

Climate Science

how much carbon = how much warming over what length of time

economists have nothing to say about this

climate change is uncertain and unfolds over time

there are deniers and alarmists

within the mainstream scientific community there is substantial uncertainty indicated in the IPCC reports

these reports are the point of departure for economists

What Can Economists Say?

climate change and pollution are a classical example of the tragedy of the commons and *market failure*: there are no property rights in the environment, so nobody to demand payment for damages, nor can there easily be

note that in smaller settings (local pollution for example) this need not be the case

economists generally recommend that the government charge *Pigouvian* taxes set to the social cost of the externality: in this case a carbon tax

other things economists can do:

- assess the economic cost of warming
- assess how much carbon is likely to be produced under different policies
- do risk assessment

Experts?

Some climate scientists make statements about these things but have no expert knowledge

Will Steffen in reference to 4C of warming:

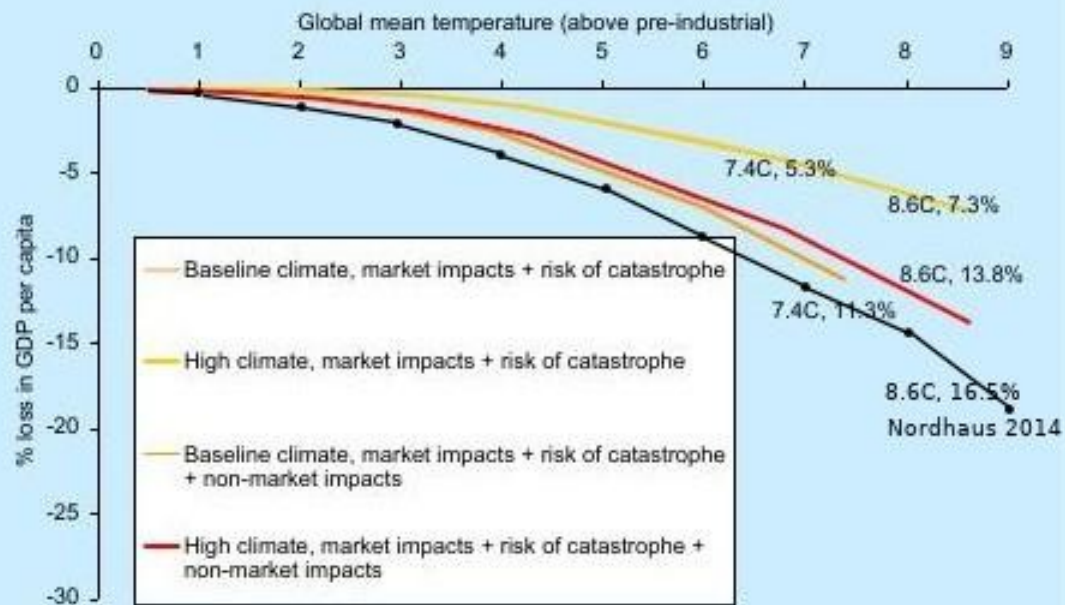
The problem there is that, in my view, it is impossible to survive that sort of change. That's beyond human physiology to deal with that sort of change...Our cities are designed for [the pre-industrial temperature level]. And remember, a lot of our infrastructure is designed for a hundred years...[we will reach 5-6C in] 85 years. A human lifetime....that's a collapse scenario. Physiologically we can't survive that. So the real challenge is: we've got to make sure we hit that 2C.

Superficially we face considerably more warming than that every year as we transition from winter to summer and he presents no evidence for his view

