Lectures on Economic Growth

Topics: Culture, Geography (climate and natural resources), & Environment

an upper intermediate course offered at the 7th semester at the

Economics Department, University of Piraeus

Previously in this course:

We have looked at the mechanics of economic growth, treating all countries as potentially equal

$$y = A \cdot F(k, h)$$

- Factor accumulation gives you k and h
- A is technology and efficiency, influenced by: R&D efforts or copying behavior, Government style, Openness to trade, Inequality

Today we look at possible root differences between countries that could affect A:

- Culture, and its interplay with the economy (chapter 14 of D. Weil).
- Geographical circumstances (chapter 15 of D. Weil).
- The global natural resource constraint (chapter 16 of D. Weil).

Xavier Sala-i-Martín (1997) runs all possible growth regressions and finds nine types of significant

1. Regional Variables: *Sub-Saharan Africa*, *Latin America* (negatively related to growth), and *Absolute Latitude* (far away from the equator is good for growth). These variables are from the Barro and Jong Wha Lee (1993) data set.[6]
2. Political Variables: *Rule of Law*, *Political Rights*, and *Civil Liberties* (good for growth); *Number of Revolutions and Military Coups* and *War* dummy (bad for growth). All of these are from the Barro and Lee (1993) data set.
3. Religious Variables: *Confucian*, *Buddhist*, and *Muslim* (positive); and *Protestant* and *Catholic* (negative). All of these variables are from Barro (1996).
4. Market Distortions and Market Performance: *Real Exchange Rate Distortions* and *Standard Deviation of the Black Market Premium* (both from Barro and Lee [1993] and both negative).
5. Types of Investment: *Equipment Investment* and *Non-Equipment Investment* (both positive, although the coefficient for non-equipment investment [$\beta = 0.0562$] is about one-fourth the coefficient for equipment investment [$\beta = 0.2175$]; see Bradford De Long and Lawrence Summers [1991]).[7]
6. Primary Sector Production: Jeffrey Sachs and Andrew Warner's (1995) *Fraction of Primary Products in Total Exports* (negative) and Robert Hall and Charles Jones's (1996) *Fraction of GDP in Mining* (positive).[8]
7. Openness: Sachs and Warner's (1996) *Number of Years an Economy Has Been Open Between 1950 and 1990* (positive).
8. Type of Economic Organization: Hall and Jones's (1996) *Degree of Capitalism* (positive).
9. *Former Spanish Colonies.*

regressors. We have discussed blue previously, still need to look at orange.

Culture causes growth

> Any prolonged discussion of growth differences ends in a blaze of amateur sociology. (Bob Solow)

So there we go: culture causes growth through

1. Openness to new ideas
2. Attitude about work
3. Attitude about saving
4. Degree of trust

These measures return in various degrees in social capital and social capability.

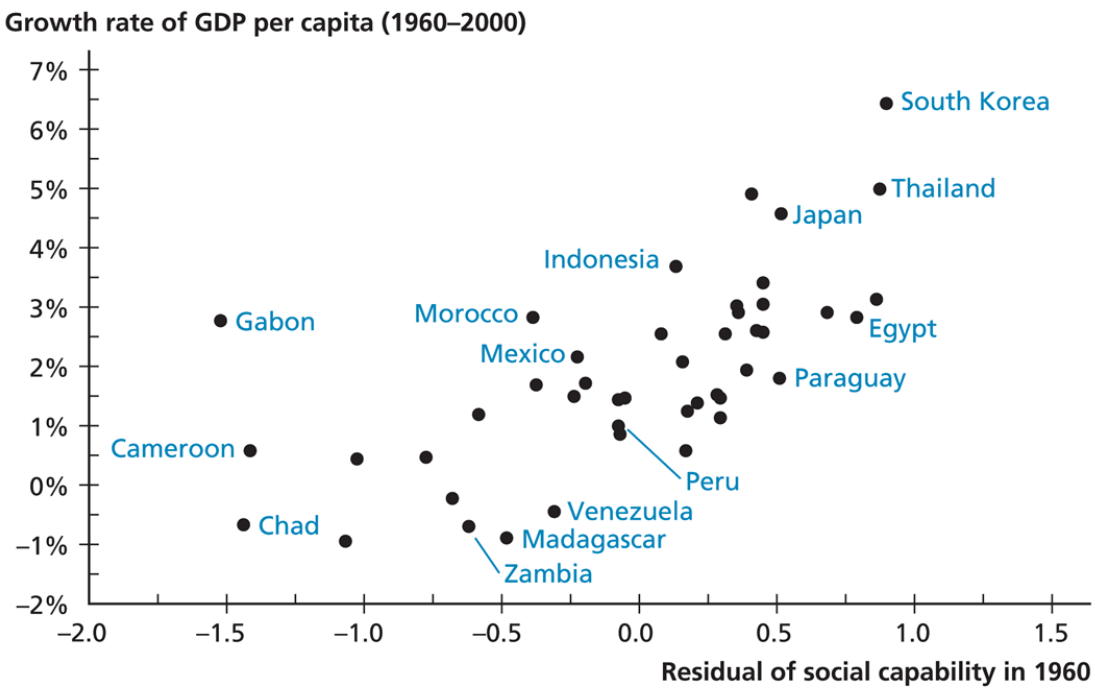
Naively, we could assume that these qualities are constant and that they explain differences in A. However

- Growth influences culture.
- The subjective assessment of any of these qualities is severely influenced by the observed level of development.

Measurement problems

The problem of subjective assessment can be circumvented if the assessment precedes the growth experience. Regress growth 1960-2000 on initial income and social capability assessment

FIGURE 14.4
Social Capability and Economic Growth



1960.

