Riding the Waves: Inequality and Adaptation to Extreme Temperatures in a Changing Climate
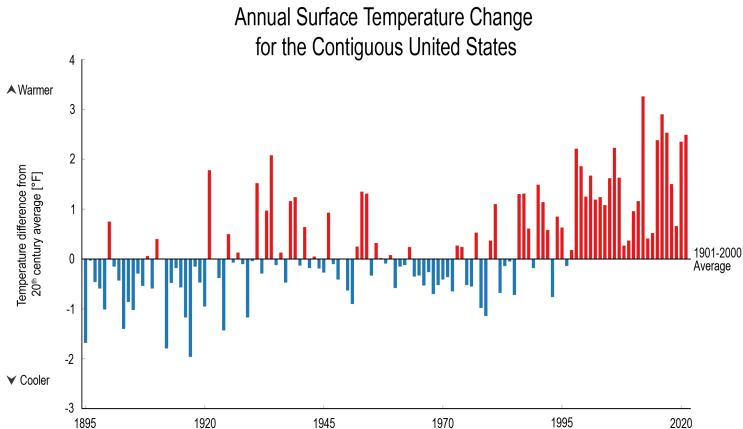
Author: Stephie Fried
Discussant: Nafisa Lohawala

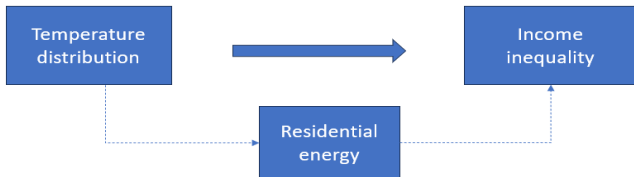Opportunity and Inclusive Growth Institute Research Conference
Oct 5, 2023

Motivation and Research Questions

- Adapting to climate change important to protect our communities

Annual Surface Temperature Change for the Contiguous United States

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- Adapting to climate change important to protect our communities

- Requires understanding the multifaceted impacts of climate change, and policy responses to develop resilience

- This paper asks:
  - How would climate change induced shift in temperature distribution affect income inequality in the US?

- Disentangles the role of different factors
  - role of adaptation to temperatures through heating/ cooling
  - role of energy assistance programs

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Model: Key Features

- Aiyagari-style dynamic heterogeneous agent model
  - At the start of each year:
    - Households don't know if it will be a hot year/ cold year
    - Choose to buy/ repair an AC/ furnace based on their expectation about the future temperature distributions (also, housing)
  - During each year
    - Households observe how hot/ cold the year actually is
    - Choose how much to use their AC/ furnace (also, consumption)
  - Perfectly competitive firms produce consumption good, housing, AC/ furnace, heating/ cooling energy
- Climate change shifts expectation about future temperatures
  - More households may buy/ repair ACs
  - Some households may get rid of furnaces
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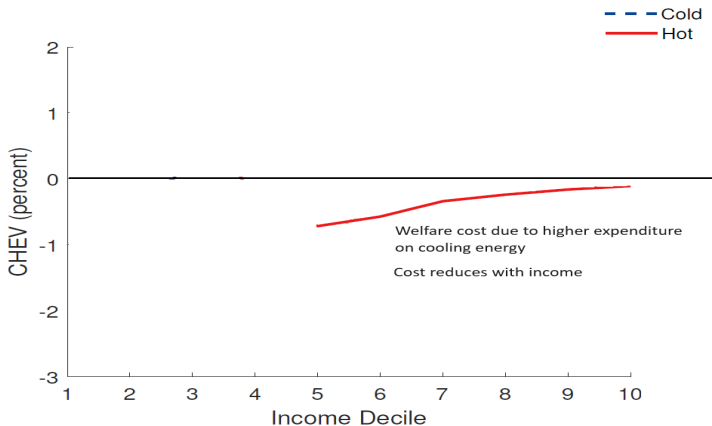   - Households may use their ACs more often

