

Climate Change and Economic Dynamics: Innovation for Economic and Planetary Security



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EXPLORING THE NEW CAPITALISM

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GOLDEN POLICY: CARBON PRICING



VIA DEMAND:

- Curbs demand for fossil fuel
- Induces substitution from carbon-intensive (tar sands?, coal, crude oil) to less carbon-intensive fossil fuel (gas)
- Induces substitution away from fossil fuel to renewables and brings forward the carbon-free era

VIA SUPPLY:

- Encourages to leave more fossil fuel in crust of earth
- Boosts CCS and limits slash and burn of forests
- Boosts R&D into clean fuel alternatives and into energy-saving technology

Peak Global Warming and Safe Carbon Budget

- Temperature cap acts as political focal point
- Cumulative emissions drive peak global warming
- Safe carbon budget is about 300 GtC to stay below 2 degrees Celsius: about 30 years at current use of fossil fuel use left
- The clock is ticking every day
- The price of carbon necessary to stay within 1.5 or 2 degrees cap must rise at a rate equal to the risk-adjusted interest rate (about 3.5%/year)
- Different from Pigouvian approach (social cost of carbon)

SUPPLEMENTARY POLICIES

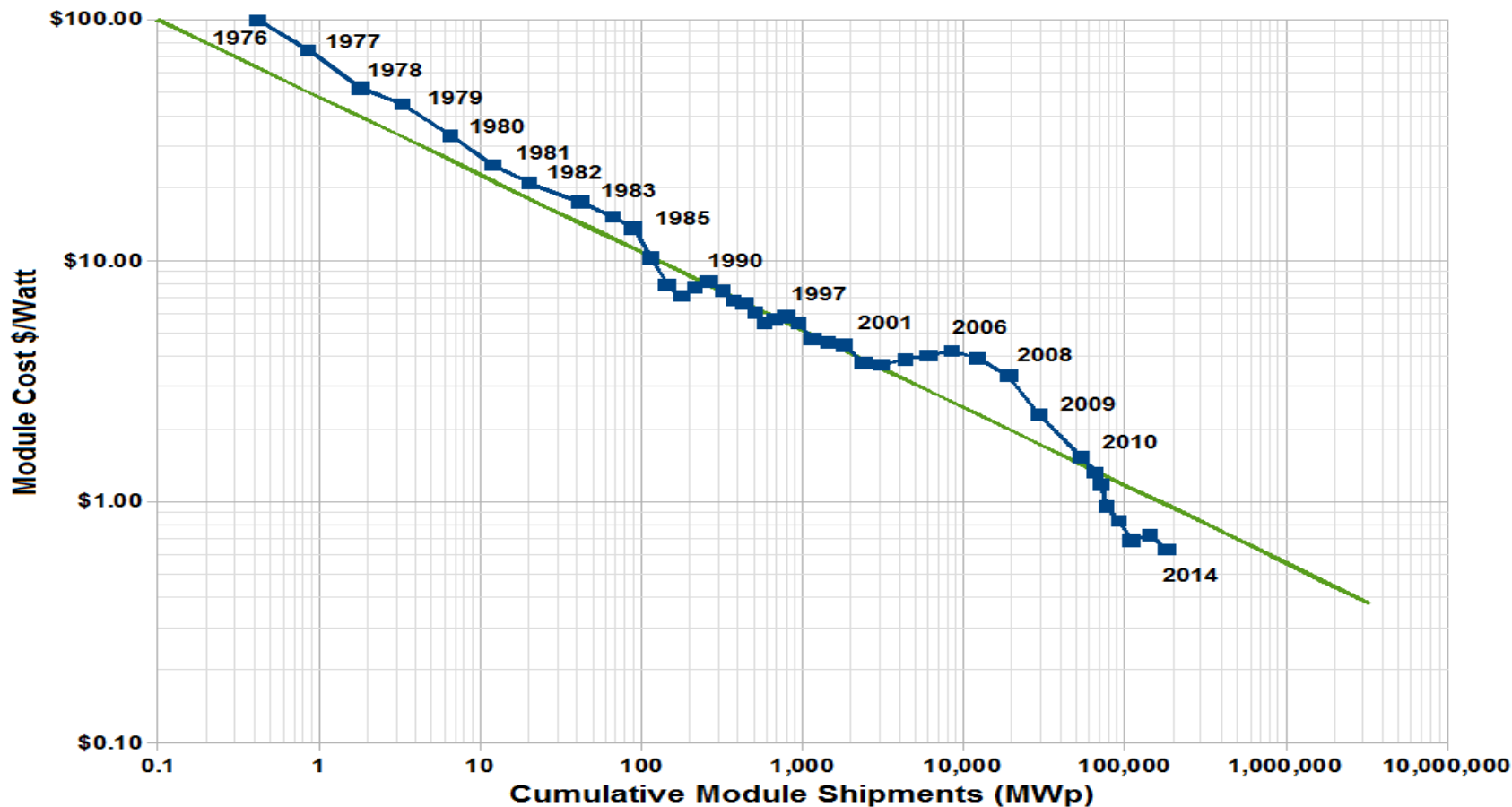


- Rebates of carbon pricing for lower incomes to make it politically acceptable and avoid “Yellow Vests”
- Subsidies for renewable energy use to capture learning-by-doing effects: Swanson’s law
- Subsidies for green R&D if patent markets do not work well: temporary hike to redirect technical change from carbon-intensive to green technologies
