



UNSW Business School\School of Economics

## **International Cooperation on Climate Change**

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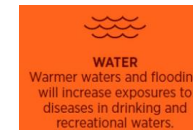
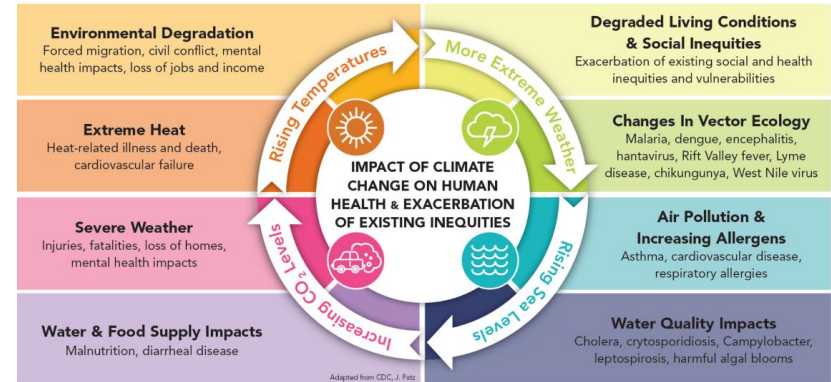
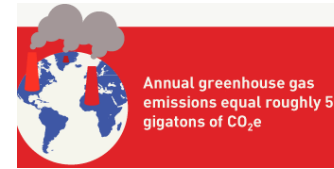
# Climate Change: Pressing Global Issue

- Human-induced Global Warming: ***Faster than ever and Accelerating***
- Substantial Consequences: ***Everyone at Everywhere***
- **Our Basic Needs** (Air, food, water, shelter, etc.) Under High Risk

Between 2030 and 2050 climate change is expected to cause

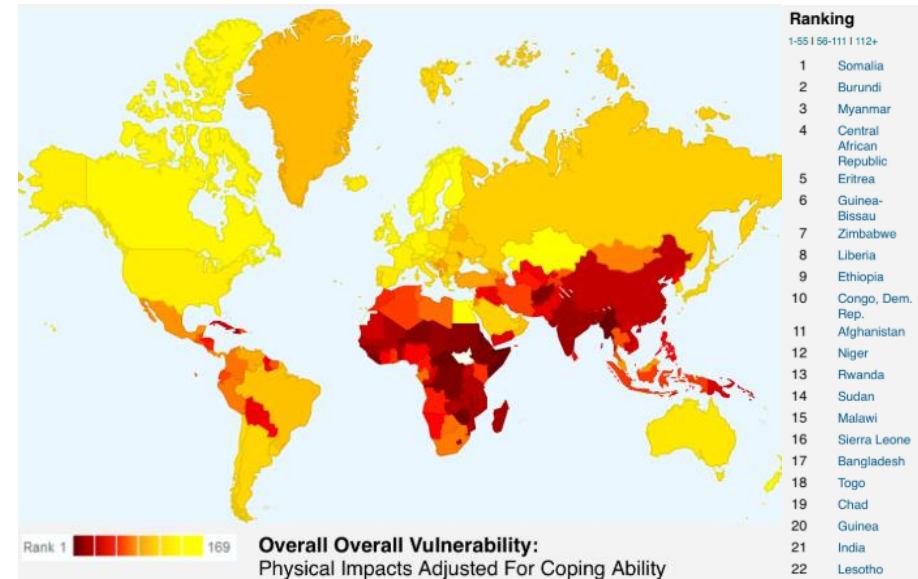
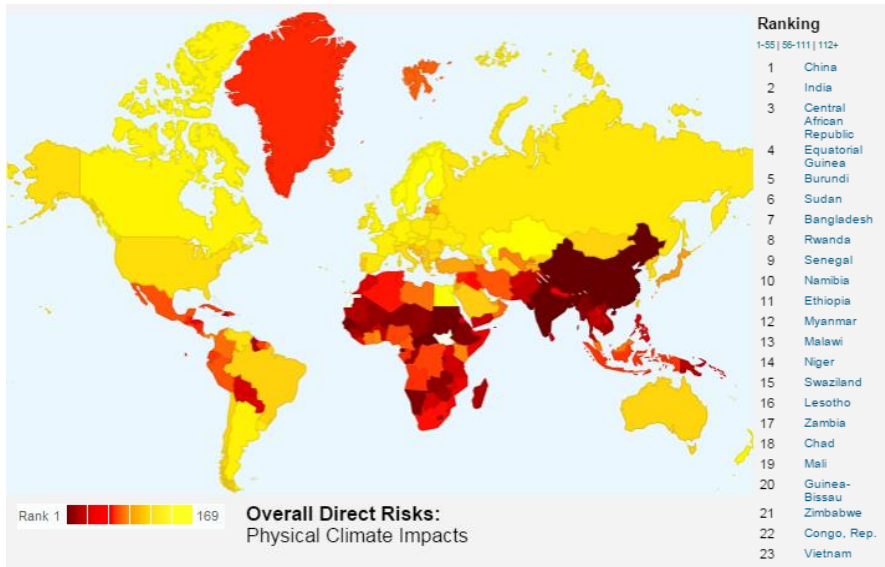
**250 000 ADDITIONAL DEATHS PER YEAR**

