



# Climate Compacts to Combat Free Riding in International Climate Agreements

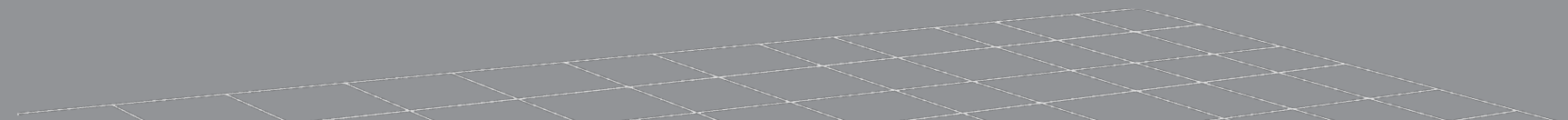
**Bill Nordhaus**

Yale

Markus Brunnermeier

Princeton

28. January 2021



# Other Webinars on Climate Change

- Jim Stock

- ... and the macroeconomy



- Esteban Rossi-Hansberg

- ... and geography, migration, ...
- Carbon taxes “flatten the curve”
  - Using less in near future, lowers costs for far future



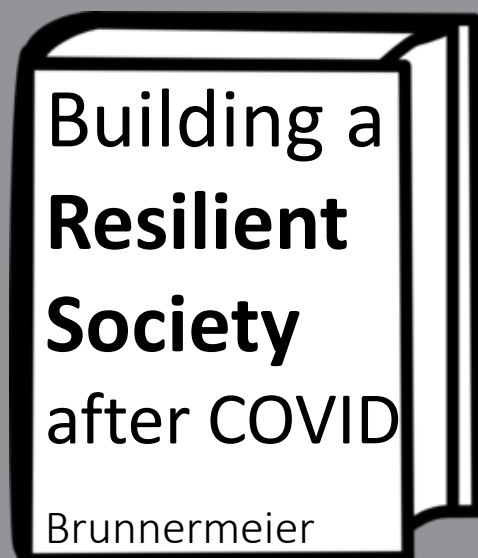
- Richard Zeckhauser

- Mitigation
- Adaption, and
- Amelioration (geoengineering, ...)



	bilateral	multilateral
Outcome-based		X
Rule-based		

- Global governance in G7, G20
  - Works well when specialized areas
  - More challenging across policy areas



# Paris Agreement vs. Paris Club

- Econ: Free rider problem



Create Club

- International Climate Agreements

- **Paris Club**



- Free-riding  
Hold-out problem  
in debt restructuring
- Critical mass of members
  - How to include China?
- Who is leveraging up the club
  - IMF
    - Coordinated approach arranged by Club
    - Precondition for IMF funding assistance

- Combat global pollutant together with local/regional pollutants
  - Politically easier
  - Hotspot issue of local pollutants make cap-and-trade schemes more challenges
  
- Border Adjustment Tax
  - Different strategies between US and EU (and China?)
    - Carbon cap-and-trade vs. industry focused?
  
  - **Objective**
    - Ensure country X doesn't get unfair advantage or
    - Induce foreign firms to also produce CO2 clean?

- ESG: Private Market Solutions
  - Importance relative to carbon tax/cap-and-trade
  - Role of central banks
- Ramp – how to phase in policies
  - Planning certainty (price vs. quantity certainty)
  - Discount rate  $r = \rho + \gamma E[g] + \frac{1}{2} \gamma(\gamma + 1) \tilde{\sigma} + Cov \dots$
  - Depreciation of existing capital stock
  - QWERTY network effects

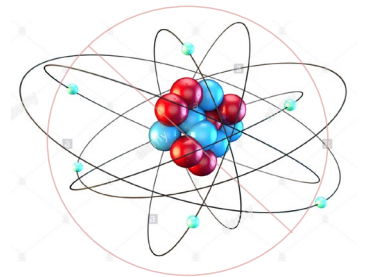
# Poll Questions

1. Human activity is a significant contributing factor in changing global temperatures.
  - a) complete agree b) mostly agree
  - c) mostly disagree d) completely disagree e) don't know
2. Global warming will pose a serious threat to Americans in our lifetime
  - a) complete agree b) mostly agree
  - c) mostly disagree d) completely disagree e) don't know
3. The country should tax the use of fossil fuels like oil and coal to slow global warming.
  - a) complete agree b) mostly agree
  - c) mostly disagree d) completely disagree e) don't know
4. The US should spend as much to stop global warming as it does on the military
  - a) complete agree b) mostly agree
  - c) mostly disagree d) completely disagree e) don't know

