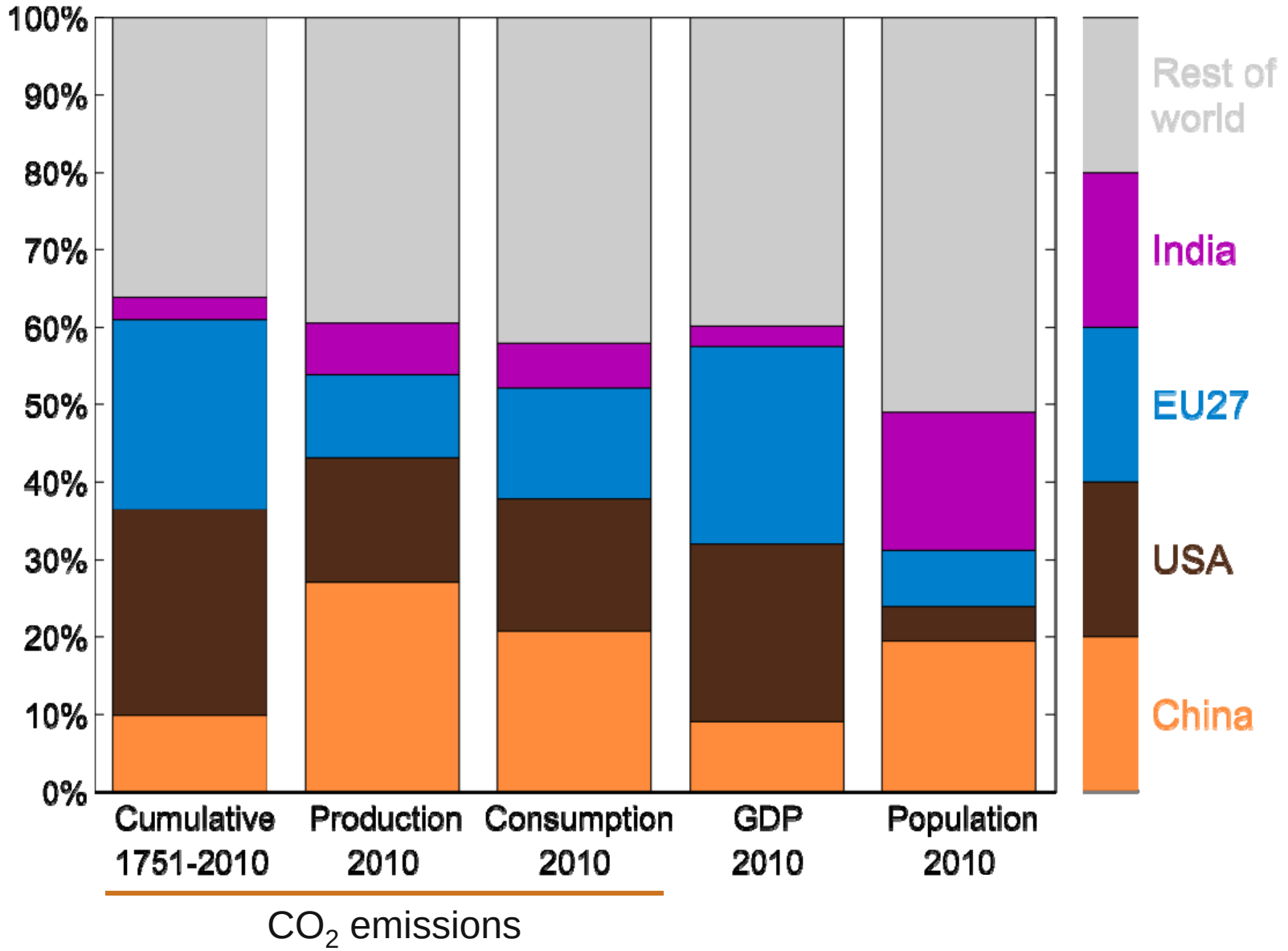
Common but differentiated

- The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof.