due to malaria, malnutrition, diarrhoea and heat stress.



# Role of Developing Countries: Suffer Most

- The most vulnerable – the poorest countries and populations – will suffer earliest and most, and it is harder for them to cope with climate change.



(Center for Global Development, 2011)

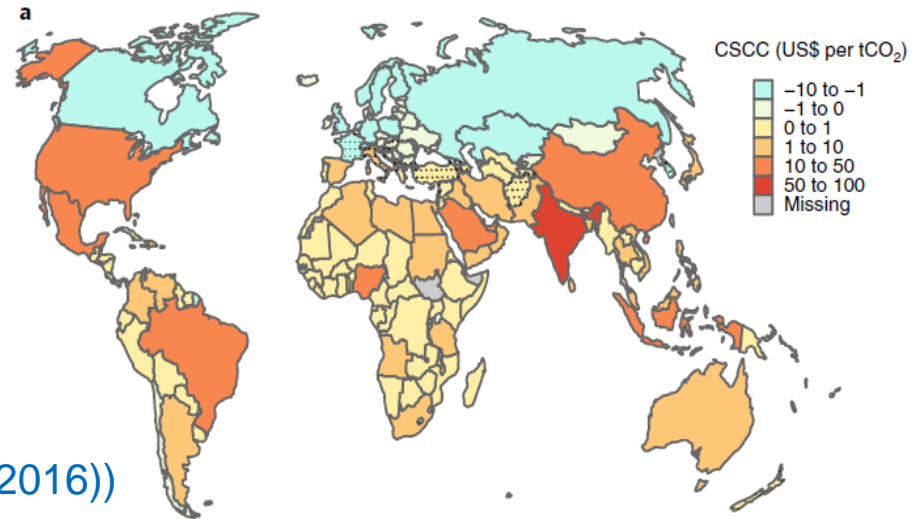
# Role of Developing Countries: High Incentives and Benefits

- Social cost of carbon associated with climate damage: **India highest**

Climate change could cost **India 2.8 percent of GDP** and depress the living standards of **nearly half the country's population by 2050** (World Bank Group, South Asia's Hotspots).

- Economics co-benefits (Mayrhofer & Gupta(2016))

- Stimulate technological innovation
- Enhance energy security
- Trigger private investment
- Generate Employment



Source: Ricke, Katharine, et al. "Country-level social cost of carbon." *Nature Climate Change* 8.10 (2018): 895.

# Benefits and Costs of Tackling Climate Change

## Benefit of action:

- 5%-20% of global GDP each year



## Cost of action:

- 1% of global GDP each year

Source: Stern Review: The Economics of Climate Change(2006)