- Soft finance to overcome capital market failure for green investments
- Need for new industrial policy for innovation and exploiting IRTS
- Encourage households, firms and government to spend on climate adaptation (e.g., water defences)

Note of optimism: cost solar panels drops 20% for every doubling of cumulative shipped volume



Swanson's Law



VERY LITTLE HAS BEEN ACHIEVED



- Need “net zero” by 2050, but global emissions have been rising relentlessly at 2.6% per year since 1900
- What have we learned according to Nordhaus:
 - Very little carbon pricing (global average \$1.7/tCO₂)
 - Little coverage: muddled, fragmented & low
 - Collapse of Kyoto agreements: international climate policy is at dead end
 - Not enough investment in green technology: double externality (global warming and learning by doing)
 - Huge fossil fuel subsidies, especially coal (6-7% of world GDP)

WHAT TO DO FOR GREEN TRANSITION



- Get rid of explicit and implicit fossil fuel subsidies
- Moratorium on coal
- From 2030 or earlier no more diesel- or petrol-based transport
- Need clear signal: start with say 80 \$/tCO₂ en let it rise at rate of say 3.5%/year (cf. France, Sweden, Finland, Norway, Switzerland)
- If necessary, on top of European permit schemes
- CO₂ prices also has collateral benefits of less air pollution: local, so no international freerider problems
- Need Border Tax Adjustments to avoid carbon leakage
- Subsidise green energies: internalise learning-by-doing benefits
- Subsidise green R&D: encourage green directed technical change
- Each year delay makes realising our climate targets more costly

