CHAPTER 4: WHY SOME COUNTRIES DEVELOPED WHILE OTHERS STAYED POOR

I. The Idea of Clinical Economics

We have seen how modern economic growth diffused throughout the world during the past 250 years. The Industrial Revolution began in England in the mid-18th century. By the middle of the 19th century, only a handful of countries had reached even $2,000 per capita (measured at purchasing power parity in 1990 prices). As late as 1940, the $2,000 threshold had been reached only by the US, Canada, Europe, the Soviet Union, Australia, New Zealand, Japan, and the Southern Cone of Latin America (Argentina, Chile, and Uruguay), but still not by most of the world.

We have begun to explore why economic growth occurred earlier in some places than others, and almost not at all in a few places. We have noted that within Europe, industrialization spread roughly from the northeast (Britain) to southwest (Balkans) in the course of the 19th and early 20th centuries. The year that each European country reached $2,000 per capita is well explained by its proximity to Britain: the closer to Britain, the earlier the date of reaching $2,000. Hence, among the continental European countries, the Netherlands was earliest and the Balkan states the latest (not until the 20th century).

We have also noted the reasons for early or late industrialization in other parts of the world. Climate zone mattered: development generally came earliest in temperate-zone regions, such as the Southern Cone of Latin America. Development came first to coastal countries, and generally reached landlocked countries (such as Afghanistan, Bolivia, and Mongolia) much later. Geopolitics certainly mattered. Domination by a European or Asian imperial power set back the process of industrialization in countries in Africa (such as Ghana and Kenya), South Asia (such as India), Southeast Asia (such as Malaysia), and Northeast Asia (such as Korea). Disease burden mattered too. Since development depends on a healthy, well-educated population, it's not a surprise that regions beset by a heavy disease burden are held back. The US south, with hookworm, malaria, and yellow fever, was at a disadvantage compared to the US north, which suffered much less from these diseases.

There are three main points here. First, modern economic growth was a diffusion process, starting in one small part of the world (Britain) and gradually diffusing, and evolving, all over the planet. Second, the patterns of diffusion are discernible. They are not just a mystery. Third, many different kinds of factors have been at play during the past 250 years, and the relative importance of those factors continues to change, especially as technologies evolve. In the past malaria was a profound barrier to development in Africa. With recent advances in malaria and treatment technologies, this particular barrier is close to being eliminated for the first time in history.

There seems to be a misguided desire for overly simple explanations of complex economic dynamics. In many places one will read that economic growth depends on "economic freedom," or on "inclusive institutions," or on "controlling corruption." Factors like economic freedom, political institutions, and

corruption may play a role; but they certainly do not play the only role, or even in the main role, in many places and times of history. These individual factors taken alone neither explain the patterns of development across the globe and over time, nor help us predict future development.

The problem is that in a complex process such as economic transformation, many things can go wrong. Think of the complexity of the global economic system like the complexity of the human body. While it is true that in the past doctors and spiritual leaders often blamed a person's disease on one factor (god's punishment of a sinner) or a few factors (the imbalances of the bodily humors), these explanations failed to understand the complexity of human pathophysiology. In a complex system like the human organism, literally thousands, indeed tens of thousands of things can go wrong. A horrific disease like sickle cell anemia, which was long a death sentence in pre-modern times, is now scientifically explained by a change of one single nucleotide on one gene on one chromosome: a single change among roughly 1 billion base pairs in the human genome. There are many diseases caused by such a single-site polymorphism, as it is called. There are other diseases caused by environmental factors, pathogens such as viral or bacterial infections, trauma, unhealthy behaviors, and many other possible factors.

The art of modern clinical medicine had advanced beyond pronouncing a single cause of disease ("you have sinned") or a single prescription ("take two aspirin and call me in the morning") or a single referral ("go to the emergency room"). The modern doctor is expected to diagnose the specific causes of a specific patient's illness and to offer a specific prescription that is accurately honed to that patient's conditions and needs. The modern economist should do the same in diagnosing the persistence of poverty. Instead of offering one simplistic diagnosis ("stop your corruption"), one prescription ("cut government spending"), or one referral ("go the IMF for treatment"), the effective development practitioner should make a diagnosis that is accurate for the conditions, history, geography, culture, and economic structure of the country in question, and of course is effective as a solution.

I have been lucky in my own work as an economist in thinking about the need for careful diagnosis and prescription because I have been able to watch a wonderful medical diagnostician do her work. That clinician is my wife Sonia, a clinical pediatrician. When she sees a young child with a fever, she doesn't immediately think she knows what the problem is, that all fevers have the same cause. Her training, knowledge and experience inform her that there could be thousands of reasons for the fever. To treat the patient effectively, she needs to make a diagnosis of the actual cause of the disease in this particular patient. She begins to ask questions. Her first question, in general, is whether the baby's neck is stiff. If it is, there is the possibility of cerebral meningitis, a relatively rare but potentially fatal condition. If the mother answers that the baby's neck is stiff then indeed my wife's next sentence is, "I'll meet you in the emergency room." More likely, of course, is that the condition is not cerebral meningitis. The list of questions continues, all aiming to ferret out whether the condition is viral, bacterial, environmental (e.g. poisoning) or something else altogether.

Doctors call the process of honing in on the actual cause of a disease a *differential diagnosis*. I have come to the view that in economic development, and indeed in sustainable development more generally, we also need to have a clinical approach based on differential diagnosis. In my book *The End*

of Poverty, I called this approach "clinical economics," and I said that the role of a good practicing clinical economist is to make a differential diagnosis for the economic case at hand, just like a good medical doctor. Medical doctors like my wife go through a systematic checklist, asking the relevant questions about potential causes of illness, and asking them in a particular order (rule out meningitis first, or move fast to the emergency room!). They look at the evidence and lab results; conduct interviews; try to understand from the parents and from the child what's actually happening; and then on the basis of a wide range of information and evidence, to make a diagnosis and a plan for treatment. The treatment may then proceed according to plan, or it may prove to be ineffective, in which case a further round of diagnosis will be necessary. (Fans of the medical TV series, *House*, a personal favorite of mine, will know the process.)

Practitioners of sustainable development also need to make such a differential diagnosis. In *The End of Poverty*, I created such a checklist for a particular "disease" that persists into the 21st century – extreme poverty. I reasoned that most of the world had by now escaped extreme poverty. Roughly 1 billion people are still trapped in extreme poverty, heavily concentrated in tropical Africa and South Asia, but with pockets of extreme poverty in other parts of the world as well (in countries as varied as Haiti, Afghanistan, and Laos). I presented a diagnostic checklist with seven main categories, and many more sub-categories.

Let's consider the seven headline items of the poverty checklist.

First, the underlying condition could be what I call a *poverty trap* – when the country is too poor to make the basic investments it needs to escape from extreme material deprivation and get on the ladder of economic growth.

