

Lecture notes 9: Geography, Climate, and Natural Resources

Geography, Climate, and Natural Resources

Figure 1: Relation between income per capita and latitude (dist to equator).

→ Strong relationship, no danger of “reverse causation.

→ What economic mechanism underlies this relationship?

→ How differences in geography/natural resources determine differences in Y?

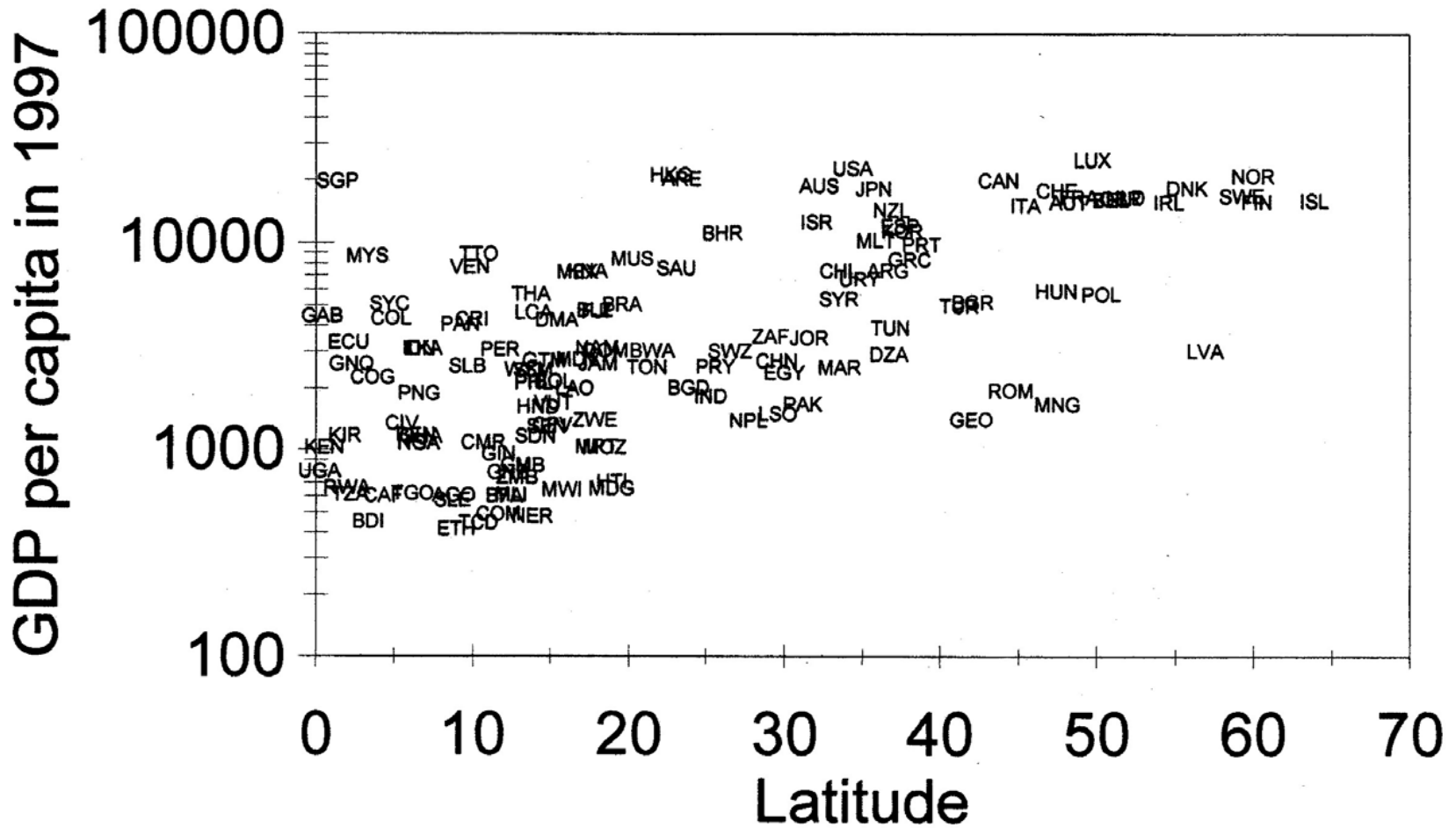
1. Geography:

- Earth - 58 m square miles of land, pop-six billion → pop density of 100 per sm.
- Inequality and density, 90% world's pop live on 10% of land.
- Mongolia - 4.3 people per sm, Australia - 6.4 Bangladesh - 2,200, US – 76.