Common but differentiated

- (Almost) Everyone has a responsibility, but how do we divide it up?
- Responsibility
  - Causality, blame, acceptance
- Benefit
  - Development, employment, income, poverty reduction

See also: Caney, S. 2009. Justice and the distribution of greenhouse gas emissions. Journal of Global Ethics, 5 125–146.


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cumulative 1751-2010
Production 2010
Consumption 2010
GDP 2010
Population 2010
Rest of world
India
EU27
USA
China
CO_2 emissions

Consumption accounting

- Start with territorial
- Add emissions embodied in imports
- Subtract emissions embodied in exports

Border Carbon Adjustments

- Intended to
  - Protect domestic industry (competitiveness)
  - Increase coverage of carbon regulation
  - Reduce carbon leakage
- A BCA applies
  - Domestic carbon regulation
  - Tariffs to imports
  - Rebates to exports
- Mixed results from economic modelling research

Border Carbon Adjustments

- Would they cause prices to rise?
  - Probably, but that's kind of the point. Price the externality (remove the distortion), let the market figure out a new optimum.
- Would they cause welfare/job loss in the developing world?
  - Not necessarily in net. There's nothing to stop (say) China from imposing and collecting the tax itself and choosing what to do with the revenue.

Aviation in the EU-ETS

- “Incoming flights can be exempted from the EU ETS if the EU recognises that the country of origin is taking measures to limit aviation emissions from departing flights.”
- Strong protests
- Compatible with international law
  - European Court of Justice
- On hold: ICAO trying again

Turtles and Shrimps (1998)

- a ban on shrimp imports from countries not certified by the United States as having adopted “a regulatory program governing the incidental taking of ... sea turtles ... that is comparable to that of the United States.”
- *The Appellate Body’s specific complaint is that the United States applies this import ban … even though many of these countries “may be differently situated.” It is this particular aspect of the “coercive effect” of the application of section 609 that disturbs the Appellate Body.*
- After the US offered to provide technical support to the appealing countries, the WTO upheld the import ban

Chang, H. 2000. Toward a Greener Gatt: Environmental Trade Measures and the Shrimp-turtle Case. Southern California Law Review, 74 31–47.

Case study: Meat and Clothing

- GHG emissions and value-added
- Three consuming countries
  - France
  - Norway
  - United Kingdom

Meat production and trade

	Production	Import	Export	$\frac{\text{Import}}{\text{Consumption}}$
World	284925	36110	39070	13%
EU	43700	15504	16264	37%
France	5475	1576	1554	29%
Norway	320	16	4	5%
UK	3535	2415	695	46%

(thousand tonnes; FAOSTAT)

Clothing and trade

- Clothing manufacture often springboard for development
  - Low fixed costs, emphasis on labour-intensity
- Significant employment
  - India: 10m cotton farmers, 125m in textiles
- Export revenue
  - Bangladesh: clothing makes up 80% of exports
- Also significant environmental issues
  - Water degradation, health consequences
- And social issues
  - Workplace safety in Bangladesh

