ATOC 1060-002
OUR CHANGING ENVIRONMENT

Class 26 (Chp 16)

Objectives of Today's Class:

[1] Policies to slow global warming (continued);

[2] Economic consequences of global warming.

[1] Policies to slow global warming

Specific policies that might be adopted to promote non-fossil energy sources:

a) Governmental regulations: **USA, CAFÉ (Combined Automobile Fleet Emissions) - fuel efficiency requirement must be met.**

b) A carbon tax on energy source that produces CO_2.

[2] Economic consequences of global warming

Previously, we focused on global warming; its effects on global climate, sea level, ecosystems.

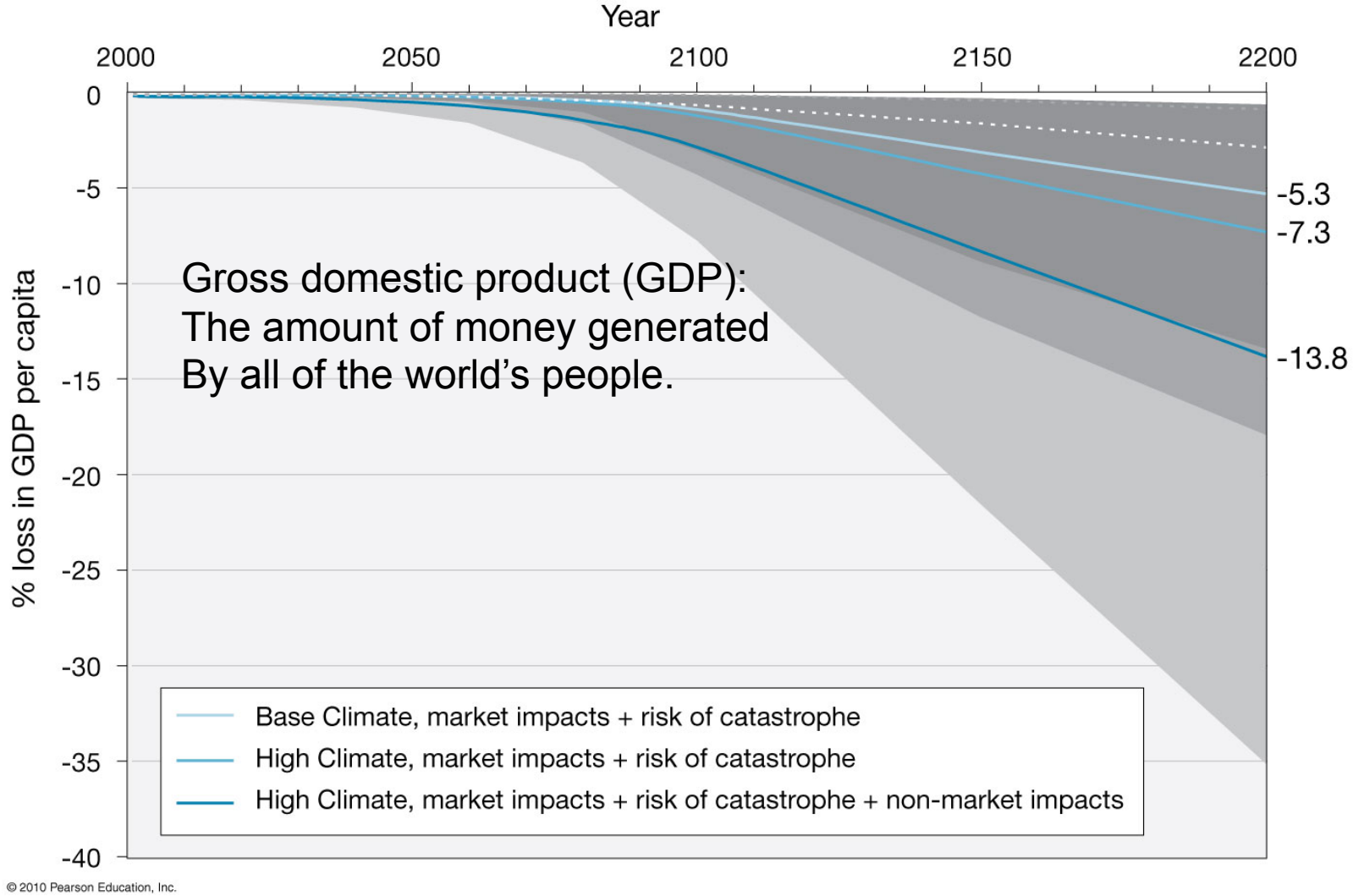
Current policy debate: what possible economic consequences can be resulted from these changes.

Cost-benefit analysis: economic models
Benefit: example, CO_2 fertilization;
Cost: sea level increase=> relocate population from coastlines; reducing CO_2 emission=> cost money.
=> Limiting climate change will cost.

Goal of economic models:
(benefit - cost) reaches maximum
Highly uncertain - more than climate models. Predicting human behaviors is more difficult than predicting physical systems. Includes value judgment.