Low density: people live where conditions are more favorable for production and for living: temperatures modest, ground is level, soil fertile, and reasonable precipitation.

Figure 15.1

Latitude and Income per Capita



How Standard of Living is related to geographic characteristics?

The Malthusian model predicted: variations in quality of land lead to differences in the number of people in a region, but not to differences in their standard of living.

a. Location, Trade and Development

Geography is an important determinant of trade: countries near neighbors or near world markets will find trade less expensive. Countries landlocked → less likely to engage in trade.

- Adam Smith (1776): Cheapest way of shipping goods – by sea → Sea transport determines where people live and standard of living.

-These claims are supported by geographic evidence:

17.4% world's land mass is located within 100 km of an ocean or a river that is navigable as far as the sea:

50% of the world population lives on this land,

68% of the world's GDP is produced on it,

GDP per capita in areas that are within 100 km of the sea is twice as high as GDP per capita in areas that are further away.

Proximity to sea can also explain large differences in living standards between regions:

89% of Western Europe lives within 100 km of ocean or navigable river,
NA - 67%, LA - 45%, SA - 41%, Sub Saharan Africa - 21%.

The average cost of transporting imports (as a ratio to total value of imports):

US - 3.6%, WE – 4.9%, EA - 9.8%, LA – 10.6, SSA - 19.5%.

- 1,000 kilometers distance from “core” economies raises TC by 1% point,
- being landlocked raises a country’s transport costs by 11%.

Diff in Transportation Cost reflected in difference in volume of trade:

Increasing distance between two countries by 1% lowers trade between them (relative to GDP) by .85%.

Landlocked countries have trade volumes that are on average 30% lower than countries which have access to the sea.

The Fates of human Societies – Europe versus the rest of the world

Colonization (since 500 years ago): the spread of Europeans – explorers, traders, colonists, and conquerors – through out the world:

- Americas and Australia: much of the native culture, language, and pop simply wiped out
- Replaced with European imports
- Most of Asia, either never colonized or maintained its pre-colonial civilization, population and languish
- Sub Saharan Africa's fate was somewhere between these two: European control was more complete than it was in Asia, but not total as it was in the Americas.
- Causes of Europe's domination: better weaponry, more sophisticated social organizations.
- But what was the source of this domination?

Biologist Jared Diamond claim:

(in his book Guns, Germs and Steel: the Fates of Human Societies)

Geography determined this outcome, providing several advantages to Europe:

- Good luck in having numerous species of plants and animals that could be domesticated,
- These large mammals formed the basis for pre-modern agricultural economies – cow, horse, pig, sheep, and goat – were all native to Eurasia.
- By contrast, in the Americas, the only mammals that could be domesticated were the llama and alpaca, which were both very localized in their habitats and of limited economic usefulness.

- Similarly, of the 56 large-seeded grass species that could potentially be domesticated as food grains, 39 were native to Eurasia, 11 to the Americas, 4 to Sub-Saharan Africa, and only 2 to Australia.
- This advantage in the range of species resulted from plain luck and from their size.
- In a larger area it is likely that more useful plant and animal species will be found.
- Eurasia geographic orientation, along an East-West axis, allowed for the spread of agricultural techniques and of useful plant and animal species throughout a zone of relatively similar climate.
- Thus the chicken, domesticated in China, could spread to Europe, while grains first domesticated in the Fertile Crescent spread as far East as Japan.

- The availability of food crops and domestic animals in Europe and Asia allowed for more efficient food production, denser populations, and the rise of advanced civilizations.
- By contrast, the North-South orientation of the Americas meant that climactically similar zones, which could potentially have shared agricultural technologies, were separated by areas in which these technologies would not be useful, and thus would not spread.
- Surplus food could support a large class of rulers, armies, new technologies, such as writing, metallurgy, and the ocean-going ships that took European colonizers around the world.
- As a result, Eurasia was more economically advanced and more densely populated than any other part of the earth.

Another advantage: close association with large animals led a number of animals diseases, such as measles and smallpox, to transfer to humans .

