



consumption-based

How much  carbon is enough?

Sufficiency in a global perspective

Julia K. Steinberger

J. Timmons Roberts & Glen Peters

0. Policy relevance?
1. Sufficient carbon: past & future
2. Consumption perspective



Starting point: environmental problems exist.

- ✓ They can be **measured** – quantification.
- ✓ They have **causes** – phenomena in human societies.
- ✓ They can be **allocated**: to industrial processes, economic sectors, population groups, geographic regions, production, consumption ...

- The “solutions” we propose to environmental problems will depend on how we measure them, understand their causes, and allocate responsibility.

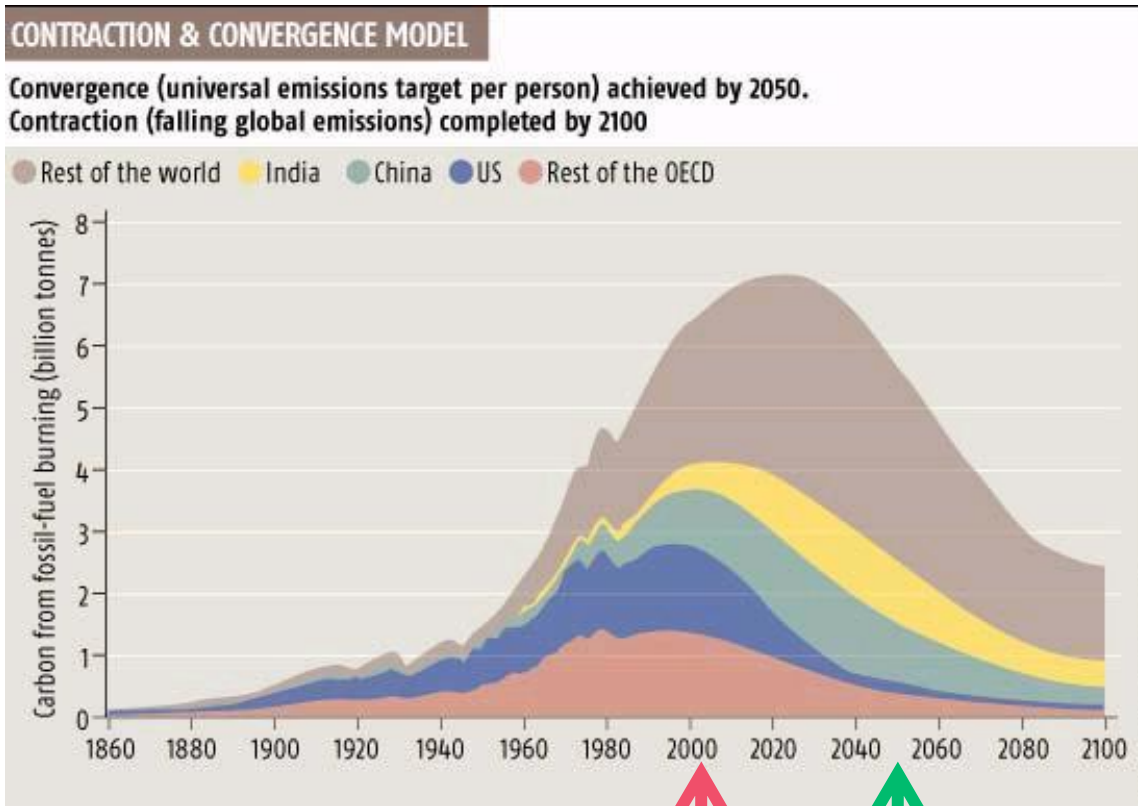


The challenge: a low-carbon future



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Contraction & convergence of global emissions



2007	tC/cap
USA	5.2
UK	2.41
China	1.35
Brazil	0.52
India	0.39
Nigeria	0.18

Population growth

2005

1.2

tC/cap

2050

0.6

tC/cap

(or as low as 0.2 tC/cap by 2100)

Sufficiency:

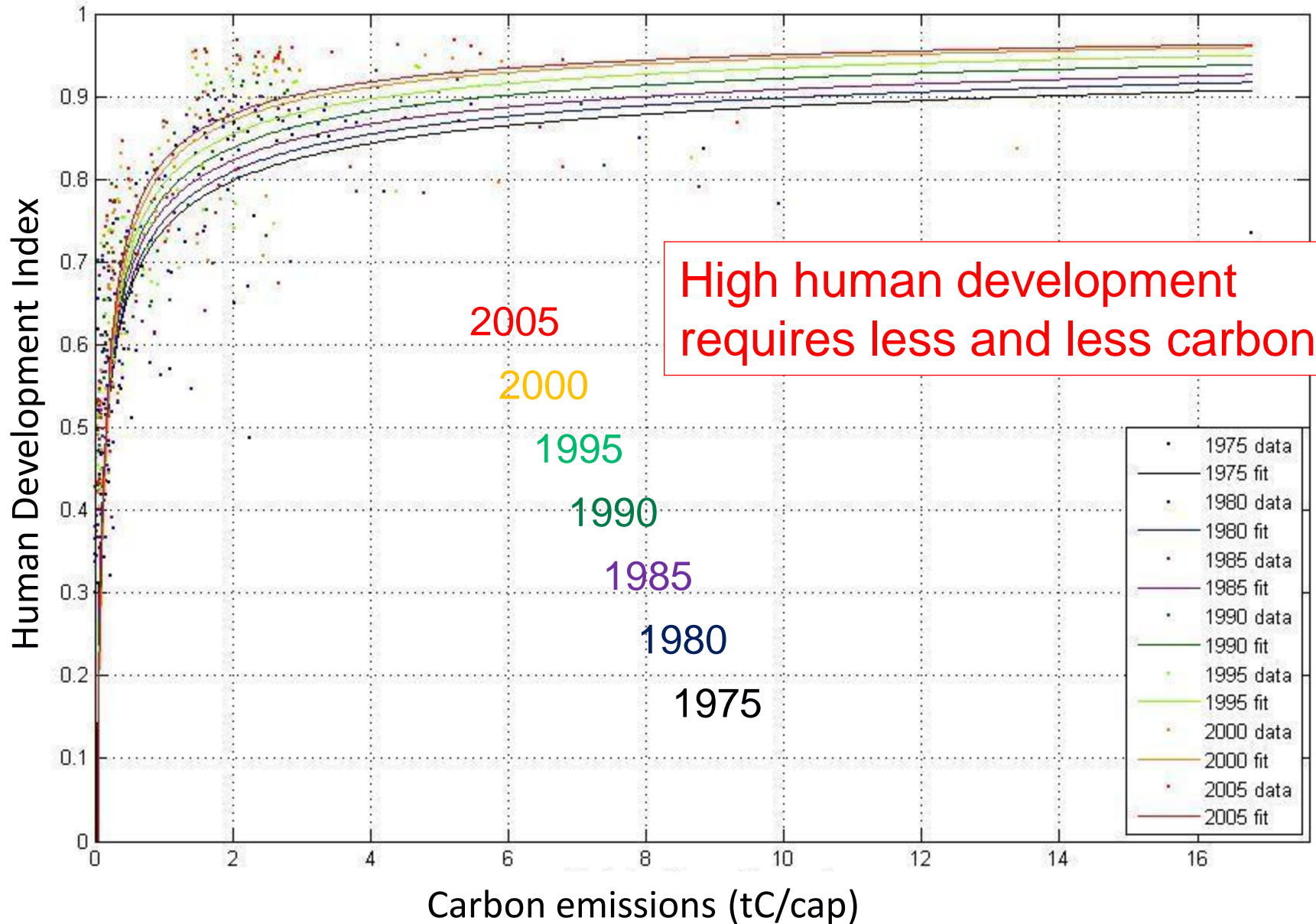
how much CO₂ is necessary for a good life?



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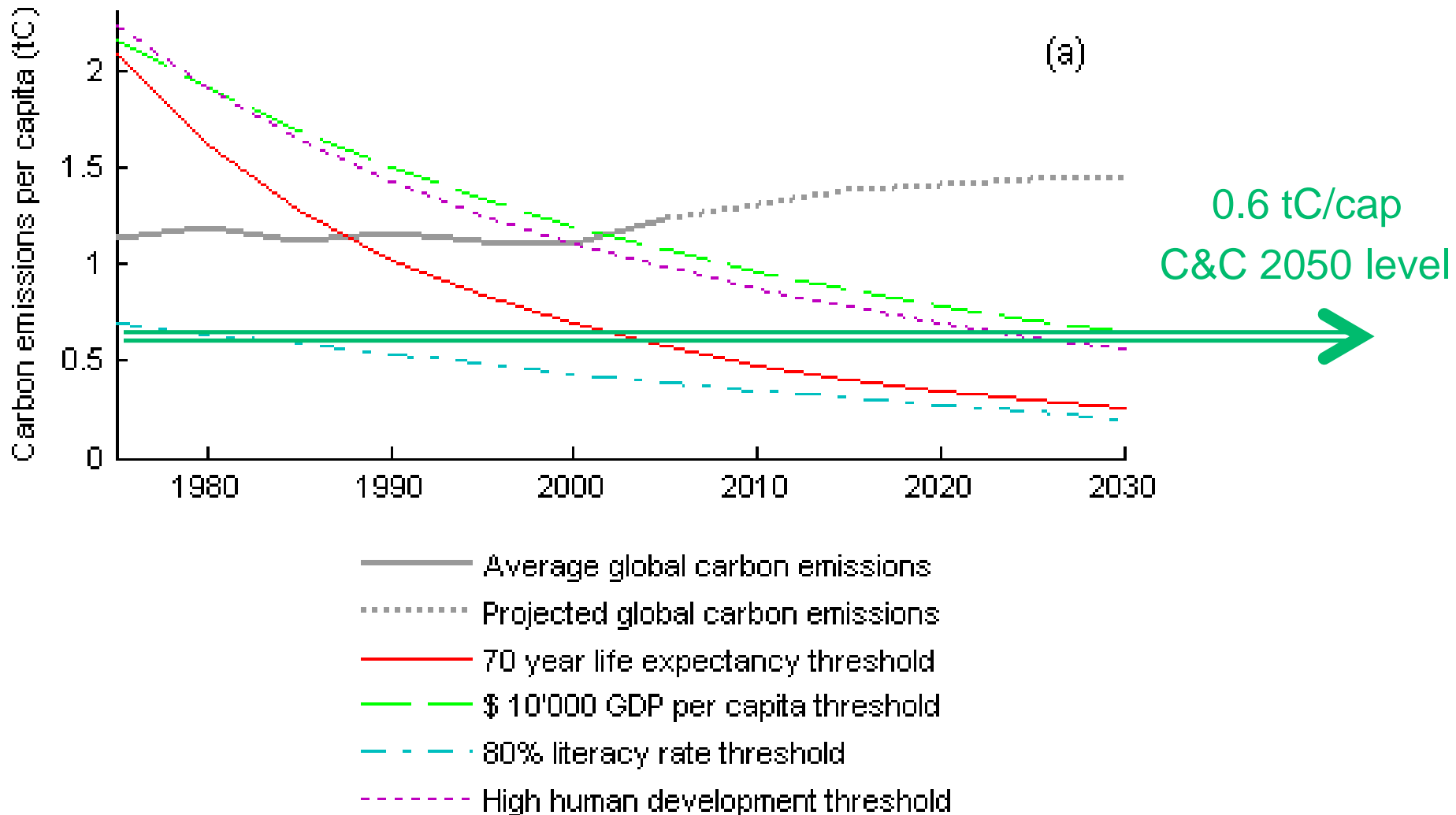
Human Development vs. Carbon



