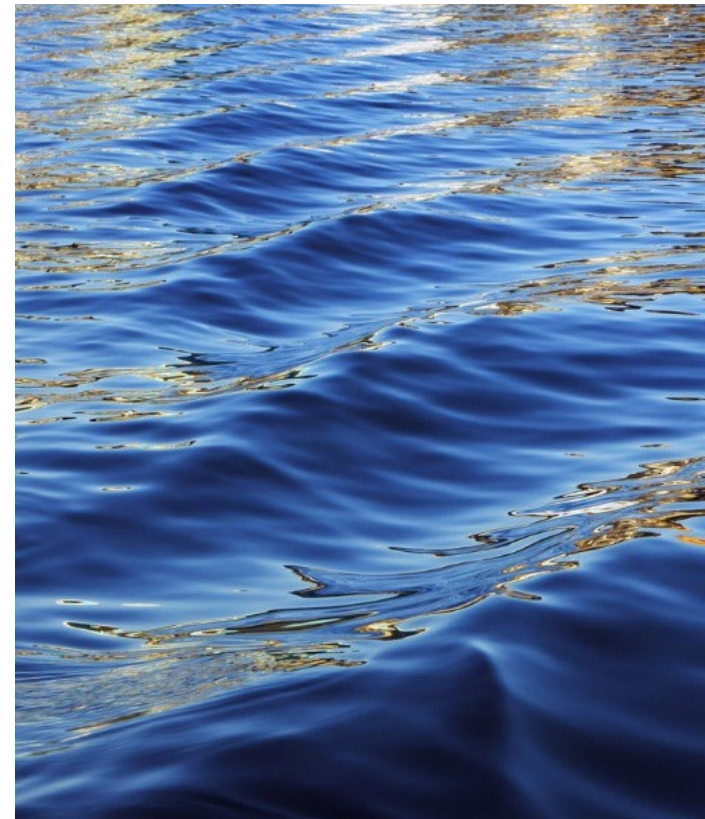




# The Green Industrial Revolution: lessons from the past

Alessio Terzi



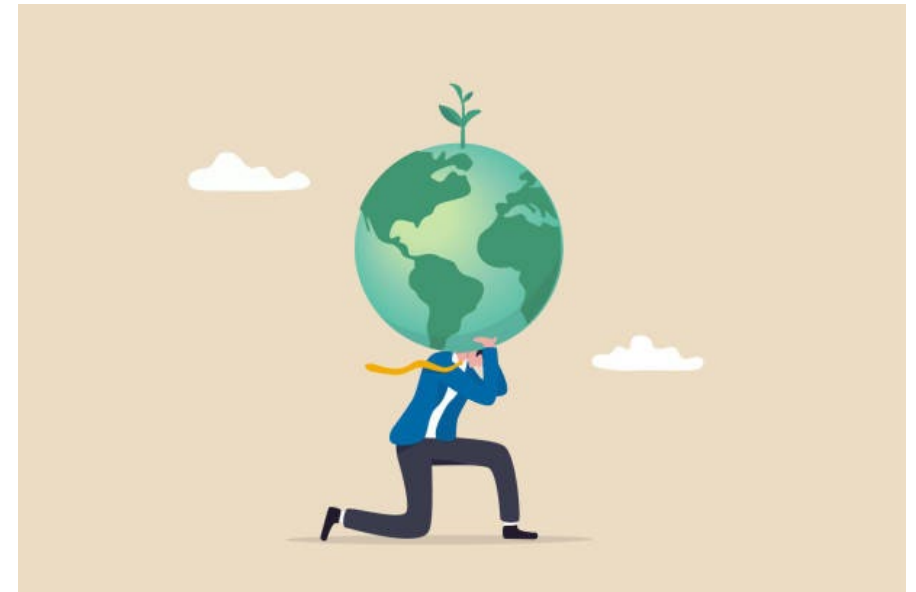
The views expressed here are solely those of the author.