# *National and International Policies for Slowing Global Warming*

William Nordhaus  
Sterling Professor of Economics  
Yale University

January 28, 2021

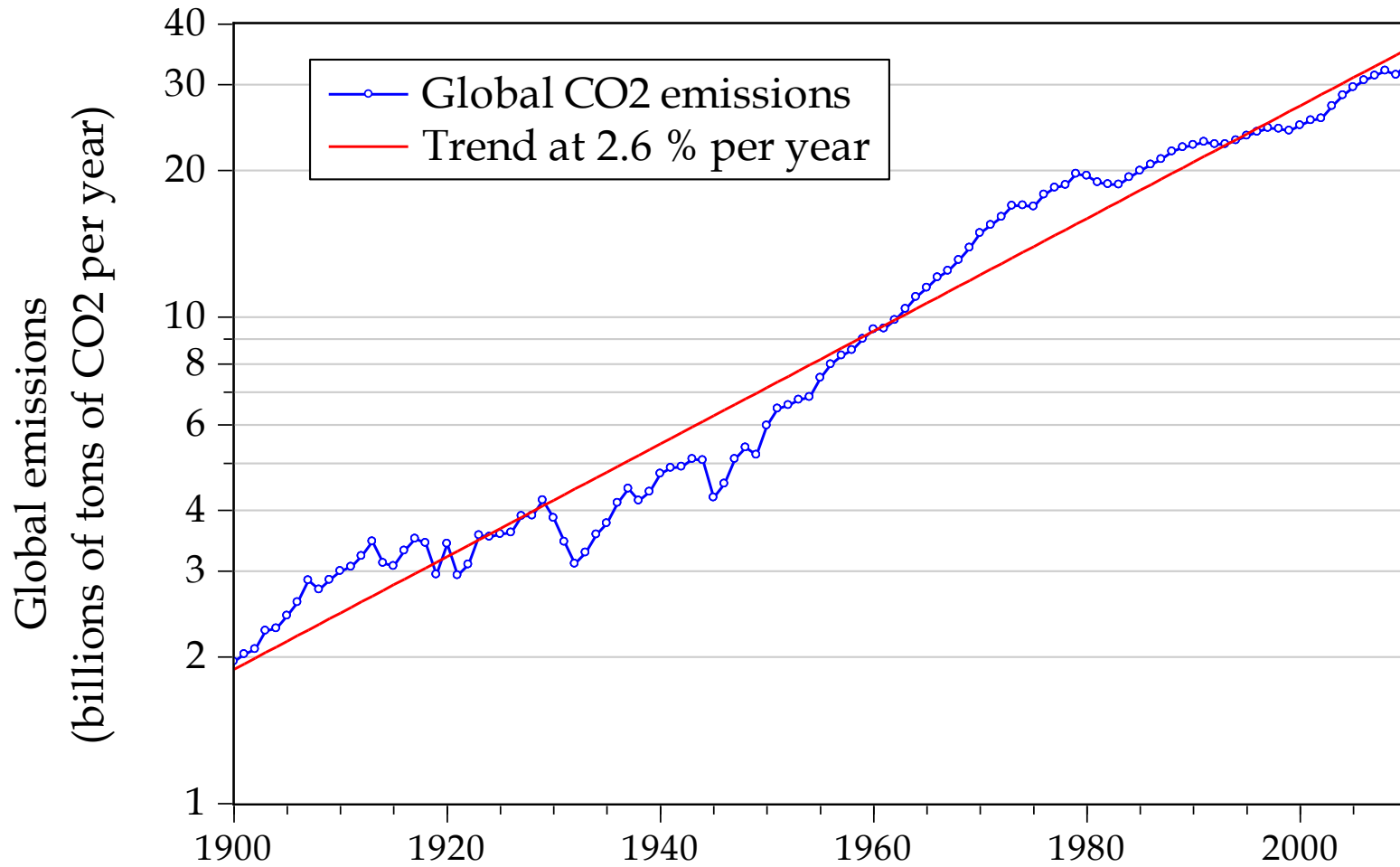




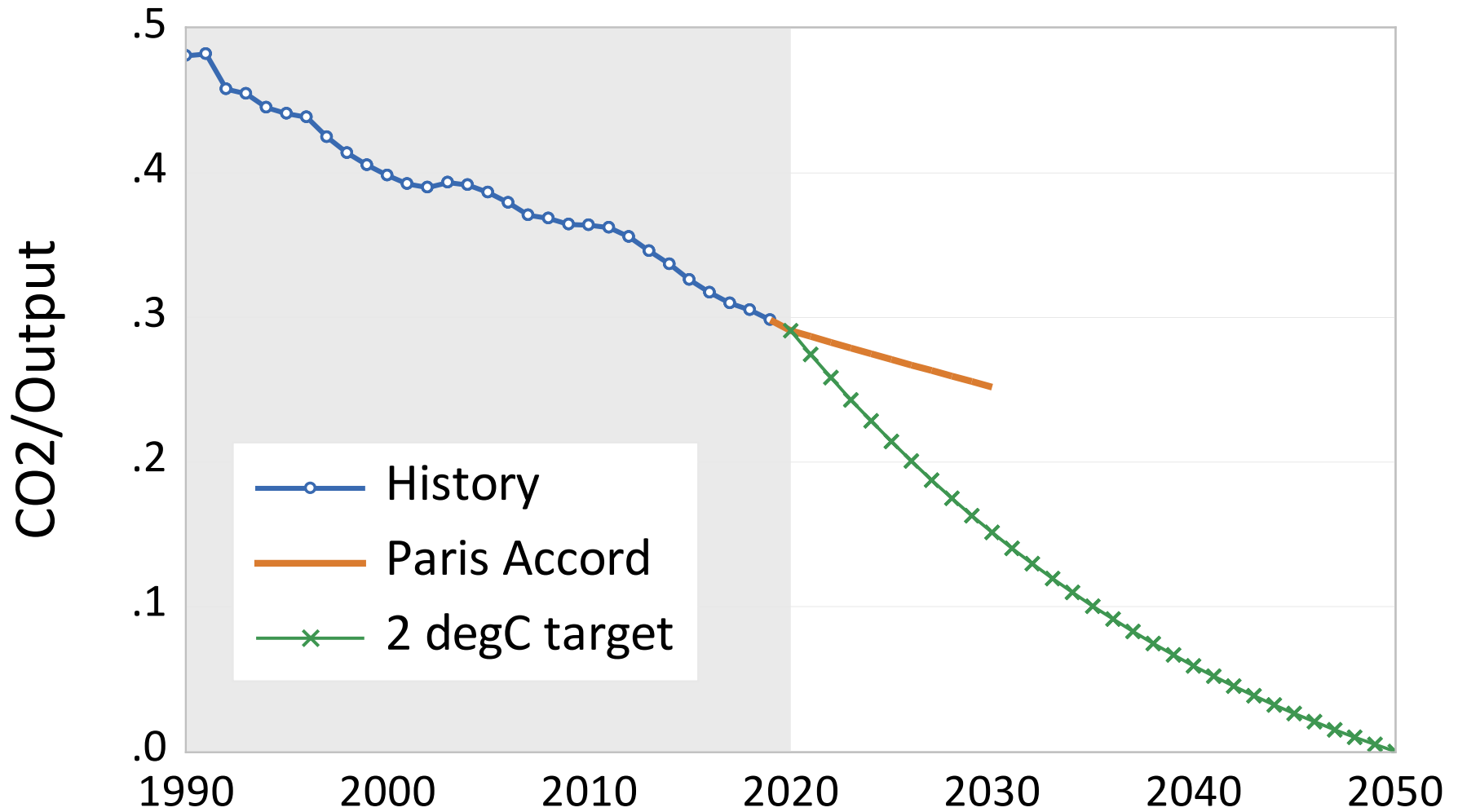
## *Four key issues for today*

- Little progress in slowing emissions
- Particular challenge of poor incentives for low-carbon technologies
- Important role of carbon pricing
- Need to combat international free riding with a climate compact