Carbon “thresholds” for sufficiency



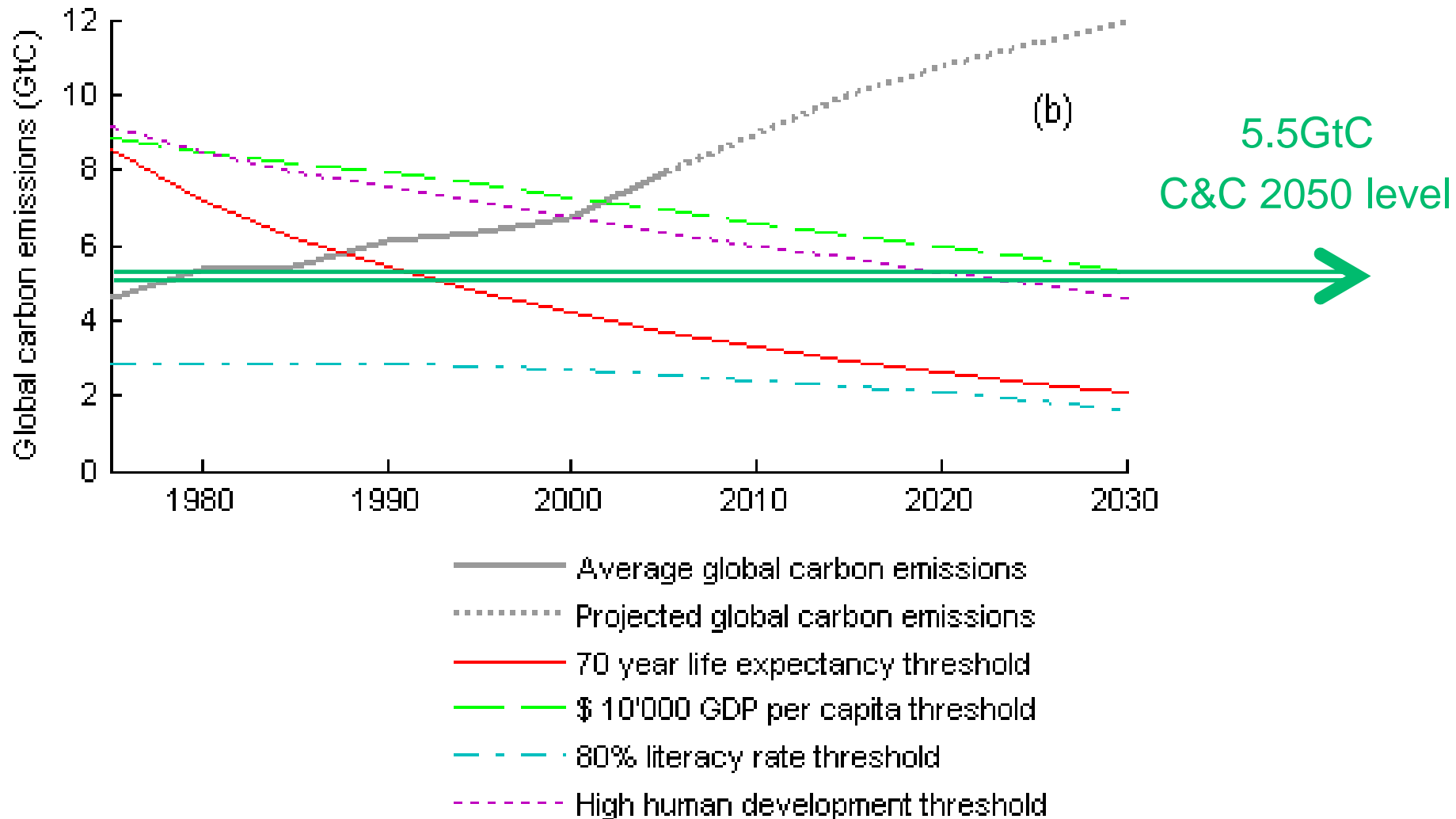
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Global carbon “thresholds”