# The cost of greening

- According to one narrative..
- Green transition represents large costs in the short term
  - “The green option is more expensive”
- It is not really an investment opportunity, because in the best case scenario we simply get to keep what we already have
  - Think ICE -> EV
  - More like military expenditure. A necessary evil
- It creates stranded assets

→ Macro models suggest muted impact on GDP (and net job creation)

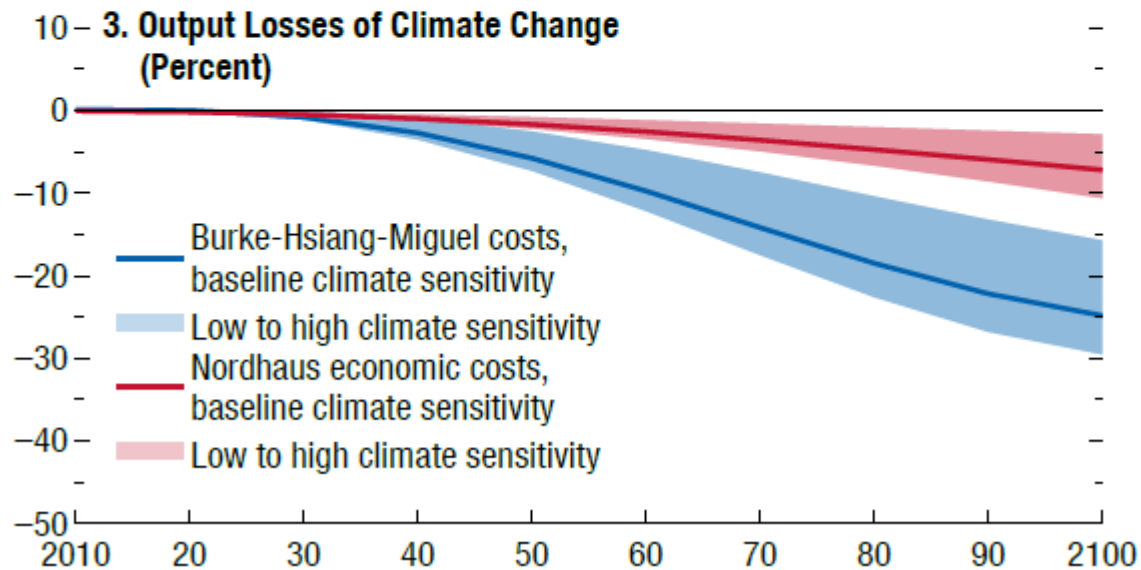
→ Empirical studies find small (positive) impact too (Metcalf and Stock, 2020)



# Defining the baseline

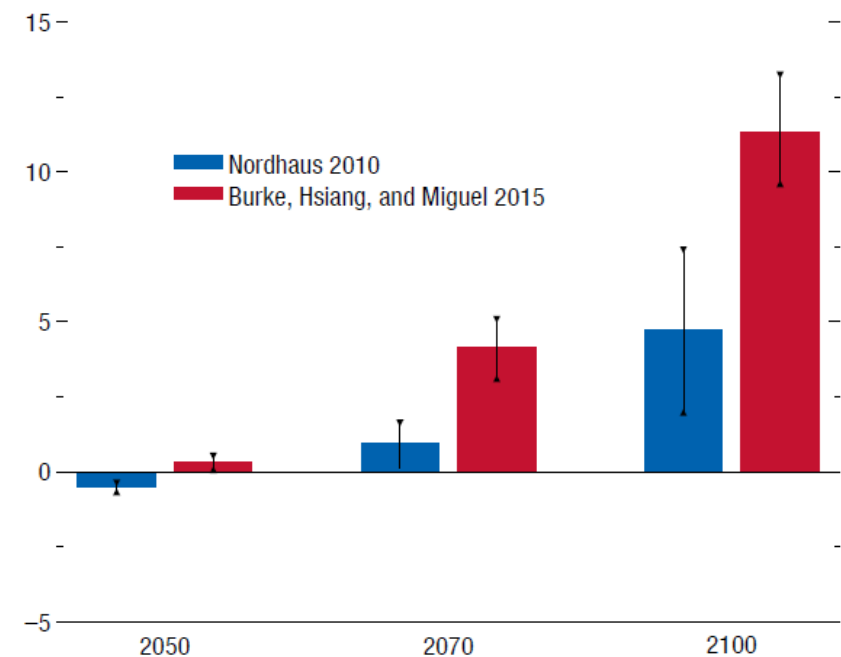
**Figure 3.1. Risks from Unmitigated Climate Change**