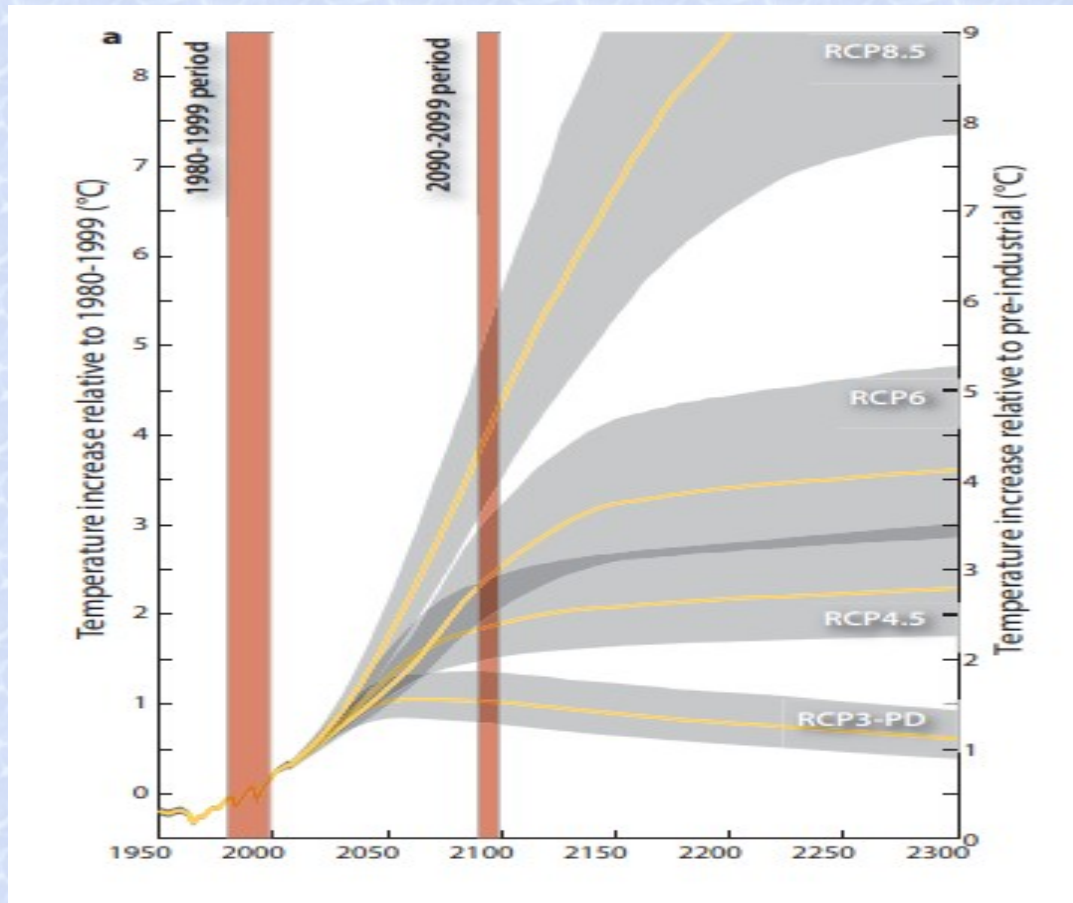
Estimates of Damages

Figure 6.6 Mean losses in income per capita from four scenarios of climate change and economic impacts, plotted against average increases in global mean temperature (above pre-industrial levels).

This figure traces mean losses in per-capita GDP due to climate change as a function of increasing global mean temperature, according to four of the scenarios of climate change and economic impacts. Losses are compared to baseline growth in per-capita GDP without climate change. Because temperature is one of the probabilistic outputs of the PAGE2002 model, increases in temperature in each scenario are averaged across all 1000 runs.



When Would This Happen?

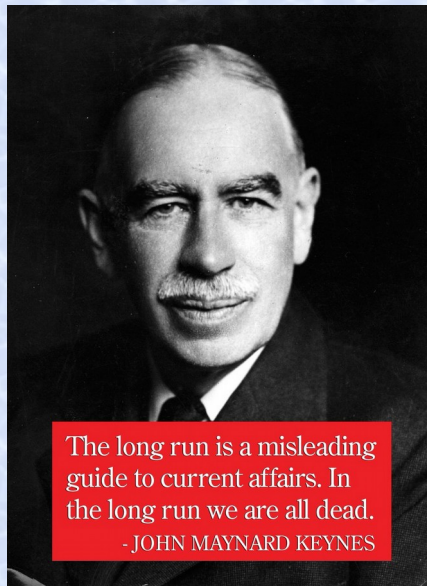


A Hundred Years is a Long Time

From 1968 to 2018 world per capita income grew from \$4937 to \$10881

more or less doubled in fifty years

so in a hundred years we might see GDP increase by a factor of 4 due to growth and shrink by 25% due to global warming, that is, about triple growth might be less: but then there would be less carbon emission and less warming



Understanding Big Numbers

places near sea level, near the equator and due to other geographical factors are at much greater risk

- Bangladesh is one such country

Could half the world population migrate?