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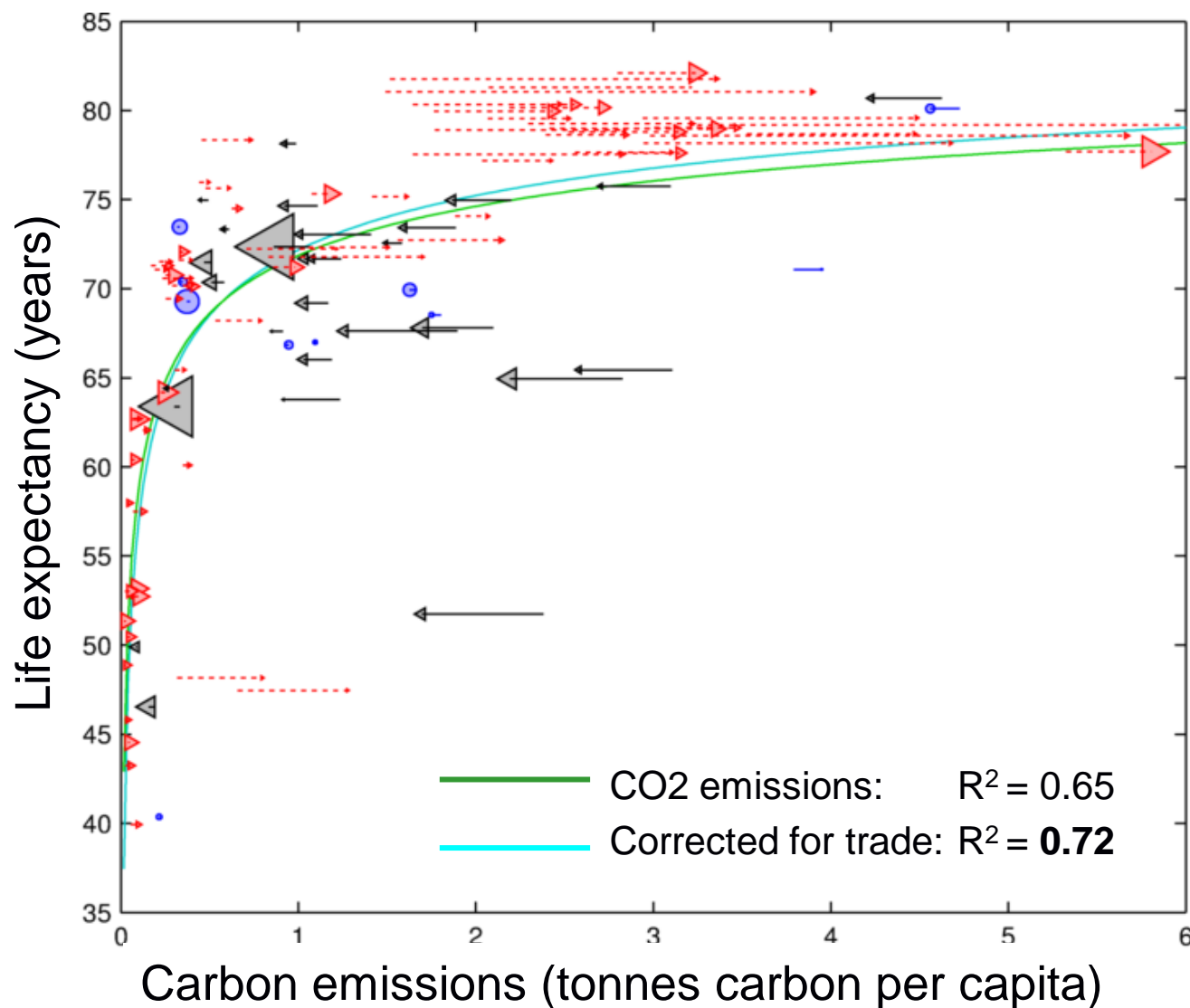
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How much CO_2 is necessary for a good life?