Under the current trajectory of emissions, the probability of keeping global warming below 1.5°C would drop to 50 percent in about 15 years. Global temperatures under business-as-usual would increase to levels not seen in millions of years, triggering substantial income losses and raising the risk of catastrophic outcomes.



**Figure 3.7. Medium- to Long-Term Output Gains from Climate Change Mitigation (Percent of baseline GDP)**

Climate change mitigation results in substantial output gains in the second half of the century.



Source: IMF (2020)

→ Poor integration of economic and climate models (CEA, 2022; Pisani-Ferry, 2019)

# The Green Deal economy

- Typically, the green transformation is modelled as a tax shift, from labour to carbon
- But of course Green Deals are much more, encompassing large public investment plans, subsidies to green R&D, carbon border adjustment, etc.
- More broadly, the green transition will require a complete transformation of basically all of production, consumption, agriculture, housing, transport..
- ...and in essence the whole structure of the economy

→ Lucas Critique, green edition (Terzi, 2022a)



# The Green Industrial Revolution

Because of how wide-reaching and all-encompassing the green transformation will be, it is probably a better comparison to the way Industrial Revolutions played out, implying..

- A complete recasting of comparative advantages across the globe
- Some countries/companies will emerge as winners, others will remain stuck in technologies that are perceived as old and lower quality (Terzi, 2022b)



# Key role of shifting preferences

- In most standard models, consumer preferences are fixed.
- Adoption of green technology is based only on the fact they become cheaper.
- Extreme weather events will lead to a shift in preferences, assigning greater value to the “green option” -> raising profitability of green firms

JOURNAL ARTICLE

## The Political Economics of Green Transitions\*

Timothy Besley, Torsten Persson

*The Quarterly Journal of Economics*, Volume 138, Issue 3, August 2023, Pages 1863–1906, <https://doi.org/10.1093/qje/qjad006>

**Published:** 24 January 2023    **Article history** ▼



# The history

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The Great Smog of London, Dec 5-9 1952

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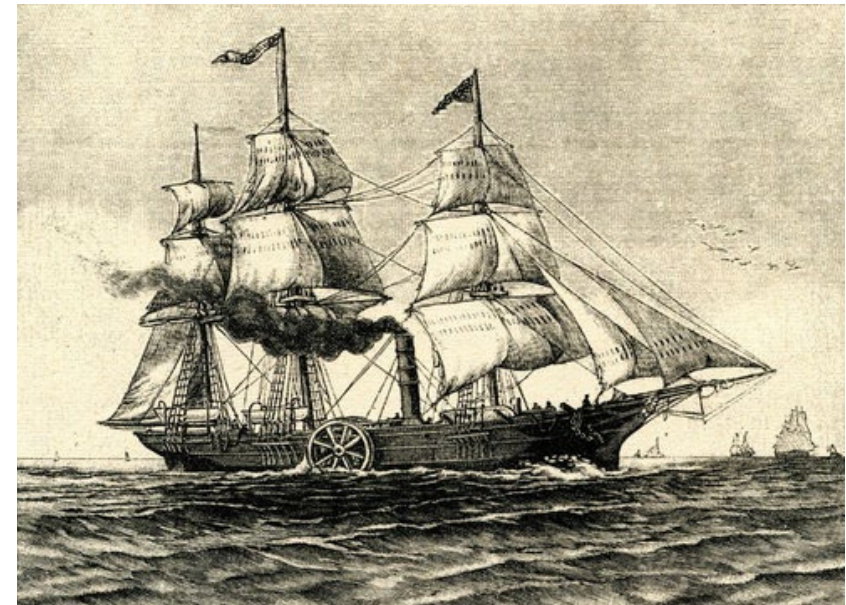
Gas