# Why does this simple math not work?

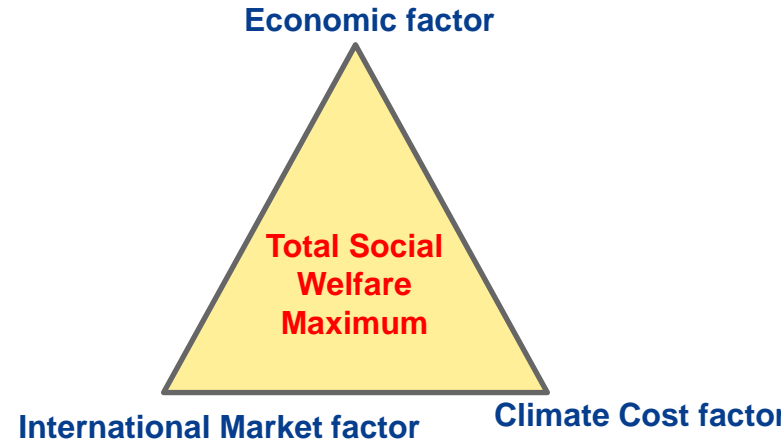
- Climate Change: a **GLOBAL** issue in terms of its cause and consequences
- Pure public good  $\longrightarrow$  free riding problems
- Sovereignty of countries: US or China or any other countries can not be forced to abate.
- Trade competitiveness loss:
  - A 1-percent point change in costs raises import penetration by 0.53 percent point. (Ederington & Minier (2003) )

**Global Prisoner's Dilemma**  
**Country A (US)**

		Country A (US)	
		Abate	Pollute
Country B (China)	Abate	10 / 10	0 / 15
	Pollute	15 / 0	1 / 1

# A Economic Theoretical Model

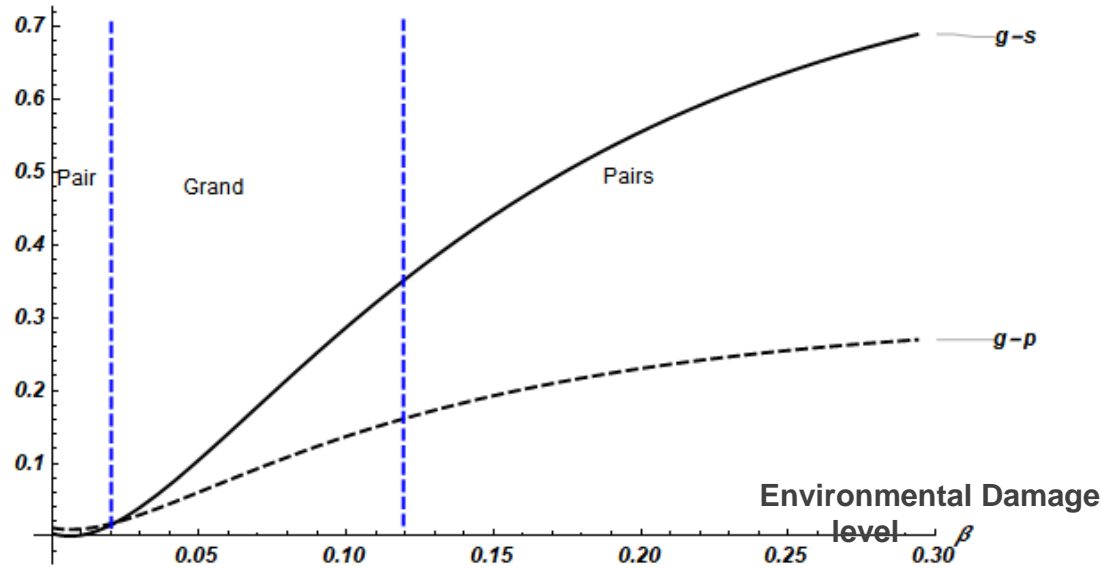
- Holistic Economic Model (Production, Consumption, Climate Impact, Trade)
- A three-country, three-good model in a symmetric world.
- Emission is jointly produced with production.
- Government sets a production tax to regulate emissions.
- Each country imports one good and exports the other two goods.
- The welfare includes the consumer surplus, producer surplus, revenues, less the damage caused by climate change.