Influences on culture

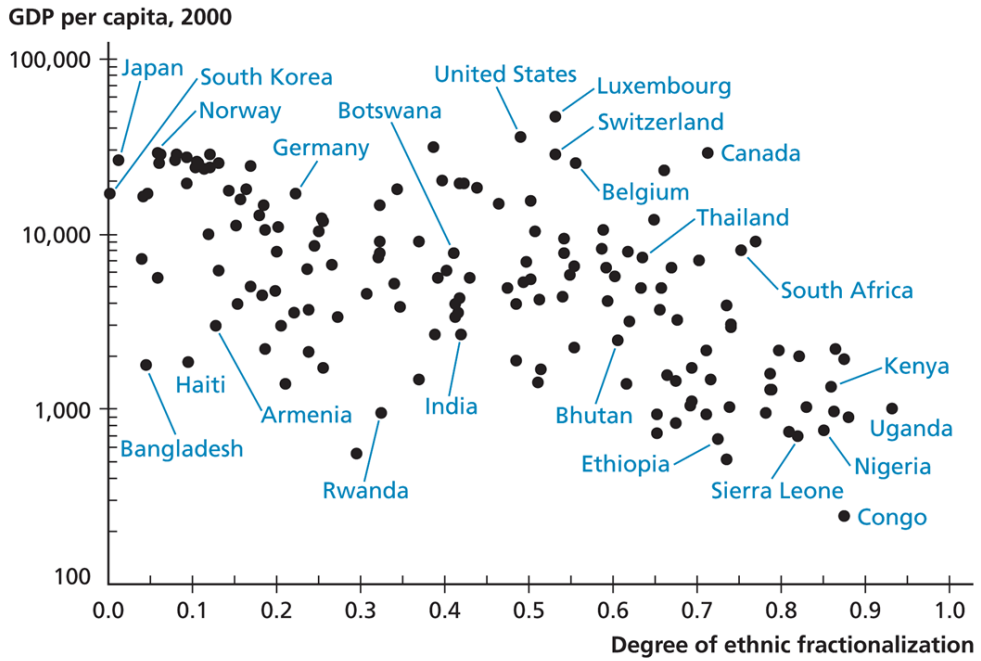
Culture is shaped by external circumstances and historical accident. We distinguish

- Climate and natural resources: harsh winters in Northern Europe inspire thriftiness.
- Ethnic makeup: trust erodes very quickly if people consider themselves a member of a faction more than a citizen of a country.
  - Ex-colonies with 'random' borders often have this problem: Rwanda, Iraq.
  - Self-image is very important: there are no 'allochtonen' in the USA.
- Population density is ostensibly related to social capability; (the Netherlands and its 'polder model' is an exception!)

The first two are mostly exogenous; the third is of course suspect.

Ethnic fractionalization

FIGURE 14.5
Ethnic Fractionalization Versus GDP per Capita



Source: Alesina et al. (2003).

Fractionalization index: $\text{Frac} = 1 - \Sigma s_i^2$, where i is ethic group.
If there is only one group, then the summation term is 1, so Frac is zero. If every single person is in a unique group, so there are N groups, then the summation term approaches 1/N, and Frac approaches 1.

Ethnic diversity (same metric but based on different language spoken):

- Papua New Guinea - 1.00 (the most heterogenous)
- North Korea - 0.02 (the least heterogenous)
- Among the most heterogenous countries: South Africa: 0.880; Australia: 0.857; Kenya: 0.852, India: 0.811
- Among the least heterogenous countries: Greece: 0.059; Portugal 0.040; Japan: 0.012; South Korea: 0.04.
- Other: USA: 0.491; UK: 0.324; France: 0.272; Germany: 0.095; China: 0.154; Cyprus: 0.359; Spain: 0.502; Israel: 0.526; Turkey: 0.299; Switzerland: 0.575; Syria: 0.581; Belgium: 0.567; Russia: 0.333

Overall, African and Latin American countries are among the most ethnically fragmented whereas European are among the least.

Culture is not static

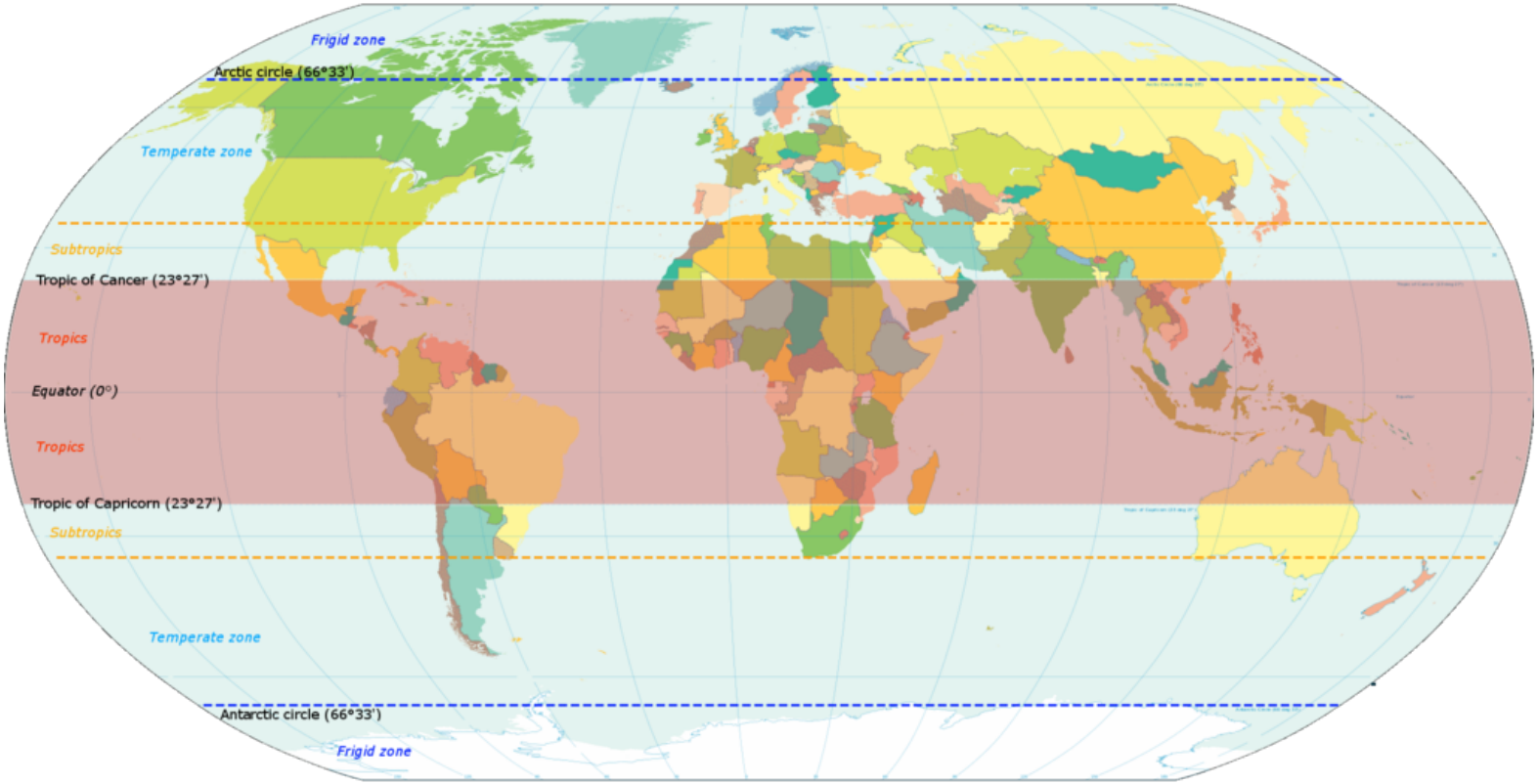
Big changes in culture are well documented

- Government policy often seeks to influence culture, sometimes to increase productivity, but often to increase the chances of the government staying in power.
- Regulation is itself subject to changing cultural views: Lindbeck (1995) argues that welfare programs have a tendency to lead to 'learned helplessness,' causing them to grow without bounds.
- Growth itself leads to changes in culture as market-relationships take the place of nonmarket-relationships.