Second, the poverty could result from bad economic policies, such as choosing the wrong kind of investment strategy, closing the borders when international trade would make more sense, choosing central planning when a market system would be better, and so forth.

Third, the poverty could reflect the financial insolvency of the government. If a government has a past history of overspending and over-borrowing, it can reach a state of financial bankruptcy. The government then owes so much to its creditors that it is unable to find the money to build roads, schools, clinics, or hire doctors, teachers, and engineers.

Fourth, the poverty might be the result of some aspects of physical geography. The country may be landlocked, far from trade; it may be high in the mountains, unable to farm or engage in low-cost manufacturing; it may face an endemic disease burden of malaria or other burdensome diseases; or it might be highly vulnerable to repeated natural disasters such as earthquakes, tsunamis, tropical cyclones (hurricanes and typhoons), droughts, floods, and other crippling conditions. A few countries, such as Haiti and the Philippines, are unusually buffeted by a large number of such conditions.

Fifth, the country might be suffering from poor governance as opposed to poor policies. On paper, the economic policies look good. In practice, they may be riddled with corruption, inefficiency, incompetence or all of the above. Poor governance is of course a matter of degree. There is corruption nearly everywhere. I sometimes say that, "Yes, corruption is real and damaging, and not only in Washington DC." Corruption is often attributed to poor countries but not to rich countries. Still, corruption is not the all-purpose explanation it is often taken to be. Many countries with moderate levels of corruption have achieved economic development. Corruption can be a problem, both moral and practical, without being a devastating barrier to development. Yet if carried to extremes, then it certainly can stop economic growth.

A sixth factor in continuing poverty may be cultural barriers. As one important example, some societies continue to discriminate harshly against the women and girls. Girls may still have little or no chance to attend school, and are expected to marry very early and to bear many children, even when the household is too impoverished to raise these children with proper health, nutrition, and education. Such cultural patterns can be inimical to long-term economic development.

The seventh factor is geopolitics, a country's political and security relations with its neighbors, foes, and allies. Geopolitics can make a big difference. If a country is physically secure from attack, enjoys national sovereignty, and is able to trade peacefully with other countries, geopolitics is the friend of economic development. If, on the contrary, the country is dominated by a foreign power (as in the colonial era), or is part of a proxy war of the great powers, the country can be undermined or even physically destroyed by the actions of more powerful countries. Think of Afghanistan. It has a hard enough time developing in view of being landlocked and vulnerable to many climate shocks such as droughts and floods. Yet since 1978, it is has been subjected to war, incursions, invasions, terrorist cells, and destructive great power politics. It is no wonder that Afghanistan remains one of the poorest places in the world. The outside powers have hindered rather than advanced Afghanistan's economic development.

There is one overriding point about these seven factors, and the many sub-factors in each of the seven categories. The problems do not apply equally to every country. Indeed, some categories are relevant for some places, and other categories are relevant for others. There is no single explanation of the persistence of extreme poverty. Local circumstances, history, and context are all important.

In my own experience of almost 30 years of working with countries all over the world, it has struck me how different parts of the world in different times have had extremely different conditions to confront in order to get out of the poverty rut. Always receiving the same doctor's prescription would be a disaster for a medical patient, and the same is true for an economy. I worked in Bolivia in the middle of the 1980s to help end a hyperinflation. Prices were rising by thousands of percent per year. When one made the differential diagnosis for Bolivia, one could see that the government was broke and was printing money to pay its bills, hence causing the hyperinflation. What was required most of all was to get the budget under control in short order so that this fever of hyperinflation could be broken. To end the large budget deficits involved several kinds of actions, including changes in public-sector prices (such

as the oil that the government sold to the public), budget outlays, and payments to foreign creditors on Bolivia's mountain of debt. One part of ending the hyperinflation involved cancelling around 90 percent of Bolivia's external debt, thereby easing the pressures of debt servicing on the budget.

Four years later, I was asked to help Poland overcome its very different crisis. In 1989, Poland was transitioning from communism to a market economy, and from a dictatorship to a democracy. Once again, Poland's malady – high inflation and collapsing output – required a differential diagnosis. Poland's greatest need in my view was to enable supply and demand to work, because the communist-era central planning had collapsed. Therefore, at the request of the new leadership, I helped to develop an economic strategy to restore market forces, supply and demand, international trade, and budget balance. Poland ended its high inflation and soon resumed economic growth, indeed quite rapid economic growth based on its new and growing economic trade and investment linkages with Western Europe.

When I began working in tropical Africa in the mid-1990s (first in Zambia, and then in numerous parts of Africa), the underlying conditions and causes of poverty were obviously completely different from those of Poland or Bolivia, or indeed other parts of the world. Africa, uniquely, was in the midst of a massive AIDS pandemic and was also suffering from the resurgence of malaria (because the standard malaria medicine was losing its effectiveness as drug resistance spread). Many parts of Africa were so poor that the most basic infrastructure – roads, power, water and sanitation – did not even exist. Nonetheless, I found some economic officials from international institutions (such as the IMF and World Bank) prescribing exactly the same medicine that they had been prescribing earlier in Poland. They were asking the impoverished African nations to cut budgets, and even to privatize health services. These were ludicrous and destructive prescriptions for impoverished regions suffering from massive disease pandemics. Africa needed its own diagnosis and prescription, not one repeated by rote from another part of the world, much less from Washington DC.

Figure 4.1. Child with Malaria in Ruhiira, Uganda

For most of tropical Africa, I felt that the first category on the checklist – a poverty trap – was the most accurate diagnosis. African governments knew what they wanted to do: expand health coverage; improve education; build roads, ports, and power grids; ensure access of the poor to safe water and sanitation; and so forth. These governments recognized their responsibilities. They even had investment plans on the shelf. But they lacked the financial resources to carry out those plans. A health plan might call for outlays of $60 per citizen per year for public health operations, yet that sum, as modest as it is for rich countries, is simply out of financial reach for the poorest countries. This is the poverty trap.

There are two main ways to break this poverty trap. One way is for the government to borrow the funds it needs for public investments, and then to count on future economic growth to fill the government's coffers in order to repay the loans. The second way is for foreign governments, businesses, foundations, and international institutions to provide temporary assistance to finance the urgent needs. As economic growth then occurs, the aid can be gradually reduced in scale and eventually eliminated. Such assistance goes by the technical term *Development Assistance*. It includes all varieties of help on terms better than market-based borrowing of funds. When governments and official agencies provide the help, it is called *Official Development Assistance,* or *ODA*. When non-government organizations (NGOs) and private foundations provide the help, it is called *Private Development Assistance*.

Since 2000, with the adoption of global goals to fight poverty known as the Millennium Development Goals (MDGs), several special institutions have been created to channel ODA to effective purposes. One of the most notable has been the Global Fund to Fight AIDS, TB and Malaria (GFATM). Donor governments and private philanthropies and business give money to the GFATM, which in turn distributes funds to poor countries suffering from the three diseases addressed by the fund. The

program has been highly effective. All three diseases are coming under control. Yet even so, public and professional resistance to ODA remains strong, in part because some economists continue to believe that poverty is caused by single factors (corruption or lack of economic freedom) not addressed by ODA. That may be true in some places, but seems not to be the case in tropical Africa.

