

International Transmission of Climate Shocks

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Overview

- Climate: global public good
 - ▶ Climate change policy: national, sub-national
- Do international linkages exacerbate or mitigate costs of climate change?
 - ▶ Yes

Overview

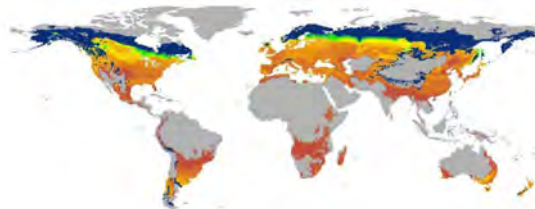
- Damages and adaptation
 - ▶ Trade
 - ▶ Migration
 - ▶ Conflict
- Mitigation
 - ▶ Trade policy
 - ▶ Multinational production
 - ▶ Innovation
 - ▶ International agreements

Overview

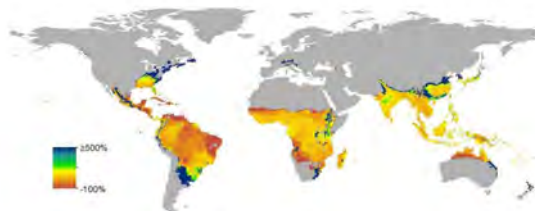
- **Damages and adaptation**
 - ▶ **Trade**
 - ▶ **Migration**
 - ▶ **Conflict**

- Mitigation
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Damages and Adaptation: Trade (1/3)



Panel (a): wheat



Panel (b): rice

Figure 1: Predicted Yield Changes. Percent changes in yield due to climate change in GAEZ model. Gray areas denote regions for which predicted yields are zero both before and after climate change.

Damages and Adaptation: Trade (2/3)

TABLE 1: CLIMATIC EFFECTS ON EXPORTS

Variables	Exports to United States		Exports to "world"	
	1 digit (1)	2 digit (2)	1 digit (3)	2 digit (4)
Temperature (degrees Celsius)	0.364 (0.421)	0.114 (0.465)	-0.356 (0.289)	-0.192 (0.326)
Temperature \times Poor	-4.173*** (1.272)	-5.812*** (1.409)	-1.637* (0.846)	-2.216** (0.942)
Precipitation (100 mm/year)	0.0830 (0.105)	0.0141 (0.110)	-0.0526 (0.103)	-0.0878 (0.0882)
Precipitation \times Poor	0.0166 (0.138)	0.253 (0.195)	0.105 (0.149)	0.415*** (0.152)
Observations	19,164	63,990	31,654	123,956
Years	1973–2001	1973–2001	1963–2000	1963–2000
Product categories	10	66	10	70
R^2	0.165	0.188	0.308	0.297
Poor effect	-3.810*** (1.235)	-5.698*** (1.255)	-1.993** (0.833)	-2.409*** (0.916)

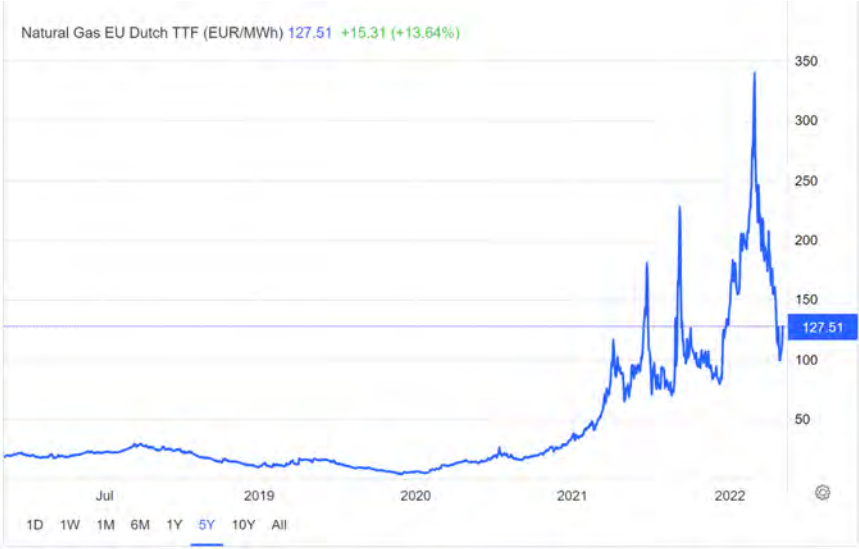
Notes: Each specification includes country \times product fixed effects and product \times year fixed effects. Regressions are Feasible Generalized Least Squares. Standard errors are clustered by exporting country.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Damages and Adaptation: Trade (3/3)



