Facts and Fiction: A Centrist View of Climate Change

Robert Mendelsohn

ICCC-12

The Heartland Institute

Global Warming Difficult to Stop

- Requires cooperation across most countries of the world
- Requires commitment to cost effective regulation
- Requires a dynamic solution that tightens over time

What is the best strategy for handling greenhouse gases?

- **Aggressive abatement-** do everything possible to move towards a zero carbon economy quickly
- **Zero abatement**- no regulation, let the economy move forward without constraints
- **Moderate abatement-** use cost effective tools to gradually slow the accumulation of greenhouse gases in the atmosphere

Case for Aggressive Abatement (Stern)

1. Inexpensive to quickly move to zero carbon economy
2. Discount rate is near zero
3. Climate impacts are catastrophic

Case for zero abatement

1. Any regulation would destroy the economy
2. Climate change is a hoax

   Emissions do not cause concentrations to rise or

   Concentrations do not cause climate to change or

   Climate change does not cause damage

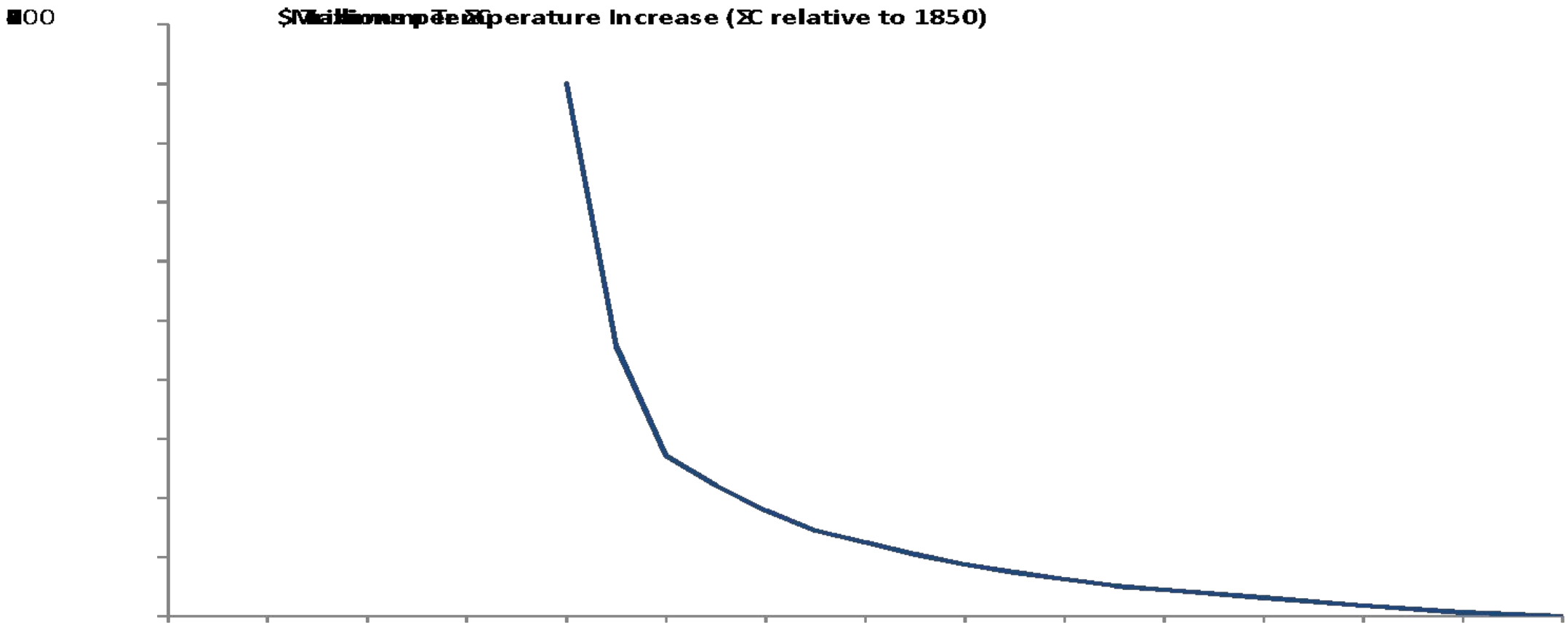
Case for Modest Abatement

- Aggressive Mitigation very expensive
- Unmitigated climate change will be very expensive
- Modest amount of abatement is inexpensive and the resulting modest warming will not be that harmful

Is the cost of mitigation low or high?