II. A Further Look at Geography – Transport, Energy, Disease, Crops

Poor countries and individual poor people are often blamed for their plight even when external factors are the major obstacle to development. It is too easy to say that the poor are still poor because of corruption or bad culture or lack of direction. All such interpretations are rife in public debate. Yet experience on the ground often suggests a very different reality.

Physical geography is the fourth item on the poverty diagnostic checklist. Strangely, practitioners often overlook the most basic realities of physical geography as contributors to poverty. I have learned about geography from the ground up, so to speak, not originally from the classroom (where I was taught very little in graduate school about physical geography). Working in Bolivia, Mongolia, Uganda, Rwanda, Kyrgyzstan, Burkina Faso, Mali, Tajikistan, Zambia, Malawi, and other places has given me, for example, a solid appreciation of the extra challenges that an economy faces when it is landlocked, and the difficulties on top of that that it faces when it is both landlocked and mountainous. The view from the Altiplano of Bolivia is strikingly beautiful: blue skies, snowcapped mountains, dry scrub rolling hills as far as the eye can see. Yet the difficulties of running a factory up there is just as striking, in view of transport costs to the Pacific ports that are among the highest costs in the world.

We have already noted that GDP per capita (Figure 1.3) has very strong geographical correlates. Tropical countries are generally poorer than temperate-zone countries. Disease burden and crop productivity may help to account for such differences. Landlocked countries are generally poorer than coastal countries. Countries facing the hazards of earthquakes and typhoons, in the Caribbean and the Asia Pacific (e.g. the Philippines) seem to pay a long-term price for that vulnerability. And so forth.

Another hint of the power of geography is found in Figure 4.2, which shows a map of the world's largest urban areas. While there are large cities found in most parts of the world, there is a high proportion of large cities along the coasts of the continents. Those large cities in the interior of the continents are very often along major rivers (such as Chongqing on the Yangtze River in China), so they have waterborne trade. Being on the coast, near ports, or near major rivers has long been a key to a vibrant economy with a sophisticated division of labor that promotes high productivity and that allows for a high degree of global trade and economic growth. This proximity to sea-based trade allows exports to world markets at competitive costs, and also enables the economy to obtain inputs from the rest of the world at low costs for processing or local production and consumption.

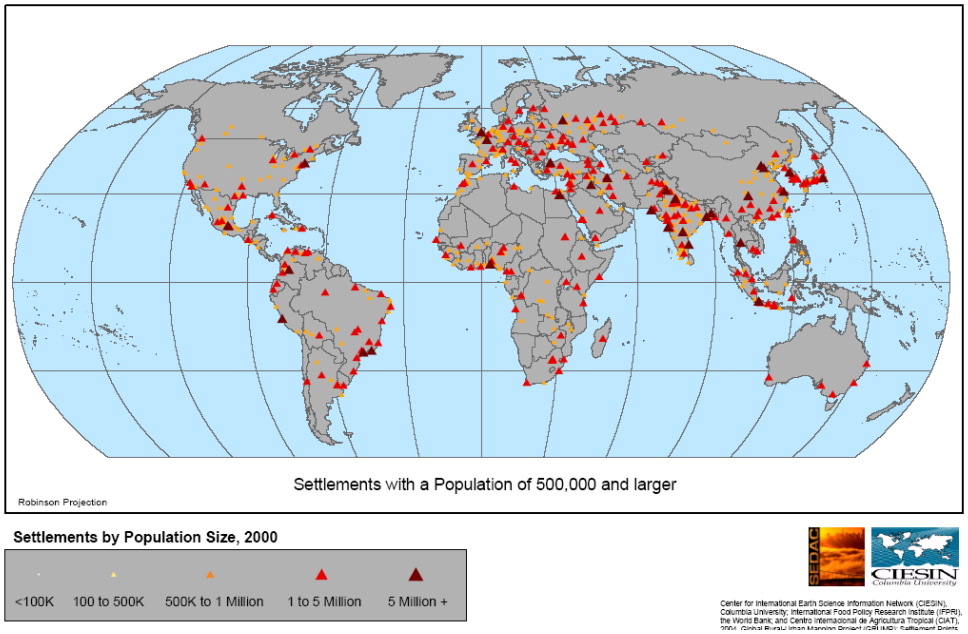

Figure 4.2. Settlements with a Population of 5000,000 and Larger

In Figure 4.3, countries are color-coded according to an average distance of the economy to the closest seaport. Countries in Western Europe, the UK, and the Arabian Peninsula among others, are very close to the port, and so are highly advantaged by very low cost transport conditions. Great Britain had a huge advantage in its 18th century economic takeoff as a coastal country with many good seaports; and London, as a city on the Thames River, was able to engage in great international trade. Moreover, England's topography also favored the low-cost construction of canals in places were rivers did not reach. These canals enabled coal to be mined and shipped widely to factory cities in Great Britain.

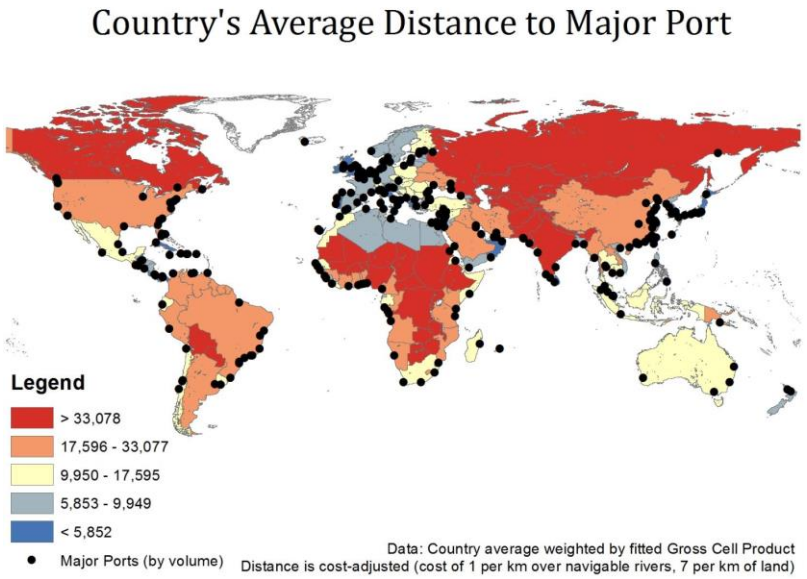

Figure 4.3. Country's Average Distance to Major Port

Large continental countries, such as Russia, have a big disadvantage. Most Russian cities and industrial zones are far in the interior of the country, and face huge overland transport conditions to get to seaports (or to import international inputs for these industries). Much of tropical Africa is landlocked; in fact, at 16 countries, Africa has the largest number of landlocked countries in the world.[1] In those 16 countries, the populations are both physically and politically far from the ports. Goods not only need to be brought inland; they need to pass a political border as well. Coastal countries that have proximate access to international trade have tended to grow better, faster, and to take off earlier. And the landlocked countries, or countries like Russia that are not landlocked but where most of the population and economic activity is far from seaports, have tended (with some important exceptions) to be laggards in the process of economic development.