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Key Findings

Welfare consequences of climate change differ across regions/ income
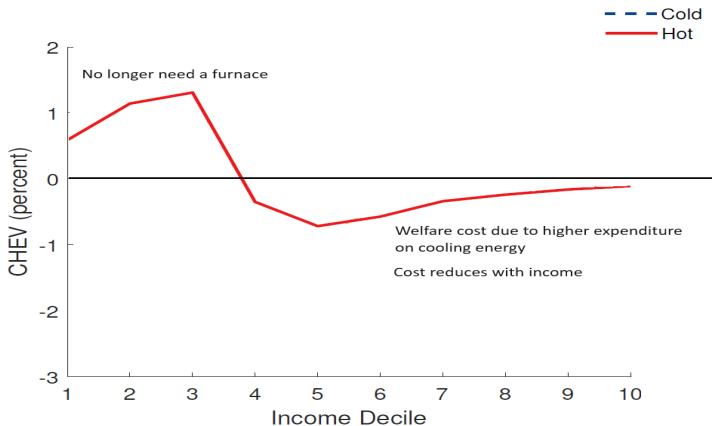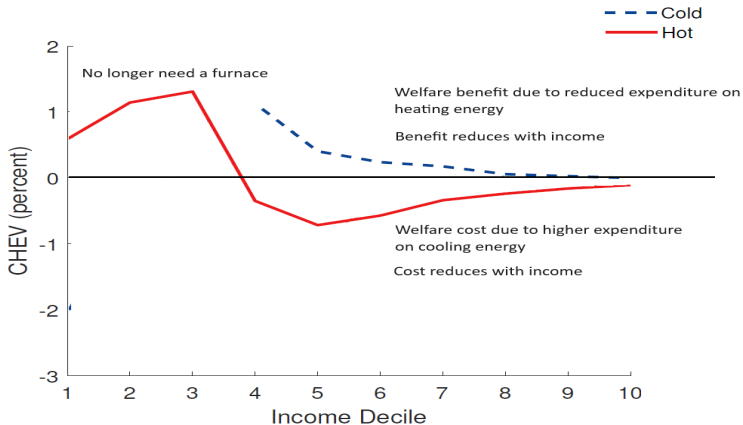

Figure 7: Welfare Consequences of Climate Change

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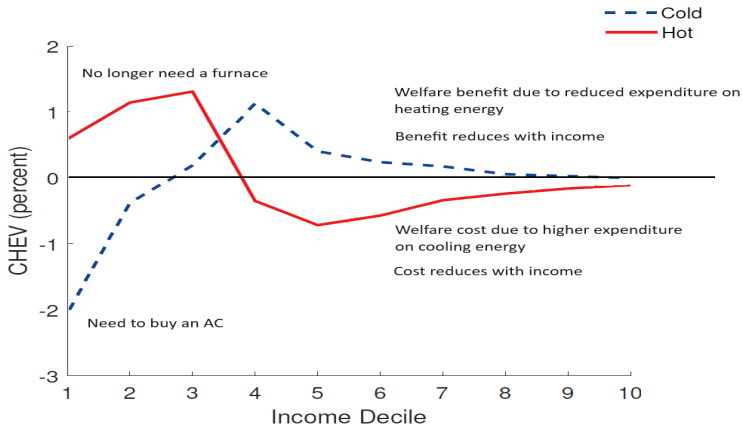

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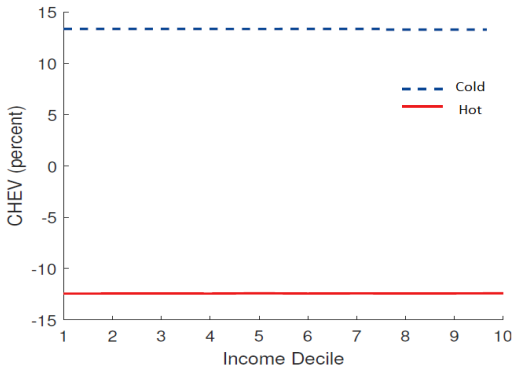

Figure 7: Welfare Consequences of Climate Change

Key Findings

Adaptation plays a key role in generating these patterns

Figure 14: Welfare Impacts of Climate Change When Households Cannot Adapt to Temperature (CHEV)

Comment 1: Welfare Effects

- The paper measures welfare effects using the consumption-housing equivalent variation (CHEV) in percent terms

- Can the welfare effects be monetized?
  - Dollar values would also be interesting to understand the magnitude of costs/ benefits

- Can the welfare effects be decomposed?
  - A household's welfare changes due to (1) change in indoor temperatures, and (2) change in households' energy expenditure

  - It would be interesting to see:
    - Average indoor temperature in the hottest month across income groups in the baseline and climate change equilibria

    - Average energy budget shares across income groups in the baseline and climate change equilibria

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Comment 2: Implications for Policy Design

- The paper analyzes the role of energy assistance programs in affecting the distributional costs of climate change

- Great because distributional consequences of government spending matters for policy[1]

- A richer modeling of the budget constraint can allow comparing policies to mitigate climate-change induced income inequality

- Consider comparing the effectiveness of LIHEAP vs WAP?
  - LIHEAP offers immediate financial assistance: crucial during extreme temperature events, but its effects are temporary.
  - WAP offers a more permanent solution by reducing the energy use

- Compare with other public assistance programs like SNAP?

