

The Limits of Economic Approaches

EES 3310/5310

Global Climate Change

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Reviewing Emissions Trading Game

Review of Game

- Command and Control:
 - Each company emits the same amount
 - A: 20 total, 10 each
 - B: 16 total, 8 each
- Cap-and-trade:
 - Give each company equal permits.
 - Let them trade
 - A: 10 permits each, Beta buys -2 for \$29
 - B: 8 permits each, Beta buys -1 for \$31
- Carbon Tax:
 - Put a price on CO₂ emissions
 - Each company can emit as much as it wants to
 - But it must pay the tax on every ton.
 - A: \$40/ton
 - B: \$44/ton

Default

Actor	Emissions	Profit	Cost	Net
Alpha	15	\$630		\$630
Beta	15	\$420		\$420
Society			−\$930	−\$930
Total	30	\$1050	−\$930	\$120

Deadweight loss = \$456

Optimal

Actor	Emissions	Profit	Cost	Net
Alpha	9	\$540		\$540
Beta	7	\$308		\$308
Society			−\$272	−\$272
Total	16	\$848	−\$272	\$576

Command & Control (A)

Actor	Emissions	Profit	Cost	Net
Alpha	10	\$570		\$570
Beta	10	\$380		\$380
Society			-\$420	-\$420
Total	20	\$950	-\$420	\$530

Deadweight loss = \$46

Optimal

Actor	Emissions	Profit	Cost	Net
Alpha	9	\$540		\$540
Beta	7	\$308		\$308
Society			-\$272	-\$272
Total	16	\$848	-\$272	\$576

Cap & Trade (A)

Actor	Permits	Bought	Sold	Emissions	Price	Profit	Cost	Net
Alpha	10	2		12	-\$29	\$612		\$583
Beta	10		2	8	\$29	\$336		\$365
Society							-\$420	-\$420
Total	20	2	2	20		\$948	-\$420	\$528

Deadweight loss = \$48

Optimal

Actor	Emissions	Profit	Cost	Net
Alpha	9	\$540		\$540
Beta	7	\$308		\$308
Society			-\$272	-\$272
Total	16	\$848	-\$272	\$576

Carbon Tax (A): \$40/ton

Actor	Emissions	Tax	Profit	Cost	Net	Rebate	Net with Rebate
Alpha	8	−\$320	\$504		\$184	+\$260	\$444
Beta	5	−\$200	\$240		\$40	+\$260	\$300
Society		+\$520		−\$182	\$338	−\$520	−\$182
Total	13		\$744	−\$182	\$562		\$562

Deadweight loss = \$14

Optimal

Actor	Emissions	Profit	Cost	Net
Alpha	9	\$540		\$540
Beta	7	\$308		\$308
Society			−\$272	−\$272
Total	16	\$848	−\$272	\$576

Command & Control (B)

Actor	Emissions	Profit	Cost	Net
Alpha	8	\$504		\$504
Beta	8	\$336		\$336
Society			-\$272	-\$272
Total	16	\$840	-\$272	\$568

Deadweight loss = \$8

Optimal

Actor	Emissions	Profit	Cost	Net
Alpha	9	\$540		\$540
Beta	7	\$308		\$308
Society			-\$272	-\$272
Total	16	\$848	-\$272	\$576

Cap & Trade (B)

Actor	Permits	Bought	Sold	Emissions	Price	Profit	Cost	Net
Alpha	8	1		9	-\$31	\$540		\$509
Beta	8		1	7	\$31	\$308		\$339
Society							-\$272	-\$272
Total	16	1	1	16		\$848	-\$272	\$576

Deadweight loss = \$0

Optimal

Actor	Emissions	Profit	Cost	Net
Alpha	9	\$540		\$540
Beta	7	\$308		\$308
Society			-\$272	-\$272
Total	16	\$848	-\$272	\$576

Carbon Tax (B): \$44/ton

Actor	Emissions	Tax	Profit	Cost	Net	Rebate	Net with Rebate
Alpha	8	−\$320	\$504		\$184	+\$260	\$444
Beta	5	−\$200	\$240		\$40	+\$260	\$300
Society		+\$520		−\$182	\$338	−\$520	−\$182
Total	13		\$744	−\$182	\$562		\$562

Deadweight loss = \$46

Optimal

Actor	Emissions	Profit	Cost	Net
Alpha	9	\$540		\$540
Beta	7	\$308		\$308
Society			−\$272	−\$272
Total	16	\$848	−\$272	\$576

Summary of Deadweight Losses

Group	Default	Command & Control	Cap & Trade	Tax
Group A	456	46	48	14
Group B	456	8	0	46

