"Should there be a green supporting factor? Carbon policies and climate financial regulation"

by Cherbonnier Hege

Discussion by Julien Sauvagnat

Bocconi University

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Summary

- Studies optimal abatement investments (mitigation) and resilience investments (adaptation) in a program in which carbon emissions inflict damages

$$V_t\left(Y_t, I_t, E_t, \omega_t, a_t\right) = \max_{\{A_t\ R_t\}} \left(U\left(C_t\right) + \beta E V_{t+1}\left(Y_{t+1}, I_{t+1}, E_{t+1}, \omega_{t+1}, a_{t+1}\right)\right) \tag{5}$$

Adaptation

subject to:

$$C_t = Y_t\left(1 - d\left(E_t\right)\left(1 - f R_t^{\frac{1}{2}}\right) - R_t\right) - A_t\left(I_t\right) \tag{6}$$

$$A_t\left(I_t\right) = a_t I_t + \frac{b}{2}\left(I_t\right)^2 \tag{7}$$

Mitigation

$$E_t = E_{t-1}(1-\delta) + \left(Q_t Y_t - I_t\right) \tag{8}$$

Discussion

- Modeling
- Examples of adaptation investments

Modeling - social planner vs economic agents

- In the program, social planner chooses the degree of investments in mitigation and adaptation depending on their relative benefits

- However, agents (firms, households, municipalities) typically do not take these two decisions jointly
  - Big polluters invest in mitigation even though most of them do not suffer any damages
  - Exposed firms and communities invest in adaptation, even though they do not emit any Co2

- Mitigation is a public good whereas adaptation benefits are mostly private

Modeling - Calibration

Hard to use this dynamic global program for decision-making

$$V_t\left(Y_t, I_t, E_t, \omega_t, a_t\right) = \max_{\{A_t, R_t\}} \left(U\left(C_t\right) + \beta E V_{t+1}\left(Y_{t+1}, I_{t+1}, E_{t+1}, \omega_{t+1}, a_{t+1}\right)\right) \tag{5}$$

Adaptation

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Mitigation

$$E_t = E_{t-1}(1-\delta) + \left(Q_t Y_t - I_t\right) \tag{8}$$

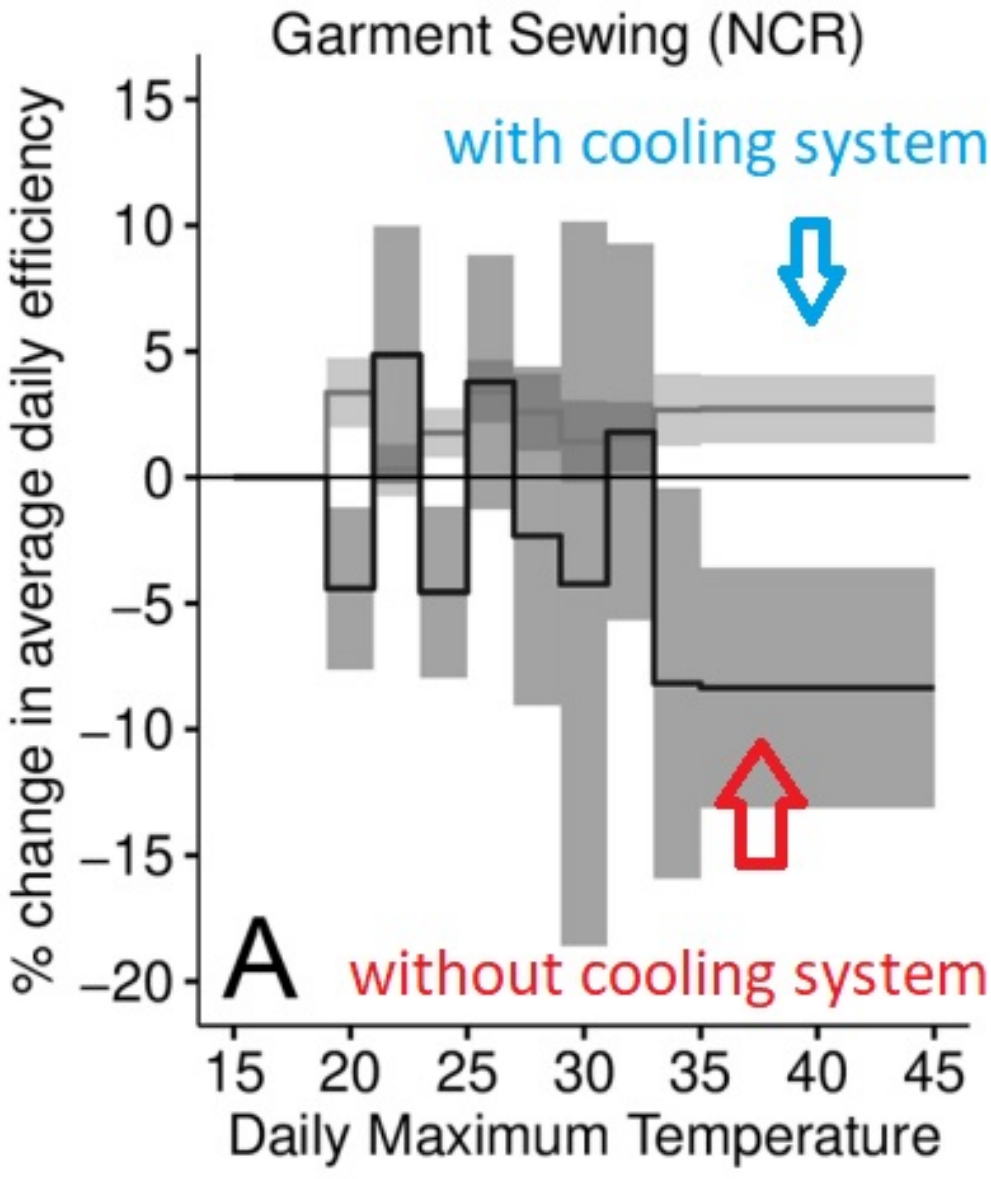
- Most of the parameters are hard to calibrate
- In particular, what do we know about f, the benefit of adaptation?