# Small Coalition Paradox

- Game Theory Model for Coalition Formation

Welfare gain from full cooperation

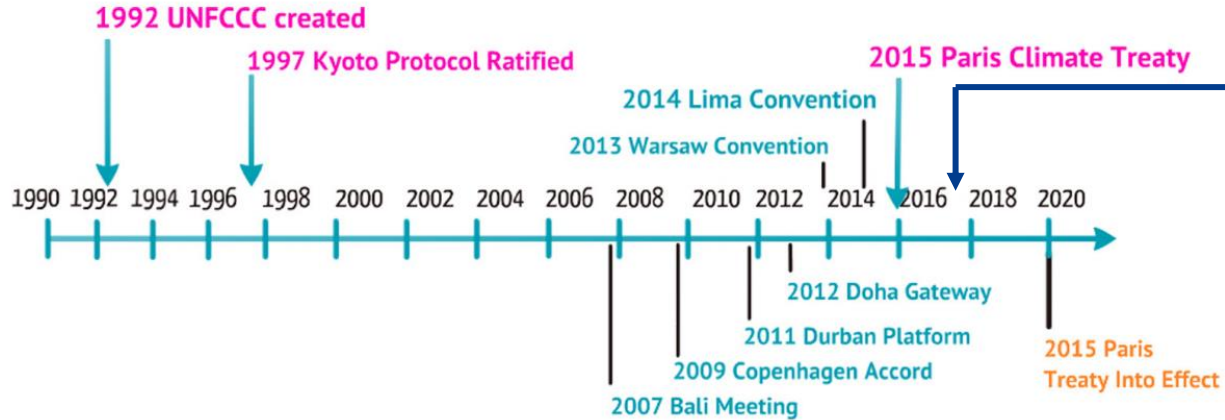


Global Welfare Gain from Grand Coalition



# International Cooperation on Climate Change

- Progress

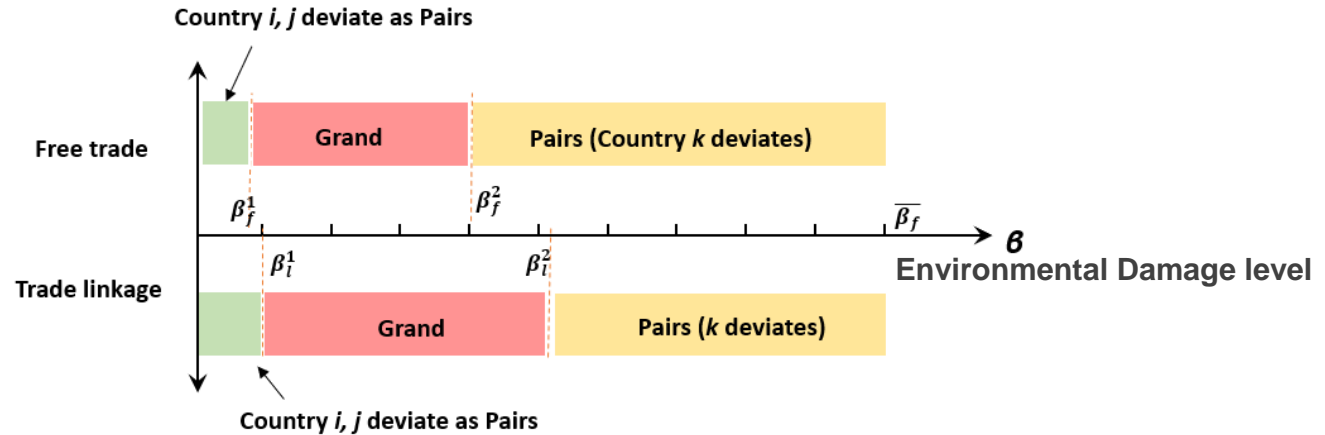


United States withdrawal from the Paris Agreement

- *What's next?*
- *How to form an effective and efficient global environment agreement?*

# How to overcome this Paradox?

- Trade is a potential solution to deter free riding problems.
- A climate club: countries that don't participate in climate cooperation will be excluded from trade privileges.



- Nordhaus (2015): a relatively low tariff (2%) is sufficient to sustain full participation and guarantee efficiency when the abatement responsibility is low. Countries with high damages (such as India) show gains in all regimes.

# Challenges in introducing trade linkage

- Countries who used to be free riders are worse off with climate club.
- If the introduction of such a club requires unanimity, free riders will be strongly against it.
- Under current WTO rules, it is not obvious whether a new clause providing for withdrawal of tariff concessions as punishment for non-participation in IEAs could be introduced without consensus of all member countries ([Maggi, 2016](#)).

**Think creative!**

**Don't wait until it's too late!**