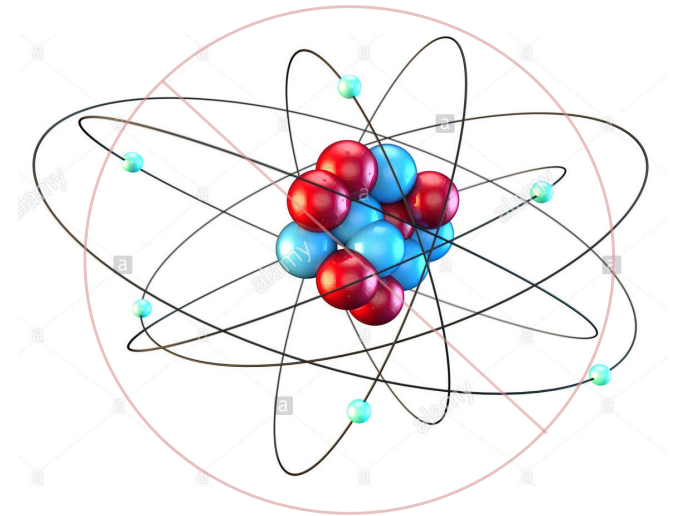
# *Global CO<sub>2</sub> emissions*



# Decarbonization: History and Future



# *Role of Economics in Climate Policy*



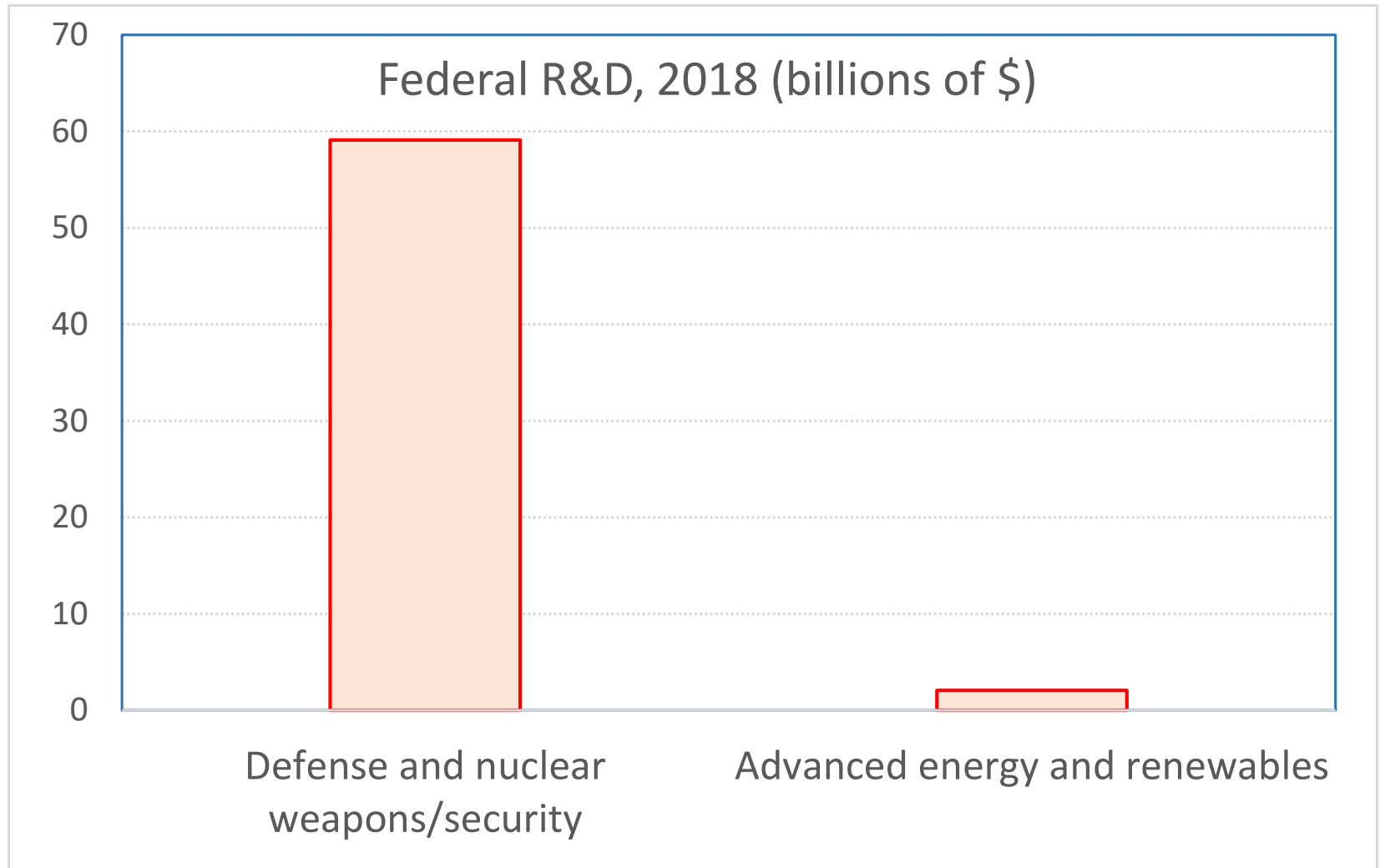
# *Economic Insight 1: Inadequate investment in low-carbon technologies*

- Public return on innovation many times larger than private returns
- But even worse: there is double externality for low-carbon innovations:
  - normal innovation externality
  - climate impacts externality