All this makes economic analysis very difficult.

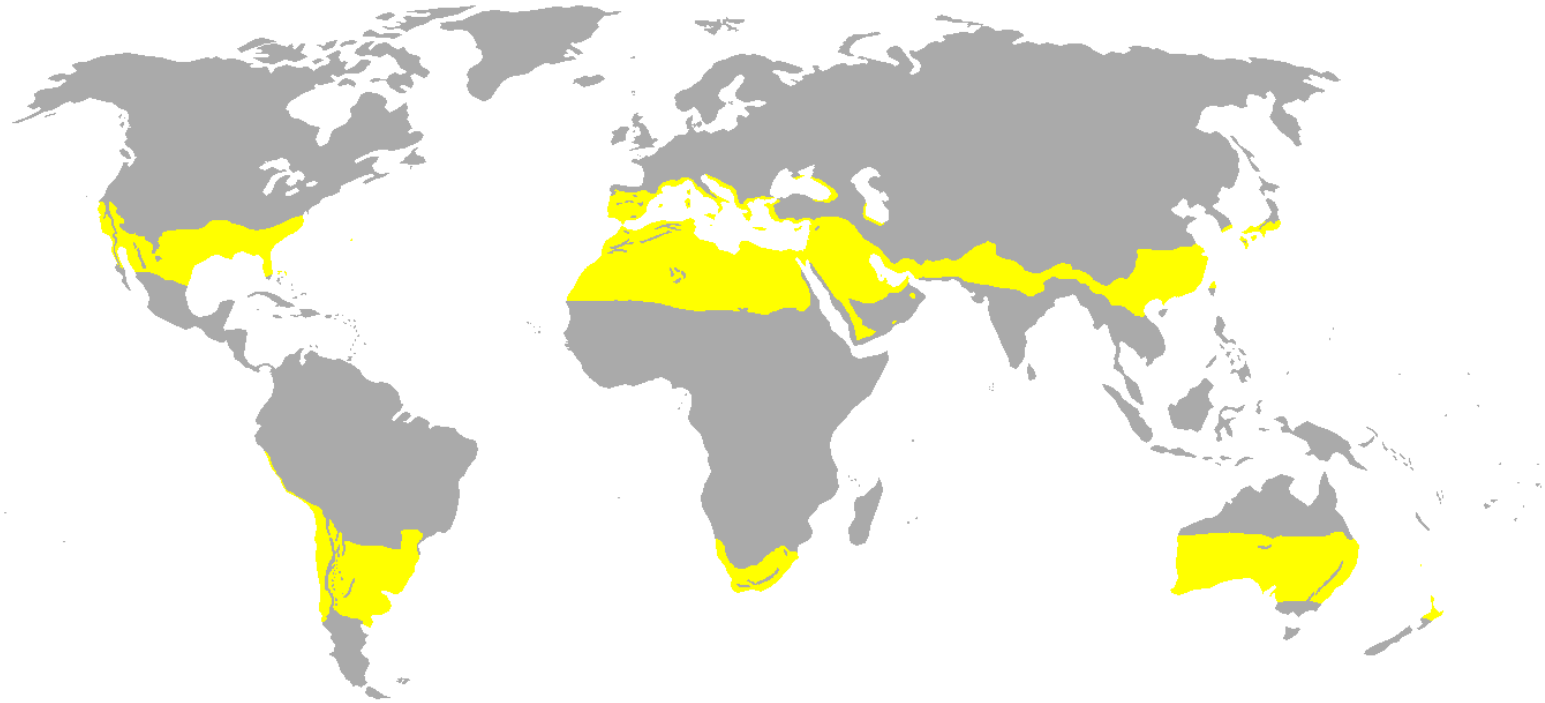
on to geography...