Summary of Net Profit/Cost

Group A

	Default	Cmd & Ctrl	Cap & Trade	Tax	Tax & Rebate
Alpha profit	630	570	583	184	444
Beta profit	420	380	365	40	300
Social cost	-930	-420	-420	338	-182
Total	120	530	528	562	562

Group B

	Default	Cmd & Ctrl	Cap & Trade	Tax	Tax & Rebate
Alpha profit	630	504	509	154	396
Beta profit	420	336	339	24	266
Social cost	-930	-272	-272	352	-132
Total	120	568	576	530	530

Overview

Barker's Critique

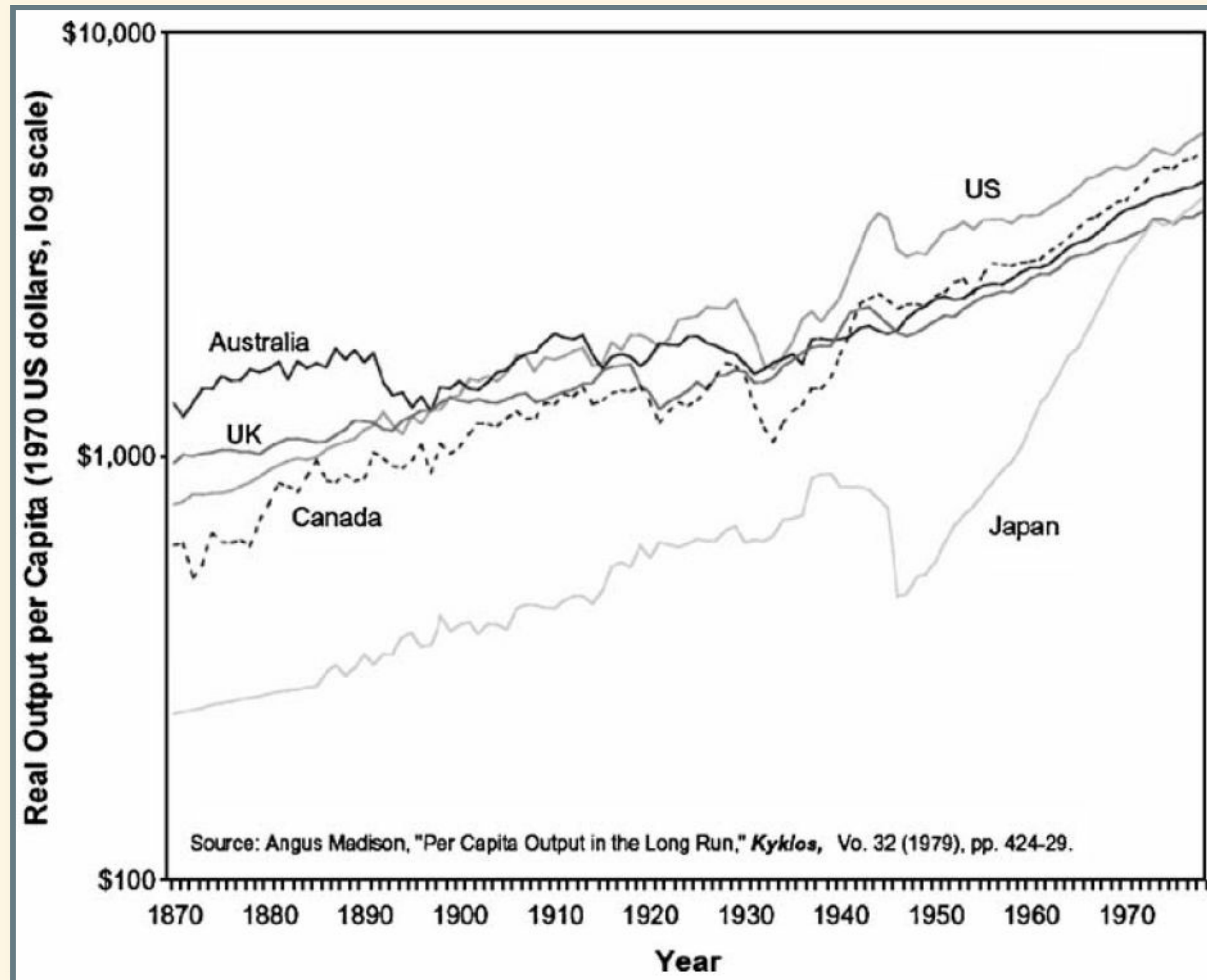
1. The global economy is a complex, nonlinear dynamic system undergoing technological change.
2. Intergenerational responsibilities are an ethical problem.
Traditional economics tacitly adopt an extreme form of utilitarianism.
Other ethical perspectives should also be considered.
3. Traditional economics assumes *continuity* and *path independence*. Both history and engineering point to *discontinuities* and *path dependence*.
4. Traditional economics assumes a mathematical *social welfare function* that ignores the realities of the political process: negotiation, fragile and unstable alliances, the role of parties, etc.