- Dense populations allowed Europe to sustain a number of endemic diseases that, in a sparser population, would - have died out.
- Over time, Europeans developed partial immunity to these diseases, although they still harbored the agents of infection.
- When Europeans came into contact with unexposed native Americans, the results were devastating. Diseases killed far more Americans than any deliberate action of the Europeans, and the massive depopulation left the Americas (and later, Australia as well) open to domination and colonization.

b. Geographic Concentration and Spillovers

Wealthy countries tend to be near one another. Europe is the best example,

Other clusters: Canada and the US; Japan and South Korea; and Australia and New Zealand.

Explanations:

1. It reflects countries influenced by their neighbors through trade, ideas that can be copied, opportunities for training, spread jobs to poor neighbors to take advantage of low wages.

EX: the “maquiladora” factories along Mexico’s border with US.

Negative spillover effects: Political instability, refugees or military aggression.

2. Countries near each other share common characteristics that are important for development: climate, culture (“Confucian” in EA).

Relevancy and effect on DEVC depend on which of these two is important:

- If (1) then poor countries next to rich can benefit from spillover.
- If (2) then fundamentals should be changed in DEVC in order to develop.

c. Geography and Government

Historians argued that geography played important role in shaping development through effect on the structure of government:

- European geography, continent's fragmentation-the Alps and the Pyrenees, bodies of water (English Channel), cut Europe into large geographic units, difficult to govern as a single unit.
- As a result, Europe has been politically fragmented for most of its history.
- China, the natural comparison, because of geography, ruled as a single unit, politically unified for much of the last two millennia.

Political fragmentation advantage for development for two reasons:

1. Threat of external competition kept governments liberal about ideas and innovations
2. Otherwise, innovators able to move to a neighboring country.

(In China, no outside competition and no place for suppressed innovators to go).

Ex: when the Genoese navigator Christopher Columbus was unable to get financing for his voyage of exploration from the Portugese, he turned to their neighbors, and competitors, Spain.

2. Climate

Table below shows the economic and population characteristics of three climactic zones which together encompass the world's entire landmass.

Table 1: World Climactic Zones

	Percentage of the World's Area	Percentage of the World's Population	GDP per capita relative to World Average
Temperate	39.2%	34.9%	1.94
Tropical	19.9%	40.3%	0.43
Other (desert, steppe, highland, and polar)	40.9%	24.8%	0.50

- Tropical region, smallest in terms of area, largest fraction of the world's population and also poorest.
- Temperate zones are wealthiest. Western Europe-96% live in temperate zones, North America-88%, LA-12%, SSA-4.5%, South Asia-0%.
- What explain these differences in income between different climactic zones?

a. Climate and Productivity

Climate affect productivity of agriculture.

Tropical climates suffer from several disadvantages in producing useful crops:

- Heavy rainfall but seasonal, and in larger quantities that lead to soil erosion.
- Constancy pattern of sunlight not optimal for growing staple grains (wheat).
- Tropical areas are characterized by a wealth of insect life, plague agriculture.

Estimate: same level of inputs, land in wet tropical climates produced 30% less output and that in the dry tropics produced 33% less output than land in the wet temperate zone.

b. Disease

The tropics are unhealthy places to live, rich in diseases: Malaria, Yellow Fever, Sleeping Sickness, and Bilharzia:

- Regions where the temperature never reaches freezing supports a much wider selection of parasites and disease carrying insects than are found in a temperate whether.
- Parasites had millions of years in Africa to evolve and take advantage of humans (Malaria and Yellow Fever were brought from Africa).
- The prevalence of disease prevented Europeans colonialists from displacing native populations in Africa as they had in much of the Americas and Australia.

Malaria:

- The most important disease affecting economic development and growth.
- Between 200 and 500 million cases per year.
- Today, confined almost exclusively to the tropics, but prior to 1945 it included Spain, Italy, and large parts of the SA.

The pattern of the disease's retreat, and of its continued strength, resulted from human activity and geographic factors:

- Malaria under control in wealthier countries, could afford investments in swamp drainage and spraying of insecticide.
- Also been in the temperate and semi-tropical areas where the disease's foothold was the weakest. In tropical regions, Malaria has remained stubbornly entrenched.

c. Climate and Effort

A controversial theory, cited to explain underdevelopment of tropical regions:

- Something about tropical climates leads people not to work hard as they would in a temperate climate.
- Simplest explanation for this phenomenon: temperature itself, “nothing can be done about heat other than move slowly and take frequent breaks”.