Adaptation - Somonathan Somonathan Sudarshan Tewari JPE 2021

"The Impact of Temperature on Productivity and Labor Supply: Evidence on Indian Manufacturing"

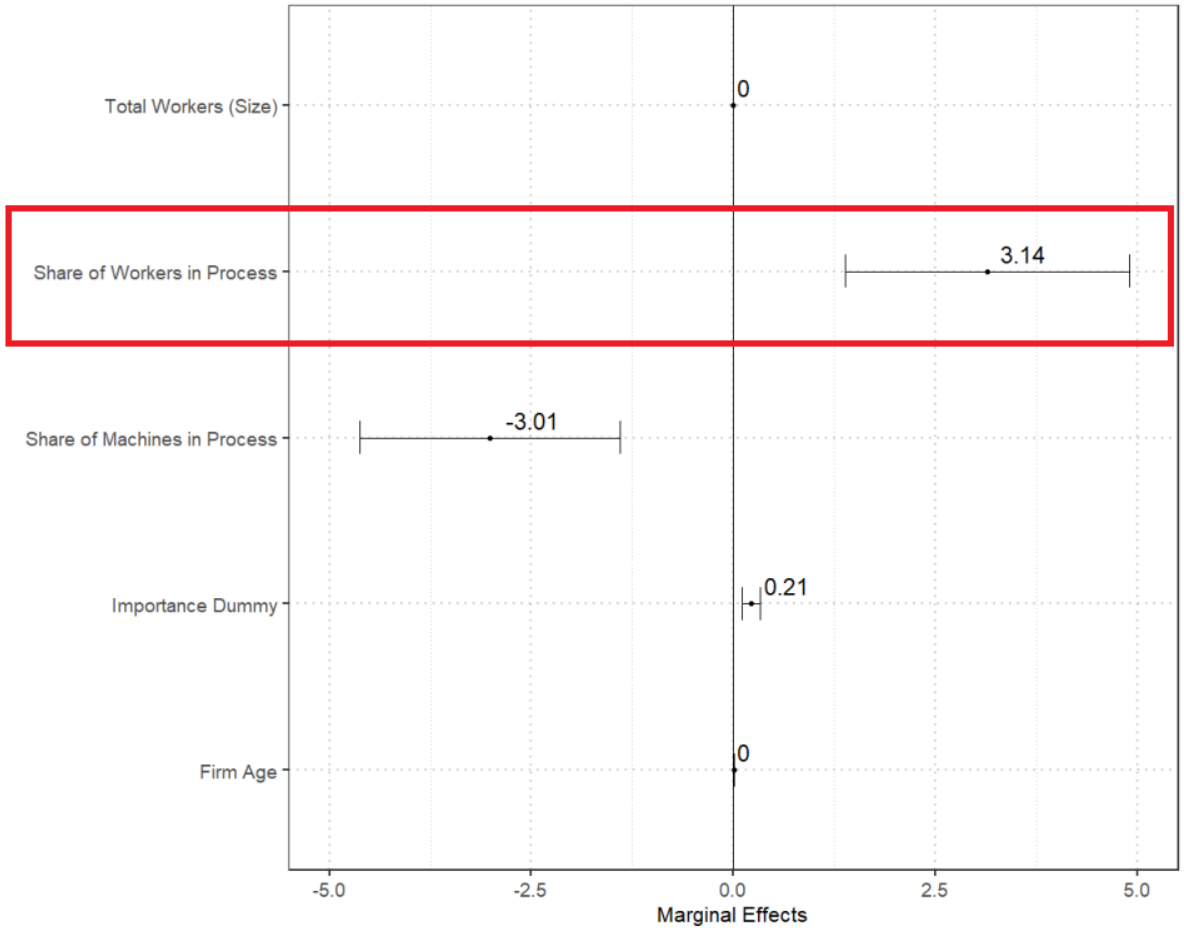
Adaptation - Somonathan Somonathan Sudarshan Tewari JPE 2021

Hot days reduce productivity



Adaptation - Somonathan Somonathan Sudarshan Tewari JPE 2021

More labor-intensive units associated with higher probability of investing in air-cooling system



Adaptation - The Venice Flood Barrier

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Never again: The disaster of 2019 should be avoided with the barriers.