The next map in Figure 4.4 shows yet another crucial aspect of physical geography: coal reserves. Energy is at the core of every economic activity, whether farming, industry, services, or transport. I have emphasized how the steam engine unleashed modern economic growth by dramatically expanding humanity's ability to concentrate energy on economic activities. Coal, followed later by oil and gas, gave a crucial and indispensable impetus to global economic development. Countries with plentiful fossil fuel resources have thereby had an easier time of achieving economic growth. Countries that lack these fossil fuels can still achieve economic growth by exporting goods and services to pay for energy imports, or by tapping other domestic energy resources such as hydropower where available, but it is considerably harder than having those energy resources in the first place!

Coal reserves

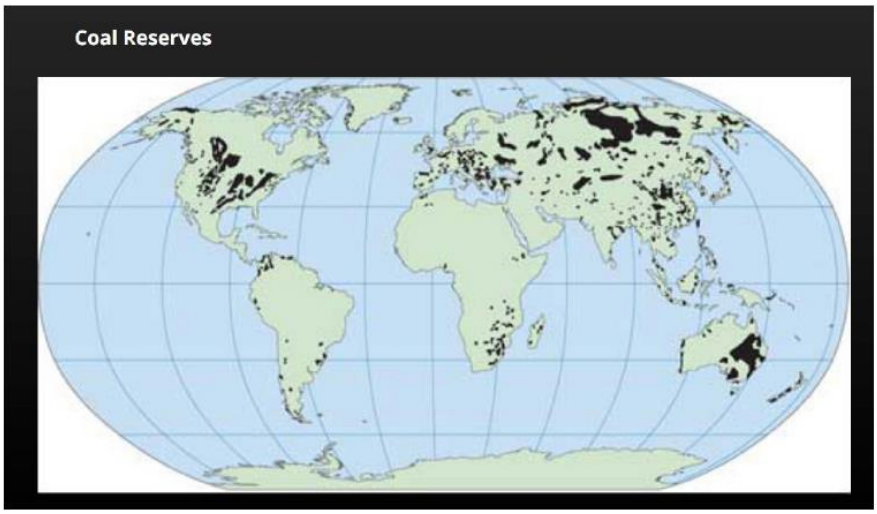

Figure 4.4. Global Coal Reserves

[1] The list is: Botswana, Burkina Faso, Burundi, Central African Republic, Chad, Ethiopia, Lesotho, Malawi, Mali, Niger, Rwanda, South Sudan, Swaziland, Uganda, Zambia, and Zimbabwe.

The geological distribution of fossil fuels is highly varied across the globe. Some parts of the world are blessed with massive fossil fuel reserves, while other places have almost none. In the 19th century, coal was "king," particularly for powering the steam engine. Figure 4.4 shows clearly that England, Western Europe, and the US have lots of coal, and that tropical Africa has almost none! That is no result of politics, imperialism, or culture. It is a matter of geology. The locations with accessible coal (that is, coal that can be mined at low cost and transported to population and industrial zones) were highly favored in economic takeoff, especially in the 19th century.

Figure 4.5 is another fossil-fuel map, this one for oil. It of course does not depict the shape of Earth as we know it, but the shape of the planet if each country's size is drawn as proportional to its oil reserves. Saudi Arabia, with its massive reserves of petroleum, is right at the center of the map, and other large countries include Iraq, Kuwait, Iran, and Venezuela. Africa barely shows up on the map, because only a few places in Africa have petroleum. The differences of oil holdings are even more dramatic when measuring reserves relative to the national populations. Both Nigeria and Kuwait export 2-3 million barrels a day. Yet Nigeria has 160 million people, while Kuwait has around 1 million.

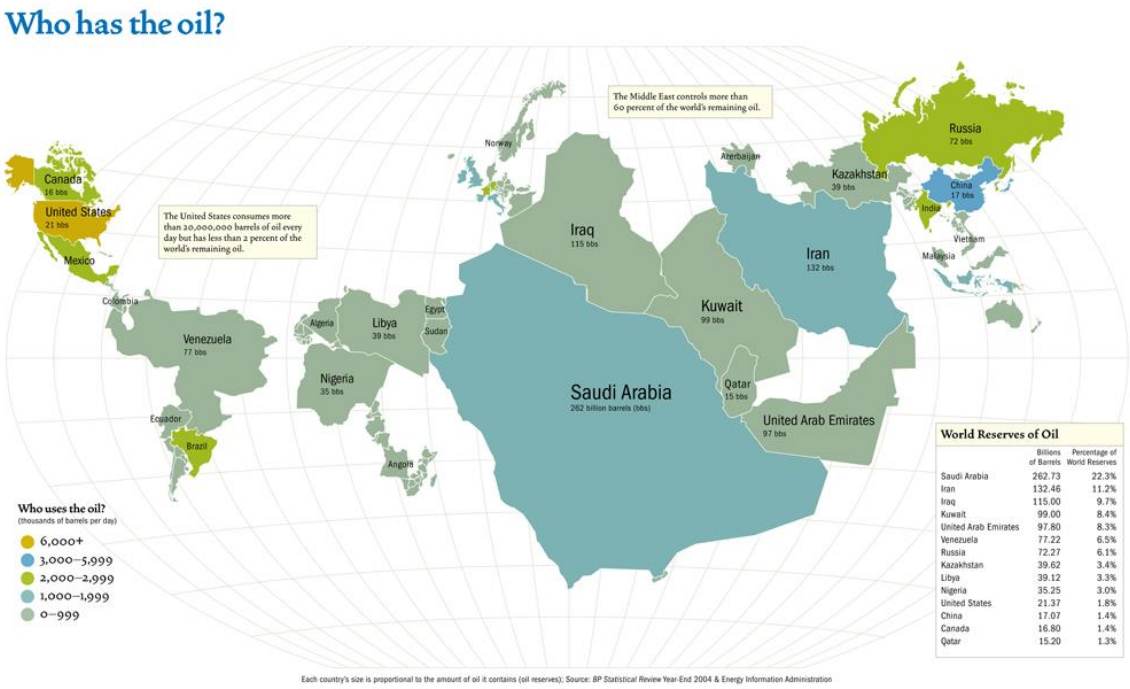

Figure 4.5. World Map Proportional to Oil Reserves

For tropical Africa in particular, the lack of fossil fuels need not consign these countries to a lack of economic development in the 21st century. The combination of modern technology and lots of sunshine has a lot of potential! The cost of solar photovoltaic power (PV) has fallen by a factor of around 100 since 1977. PV and other forms of solar power (such as concentrated solar thermal energy) could now offer Africa a great energy breakthrough, one that is especially important for the countries that, for no

fault of their own, simply lacked the coal, oil, and gas reserves that have benefited other parts of the world.