PANDEMIC, BIODIVERSITY AND CLIMATE

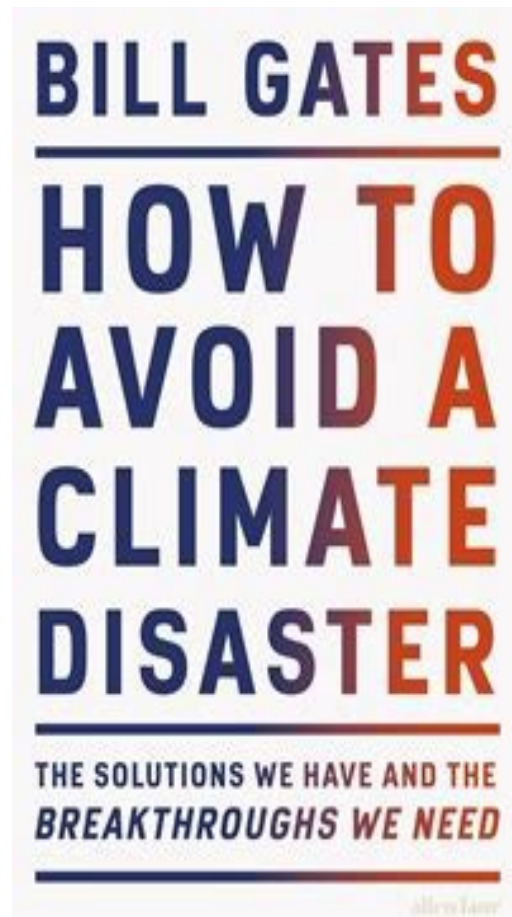
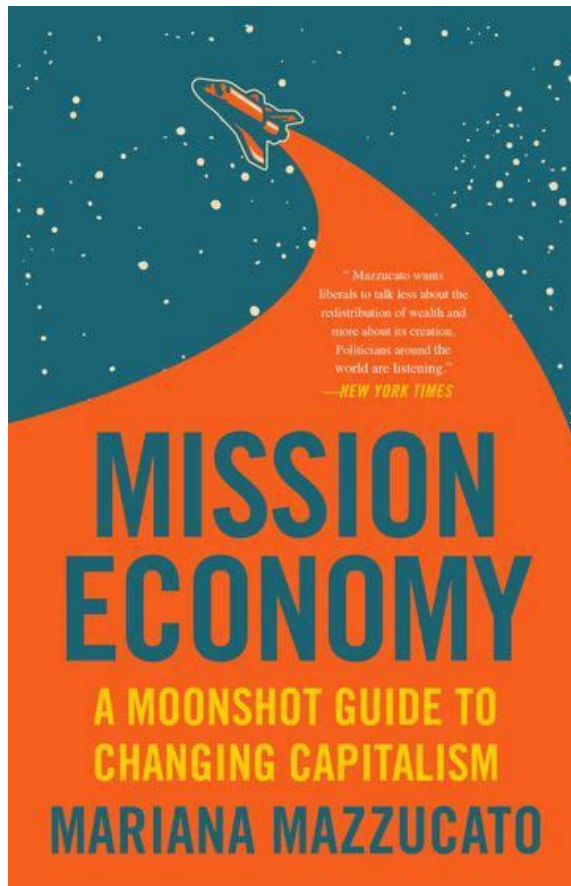
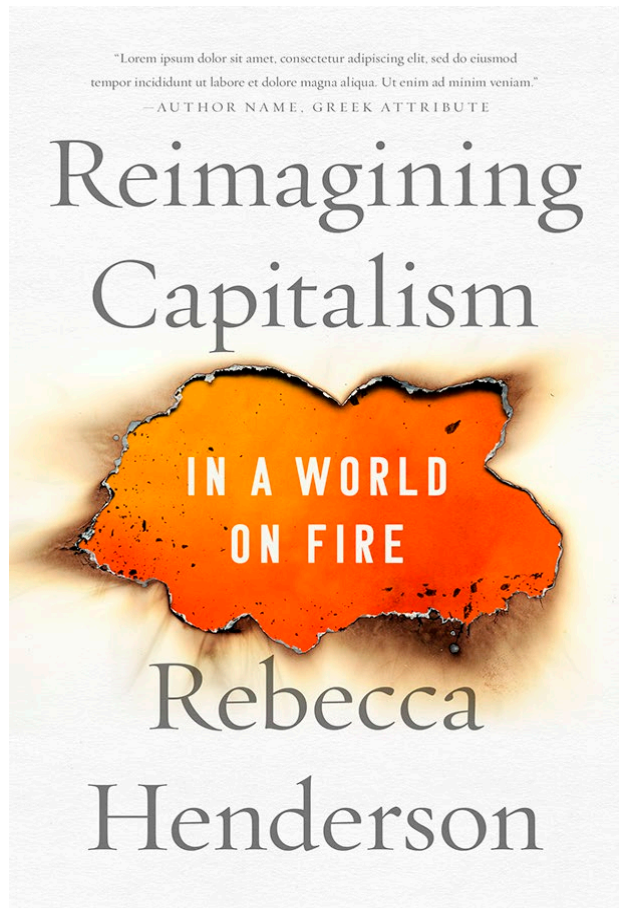


- The Covid-19 pandemic has had surprisingly little effect on economic activity
- But has had huge effects on inequality: elderly, people with poor health and low financial buffers, those in vulnerable professions are hit most
- If vaccines come quick enough, we can avoid new variants of the virus causing damage
- These viruses will come and go. Especially given the deplorable and worsening state of biodiversity
- We need a resilient planet and a resilient economy

