

Adaptation to climate change: air conditioning and the role of remittances

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Background

1. Mediating effect of air-conditioning:

- ▶ Reduce the heat-related mortality (Barreca et al. 2016, JPE) Example
- ▶ Reduce the heat-related loss of labour productivity (Somanathan et al. 2021, JPE)
- ▶ Mitigate the impact of heat on learning outcomes (Park et al. 2020, AEJ)

2. However, the access to cooling energy is **unevenly distributed**

- ▶ A technology not affordable for everyone, especially in **developing economies**
- ▶ Only richer households can respond to temperature changes
- ▶ Unmet cooling needs have **social implications**

Research Questions

1. Does there exist additional income sources that can improve households' adaptive capacity?
 - ▶ Focus: **International remittances**
2. Do remittances improve households' ability to adapt to more frequent hot days?
 - ▶ Study context: **Mexico**
3. What is the welfare gain of allowing households to adopt cooling technologies?
 - ▶ **Consumer surplus gain** [Graph](#)

Remittance Income

- ▶ Remittance income has been shown to be **not fungible** (e.g. Adams, 1998; Amuedo-Dorantes and Pozo, 2014a)
- ▶ Remittances are seen as a **transitory** type of income (e.g. Adams and Cuecuecha, 2010)
- ▶ Remittances are so used differently with respect to other income sources
 - ▶ Remittances increase the marginal propensity to invest of the recipient households through **precautionary savings**
 - ▶ Households tend to spend them more at the margin on investment goods than on consumption goods

Preview of the Results

- ✓ International remittance income facilitates the adoption of air-conditioning
- ✓ The impact of remittances on air-conditioning is
 1. mostly concentrated in the coastal areas
 2. stronger for low and middle-income households
- ✓ The net increase in consumer surplus attributed to air-conditioning ranges from about \$7 to \$28 (2012 PPP) per household per year
- ✓ Net benefits of air-conditioning depend on the social costs of additional CO₂ emissions.

Literature: Adaptation to climate change

- ▶ Labour income and wealth are crucial determinants of adaptive capacity and financial constraints a critical barrier (Yohe and Tol, 2002; Smit and Wandel 2006, Chambwera et al. 2015; Siders, 2018)
- ▶ Access to and adoption of air-conditioning (Auffhammer and Mansur, 2014; Davis and Gertler, 2015; De Cian et al., 2019; Mastrucci et al., 2019; Randazzo et al., 2020; Pavanello et al., 2021)
- ▶ Migration as a powerful adaptation strategy for population living in fragile environments (Gray and Mueller, 2012; Belasen and Polachek, 2013; Mastroiillo et al, 2016; Cattaneo and Peri, 2016; Baez et al., 2017; Bosetti et al, 2020)

Literature: Remittances

- ▶ Remittances relax households' budget constraint and enable different decisions regarding expenditure allocation (Edward and Ureta, 2003; Chami et al., 2005; Taylor and Mora, 2006; Woodruff and Zenteno, 2007; Yang, 2008; Mendola, 2008; Adams and Cuecuecha, 2010b; Clément, 2011; Amuedo-Dorantes and Pozo, 2014a)
- ▶ Remittances increase asset accumulation (Adams, 1998; Chiodi et al. 2012; Adams and Cuecuecha, 2010a; Amuedo-Dorantes and Pozo, 2014a; Amuedo-Dorantes and Pozo, 2014b)
- ▶ Remittances influence energy consumption through energy-related goods and investments (Airola, 2007; Adams and Cuecuecha, 2010a; Akcay and Demirtas, 2015)
- ▶ Role of remittances in the adaptation process has been marginally studied (Veljanoska, 2021)

Mexico

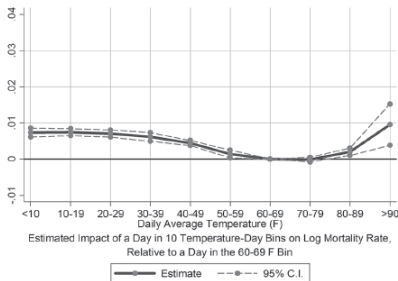
- ▶ **Third country for inflows of remittances** and the top remittance recipient in Latin America and the Caribbean, second/first in relative terms
Inflows
- ▶ Experiencing a **rapid increase in air-conditioning adoption**.
Air-conditioning penetration rate has doubled in the last 10 years (Davis and Gertler, 2015) Imports
- ▶ Mexico is an ideal setting for an empirical study on air-conditioning because of its **hererogeneous climate** Climate

THANK YOU FOR YOUR ATTENTION!