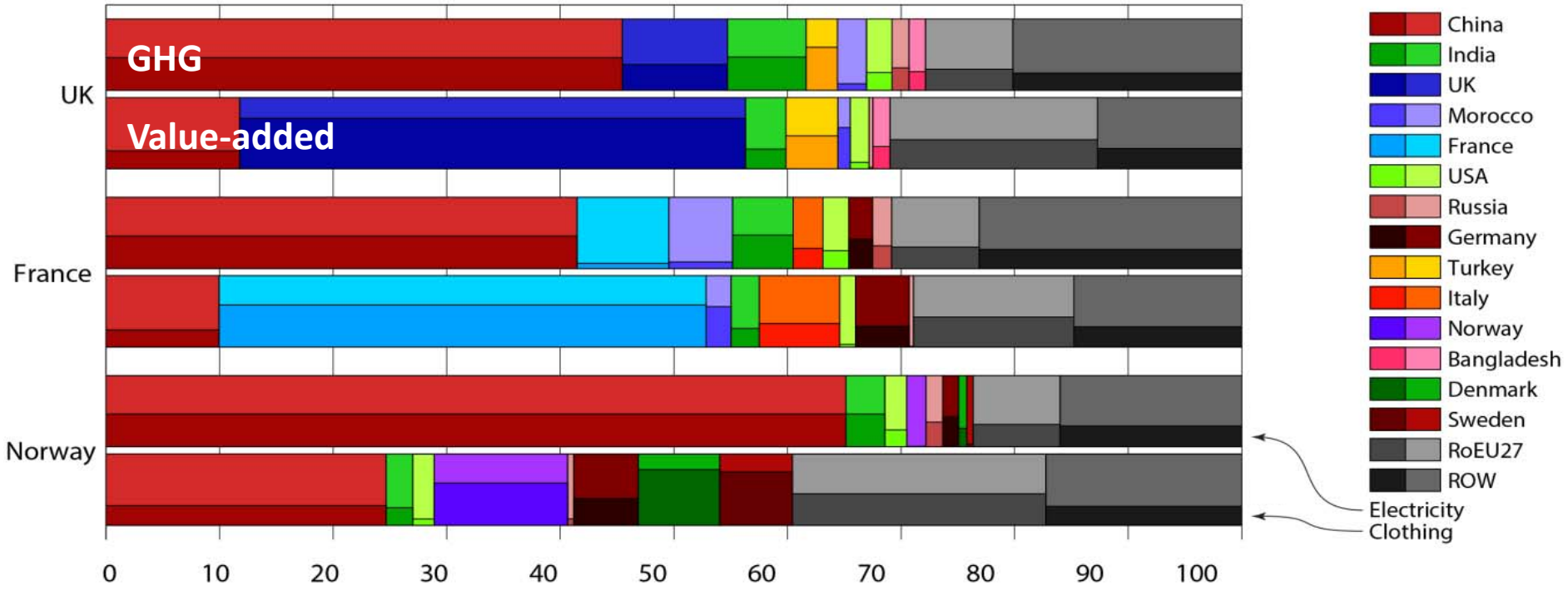
Method

- MRIO based on GTAP's database (129 regions, 57 sectors)
  - Peters, G. P., Andrew, R. & Lennox, J. 2011. Constructing a Multi-regional Input–output Table Using the GTAP Database. *Economic Systems Research,* ***23 131–152.***
  - Andrew, R. M. & Peters, G. P. 2013. A Multi-region Input–output Table Based on the Global Trade Analysis Project Database (GTAP-MRIO) *Economic Systems Research,* ***25 99–121.***
- Emissions data
  - GTAP's energy data + EDGAR non-CO_2 + UNFCCC non-CO_2
- Value-added directly from MRIOT
- $f = F(I - A)^{-1}y$