Path Dependence, Economics, and Technology

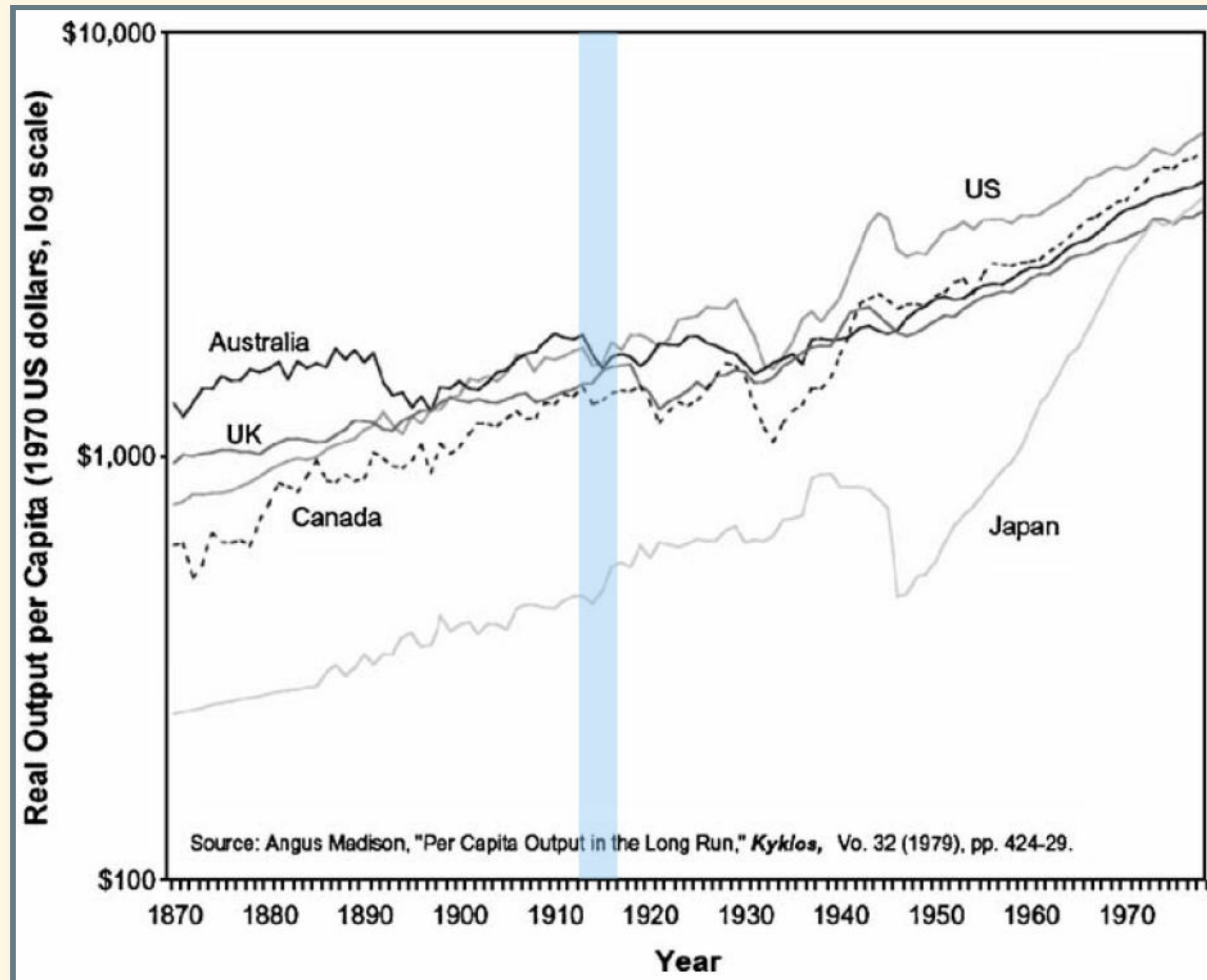
- Ideal: If you develop a better product for a lower price, it will dominate the market
- Complications:
 - Network effects:
 - One cell phone is not much good. Need a network of people to call
 - Hydrogen vs. electric, vs. gasoline cars:
 - Cars need filling/charging stations,
 - Filling/charging stations need cars.
 - Similarly, VCR/DVD/etc.: players need movies, movies need players
 - Familiarity: QWERTY keyboards → lock-in
- Which technology is widely adopted depends on historical path