Yet another aspect to geography that makes a huge difference to long-term growth and sustainable development is climate. The importance of climate is obvious: all human beings need food, fresh water, and other ecosystem services (fiber, timber, protection from hazards) to survive and to thrive. Climate has a huge effect on crop productivity, disease, water scarcity or availability, and vulnerability to hazards.

Figure 4.6 shows a map of the Köppen-Geiger (K-G) climate classification system, which is one popular system for classifying climates that is widely used by geographers. The pink and the red areas in the K-G map are the tropical areas, characterized by year-round warmth. The tropical eco-zones have very distinctive challenges in food production and in disease burden, with many diseases such as malaria thriving in this ecology. (Places with winters typically have a seasonal break in the transmission of many warm-temperature diseases, making the disease burden lighter and also making it much easier to control or eliminate the diseases locally.)

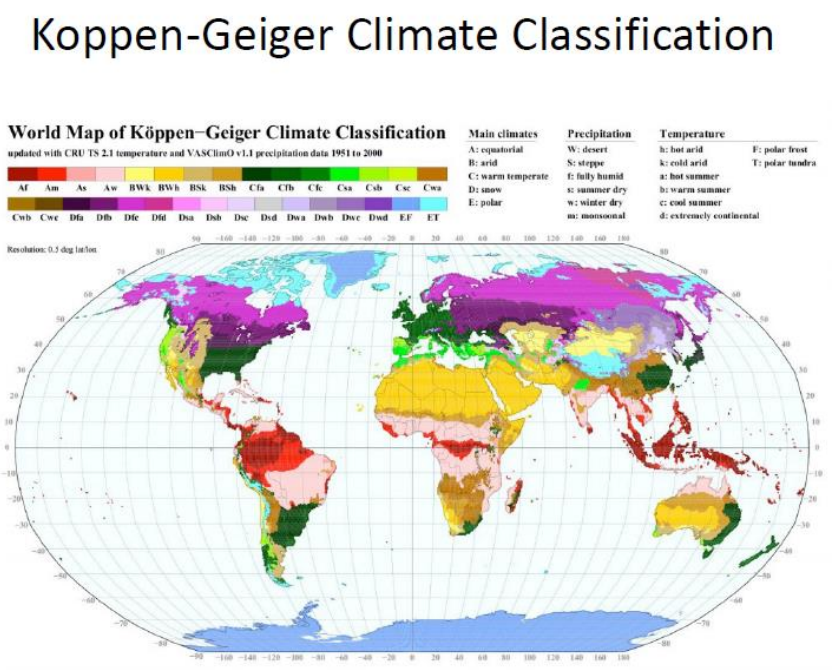

Figure 4.6. Koppen-Geiger Climate Classification

The beige areas are the drylands, where total precipitation is low, and the ability to grow crops is either small or entirely non-existent. This is the region where pastoralism (maintaining livestock such as camels, cattle, goats, and sheep) tends to dominate, and where many millions of people still live nomadic lives, moving from place to place to graze animals on seasonal grasslands. Since growing food in dry regions is so difficult, it is not surprising that these regions are particularly vulnerable to extreme poverty. There are a few wealthy dryland areas, but in those cases typically associated with vast mineral

wealth under the ground, e.g. the diamonds in the Kalahari Desert of Botswana and the hydrocarbons in the Arabian Peninsula.

The light green and the dark green areas are the world's temperate zones, which have both winters and summers. Most of these temperate areas have reasonably plentiful water throughout the year. The light green areas are particularly interesting. They are on the Western side of the major landmasses: Eurasia, North America, South America, Australia, and a small part of South Africa (around Capetown). This climate is called the "Mediterranean climate," since it prevails in the Mediterranean region of Southern Europe, North Africa, and the Levant (the Eastern Mediterranean). It is characterized by wet, fairly mild winters, and warm, sunny, dry summers. You guessed it: this is just the perfect environment to grow the world's best wines.

The dark green areas, such as my own hometown of NYC, and also most of Western Europe (other than Southern Europe), parts of China, Japan, Australia and New Zealand, and Argentina and Uruguay, are the temperate zones that are wet all year round. These are outstanding locations for grain production, especially the kind of mixed-grain-and-livestock farming that we associate with Europe and much of the United States. Without doubt, this dark green part of the world has hosted the highest average incomes in the world, other than the special cases of rich zones that sit atop great mineral or hydrocarbon wealth. The temperate zones, well, temperate: they are moderate, not too hot, not too cold, with a long growing season, and the absence or near absence of tropical infectious diseases such as malaria, yellow fever, dengue, and various tropical worm infections.

Modern economic growth began in the dark green temperate climate of England, and quickly spread to similar locations, in North America, Australia, New Zealand, and the Southern Cone of Latin America (Argentina, Chile, and Uruguay). All of these locations exhibited high-productivity agriculture, mixed grain and animal husbandry, strong forestry sectors with plentiful timber and other forest services, and healthful environments, notably for European settlers. We see that modern economic growth diffused not only according to geographical proximity (distance from London) but also what we might call "climate proximity," the similarity of a location to that of England.

The light purple and dark purple zones are the cold zones. The closer to the North Pole, the colder the climate and the shorter is the potential growing season. Near the Article circle, farming becomes impossible (with small groups engaged in hunting, fishing, or reindeer herding). Of course there are many mining activities in the far northern regions, but almost always with small resident populations and very capital-intensive operations.

Let's consider in a bit more detail the single most important case of a climate-dependent disease: malaria. Malaria is a mosquito-transmitted disease. The malaria pathogen is a one-celled organism called Plasmodium. A mosquito becomes infected with Plasmodium when it bites a human being that is already infected with malaria, in order to take a blood meal. It gets more than the blood; it also gets the Plasmodium in the individual's bloodstream. The mosquito infects another person, roughly two weeks later, when it once again takes a blood meal, this time from a human being not yet infected with

malaria. In the process of drawing blood from the new victim, it also transfers the Plasmodium to the unsuspecting individual. Many days later, that person will develop a severe, life-threatening case of malaria.

Malaria is only transmitted by a certain kind of mosquito (the Anopheles species) and only when the air temperatures are above around 18 degrees Centigrade/65 degrees Fahrenheit. The warm air helps to make the mosquito infective when it bites the second time, transmitting the disease to the uninfected individual. If the outside air is too cool, below 18C, the Plasmodium living inside the mosquito probably will not have passed through its own lifecycle rapidly enough in the gut of the mosquito for the next bite to pass the infection to another person.