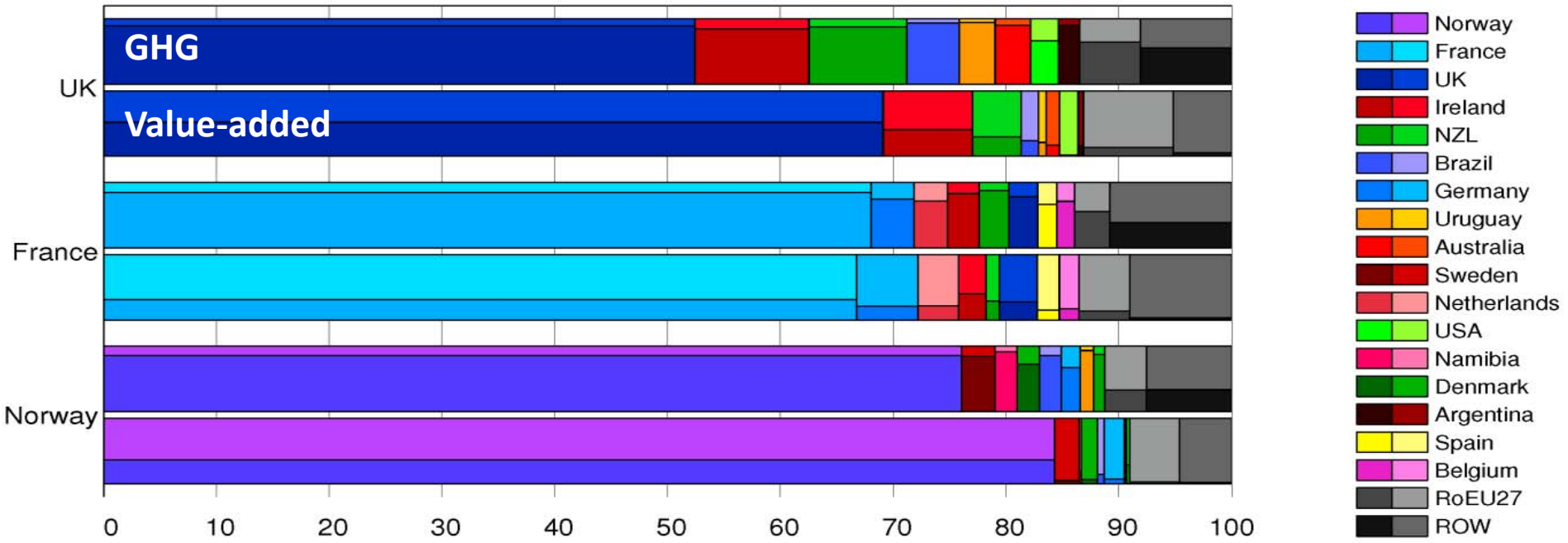
Caveat

- Purchases from wholesale and retail trade
  - Recorded in IOT as:
    - a purchase from the sector that produces the good,
    - plus a payment of margin to the trade sector
- Trade sector margin cannot be distinguished from other products