Still can be used as a guide.

a) The Stern review on the economics of global warming



British report: led by economist Nicholas Stern: 5-30% loss of GDP per capita.
Yale: William Nordhaus disagrees with Stern: Economic discounting different!

b) Economic Discounting

In economic models of global warming, key question: How much should we pay now in order to avoid damages that my be incurred in future?

Global warming - slow process; large damage- more than 100 years later.

In a typical cost-benefit analysis, future damages or benefits are discounted at a rate of as much as 10%.
A benefit of $100 that is realized 1 year from now is valued at only $90.91 [=$100/(1+0.1)].

Discount rate takes into account: (1) save, could invest to make a profit (called growth discounting); (2) would rather have a dollar today than a dollar 10 years later (after adjustment of inflation); called time preference discounting.

A typical cost-benefit analysis, future damages (or benefits) are discounted at ~3%/year. (some uses 7%~10%/year)

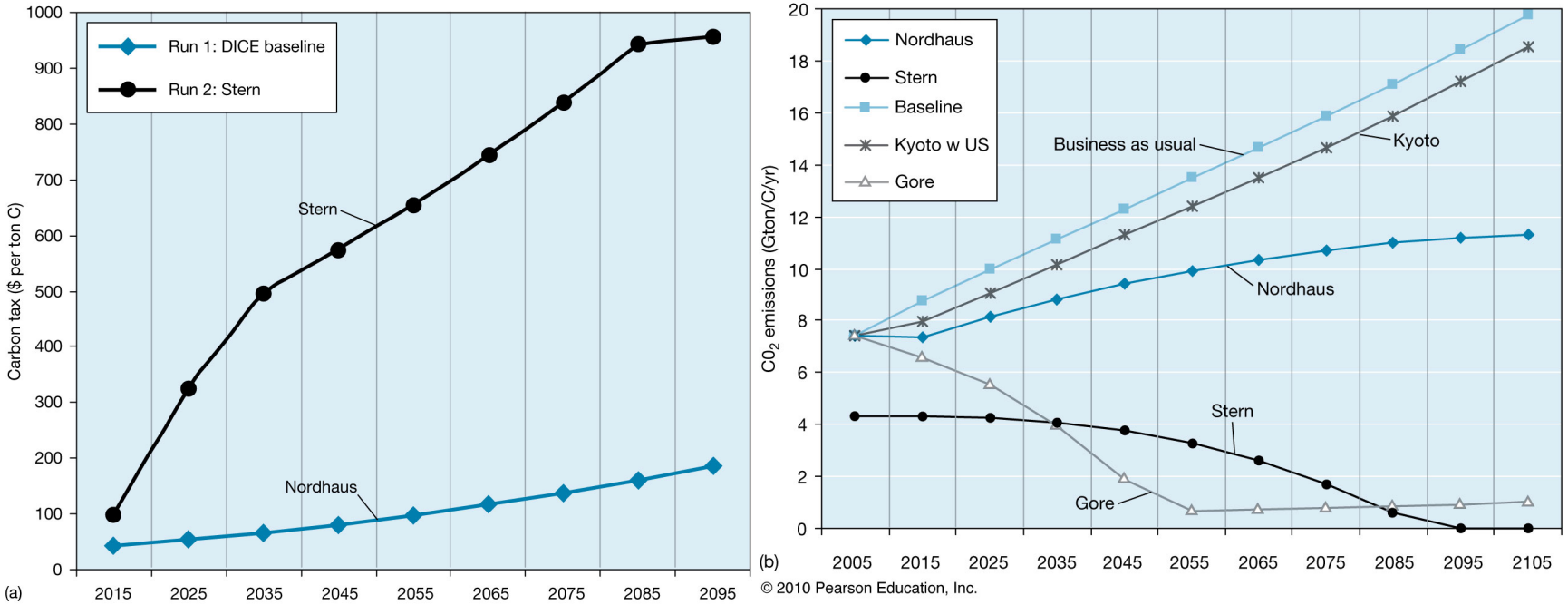
Use 3%, $100 benefit (damage) now:
1 year later, valued at 100/(1+3%)=$97;
50 years later, valued at $100/(1+3\%)^{50}$ =$23;
200 years later,valued at $0.27.