Policies requires

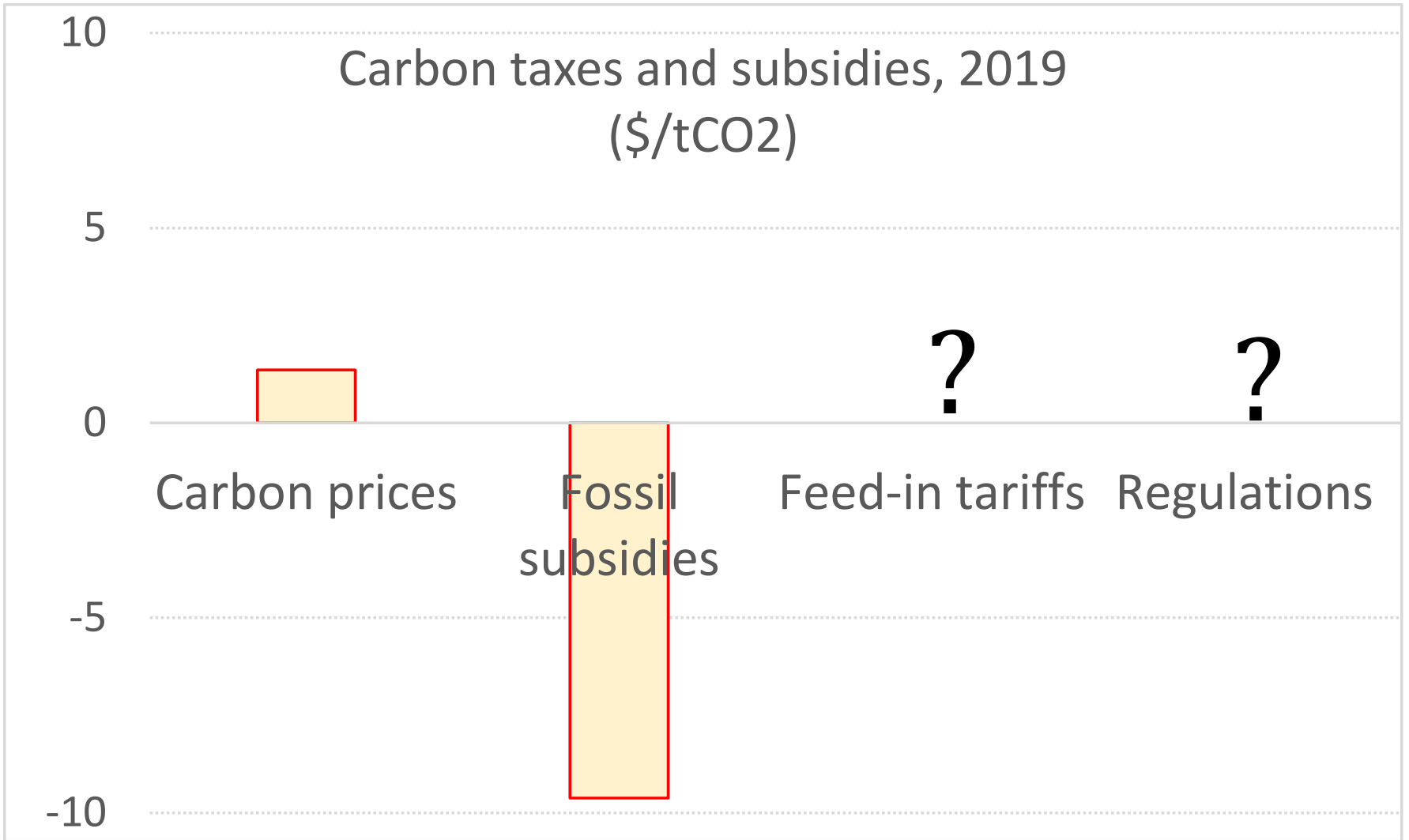
- fix climate externality through C pricing
- special incentives for low-C technologies

# *Federal R&D: Military v. Green Energy*



## *Economic Insight 2: Harmonized Carbon Prices*

- High price on CO<sub>2</sub> emissions is the key to sharp emissions reductions.
- Level of price should be harmonized to meet climate target
- However, in reality, carbon prices are muddled, fragmented, and low.