Cooler climates, therefore, do not have malaria transmission, but places that are warm all year round, such as tropical Africa, generally have very high year-round malaria transmission. Africa seems to be uniquely burdened on three counts: high temperatures year round; enough rainfall year round to provide breeding sites for new generations of Anopheles mosquitos; and strangely enough, the most deadly kind of Anopheles mosquito as well, called *Anopheles gambiae*. That kind of mosquito simply loves to bite people, as opposed to cattle and other animals. The result is that Africans are really in the malaria "line of fire."

Figure 4.7 is a map that I put together with colleagues around a decade ago, in order to combine the three key factors (temperature, moisture, and kind of anopheles mosquito) to make a worldwide measure of which regions are most susceptible to malaria transmission, infection, and alas, deaths. Hands down, Africa is truly the most vulnerable part of the world. It puts together every ecological condition that contributes to year-round, intensive malaria transmission. The result is that perhaps 90 percent of all malaria deaths in the world today take place in tropical Africa.

Malaria ecology

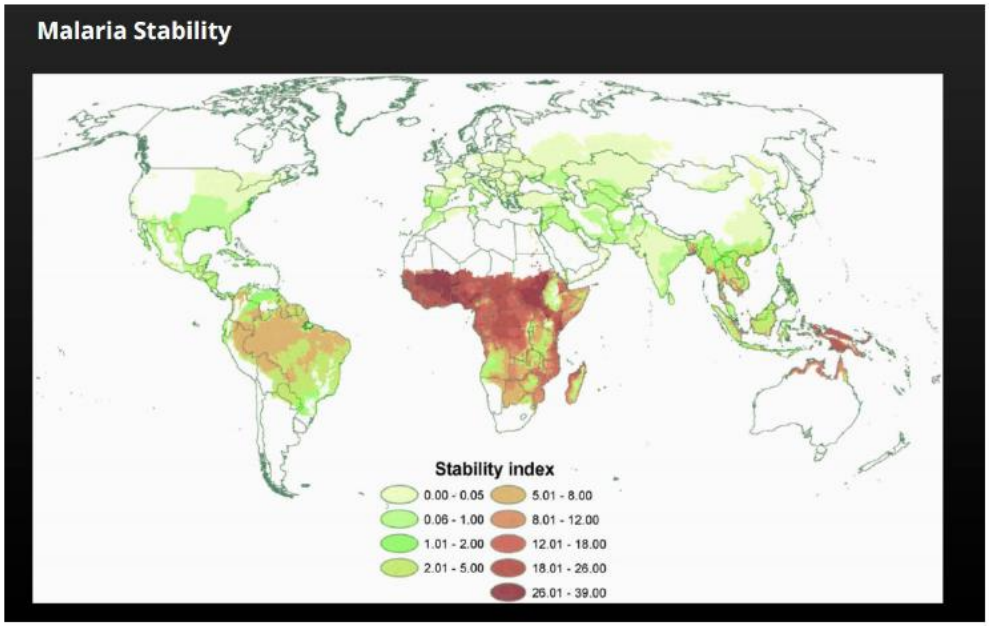

Figure 4.7. Global Malaria Stability

Repeated bouts of malaria not only claim vast numbers of African lives, hundreds of thousands every year, but they debilitate African societies and economies. Children are repeatedly absent from school, and often never finish. Many kids die; others grow up with long-term physical and cognitive difficulties. Husbands and wives have large numbers of children out of fear that many will die, yet the consequence is that they often have more children than they can support with decent nutrition, health care, and education.

In this way, malaria has subtle and insidious ways of holding back overall economic development. Yet while the burden of malaria depends on climate, places with high malaria burdens need not just sit back and suffer. Geography is not deterministic. Geography points to measures that should be undertaken to reverse or offset the burdens that may be imposed by geography. African nations with high malaria burdens now can use advanced methods of malaria control to reduce the number of infections and dramatically reduce the number of deaths from malaria.

The moral of the story is that a difficult geography does not prevent development, but does signal the kinds of investments needed to overcome geographical obstacles. Table 4.1. shows a quick, short, illustrative list:

Table 4.1 Geography and Policy Implications

Geographical Condition	Implication for Public Policy
Landlocked	Build good roads, rail to the port; maintain good relations with coastal neighbor; emphasize internet-based export activities to "defeat" location
Water stressed	Emphasize irrigation, e.g. using new solar-powered irrigation pumps for smallholder farmers; specialize in crops that do not require huge amounts of water
Heavy disease burden	Scale up public health interventions to control climate-related diseases
Natural hazards	Understand the changing probabilities of events like floods, droughts, cyclones, extreme storm, and others, and prepare for them with public awareness and physical and social infrastructure
Lack of fossil fuels	Examine and develop alternative options for domestic energy sources, such as geothermal, hydro, wind and solar power; emphasize energy efficiency

The point is: be aware of geography, don't give up ("geography is not destiny"), and come up with meaningful alternatives when underlying geographical conditions are difficult for one reason or another!

III. The Role of Culture – Demography, Education, Gender

In the differential diagnosis of why some places are ahead and others behind, very often people turn first to the sixth category on the list: culture. Culture can be a glib and rather insulting explanation of somebody else's poverty. Rich people often like to think of themselves as rich because of their superior culture, for example that they pray to the right god. They often have a hard time understanding the natural advantages that might have helped to propel their country forward. In short, the rich often like to blame the poor for their problems, attributing the poverty to factors like laziness or the wrong set of religious beliefs.

The situation is often more humorous. When a place is poor, it has the reputation of being lazy. If and when it becomes rich, the reputation is turned on its head. This happened with Japan in the late 19th century. When Japan was still poor (around 1870), European observers condemned the Japanese for their alleged laziness. When Japan boomed, Europeans and Americans complained that Japanese culture led the Japanese to work too hard. This kind of reversal probably means that culture was not the key to understanding either the initial poverty or the subsequent wealth. Other factors were at play.

We should also remember that culture is not a fixed monolith that remains unchanged. Cultural attitudes, like economic structures, change over time. Think of the changing attitudes to women, African-Americans, Jews, the Irish, and other groups that once faced terrible discrimination in the United States. With lots of struggle, attitudes (and laws) changed. The culture changed. The attitudes of today's youth in the US regarding racism, religious minorities, gender roles, and other aspects of "culture" have changed markedly and relatively rapidly, with significant attitudinal changes in the course of one generation.

I do not want to be misunderstood. Culture matters for economic development. But like geography, culture is not destiny. Attitudes evolve, and can evolve in ways that support sustainable development. When it comes to the most important cultural beliefs that affect sustainable development, we should turn our attention to cultural attitudes towards family size, educational attainment, and the role of women.