- Could we build houses, schools, hospitals, etc?

Over the last 50 years we did just that:

World population

- 1973 3.9 billion
- 2023 8.0 billion

Could we move them?

- In 2022 there were 3.7 billion air passengers

Discounting

usually we discount future losses against current expenses

some argue we should not do that for climate change

Nicholas Stern: as an ethical matter future generations are worth as much as current generations

implications: to prevent a 16.5% loss to GDP starting 200 years from now should give up today an amount equal to 80% of that loss

give up 13.2% of our current GDP starting now and forever

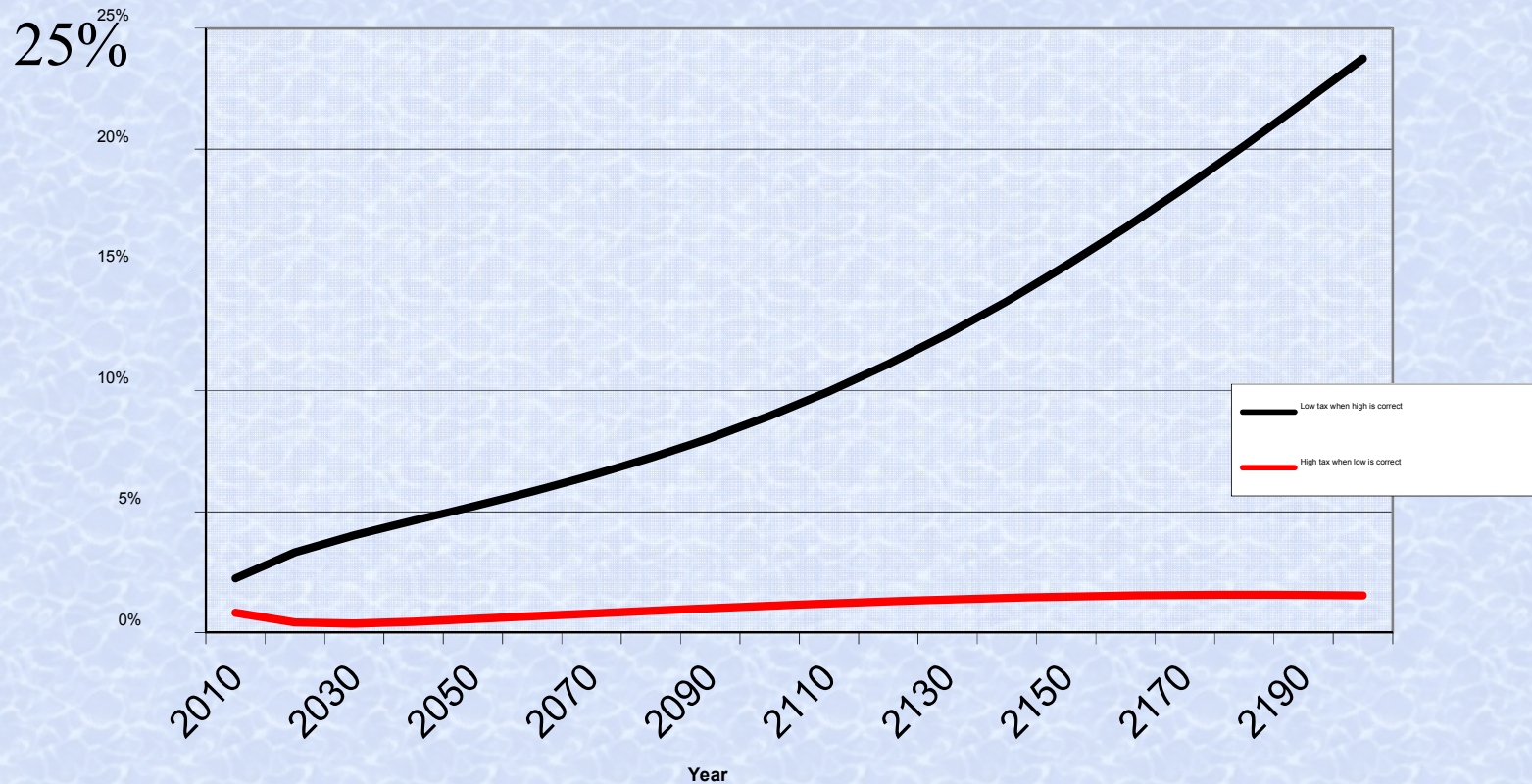
suffer a great depression starting immediately to prevent a slightly larger great depression starting 200 years from now