Adam's Fallacy

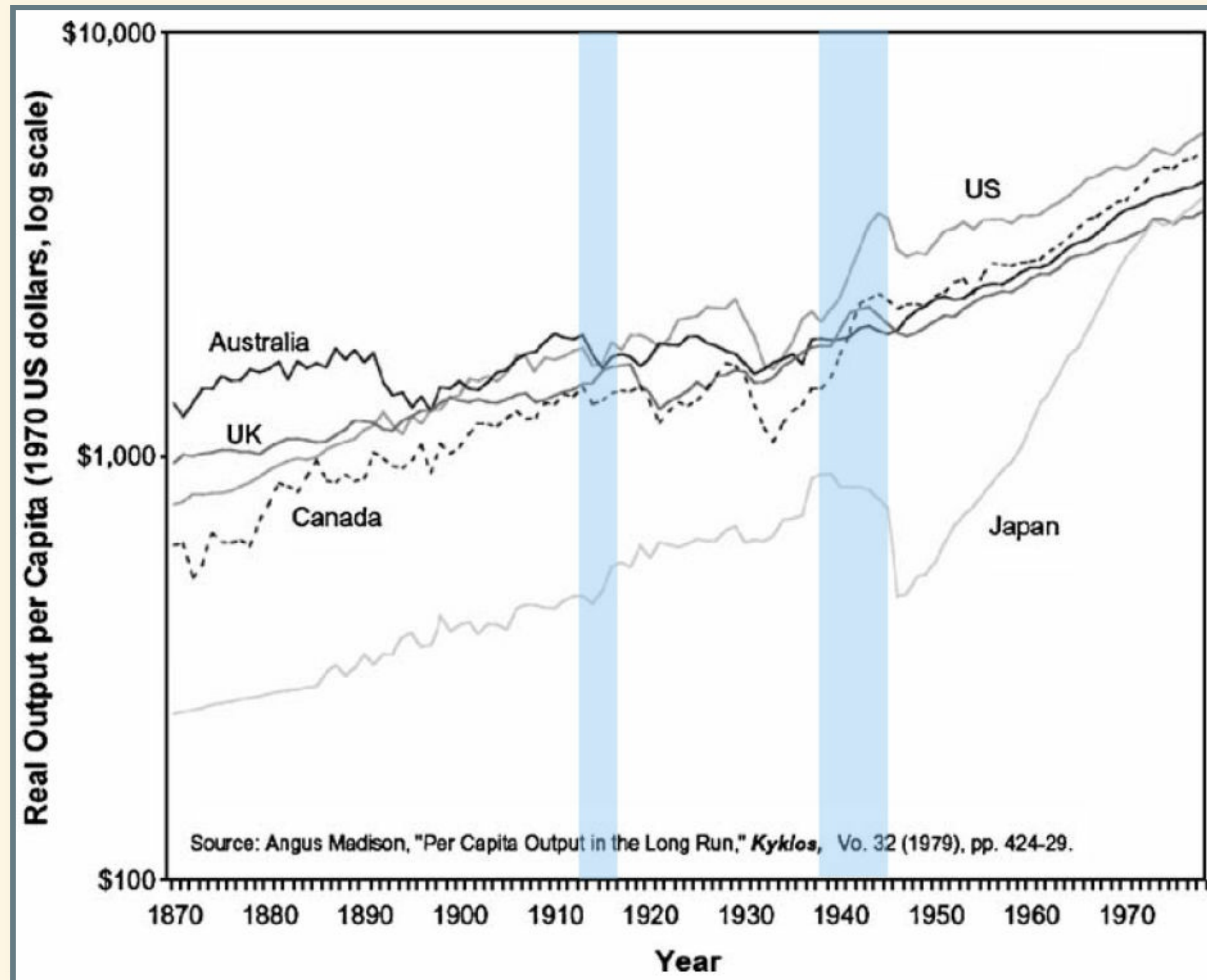
What Does Economics Leave Out?



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What Does Economics Leave Out?



*[Five meters of sea-level rise] is something
that should rather be avoided.*

— R. Tol

*The reason we should “rather avoid”
drowning the coastal cities of the world is
not primarily that this would reduce global
GDP, but that drowning those cities would
be a dreadful act of barbarism*

— C. Jaeger et al.

What Is the Value of Non-Market Goods?