[Kevin H. O’Rourke and Jeffrey G. Williamson, *Globalization and History: The Evolution of a Nineteenth Century Atlantic Economy*, MIT Press, 2000.]

A related claim: there is an interaction between climate and culture. A temperate climate, where crops mature seasonally and one must provide shelter and heat for the winter, instills certain cultural values, such as saving and planning ahead. These cultural values, according to this view, are then conducive to economic development.

Example to these explanations:

The experience of the US South:

- Was a slow-moving place,
- Was also significantly poorer than the rest of the country.
- But in the postwar period, much of this gap, both in culture and economic status, has been closed (air-conditioning?).

3. Natural Resources

A geographic determinant of income is the presence or absence of Natural Resources, farmland, forests, or minerals:

- Is it obvious that countries with more natural resources (per capita) should be richer than those without resources?
- The relationship between resource endowments and income is more complex than one would initially think.

a. The Relationship Between Resources and Development and Growth

- Fertile land - until last century is most important natural resource for economic development.
- Land was more significant than capital as a factor of production prior to industrialization.
- Land-abundant countries among the richest countries in 19th century: Australia, US, and Canada had higher real wages than any country in Europe, Argentina's real wages were higher than any country in Europe.
- They became magnets for immigration: in the century following 1820, 60 m from Europe, and capital.
- Growth of these New World countries was very much "resource driven."
- But, there are also examples where resource-driven growth failed, L.A: boom in the production of gold (Peru), silver (Mexico), Copper (Chile), sugar (Cuba), coffee (Brazil, Columbia, and Costa Rica), guano (Peru), and nitrate (Chile).
- These episodes often left the countries that experienced them poorer than when they began.

More modern evidence:

Post-World War II period, the relationship between economic development and natural resources is also mixed:

- Oil exporting countries of the Persian Gulf
- Japan, grown rich despite being exceedingly poor in resources
- Nigeria and the Soviet Union which have remained poor despite a generous natural resources.

Figure 4: Difficulties in interpretation.

b. Explaining the Resource Curse

Can natural resources actually impede economic development in the long run? a “resource curse.”?

Saving:

- booms in income resulting from natural resources tend to be temporary
- Raise their level of consumption to levels that cannot be sustained once the boom ends
- Lead to low rates of saving (and thus investment) in an effort to maintain consumption
- Lower investment → lower level of income
- If government forward-looking → invest large fraction of windfall and invest it for the future.

Industrialization:

- A country with natural resources often import manufactured goods and do not develop its own manufacturing goods sector
- Manufacturing industries are those with the most rapid technological progress
- A natural resources country will miss out on this progress, may end up worse off in the long run: **Dutch Disease.**

“Backward and forward linkages,”

“backward linkages,”: locally produced goods are used as inputs by the resource extraction industry,

“forward linkages”: the natural resource is processed or used in the production of other goods.

If such linkages are present, the presence of a natural resources can lead to industrialization in the economy as a whole.

Whether there will be such linkages depends on the:

- Nature of the commodity and transport costs,
- State of the economy in which the resource is found.

Ex: US in the 19th century, not possible to export natural resources. Thus the export of resource-intensive products such as wheat to Europe involved a rich set of forward and backward linkages, and thus resource exports were intimately tied up with industrialization in the US itself.

Ex: resource exports sectors in DEVC became “enclaves,” with almost no contact with the rest of the country’s economy: offshore oil production.

Politics:

- Government could play a role in turning the resource curse into a blessing.
- Government policy could be used to make sure that the windfall income from a commodity boom was used for investment or put aside for a rainy day, rather than being used for consumption.
- Similarly, since many resource extraction industries are owned by the government itself, government policy could be used to establish forward and backward linkages between resource extraction and other sectors of the economy.
- Governments can collect taxes on resource exports and use this revenue to provide public goods such as infrastructure or to invest in education.

- Many argue that the presence of natural resources actually makes governments undertake *worse* policies than they otherwise would.
- That is, natural resources have a toxic effect on the political system.
- The most common pattern is that in countries with natural resource windfalls, high levels of government spending, much of it wasteful, are used to buy off different ethnic, religious, and tribal groups.