Sufficiency and carbon emissions: Taking trade into account



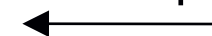
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Carbon importer



Carbon exporter



Carbon neutral

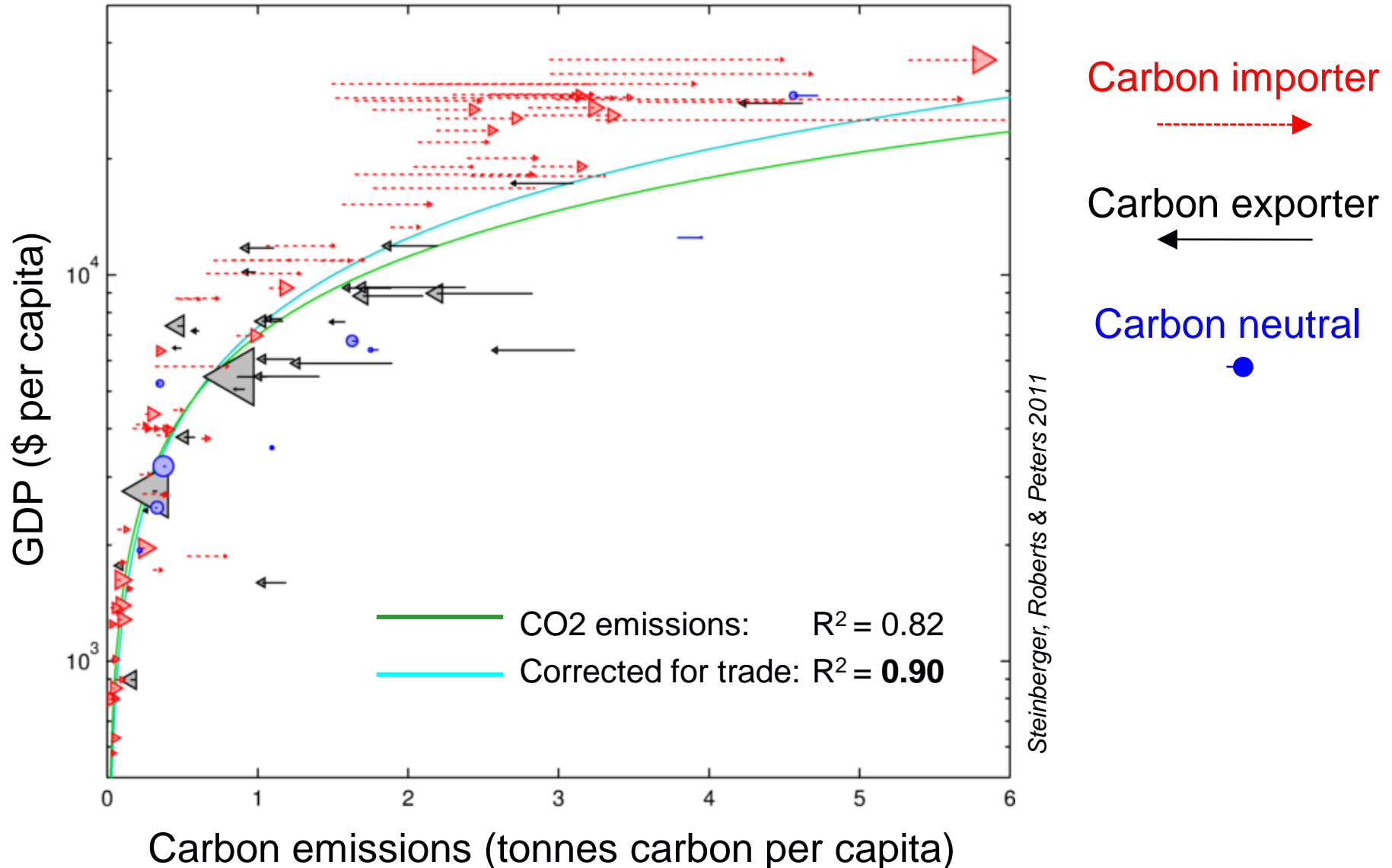