Source: tradingeconomics.com

Damages and Adaptation: Migration

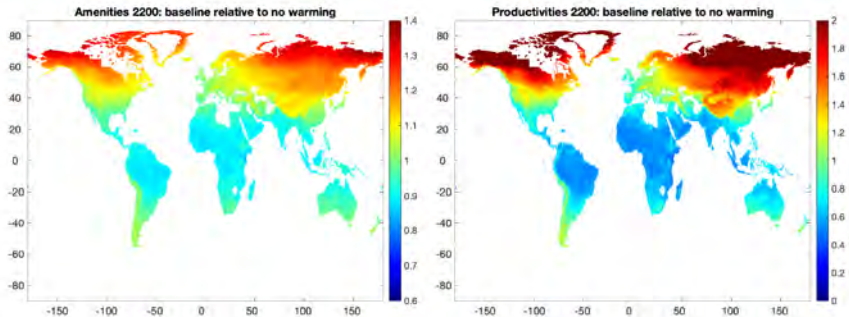
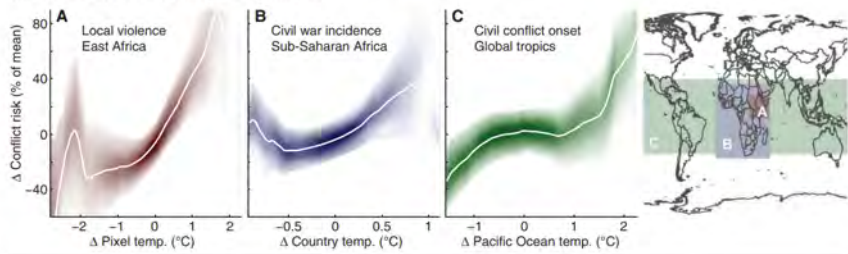


Figure 6: Gains and losses in amenities and productivities from global warming in the year 2200.

Source: Cruz and Rossi-Hansberg (2022)

Damages and Adaptation: Conflict

Climate and conflict across spatial scales. Evidence that temperature influences the risk of modern human conflict: (A) local violence in 1° grid cells, (B) civil war in countries, and (C) civil conflict risk in the tropics. The map depicts regions of analysis corresponding to nonparametric watercolor regressions in (A) to (C). The color intensity in (A) to (C) indicates the level of certainty in the regression line.



Source: Burke, Hsiang, and Miguel (2013)

Overview

- Damages and adaptation
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- **Mitigation**
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Mitigation: Trade Policy