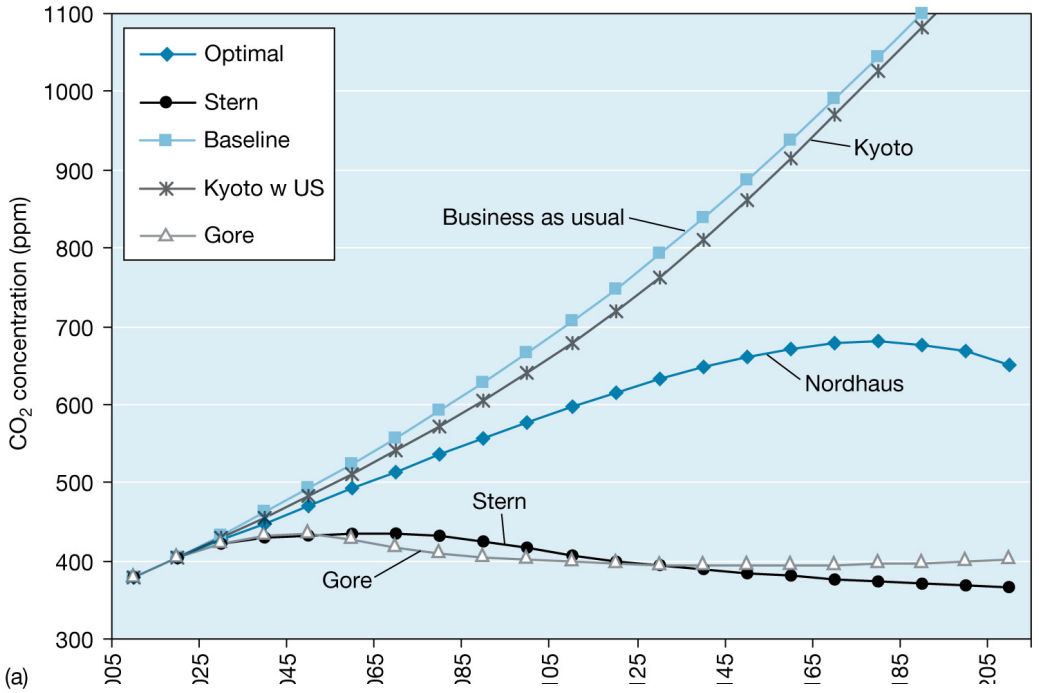
Even catastrophic change were predicted 200 years later, and the damages could be real and could be large in real economic terms, but time preference discounting ensures that they would be essentially neglected.

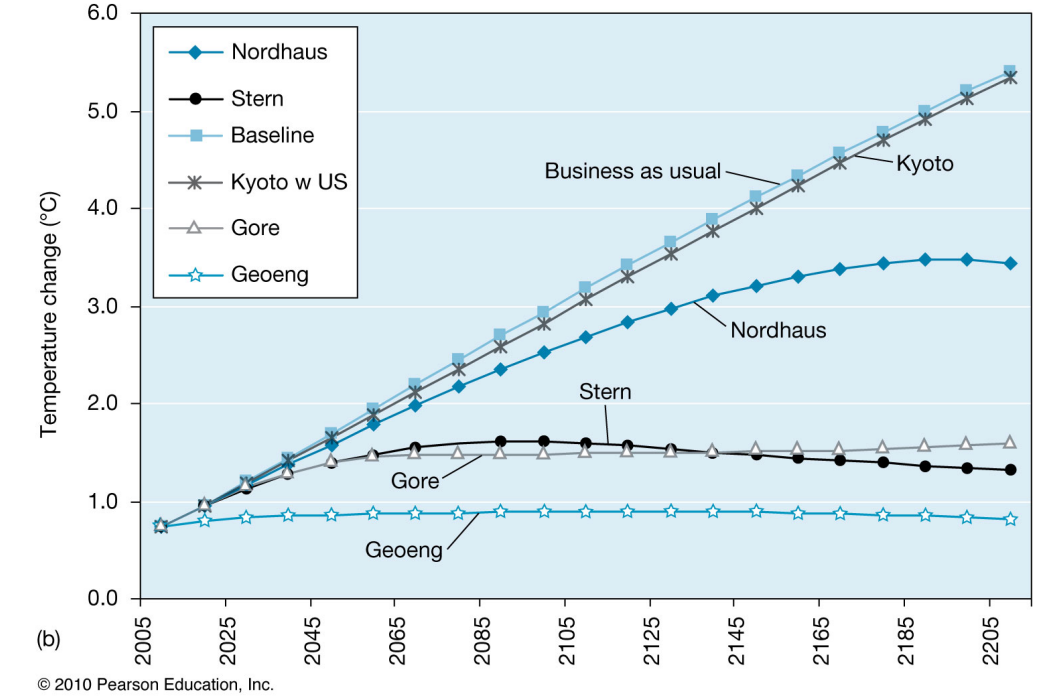
Problems: time preference discounting ~ apply to short Term economy; Does it also apply for long term?

c) cost-benefit calculations with different discount rates: Nordhaus versus Stern

Nordhaus: Dynamic Integrated Climate-Economy (DICE) Model: very simple economic model – includes factors such as population increase, new technology development, and climate change.







Business-as-usual: CO_2 emission: 8Gton(C)/yr today to 20Gton(C)/yr in 2100;

Nordhaus's: holds to less than 10 Gton(C)/yr and declines back to 6Gton(C)/yr in 2100;

Gore's proposal: less than 1 Gton(C)/yr in 2050 and hold them there indefinitely;

Stern's: reduce emissions somewhat more slowly than Gore's, but achieve even lower emission levels than Gore's.

Policies to achieve Gore and Stern's proposals?
Is Nordhaus's proposal enough? Are the economic damages estimated correctly?

11 clickers questions will follow