When we look at the population challenge, a good place to start is the world map of the fertility rate shown in Figure 4.8. The total fertility rate (TFR) in a country measures the average number of children that a woman in the society will have during her lifetime. The world map shows the tremendous variation in total fertility rates in our world today. In many parts of the world, especially the high-income countries, total fertility rates are below two. That means that each woman, on average, is having fewer than two children. When fertility rates are below two, so that on average each mother is not replacing herself in the next generation with a daughter (statistically speaking), the population tends will decline over the long term. When the total fertility rate is above two, the population will tend to increase over the long term. In the high-income world, total fertility rates today are generally below two; in some of the world's poorest countries, notably in tropical Africa and in parts of south Asia, total fertility rates are still above four; and in many rural areas in low-income tropical Africa, total fertility rates are above six. This means that each woman is having three or more daughters. One can immediately see the potential for a dramatic rise in the overall population over the course of just a few decades.

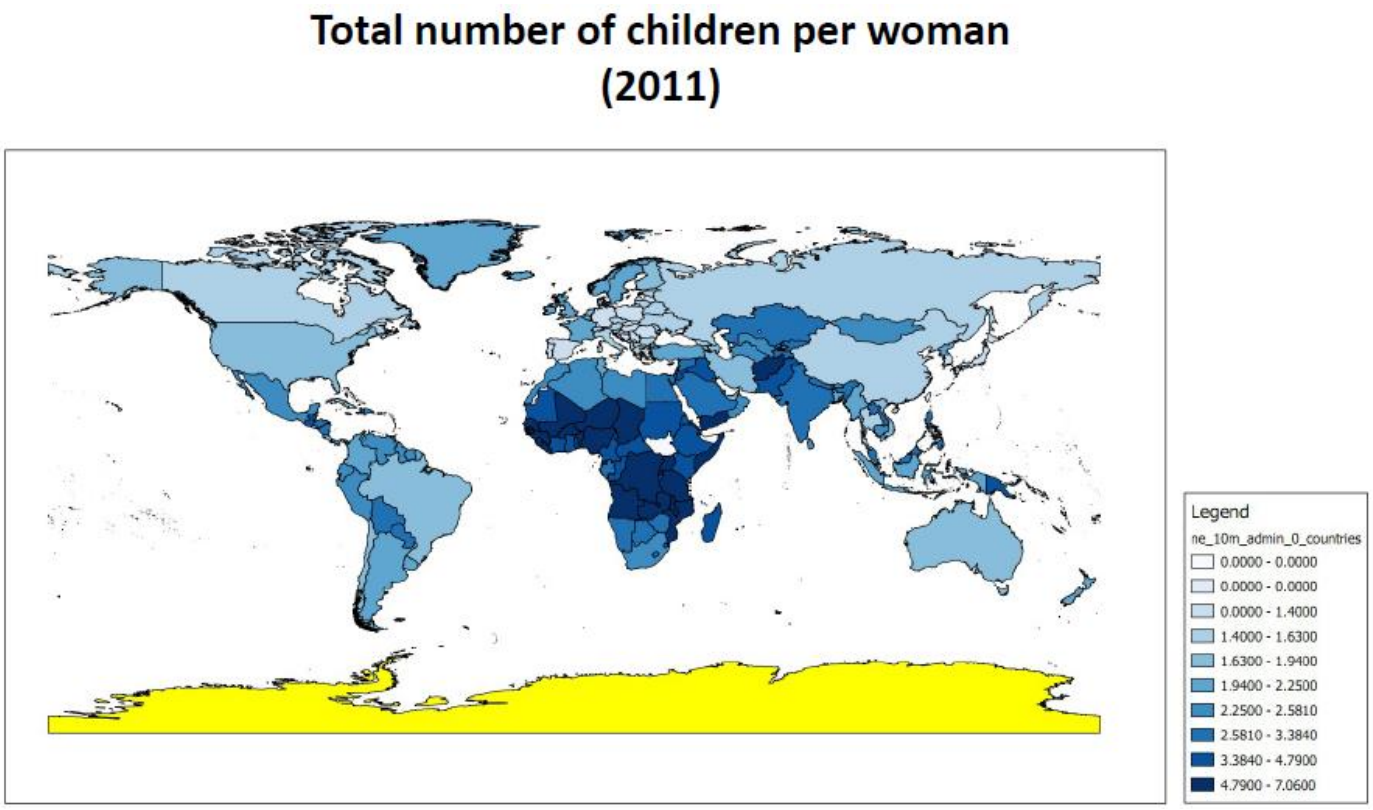

Figure 4.8. Children per Women (2011)

High fertility rates tremendously affect economic development because with very large populations of young children, poor families have a very difficult time providing the basics for all of their children. Perhaps only the eldest son is able to go to school, and the younger girls are married at a very young age, without proper education. In the next generation, those young girls will grow up without the literacy and the skills they need to help their own lives, and their own children too are likely to grow up in poverty. Countries that have made a transition from high fertility rates to low fertility rates have tended to have an advantage in economic development, while countries that have very high fertility rates tend to have much lower economic growth.

Over time the fertility rate shapes the population dynamics: whether the population is rising or declining in overall size, as well as the age structure of the population. A population's age distribution is illustrated by what's called the age population pyramid – an example of Japan's changing age-population pyramid is shown in Figure 4.9. These pyramids show the numbers of boys and girls, or men and women, at various ages. In the 1950s, total fertility rates in Japan were above replacement rate. (The TFR in 1950-55 was around 3.0.) As a result, there were more young children than parents, and more parents than grandparents (because the TFR was above 2 in earlier generations as well). The age-population profile therefore looks like a pyramid, with a wide base (many young children), a smaller mid-section of parents, and a narrow segment of grandparents at the top. By 2005, the shape of that age-population profile had changed considerably. Japan had reduced its fertility rates, partly as a result of changing culture, partly as a result of economic development, and partly as a result of public policy

and access to modern contraceptives. The number of children was actually much fewer than the number of parents because the total fertility rate had come down to 1.3. In the projections for 2050, in the middle of the century, the continuing low TFR will lead to an age-population structure that is an inverted pyramid. Every generation will be smaller in number than the parents' generation, an astounding turn of events, but one that is implied by a TFR that stays well below 2.0.

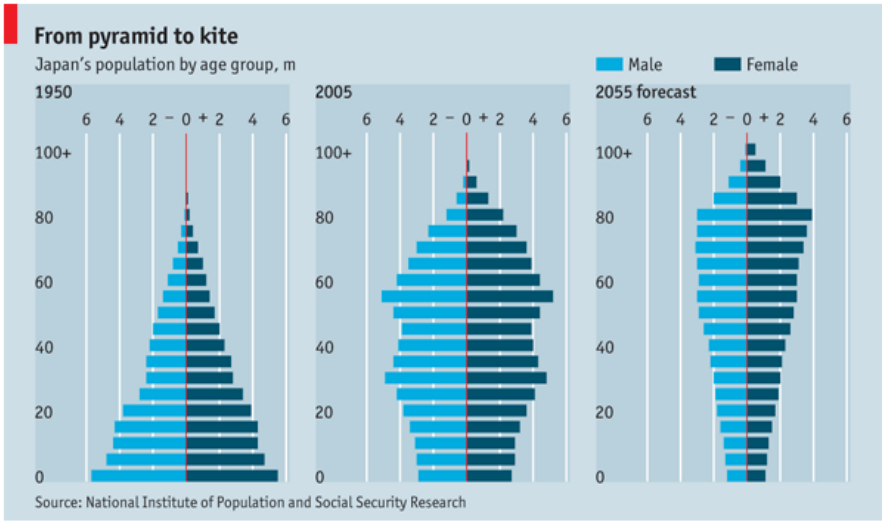

Figure 4.9. Japan's Population Pyramid

These three cases provide a wonderful illustration of the link of TFR and the age structure of the population. With a high TFR, the population is young. With a moderate TFR around 2.0, the population is middle-aged. With a very low TFR, well below 2.0, the population is aged.