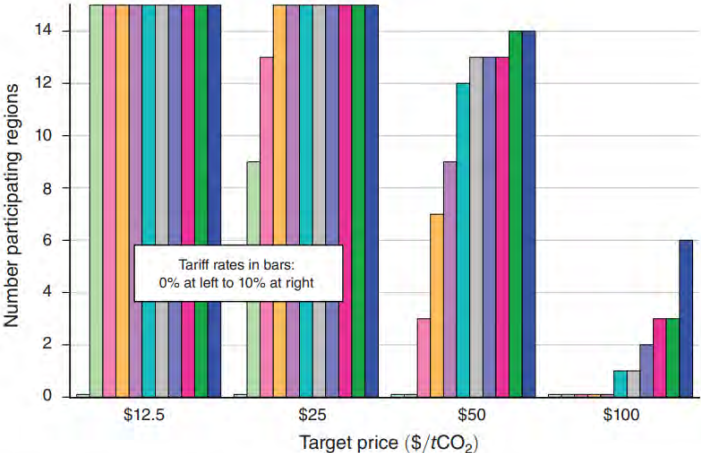


FIGURE 3. NUMBER OF PARTICIPATING REGIONS BY INTERNATIONAL TARGET CARBON PRICE AND TARIFF RATE

Source: Nordhaus (2015)

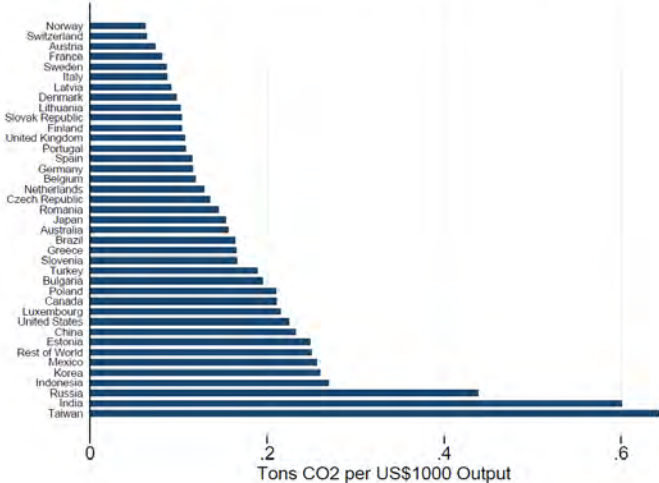
Mitigation: Trade Policy

Country	Non-Cooperative Border Taxes			Cooperative Carbon Taxes		
	ΔCO_2	ΔV	ΔW	ΔCO_2	ΔV	ΔW
EU	0.7%	-1.2%	-1.3%	-9.2%	0.0%	2.0%
BRA	-6.0%	-1.3%	-1.3%	-70.7%	-1.3%	-0.8%
CHN	3.0%	-1.0%	-1.0%	-69.3%	-1.3%	-0.9%
IND	1.1%	-4.4%	-4.4%	-76.0%	-2.6%	-2.1%
JPN	3.4%	-0.9%	-0.9%	-23.1%	-0.2%	1.5%
MEX	-1.6%	-3.2%	-3.2%	-79.5%	-0.6%	-0.4%
USA	1.3%	-1.7%	-1.7%	-48.2%	-0.3%	0.3%
Global	-0.6%	-1.7%	-1.7%	-61.0%	-0.6%	0.4%

Source: Farrokhi and Lashkaripour (2022)

Mitigation: Multinational Production / FDI

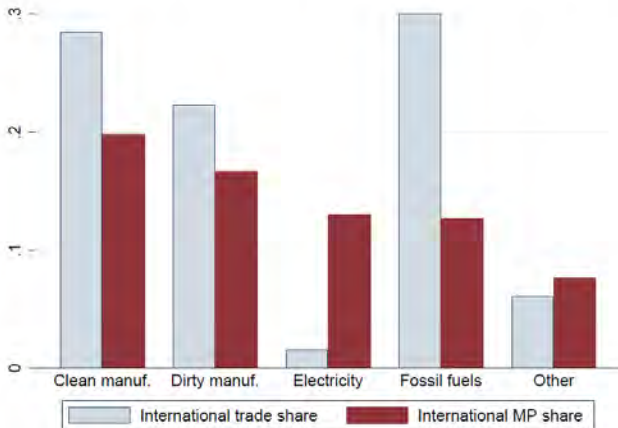
Figure 1: Carbon Intensity of Production, by Country



Source: Garcia-Lembergman et al. (2022)