- Invest in clean infrastructure, efficient retrofitting of buildings, investment in education and training, natural capital investment, and clean R&D
- Invest in control of pandemic (test, track and contain), vaccines, border checks & safe travel and trade, food security and shorter local supply chains including sanitary standards, renewable energy (batteries, solar, wind, electric vehicles), circular economy, and secure ICT networks
- Make sure new jobs and sectors are wherever possible Corona-proof (e.g., part-time in office, part-time at home, less commuting is win-win): improve resilience
- “Create army of zero-carbon workers, retraining and redeploying those who can't work into different industries, from home insulation to wind turbine manufacture to tree planting”

- Do not bailout carbon-intensive firms in the pandemic unless they fundamentally reform
- Make sure all firms are carbon-free or can prove that they capture and sequester all their carbon emissions
- Government as launching customer and finance facilitator, especially cities
- Spatial planning pandemic and climate proof: central government, provinces, cities
- Golden Covid-19 opportunity: do not keep living zombies from the fossil era alive, but invest in those companies that are going to make the green transition possible (“never waste a crisis”)
- Be aware: fossil fuel incumbents will try to frustrate green plans
- Independent carbon central bank: carbon reductions are too important to leave to discretion of politicians

Three great books to read on capitalism, radical change, and new industrial policy



THE WORLD IS ON FIRE – Rebecca Henderson



- Triple crisis:
 - 1. environmental (climate, biodiversity, oceans, etc.)
 - 2. inequality
 - 3. collapse of institutions & threat to democracy.
- Need for purpose-driven firms, rebuilding institutions and bringing markets and government back in balance, and ***innovation***.
- Establish metrics to measure environmental and social impact of business practices (cf. Lucrezia Reichlin and others)
- Cooperate on sustainable, self-regulatory standards across whole industries
- Private sector support for democratic reforms
- Also *Mariana Mazzuato: A Moonshot Guide to Changing Capitalism*: role of government and corporations (cf. the speed of development of vaccines)

HOW TO AVOID A CLIMATE DISASTER

Bill Gates (2021)



- To get to net zero, need adaptation and mitigation
- Making *things* (cement, steel, plastic) is 31%, *plugging in* (electricity) is 27% and growing *things* (plants, animals) is 19%, but *getting around* (planes, trucks, ships) is 16% and *keeping warm and cool* (heating, air-co, fridge) only 7% of total emissions. Think of it!
- Many obstacles on the way, but must be done with huge technological breakthroughs
- Need storage to deal with intermittence: batteries, pumped hydro, thermal storage, cheap hydrogen
- Also need breakthroughs in capturing carbon and using less.
- Need people like Norman Borlaug (semi-dwarf wheat & green revolution), Elon Musk, Bill Gates ... capitalism!

THE CLIMATE TRAP - BESLEY AND PERSSON



- **Chicken and egg externalities:**
 - Demand for green technology (batteries, electrical vehicles, heat pumps, etc.) depends on low-cost products being available
 - But supply of cheap products only becomes available if there is enough demand.
- **Socialisation of preferences:** as more and more people are environmentalist, more materialists turn green too
- Political system cannot commit to future policies
- Leads to classic case of strategic complementarities leading to a climate trap with multiple equilibria.
- Need grand coalition of visionary politicians, business leaders and people in society to shift from bad to good equilibrium

NEED FOR RADICAL CLIMATE POLICIES



- We are at risk of 9 big climate tipping points (Greenland and Antarctic Icesheet, permafrost, Gulf Stream, etc.) which will lead to abrupt, irreversible system changes and gradual but sure heating up of the planet \Rightarrow long time scales
- Must counteract with radical climate policies to use non-climatic tipping points to get quick green transition:
 - **technological** tipping points (once cost of solar or wind plus storage is lower than that of coal, or gas)
 - **social** tipping points (Greta Thunberg effect)
 - **political** tipping points (e.g. via climate clubs and genuine leadership across politics and corporations)
- Mankind has always been inventive and will rise to the challenge but must not wait for then it will be much costlier and might be too late