Gas

Electricity

# Case study: Steam ships

- The first steamship crossed the North Atlantic no faster than the best contemporary sail ships with favourable winds (Smil, 2017)
- From the first ships built, in 1815, to 1830, entrepreneurs saw the potential of steam power and pushed its expansion. [...] Sailing ships improved efficiency and competitiveness after the introduction of steam ships, and grew in importance. Early steam ships were highly inefficient, requiring vast quantities of coal to fuel the voyage. Since they could less easily fuel-up on route than a train, the coal required displaced valuable space that might carry goods or passengers. It was not until major improvements in fuel efficiency in the latter part of the nineteenth century that it finally replaced the sailing ship (Fouquet, 2010)



SS Savannah, 1818



# The Adam Smith fallacy

Critics would argue that green tech does not display a higher productivity than the polluting option. Hence, it is not an Industrial Revolution.

- In the early stages on an IR, the new tech does not necessarily reflect higher productivity gains!
- Trial and error with mechanisation initially led to widely dispersed productivity draws and low average productivity.
  - In the subsequent decades, high productivity growth was observed, as new entrants adopted improved methods of production/organisation (Juhász et al, 2020)
- The same with the Second IR
  - Line shaft -> assembly line (Aghion et al, 2021)



# The scope for secondary innovation

- Green innovation will not stop at replacing the polluting option with the green option

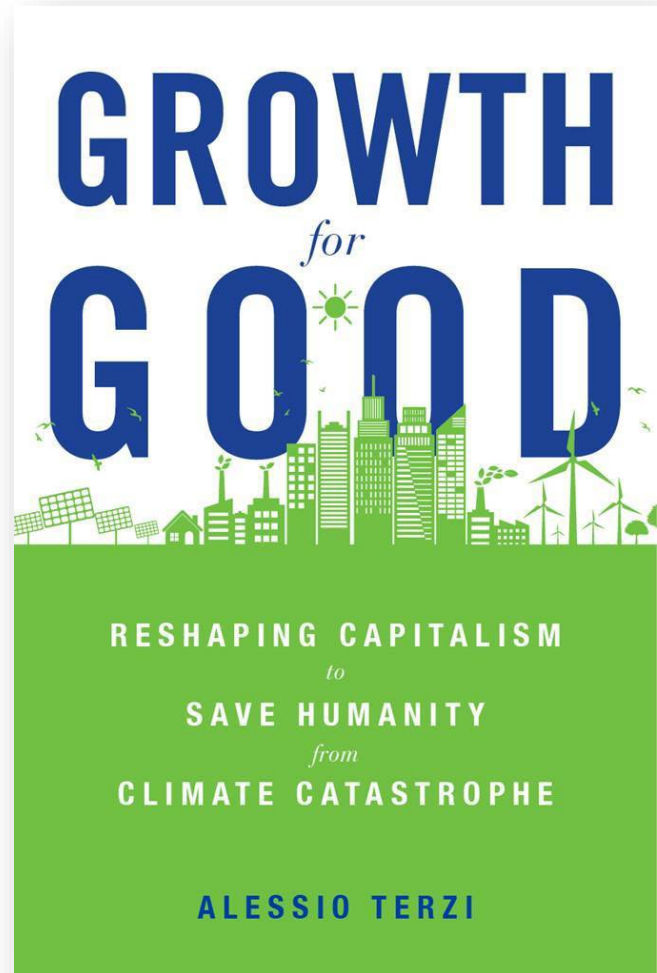
*“For two hundred years, technologies based on fossil fuel have been explored. Diminishing returns may have set in. Climate change has induced new searches in other parts of the technology frontier. [...] the green economy may usher in a new era of high productivity growth.”*

Stern and Stiglitz (2021: 61)

Renewable could easily become by far the cheapest electricity source in history (IEA, 2020)



