Climate Emergency: Micro, Macro and Social Solutions

Daron Acemoglu

Climate Change Problem: CO$_2$ over 800,000 years

![Graph showing CO$_2$ levels over 800,000 years with marked peak in 2019 at 409.8 ppm.] (NOAA Climate.gov Data: NCEI)

Source: National Oceanic and Atmospheric Administration

- No serious doubt that this is anthropogenic.
Costs Multiplying: Predicted Increases in Temperatures

May be much worse with tipping points and mass emigration.

A true emergency.
Way Forward

- De-growth not really an option.
- About 5 billion people around the world are still in moderate or extreme poverty — living on less than $10 a day.
- Growth without energy is difficult as well — though improvements in energy efficiency of existing sources is feasible to some degree (as I show next).
- Geo-engineering is, in my opinion, no more than a dangerous chimera — and most of the techno-utopian calls for reliance on geo-engineering are no more than excuses for not doing anything.
- Real solution: transition to clean energy.
A Framework

- One useful framework may be that of Acemoglu, Akcigit and Kerr (2016):
- Many “energy tasks”, each one of which can be produced using clean or dirty technology.
- Advances in both technologies are feasible (hence energy efficiency improves even with dirty technologies).
- Switching to clean will happen unevenly across tasks because:
  - clean is further behind in some tasks;
  - clean is technically harder in some tasks.
Fewer emissions in the US energy sector today than in the 1990s.
Huge advances in renewables, especially solar and wind.
But Already a Slowdown

- This was achieved by innovation targeted to renewable energy.
- But already a slowdown.
Slowdown not Just a US Phenomenon

Renewable over Total Patents

Year


Canada
Germany
France
United States
Why the Slowdown/Reversal?

- Shale gas and the relaxation of strong incentives for renewables (Acemoglu, Aghion, Barrage and Hemous, 2022).

![Fuel Shares in U.S. Electricity Generation](chart)

Data source: EIA.
The Role of Shale Gas

- Shale gas expansion strongly associated with reversal in green patents.
Insufficient Progress, Even Without the Slowdown

- Lots of energy tasks where we have not made much advance:
  - industrial energy needs (greater reliability and storage necessary);
  - land transport (switch to electric vehicles and storage);
  - airlines (reduce use and switch to renewable fuels?);
  - agriculture (very little progress so far);
  - deforestation (obvious policies, but difficult to implement).
Sources of Greenhouse Gas Emissions

- Little advance in many of these sectors.
- More radical policies will be necessary moving forward.
What Does This Imply for Growth?

- Acemoglu et al. (2012) and Acemoglu, Akcigit and Kerr (2016): switch to clean innovation can be growth-enhancing rather than growth-retarding.
- We will likely have cheaper electricity for most tasks, brand-new climate-related investments can increase growth.
- But timing is of the essence (sooner rather than later).
- Use of the correct mix of policies critical:
  - Not just carbon taxes (but of course we do need aggressive carbon taxes);
  - Substantial subsidies to clean technology to facilitate energy transition.
What Does This Imply for Labor?

- The bad scenario: the US already has a good jobs problem, especially for workers without a college degree.
- Many men without a college degree are still employed in manufacturing, and greater environmental regulations and higher energy costs can destroy these jobs.
- Walker (2013) finds that workers in newly-regulated plans under the 1990 Clean Air Act Amendment lost jobs and earnings, with a total labor income cost of $5.4 billion.
- Can a full transition to clean energy be equally costly?
- We do not know, but probably not.
- Most manufacturing plants can switch to clean energy.
- As we have seen, renewable costs are already lower than fossil fuels. With appropriate subsidies, the effect on manufacturing may not be very large.
- The coal industry will be negatively affected, but employers just over 40,000 people at the moment.
- There is still hope that the clean energy sector can generate higher-quality jobs (in construction, operations, technical occupations, and precision work).
What Does This Imply for Macroeconomic Policy?

- The general approach in macroeconomic policy based on two ideas:
  - Welfare maximization based on discounted utility.
  - Tinbergen principle: each policy instrument dealing with a specific market failure/externality.

- It may be time to abandon both.
- Discounted utility maximization, as used, e.g., by Nordhaus, makes no sense for climate policy.
- With standard discount rates, climate damages in 100 years time matter almost not at all.
- There are good philosophical reasons for considering other social objective functions.
- For systemic, existential challenges, such as global warming, we should also abandon the Tinbergen principle.
- Already when technology can be directed it is optimal to heavily rely on subsidies to green technologies, as well as carbon taxes.
- But even more radically, there are grounds for using monetary, fiscal and financial policies for combating climate change. For example, reducing credit and/or other transfers (such as during the pandemic) to fossilfuel energy companies, and to airlines and car companies not making sufficient investments in reducing emissions.
Even Further Beyond Economics

- How did the major improvements in wind and solar take place?
- Some of it was (neoclassical) economics: subsidies to new technologies and economies of scale.
- But equally important was societal pressure:
  - Organizations such as Greenpeace prioritized climate change and new NGOs such as 350.org mobilized citizens on climate change ahead of all other issues.
  - In the words of Bill McKibben,
    "In 50 years, no one will care about the fiscal cliff or the Euro crisis. They’ll just ask: So the Arctic melted, and then what did you do?"
- Consumers demanded cleaner products.
- Employees demanded lower carbon footprint from their companies.
Of course, some of this is greenwashing. But the fact that it's happening is evidence of societal pressure.

We need more of this, much more.