# The carbon price landscape, 2019

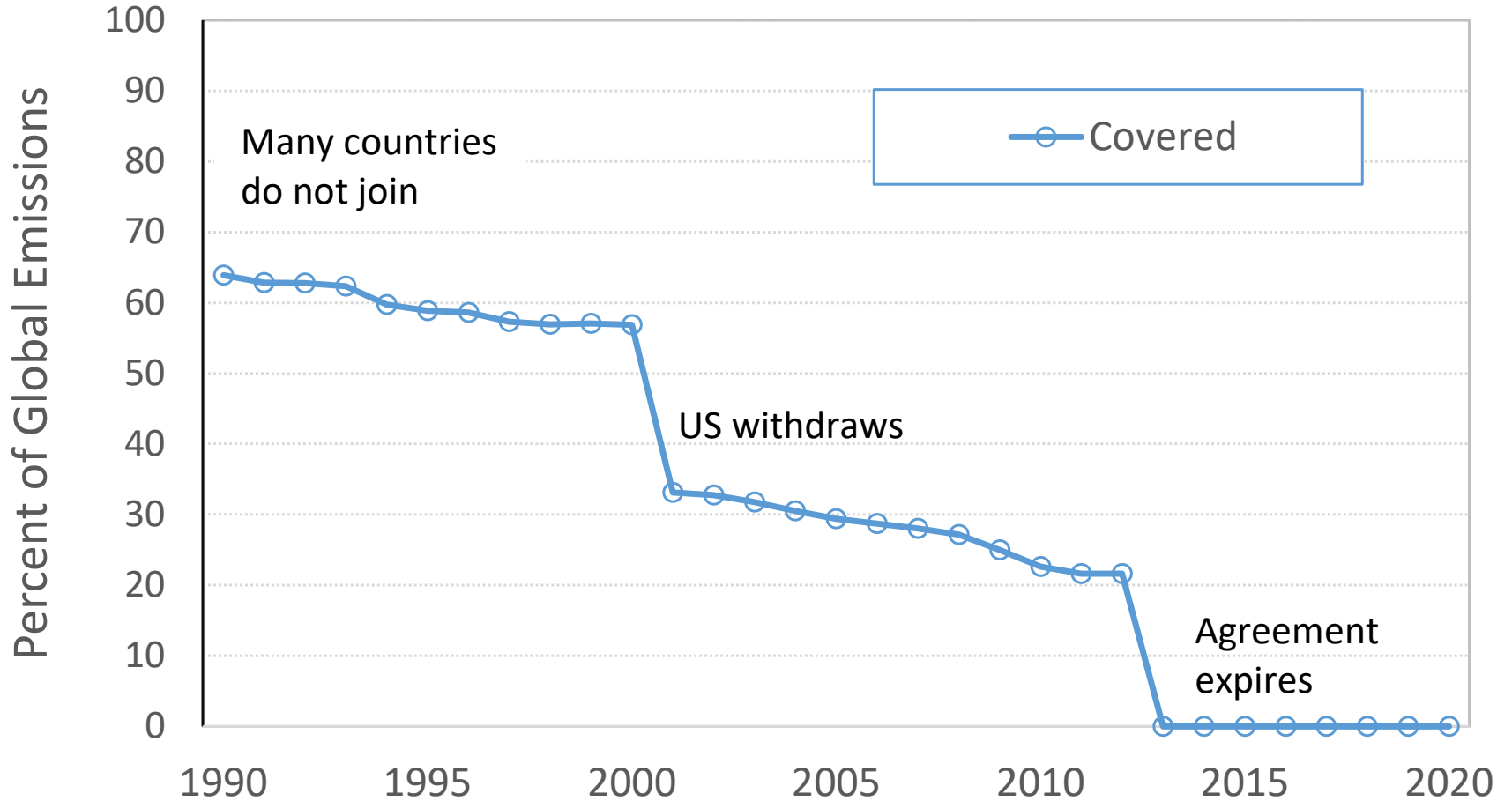
<i>Region</i>	<i>Percent of region covered by price</i>	<i>Carbon price (\$/tCO<sub>2</sub>)</i>	<i>Effective price (\$/tCO<sub>2</sub>)</i>	<i>% of global emissions</i>
Sweden	40	127	50.8	<1
Norway	60	59	35.4	<1
Switz	33	96	31.7	<1
BC	70	26	18.2	<1
France	33	50	16.5	1
Calif	85	16	13.6	2
ETS	43	25	10.8	8
Japan	70	3	2.1	5
Argentina	20	6	1.2	<1
Chinese cities	40	3	1.2	1
Northeast US	18	5	0.9	1
Mexico	45	1	0.5	1.5
Uncovered	100	0	0.0	80
<b>Global average</b>			<b>1.7</b>	