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[1]See new OMB guidelines

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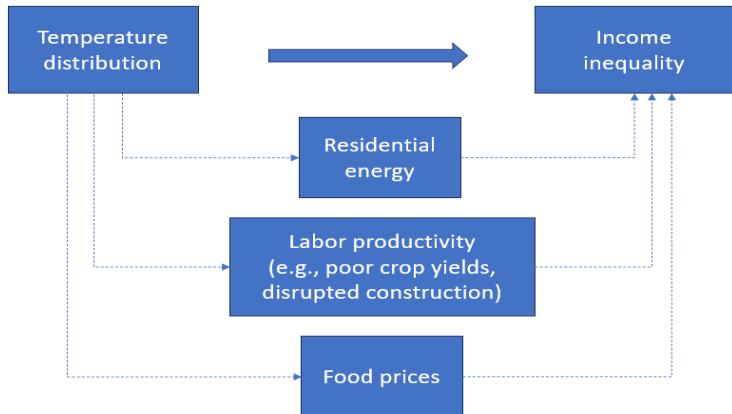- Compare with other public assistance programs like SNAP?

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Comment 3: Other Channels

- RQ: How would climate change induced shift in temperature distribution affect income inequality in the US?

- The paper focuses on residential energy costs
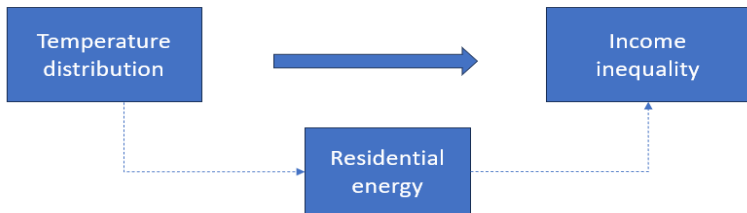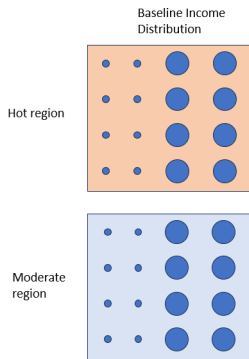
Comment 3: Other Channels

- Other channels may be relevant too

- Difficult to incorporate all of these, but helpful to discuss

Comment 4: Climate Change Induced Migration

- The paper abstracts from migration, but it can interact with energy costs to generate different patterns of inequality
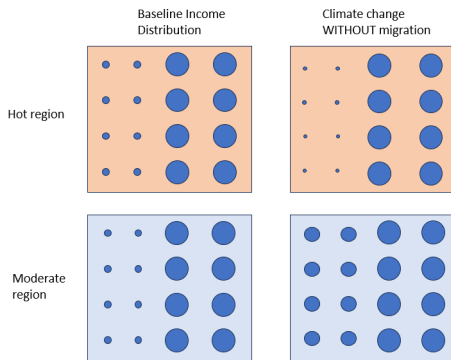- Suppose moderate regions become more attractive[2]; housing prices ↑

- Simulate scenarios by varying income distribution across regions?

[2]Kaczan and Orgill-Meyer (2019)

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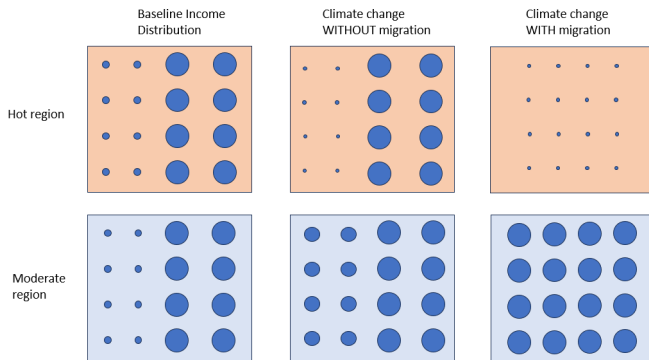- Suppose moderate regions become more attractive[2]; housing prices ↑

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Thank you
nlohawala@rff.org

Minor Comments

- Intuitively, what does it mean for indoor temperature to affect utility from housing amenities?
- How are Ω^h and Ω^c calibrated?
- It'd be helpful to see summary stats on ecomfort.com data
- Can some learning be carried to other countries?