- Stringent mitigation required for low temperature targets is very expensive
  - Present value of $50-60 trillion
  - Requires carbon price today of $100/ton CO_2
  - Prices rise at half the interest rate
- Modest mitigation required for 4˚C target
  - Present value ≈$10 trillion
  - Carbon price today $5/ton CO_2
  - Prices rise at half the interest rate

Marginal Cost of Max Temperature Targets



Low temperatures are expensive

- Must abandon existing capital and some stocks of fossil fuels
- Must replace with alternative energy at huge scale
  - Double nuclear power
  - 1 million 2MW windmills
  - 2 million ha of solar power
  - Carbon capture and storage (CCS) on all coal and gas plants
  - Biofuels with CCS on 1/6th cropland
  - Bioenergy with CCS from global forests
  - Increase efficiency of all cars to 60mpg
  - Make all buildings energy efficient

More Modest Temperature, Less Mitigation

- Only need a fraction of methods required for stringent target
- Time to implement
- Much fewer stranded assets
- Postpone expensive mitigation lowering cost

Mitigation Must Be Cost Effective

- Above cost estimates assume every polluter regulated
  - Universal participation of countries
  - 2/3 of future mitigation in developing countries
  - Doubles cost if half countries participate
- Assumes MC equated across every polluter- common carbon price
  - No polluters are exempt
  - Every cost effective mitigation utilized

Discount Rate is not Zero

- Discount rate for capital investment should be equal to real interest rate for economy
- Real interest rate has been near **4%** since industrial revolution
- Even if interest rate declines as growth rate declines, the interest rate will get no lower than 3%

Timing is important

- Mitigation must start now
- Climate impacts are long delayed
  - Takes decades for greenhouse gases to warm ocean
  - Warmer ocean leads to warmer climate
  - Takes time for ecosystems and ice sheets to react
- Higher discount rate means climate damage has lower value

Climate Science

- Global emissions of greenhouse gases are about 45Gt/yr of CO_2e
  - Emissions largely from burning fossil fuels
- Greenhouse gas concentrations are now about 450 ppme (275 in 1750)
- Global temperatures are about 1˚C warmer than in 1900
  - Almost everyone notices it is warmer
  - But the change is small relative to change within a day
    - Washington DC has 8˚C average diurnal range

Economy is Affected

- Only a small fraction of economy vulnerable to climate change
- Biggest vulnerable sector is agriculture
  - 4˚C warming could cause 40-60% potential losses
- Higher cooling costs
- Water likely to be scarcer
- Coastal inundation possible

Nonmarket effects are likely

- Large potential health effects from heat stress and disease
- Large long term ecosystem changes
- Coastal inundation of wetlands and beaches likely

Climate Damage Depends on Adaptation

- Climate change can cause crops to fail, coastal structures to be inundated, people to die from excess heat and new diseases
- If farmers adjust crops grown, if communities protect developed coastlines, if people cool their homes, and if public health fights new disease, these effects will be much smaller
- Adaptation is in the interest of every person, firm, and community because it will make them better off

Catastrophic Ice Sheet Melt

- Warming could raise the sea by 5-25 meters if all ice sheets melt
- Higher temperatures increase probability, speed, and extent of melting
- If happened tomorrow, would flood all major coastal cities and cause tens of $ trillions of damage
- But melting will take several centuries
- Present value of damage is in $ trillions
- If protect major cities, present value closer to $ hundreds of billions

Ecosystems will change

- Up to 5˚C, biomes will shift poleward, forest growth will rise, forestland will expand, and biomass will increase
  - Changes likely beneficial

- Beyond 5˚C, biomes will continue to move poleward, but forest growth will level off, and biomass will likely fall.
  - Changes likely harmful

Climate Damage Rises with Temperature

- Damage likely very low up to 2˚C
- Damage gradually rises as temperatures approach 4˚C
- Damage can get very high above 4 ˚C

Optimal Max Temperature Target