Geography: Tropics



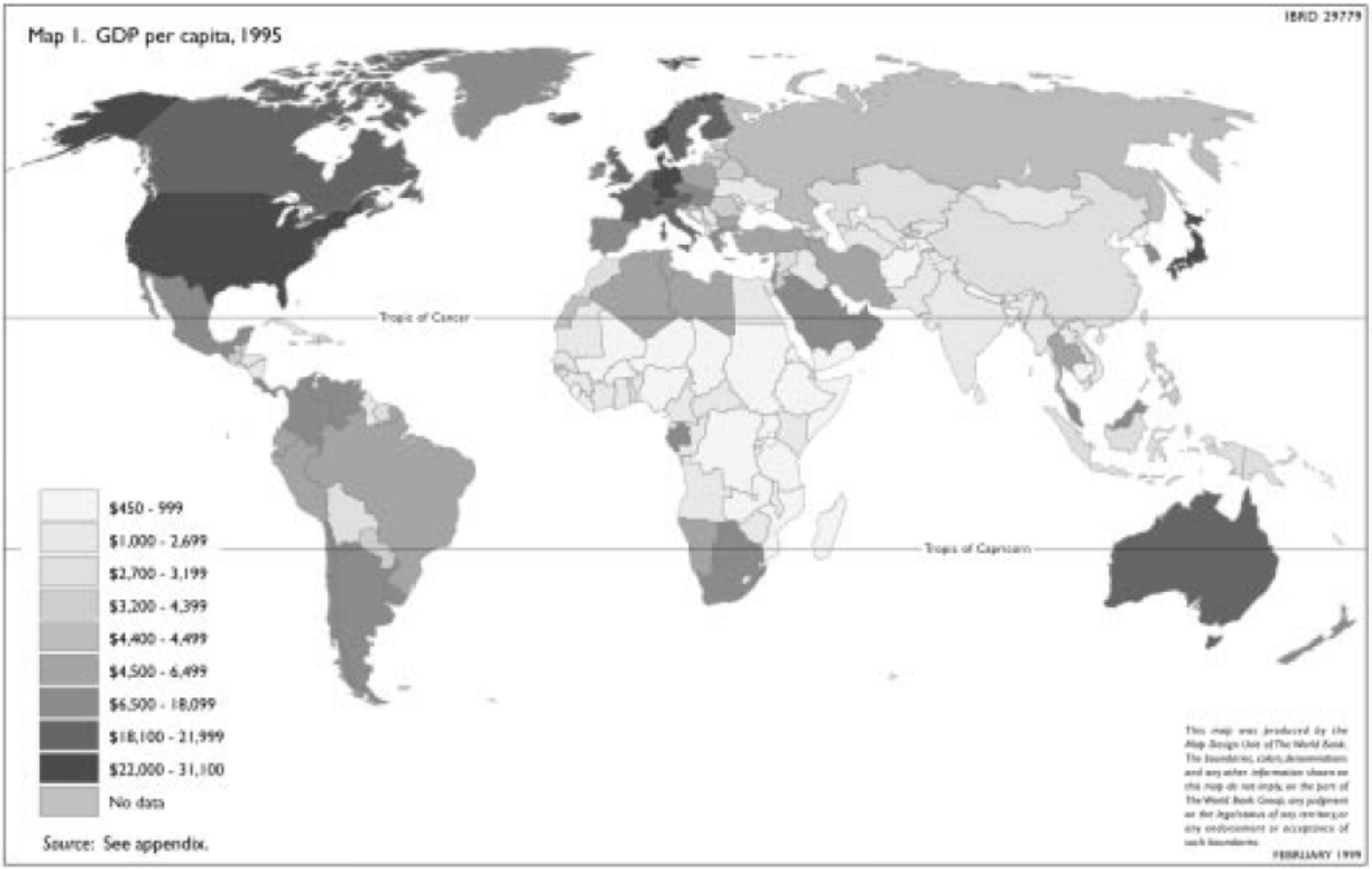
Source: Wikipedia

Geography: Sub-tropics



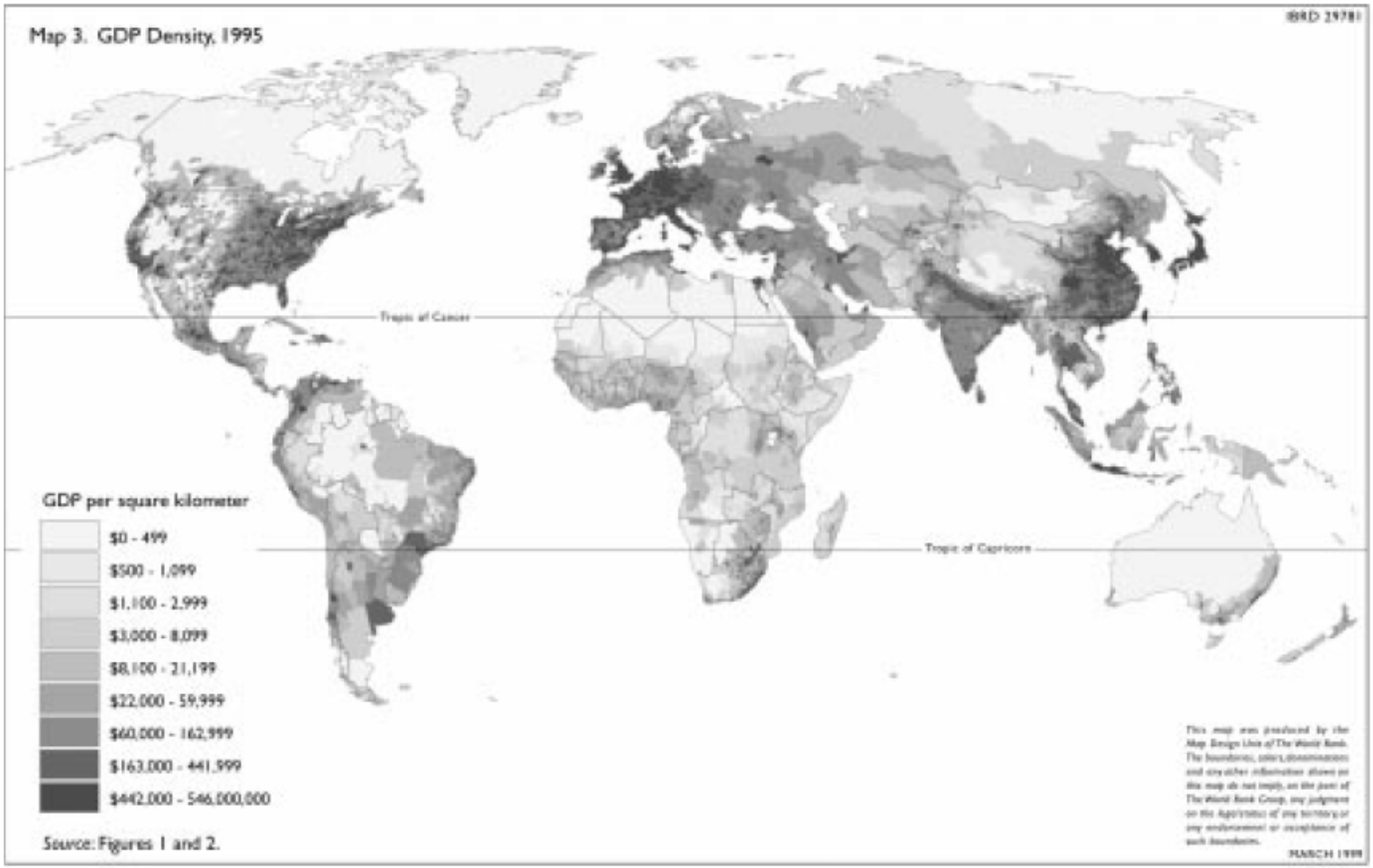
Source: Wikipedia

PPP adjusted GDP/head 1995



Source: Gallup, Sachs and Mellinger (1998)

GDP density (production/km^2)



Source: Gallup, Sachs and Mellinger (1998)

The case of the tropics and sub-tropics

Tropical:More than 50% of land area in the tropics.