Mitigation: Multinational Production / FDI

Figure 3: Shares of Trade and Multinational Production in Output, by Broad Sector



Mitigation: Multinational Production / FDI

Table 1: Affiliate's CO₂ Rates Vary by Home Country

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: Firm log CO ₂ rate						
Home country's log CO ₂ rate	0.96*** (0.24)	1.07*** (0.22)	0.56* (0.30)	0.63** (0.25)	0.63** (0.23)	0.60** (0.29)
Host country's log CO ₂ rate	0.89*** (0.09)	0.86*** (0.09)				
Firm log revenues						-0.48*** (0.08)
Observations	4,833	4,833	4,833	4,833	4,833	4,833
R-squared	0.05	0.24	0.28	0.48	0.63	0.70
# host countries	42	42	42	42	42	42
# home countries	32	32	32	32	32	32
Industry FE	no	yes	no	yes	-	-
Host country FE	no	no	yes	yes	-	-
Industry x host country FE	no	no	no	no	yes	yes

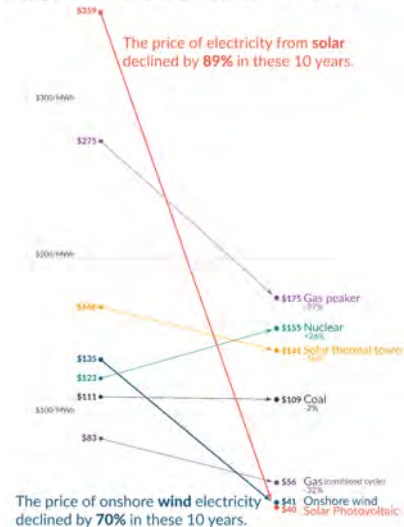
Source: Garcia-Lembergman et al. (2022)

Mitigation: Innovation

The price of electricity from new power plants

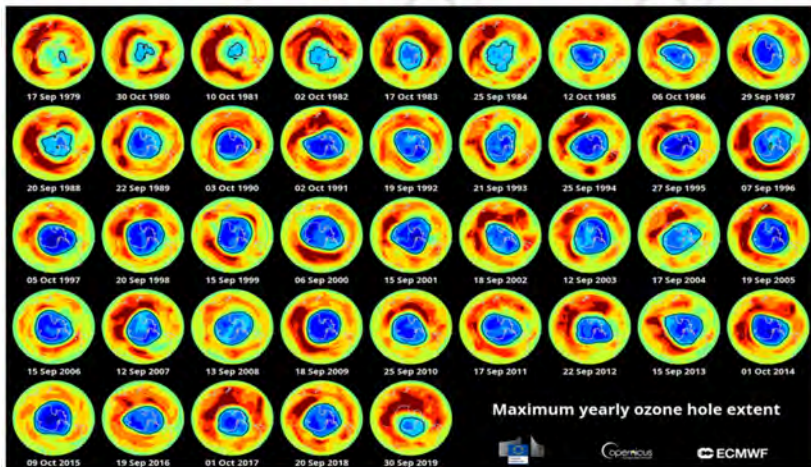
Electricity prices are expressed in "levelized costs of energy" (LCOE). LCOE captures the cost of building the power plant itself as well as the ongoing costs for fuel and operating the power plant over its lifetime.

Our World
in Data



Mitigation: International Agreements

Fig. 4: Maximum ozone hole extent over the southern hemisphere, from 1979 to 2019



Source: Copernicus Atmosphere Monitoring Service provided by Copernicus Atmosphere Monitoring Service (CAMS), via [urlhttps://www.eea.europa.eu/data-and-maps/indicators/production-and-consumption-of-ozone-3/assessment](https://www.eea.europa.eu/data-and-maps/indicators/production-and-consumption-of-ozone-3/assessment)

Overview

- Do national borders mitigate or exacerbate climate change?
 - ▶ Both
 - ▶ Challenge: constrained optimal policy