Source: World Bank

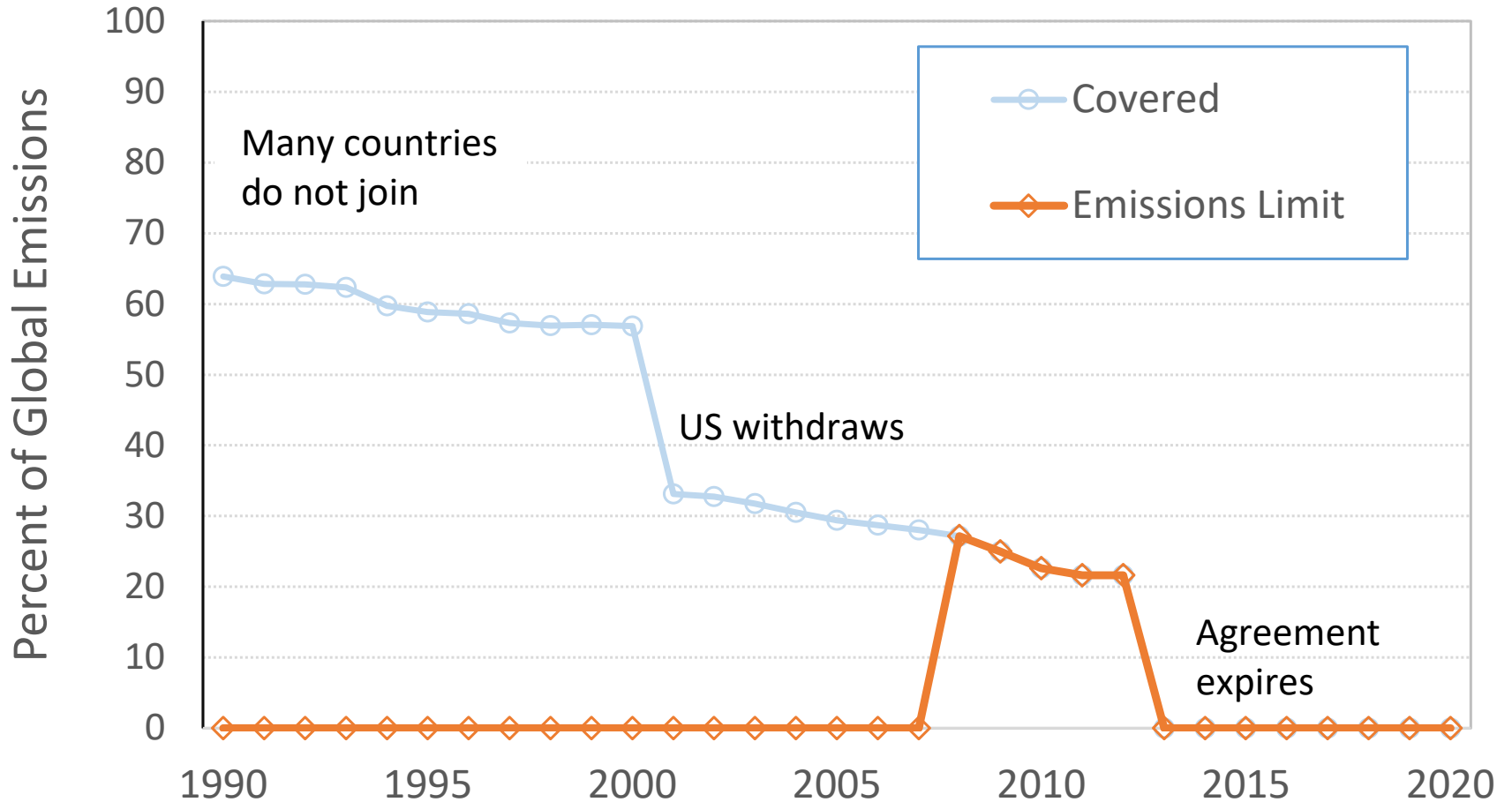
## *Economic Insights (3): The Global Free Rider Problem*

- International climate policy is at a dead end.
- Why? Climate change policy is hampered by *the free rider problem*:
  - The agreements are voluntary.
  - So there are no penalties for (costly) non-participation
- Evidence:
  - Low carbon prices around the world
  - Collapse of Kyoto Protocol (next slide)