	Tropical countries	Non-tropical countries
Number	78	72
Population	59%	41%
GDP/head '95	$3326	$9027

Non-tropical countries with more than 50% of their land-area inside the ecological tropics: sub-tropical.

	Temperate countries	Sub-tropical countries
Number	63	15
GDP/head '95	$9302	$7874

It seems that being in the tropics is bad for productivity.

Geography and growth

Effects of geography on productivity and economic growth run through:

1. Climate (via agriculture, health and effort)
   - Mechanisms: Adverse geography diminishes agricultural productivity, health; thereby economic development (Gullup et al., 1998)*; High disease climate lead to predatory state institutions, which impede long term development (AJR, 2001)*; In turn, low levels of development results in low levels of innovation and technological change (Sachs 2000)*.
2. Transport costs and competitiveness through location
3. Climate, transport costs and government
4. The presence of cities and external effects
5. The presence of natural resources

(*) See last slide, "References"

Agglomeration

People and productivity turn out to be highly concentrated on all levels of scale:

Scale	Region	Prod/ area	Prod/ head/area
Continents	High Incomes	1	1
	East Asia and Pac.	0.51	0.27
	Sub-Saharan Africa	0.06	0.09
Countries	Netherlands	1	0.95
	Belgium	0.67	1
	France	0.21	0.05
	Greece	0.08	0.12

Source: Thijs Knaap (2004)

First nature, second nature

But all this concentration may be due to different things:

1. First nature: physical geography is highly differentiated, and some places are better than others. If people move to the best place, or succeed more often at better places, this is where agglomeration takes place.
2. Second nature (or spillovers): people and firms, or firms and firms, may be attracted to each other for economic reasons (Marshallian trinity). Even on a featureless plane, there will be agglomerations at unpredictable places.

Usually, both factors are at work, the challenge is to identify which is which. This chapter loads almost everything onto first nature.

The resource curse

Many countries with abundant resources have poor long-term performance. Why?

1. Easy life leads to slacker cultural values, evades hard choices.
2. Overconsumption leads to disappointing performances when the resources are gone.
3. Dutch disease: natural resources exports lead to an overvalued exchange rate, making manufacturing unproductive.

All these effects are not necessary: good political management can avoid them. However, politics itself is often poisoned by the resources. Exceptions: Norway, Botswana.

Illustration: Nauru

The Pacific island of Nauru was covered in phosphates, all of which have been sold. The government used to proceeds to invest abroad and live off the rents.

So far, so good. However, insufficiently diversified investments and corruption have caused the entire asset stock to disappear. The country is now bankrupt.

Source:

wikipedia.com

Natural resource consumption

We distinguish non-renewable and renewable resources.

- non-renewable: once it's gone, it's gone. Oil, coal, gas.
- renewable: in principle, the resource can regenerate. Fish, forest, air quality.

For non-renewable resources, scarcity should be reflected in prices; when they rise to high, substitution takes place.

For renewable resources, there exists an optimal yield level, at which regeneration just equals harvest. Most of the time, production is way higher than that level.

Property rights

Currently fashionable political ideas of ownership draw our attention to the institution of property rights.

Larry Summers: "In the history of the world, no one has ever washed a rented car."

Many problems in the world can be traced to the fact that property rights are not clearly defined. This often leads to the tragedy of the commons.

Commons problem

There is a field to which access is free. Cows graze the field. The total amount of milk produced depends on the number of cows:

cows	milk
20	100
30	150
40	180
50	150
60	100

A private owner would never put more than 40 cows in the field. But with 40 cows present, it makes sense for a single cow-owner to add his cow. The drop in production is external.

Commons

Once you know how to look for it, commons are everywhere. For instance:

- Overfishing
- Littering
- Neighborhood degradation
- Building flood protection or abating greenhouse gas emission
- Student house toilets

See also the recent drive to sell off rented houses in the Netherlands.

The fix for this kind of problem is surprisingly easy: assign property rights. To anyone.

Ronald Coase

"in a regime of zero transaction costs, an assumption of standard economic theory, negotiations between the parties would lead to those arrangements being made which would maximise wealth and this irrespective of the initial assignment of rights."

"what are traded on the market are not, as is often supposed by economists, physical entities but the rights to perform certain actions and the rights which individuals possess are established by the legal system."

Source:
nobelprize.org
(nobel lecture 1991)

Finite resources

Remember Malthus' model:

> Mankind will always grow to fill its ability to produce, leaving everybody at subsistence level.

Now we introduce the term Malthusians to describe a related idea:

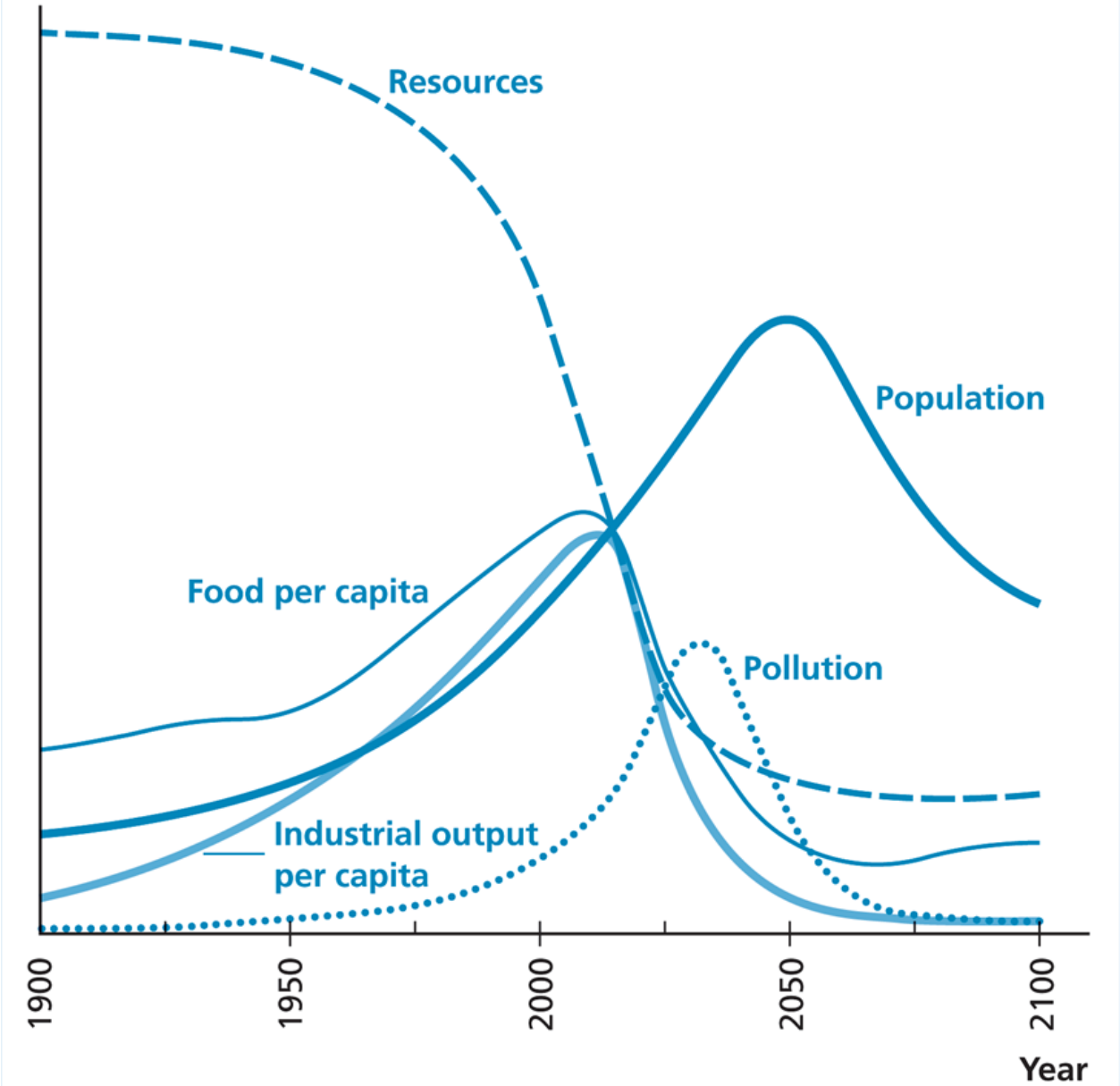
> There are limits to growth as we deplete finite resources.