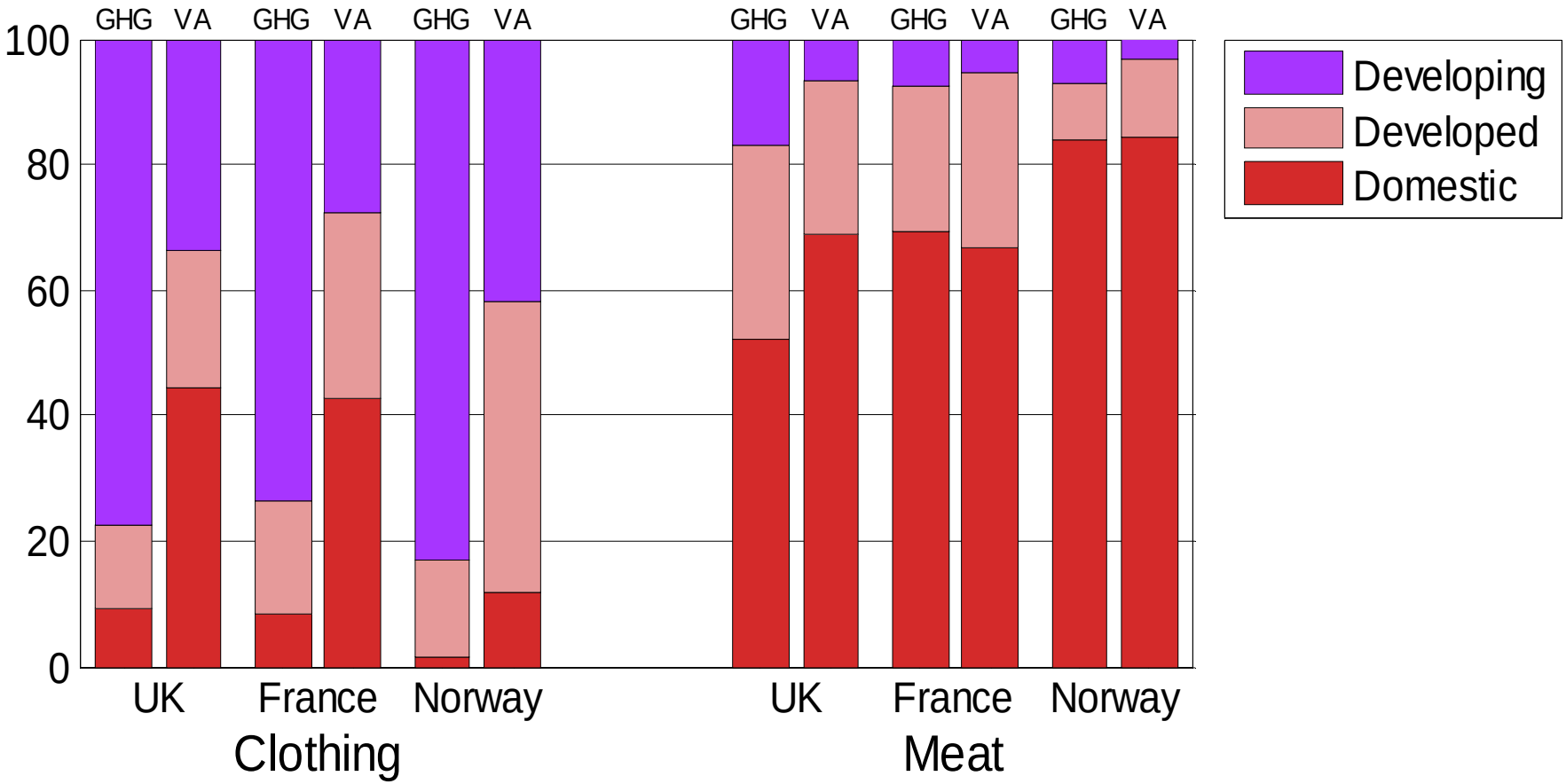
Results: Clothing



Results: Meat



Overall


GHG
VA
100
80
60
40
20
0
UK
France
Norway
Clothing
Meat
Developing
Developed
Domestic

Clothing emissions sources and funnels

	direct as fraction of total				pass-through as fraction of total		
	UK	FRA	NOR		UK	FRA	NOR
CHN ELY	21%	19%	30%		23%	21%	32%
CHN TEX	2%	2%	3%		34%	31%	48%
CHN WAP	2%	1%	3%		39%	34%	63%

And meat?

- Most emissions are occurring in developed countries
- Most of those countries already have some carbon regulation
- But non-CO_2 not regulated
- Developing countries locked out of these supply chains

Combine the two?

- Shared responsibility
  - Lenzen, M., Murray, J., Sack, F. & Wiedmann, T. 2007. Shared producer and consumer responsibility – Theory and practice. *Ecological Economics, **61** 27–42.*
  - Andrew, R. & Forgie, V. 2008. A three-perspective view of greenhouse gas emission responsibilities in New Zealand. *Ecological Economics, **68** 194–204.*
- Income responsibility
  - Marques, A., Rodrigues, J., Lenzen, M. & Domingos, T. 2012. Income-based environmental responsibility. *Ecological Economics, **84** 57–65.*

Summary

- Strong contrasts between the two supply chains considered
- Choice of (ideal) least-burden carbon mitigation depends on the supply chain in question
- Strong discrepancies between emissions and value-added in clothing sector

Future work (wishlist)

- Factor ownership
  - value-added where it's due
- Processing trade
- Add employment and other benefits of globalisation, along with other environmental pressures

Thank you

folk.uio.no/roberan