Steinberger, Roberts & Peters 2011

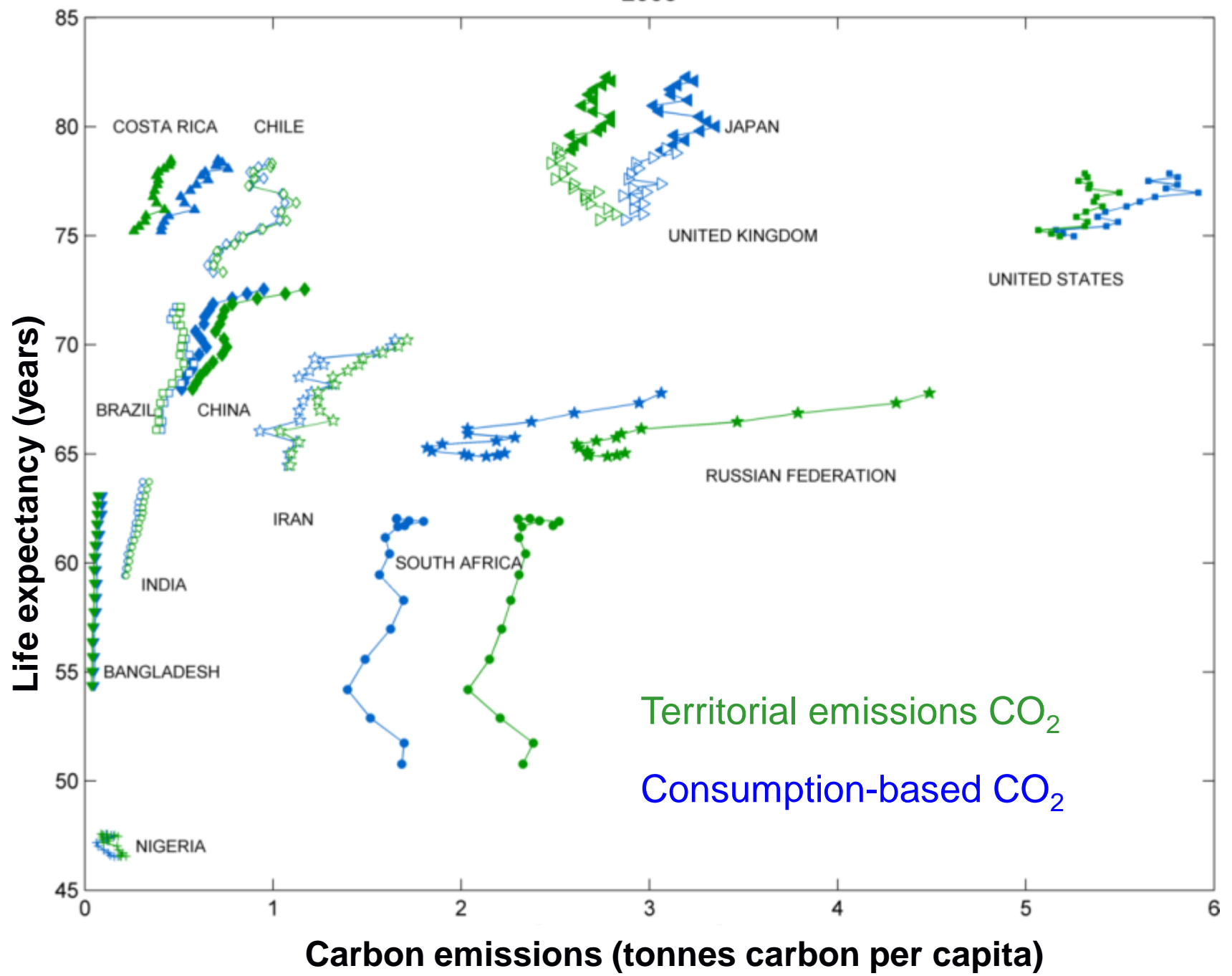
Income and carbon emissions: Taking trade into account



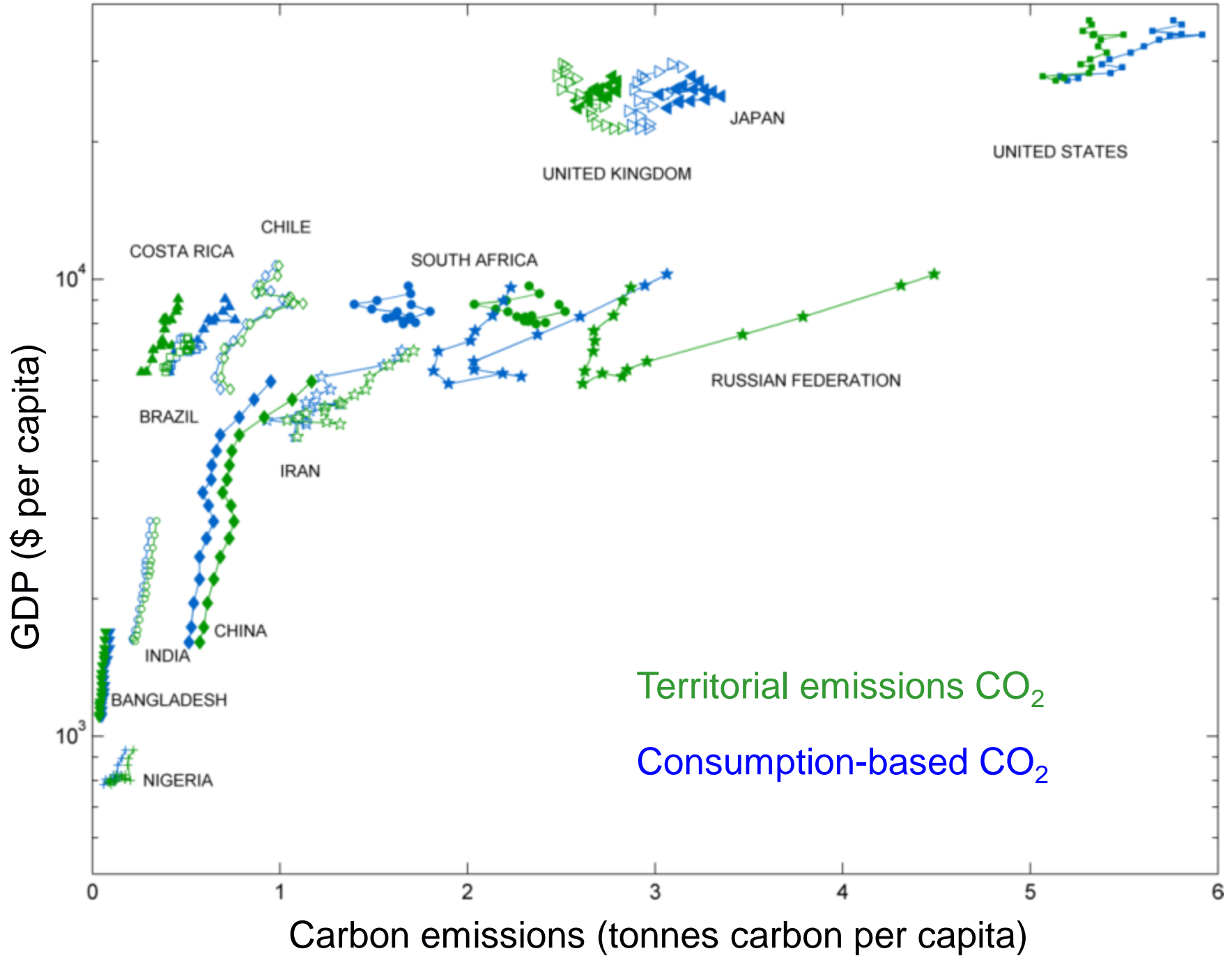
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2005