Club of Rome

Meadows (1972) “The Limits to growth: a global challenge"

> If the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity. It is possible to alter these growth trends and to establish a condition of ecological and economic stability that is sustainable far into the future.

FIGURE 16.3
Growth Forecast from *The Limits to Growth*



Solow on Rome

The one thing that really annoys me is amateurs making absurd statements about economics, and I thought that the Club of Rome was nonsense. Not because natural resources or environmental necessities might not at some time pose a limit [. . .]–I didn't think that was a nonsensical idea–but because the Club of Rome was doing amateur dynamics without a license, without a proper qualification.

Technology has to be the main part of the solution. To the extent that we talk in terms of any moral obligation, it's our obligation as rich countries to find ways for the rest of the world to develop economically with a proper respect for the environment and the dangers that could be associated with global warming.

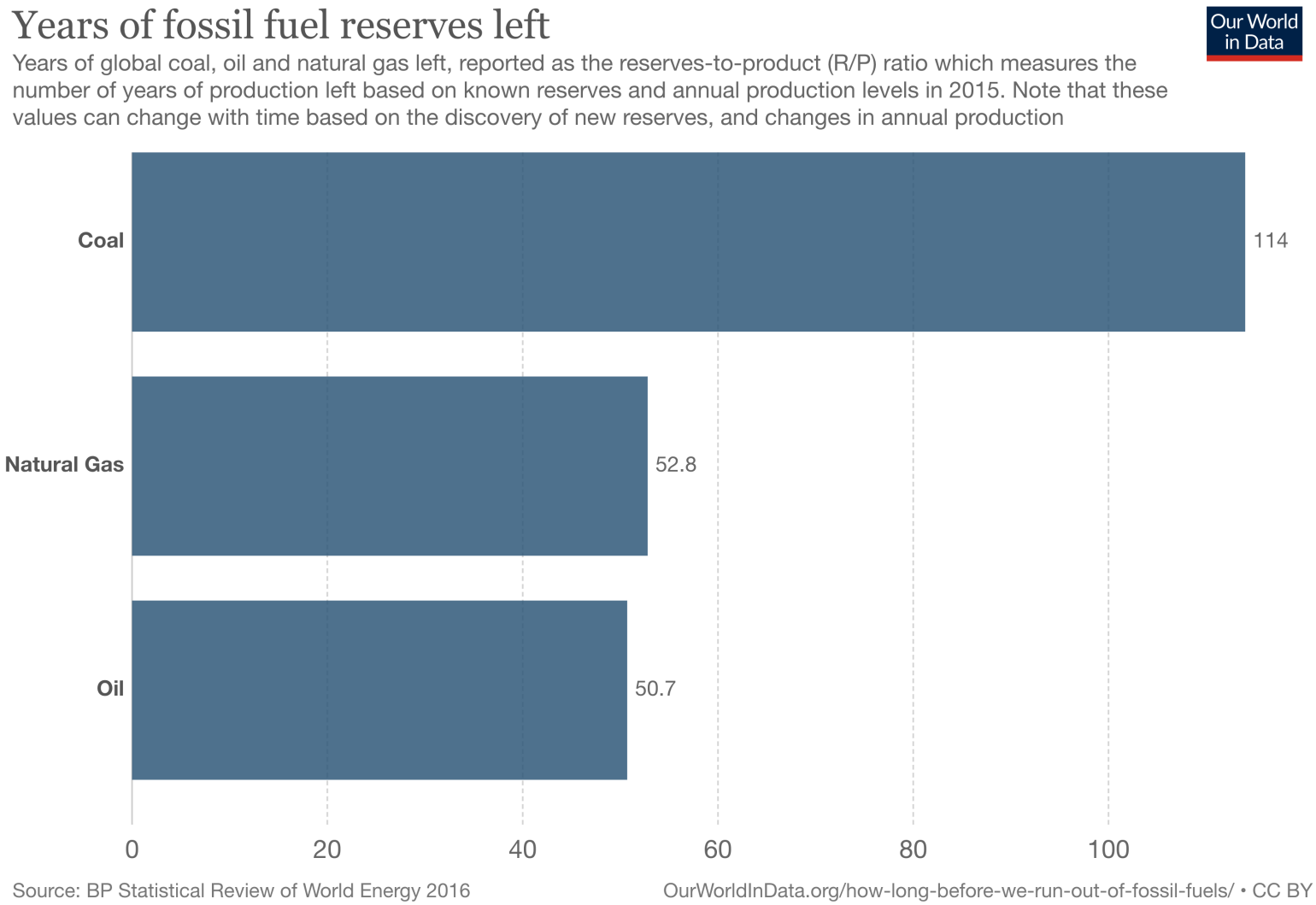
`http://minneapolisfed.org/pubs/region/02-09/solow.cfm` or Webct

Are we running out?