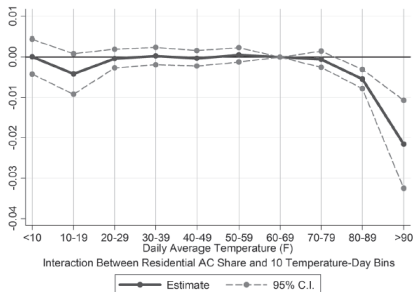
Extreme Heat, Human Well-being, and Air-conditioning

An Example from Barreca et al. (2016):

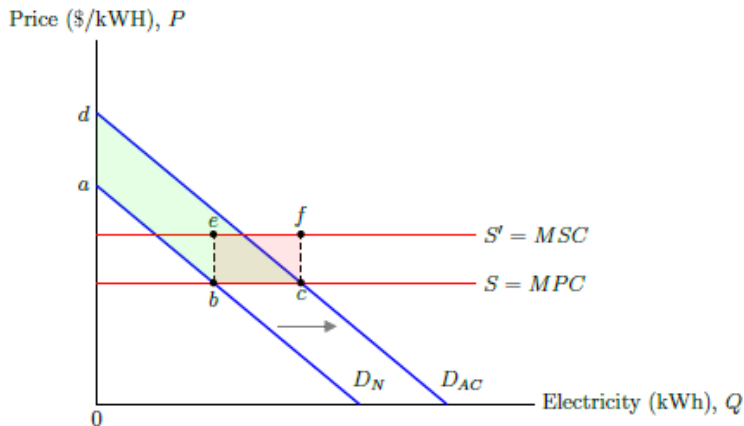
Without AC



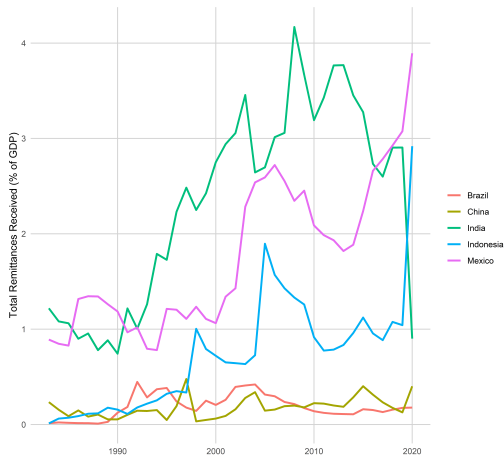
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Consumer Surplus Gain

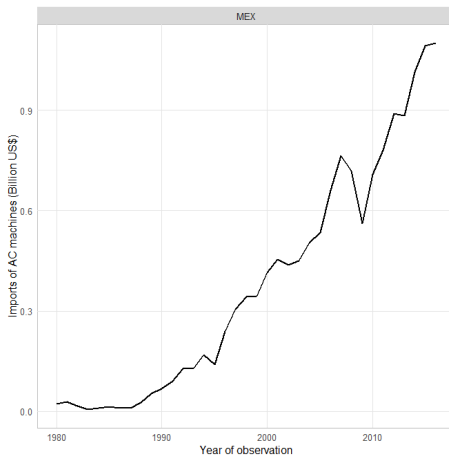


Inflows of Remittances



Data Source: World Bank [Main](#)

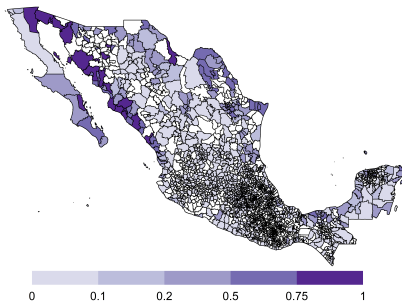
Air-conditioners



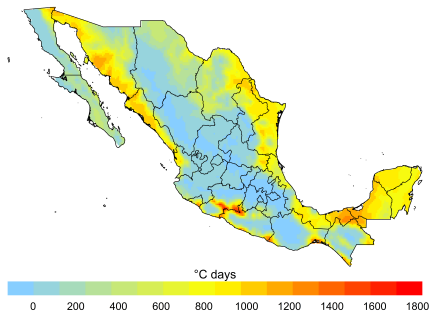
Data Source: Uncomtrade [Main](#)

Air-conditioning and Climate

Air-conditioning



Climate



Data Source: (1) ENIGH (2) GLDAS [Main](#)