Adaptation - The Venice Flood Barrier

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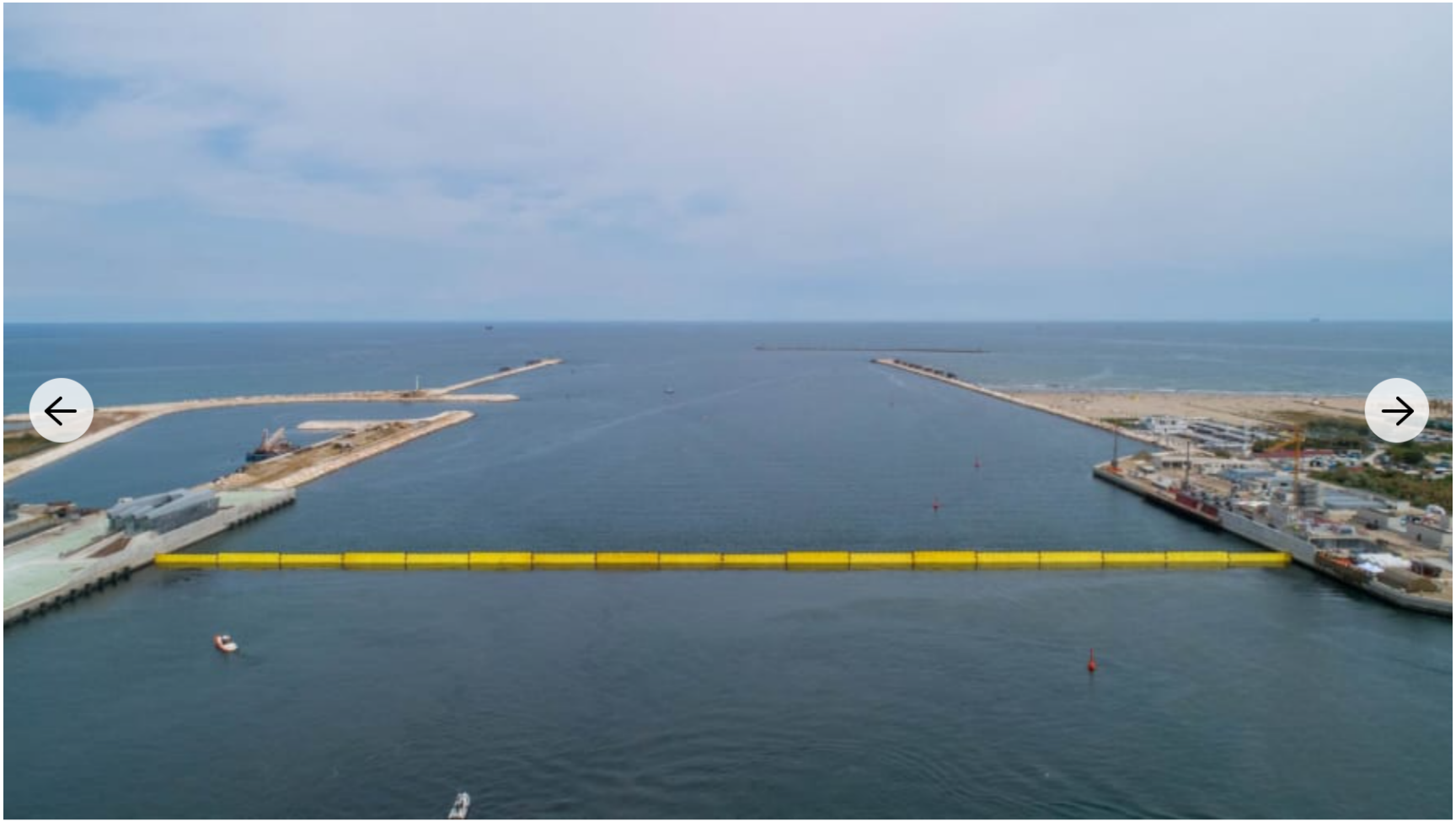
Closed case: Barriers across the lagoon's three main channels close it off to the tide.

Adaptation - The Venice Flood Barrier



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Staying dry: In their first year of operation, the barriers have not failed once.

Adaptation - The Venice Flood Barrier

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Big brother: The control room tracks the entry points to the lagoon, as well as tide levels.

How to model adaptation?

- An expense flow generating even more emissions?
  - As the cooling system in Indian factories?
- A (resilience) capital stock?

$$K_{\text{Resilience,t}} = (1 - \delta) K_{\text{Resilience,t-1}} + I_{\text{Resilience,t}}$$

  - As the barrier in Venice?