Reports on impending scarcity are nothing new. But if we are running out of raw materials, that should be reflected in prices. Raw materials prices have been stationary or falling.

- Our ability to use resources effectively has gone up.
- However, some things are not included in prices (like environmental effects.)

When will fossil fuels run out?



What are the alternatives?

Renewable energy sources, such as solar and wind power, provide a viable alternative to fossil fuels.

As the name suggests, these sources are renewable and won't run out.

Not only that, but they are also more environmentally friendly, producing little or no CO_2 when generating electricity.

How to deal with finite resources

When confronted with non-renewable finite resources, there are two economic principles at work:

- Scarcity leads to higher prices leads to substitution.

Both substitution away from the resource (from diamonds to other stones, for example) and toward more efficient use.

- Through technological progress, effectivity goes up.

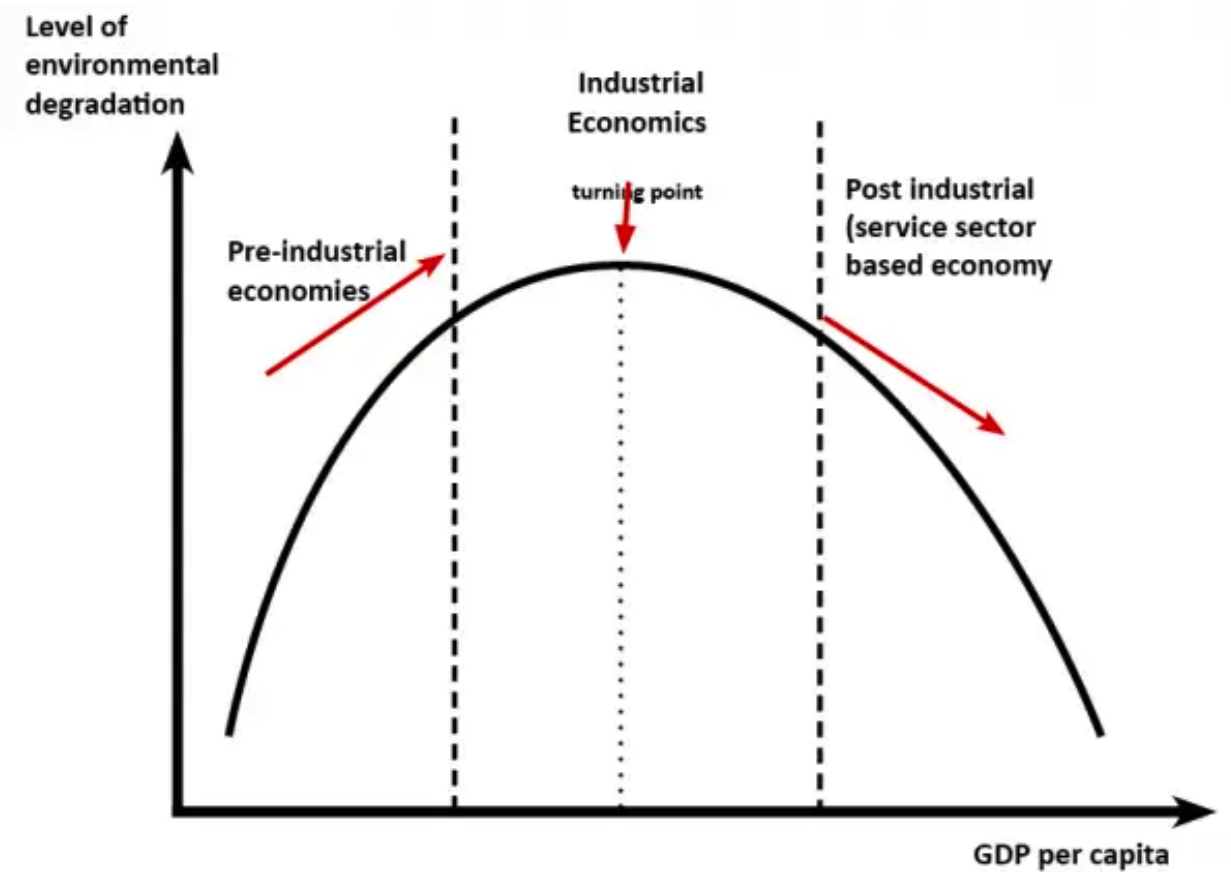
In principle, a fixed stock can be made to last forever.

Environmental impact of economic growth

The environmental impact of economic growth includes:

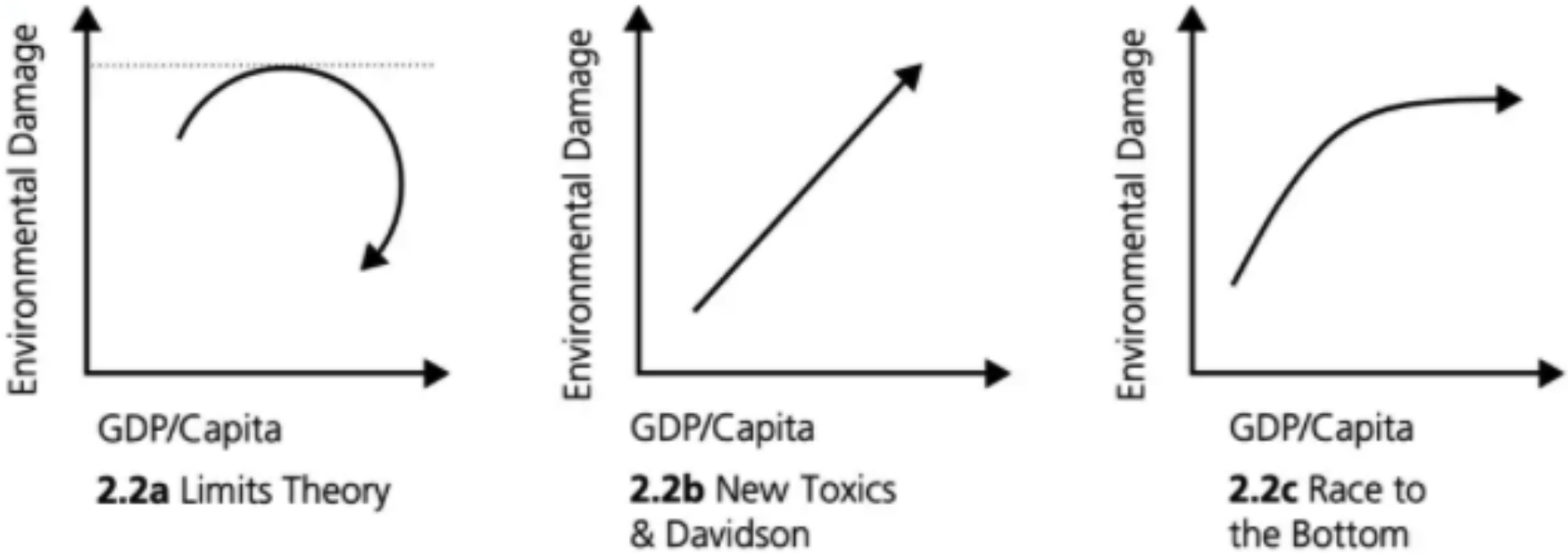
- higher levels of pollution
- global warming and volatile erosion
- A decline in sources of non-renewable resources (oil/coal/gas).
- Loss of fishing stocks - due to overfishing
- Loss of species diversity - damage to natural resources has led to species extinction.