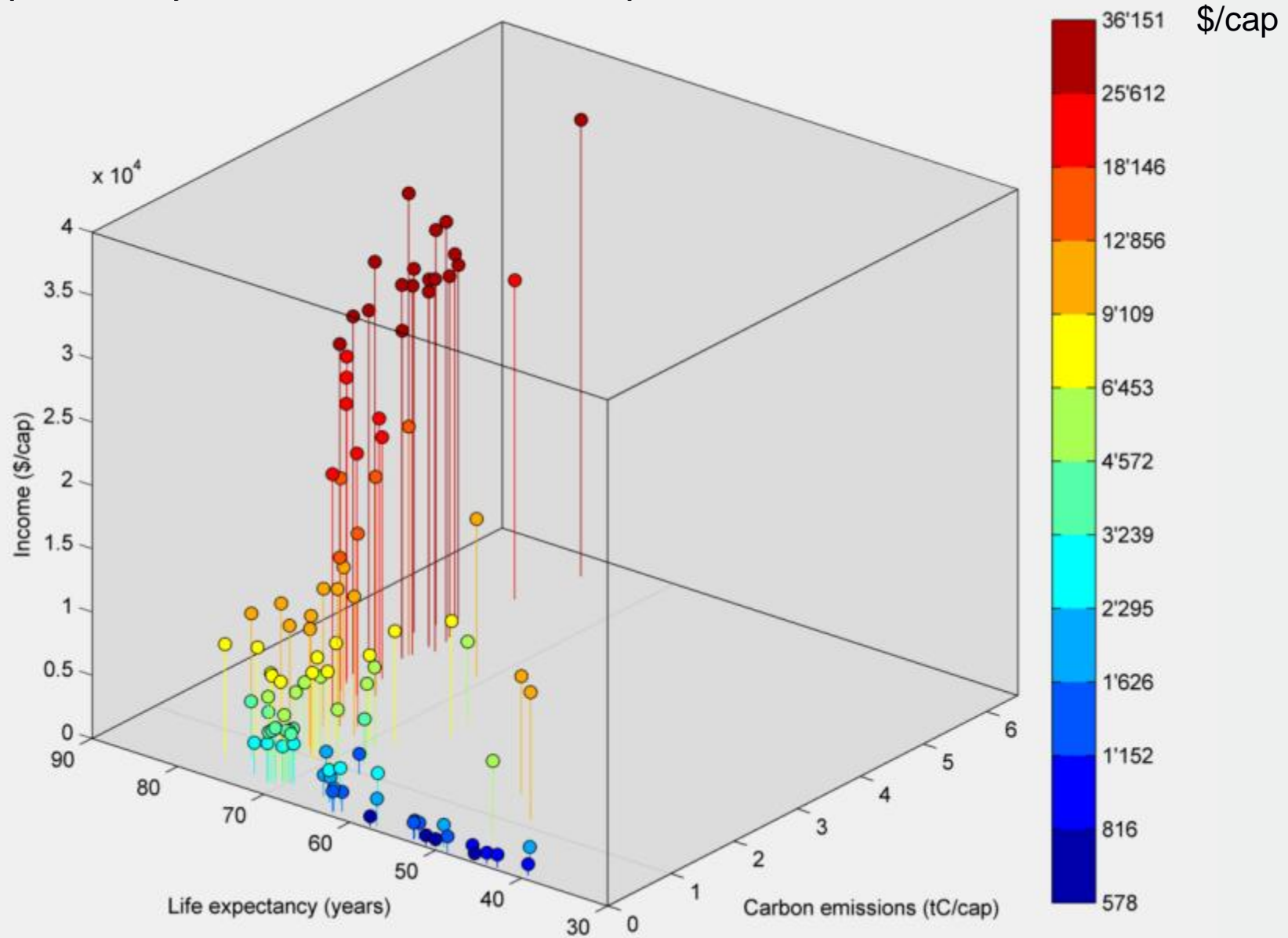


2005

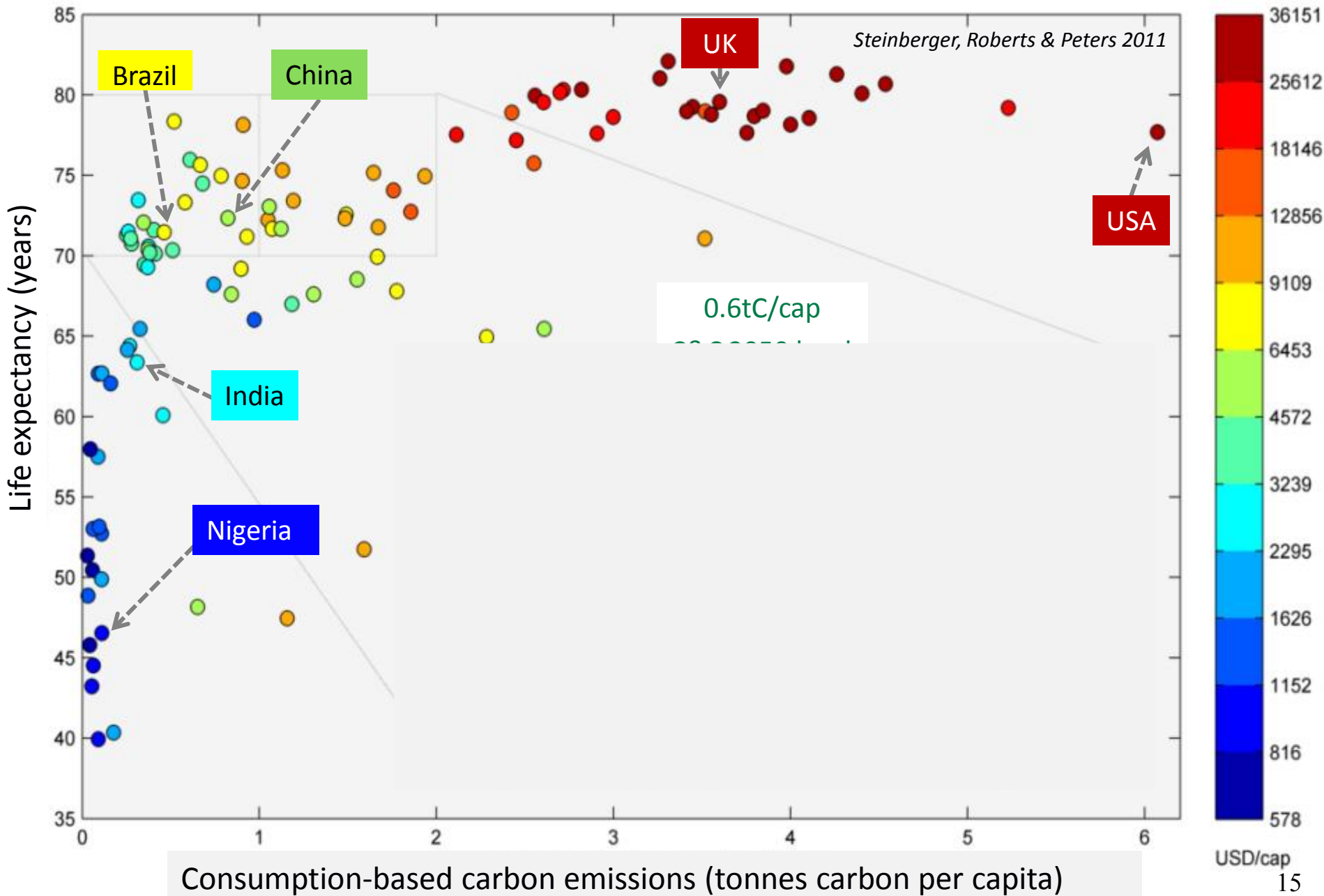


Territorial emissions CO₂
Consumption-based CO₂

All together now: Life expectancy, income and consumption-based carbon



Who is sustainable?



Thank you for your attention



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References

- Steinberger, J. K. and J. T. Roberts (2010). "From constraint to sufficiency: the decoupling of energy and carbon from human needs, 1975-2005." *Ecological Economics* 70(2): 425-433.
- Consumption-based data from Peters, G. P., J. C. Minx, C. L. Weber and O. Edenhofer (2011). "Growth in emission transfers via international trade from 1990 to 2008." [Proceedings of the National Academy of Sciences](#).
- Steinberger, J. K., J. T. Roberts and G. P. Peters (2011) Forthcoming (we hope).