however of that future cost

- 82% more than 400 years from now
- 55% more than 800 years from now

Upside and Downside Risk: Consumption Loss

Consumption loss



black: low tax when bad scenario; red high tax when good scenario
from: Hassler, Krusell and Olovsson

Petroleum

petroleum is increasingly costly to extract as more is extracted

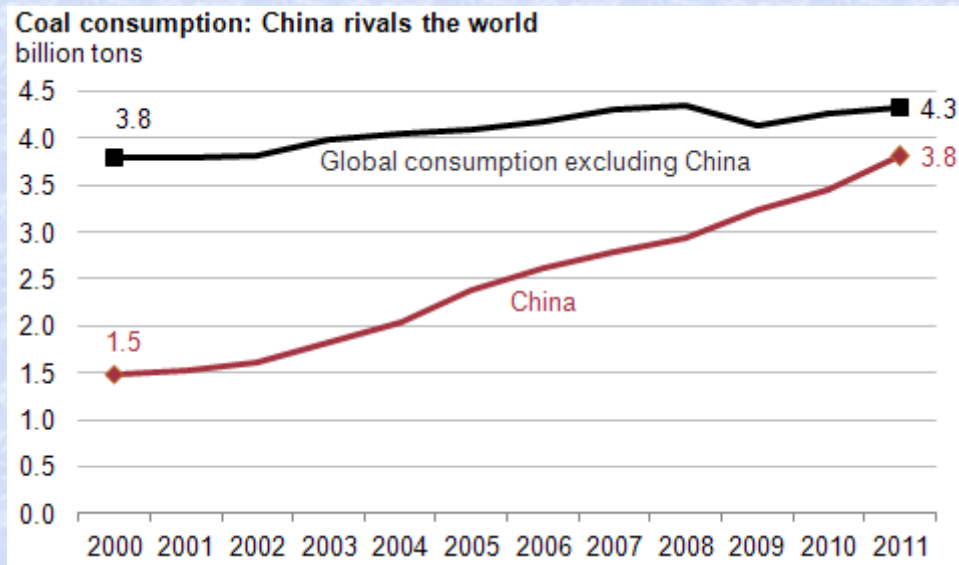
remember the market

will price itself out of the market compared to green alternatives even without protests or government action



Coal

- there is a lot lot of coal very close to the surface
- it is cheap energy and attractive to developing countries
- how China grew so fast



US Energy Information Administration

Bangladesh

- per capita GDP UK: 57,000
- per capita GDP China 23,000
- per capita GDP Bangladesh 8,600

Bangladesh: the most to gain, the most to lose
who chooses for Bangladesh?



Where to Spend It?

prior to Covid US carbon emissions fell during the presidency of Donald Trump

very little impact of further reducing carbon emissions in US/Europe/Japan

the problem scenarios involve increased carbon emissions from developing countries such as Bangladesh

cost effectiveness:

- spend money on electric cars for us?
- or for solar plants for Bangladesh?

Political Economy

everyone claims to be green, but nobody wants to sacrifice

a key factor the last election in the Netherlands is that farmers there are upset with green policies that are costly for them

ULEZ, electric car mandates and so forth are all politically unpopular with the people who have to pay the price

they are also feel good policies that have little impact on global warming

If there is going to be a political price: how about paying it for **effective** policies?