1. Kuznets Curve for economic growth and environmental damage



One theory of economic growth and the environment is that up to a certain point economic growth worsens the environment, but after that the move to a post-industrial economy - it leads to a better environment.

2. Altrnative Theories for economic growth and environmental damage

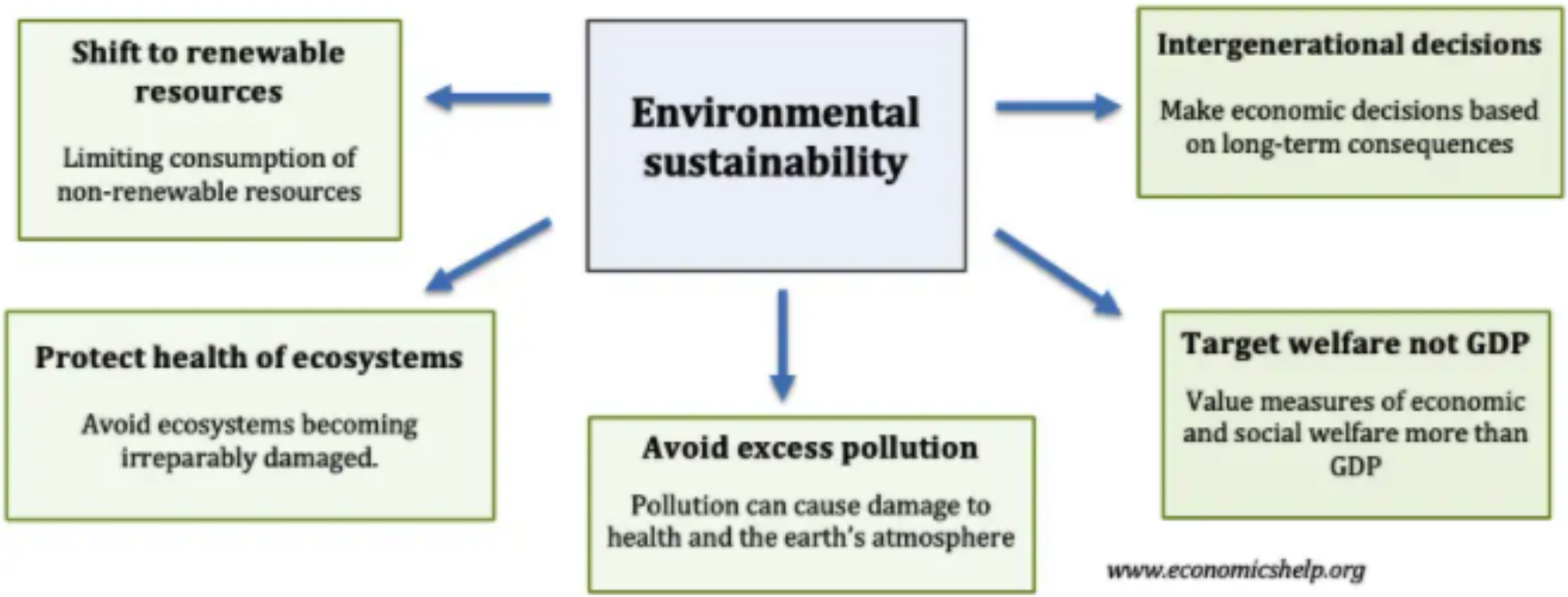


Source: "Economic Growth and the Environment" (March 2010). Tim Everett, Mallika Ishwaran, Gian Paolo Ansaloni and Alex Rubin.

...condinued

- "Limits Theory": Economic growth will damage the environment, and damage will itself start to act as a brake on growth and will force economies to deal with economic damage. For example, if we run down natural resources, their price will rise and this will create an incentive to find alternatives;
- "New toxics": An ever-increasing range of toxic output and problems, some issues may get solved, but they are outweighed by newer and more pressing problems which are difficult if impossible to overturn. This theory has no faith that the free-market will solve the problem because there is no ownership of air quality and many of the effects are piling up on future generations;
- "Race-to-the-bottom": This suggests that in the early stages of economic growth, there is little concern about the environment and often countries undermined environmental standards to gain a competitive advantage - the incentive to free-ride on others' efforts. However, as the environment increasingly worsens, it will reluctantly force economies to reduce the worst effects of environmental damage. This will slow down environmental degradation but not reverse past trends.

Economic growth without environmental damage



...continued

- A shift from non-renewables to renewables A recent report suggests that renewable energy is becoming cheaper than more damaging forms of energy;
- Social cost pricing. Pass regulations making polluting goods more expensive (e.g. carbon tax);
- Treat the environment as a public good (through regulations, government ownership and limits on external costs);
- Technological development. It is possible to replace cars running on petrol with cars running on electricity from renewable sources;
- Include quality of life and environmental indicators in economic statistics. Rather than targeting GDP, environmental economists argue we should target a wider range of living standards + environmental indicators.
- A greener style-life (even in food)
  - Meat & the Environment: https://www.cleanwateraction.org/features/meat-industry-%E2%80%93-environmental-issues-solutions
  - Are my hamburgs hurting the planet? https://www.washingtonpost.com/climate-solutions/2019/11/18/are-my-hamburgers-hurting-planet/

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