# The book



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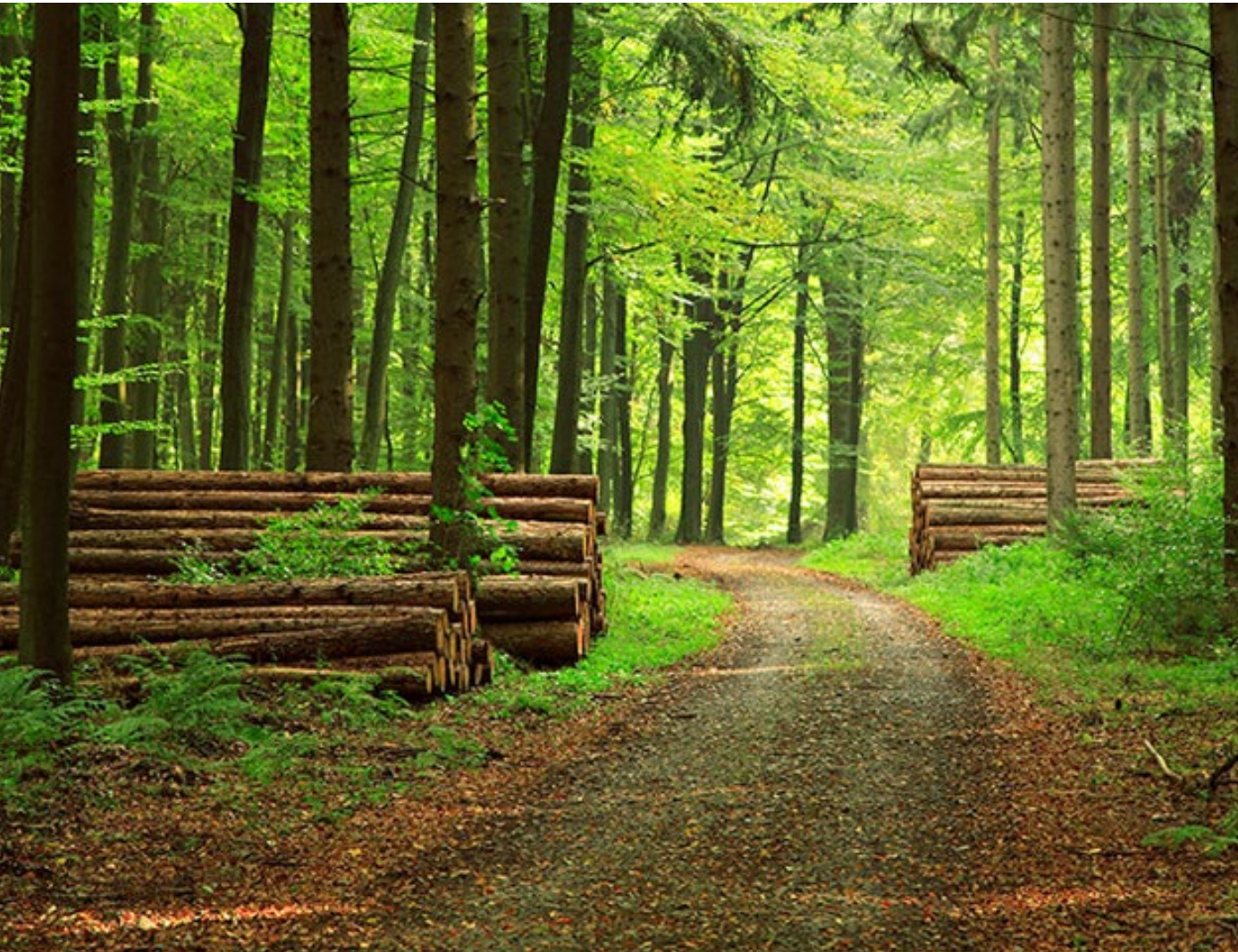
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World





# Thank you!

For questions/comments:

[Alessio.terzi@sciencespo.fr](mailto:Alessio.terzi@sciencespo.fr)

Twitter: @terzibus

[www.alessioterzi.eu](http://www.alessioterzi.eu)

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