## Participants in Kyoto Protocol (1997 - 2012)



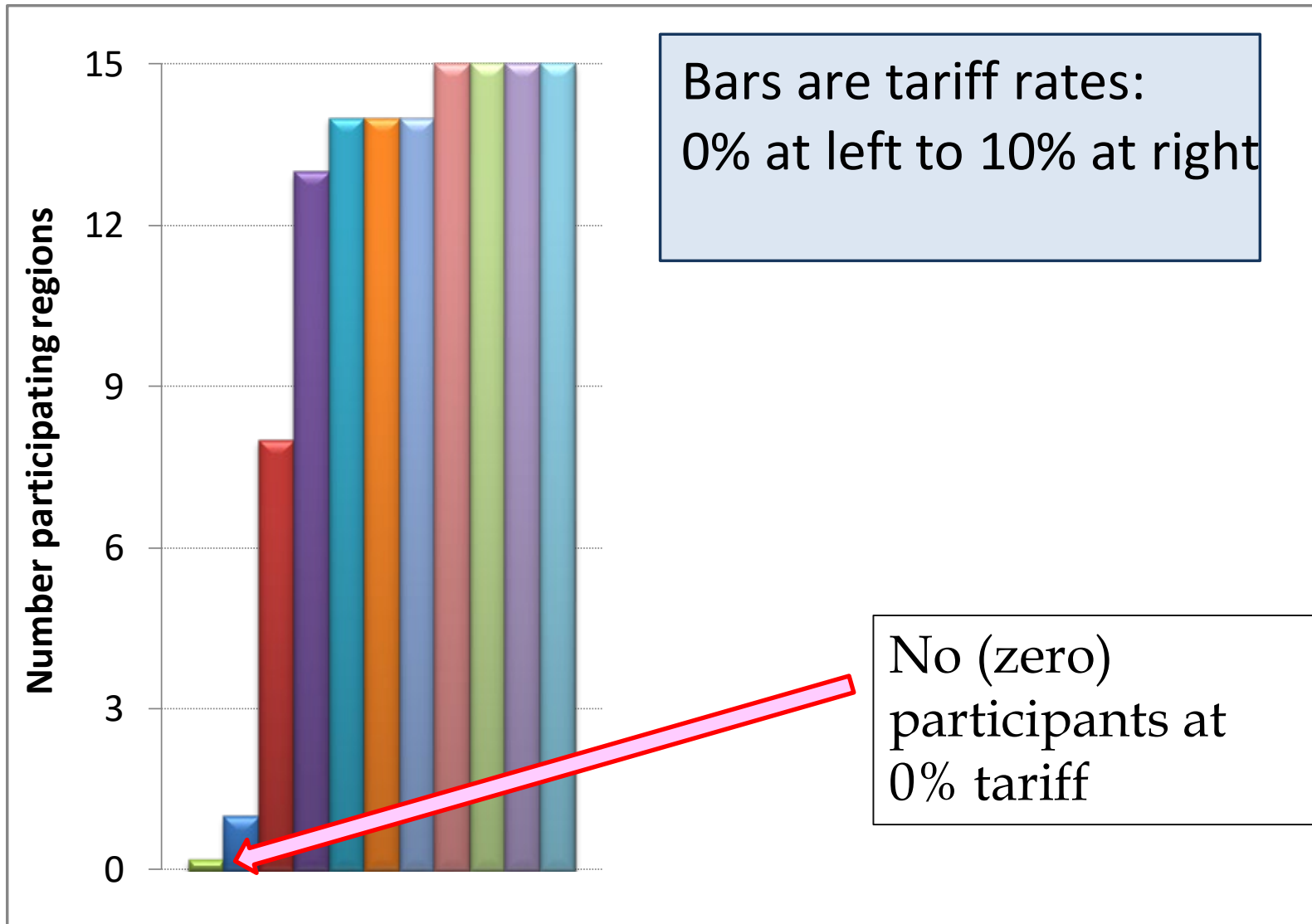
## Emissions Limits Under Kyoto Protocol (1997 - 2012)



# *A Climate Compact to Overcome Free-Riding*

- Effective international agreements require incentives: climate compact.
- Compact involves a regime with two features:
  - Target carbon price, perhaps \$50 per ton CO<sub>2</sub>
  - Penalty tariff on non-participants, say 3% penalty tariff
- Modeling at Yale suggests that compact may be effective way to combat free-riding

# Example of Climate Compact Participation



Example for \$50/ton minimum carbon price.

# Summary

- Little progress on slowing warming.
- Low-carbon technologies plagued by double externality.
- Central goal is high and harmonized carbon prices.
- Effective international policies require climate compact structure with carrots and sticks.