Most of today's very poor countries still have the pyramid shape, with a high TFR and a very wide based of young people. This means that populations are continuing to soar. Each new generation is much more numerous that the parents' generation. The population of sub-Saharan Africa, for example, would reach almost 4 billion people by 2100, compared with around 950 million today, if the fertility rate declines only gradually. On UN data, Africa's population would have grown from around 180 million in 1950 to 3.8 billion at the end of the century, a more than 20 times increase in 150 years – an unprecedented increase. With all of the difficulties of shrinking farm sizes, climate change, and depleting energy resources, this kind of dramatic and unprecedented rise of population would almost surely put prosperity out of reach.

The problems are as serious within each family. If a poor father and mother are raising six or eight children, how can they hope to provide each child with the human capital (health, nutrition, and education) that the child will need for lifetime success? More generally, how will all of today's very poor children obtain the education, health care and nutrition that they need, and how can societies hope to keep up if the population continues to soar? Success will depend on today's high fertility countries reducing the high fertility rates on a voluntary basis through public policy and changing cultural attitudes. The most important single step, it seems, is to help young girls stay in school. They will marry

later, have fewer children, and be more oriented towards the work force. They and their husbands will choose voluntarily to have many fewer children, a voluntary reduction of high TFR that has already occurred in most other places in the world.

Another attitude or cultural phenomenon, of course one that is also shaped by politics and economics, involves a society's attitudes towards education. Some societies, even while in a state of great poverty, focused a huge amount of government and family effort and attention on literacy and education. South Korea is one such country – even when it was impoverished in the middle of the 20th century, it had a very high literacy rate, and a remarkably strong drive to raise educational attainment. This commitment to education helped South Korea to achieve some of the fastest and most successful economic development ever attained, and with widespread prosperity. A huge part of Korea's remarkable economic advance has been facilitated by its deep commitment to broad-based, high-quality education for all. This commitment to excellence in education shows up in international test scores. Figure 4.10 shows the 2012 PISA rankings on international testing in math, science and reading, with Korea near the top on all three categories. This remarkable performance reflects not only public investments in education, but also strong parental support in Korea for educational attainment of their children. Note indeed the preponderance of East Asian excellence at the top of the charts, reflecting a cultural commitment to educational attainment that is widespread in East Asia.

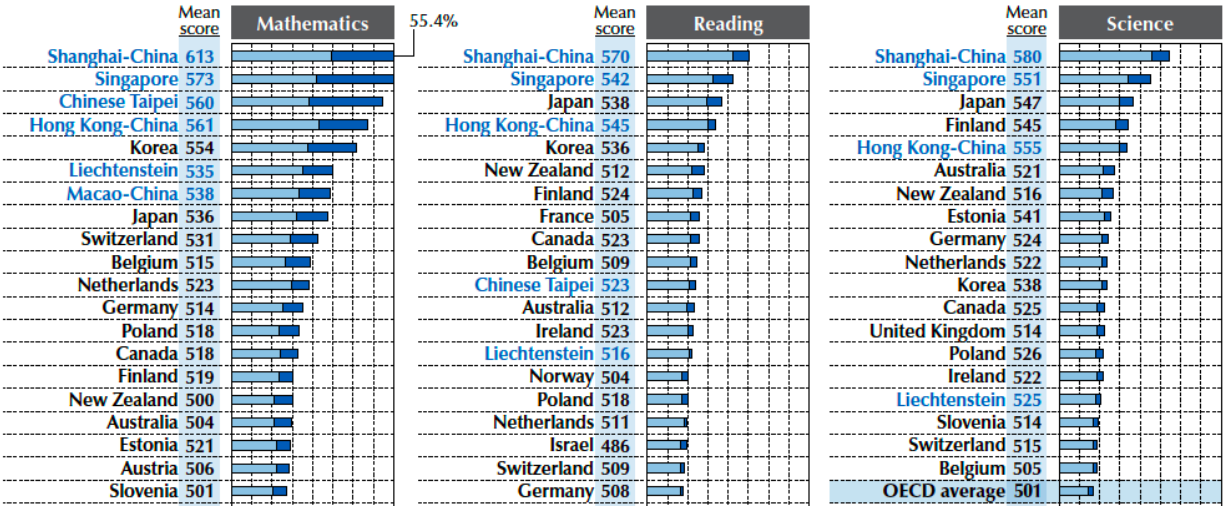

Figure 4.10. PISA Education Rankings (2012)

Figure 4.11. South Korean Schools

Yet another cultural attitude that deeply influences patterns of economic development is the cultural attitude towards women. Do women have legal rights? Are women participating on an equal basis in the labor force? Do women continue to face massive discrimination? Gender equality of course also has political aspects (e.g. when women are denied the right to vote), but culture plays a very significant role. Once again, as with fertility and as with education, there are big differences around the world in attitudes towards gender equality and attitudes towards women, and this influences economic development in many ways.

There probably is not a society in the world where women still do not face at least some discrimination, because the long history of the world is a history of discrimination against women. It took exceptional political effort, social mobilization and a lot of courage of women to break through this discrimination, even in places that today we view as close to attaining gender equality. But there are many parts of the world where women still face profound barriers to their economic and political participation. What are the consequences of that? Most obviously and evidently, a society that tries to run on half its brain power and talents; that disenfranchises half the population; and that blocks women from problem-solving, economic leadership, and politics, is bound to fall behind countries that are empowering all of their citizens, female and male.

This is an area where there have been huge positive changes over the last 30 years, though the progress is by no means uniform. For example, Rwanda's parliament is not only more than half women, 64% female, but it also has the highest proportion of women in parliament in the world. Female

participation in politics has soared in Rwanda and is rising in other parts of the world, though there are still huge inequalities and male domination of political power. In Rwanda, female empowerment has extended beyond parliament. Rwanda has made astounding progress in reducing child mortality and in improving education and social conditions. (The under-5 mortality rate has declined by roughly half in just one decade, from 145 deaths/1,000 births during 2000-05, to 74/1,000 births during 2010-15.) While there are many factors contributing to Rwanda's ongoing escape from the poverty trap, I believe the role of women in politics has played a significant role. Rwanda's success is a very powerful message for countries that are still lagging behind: For success in the 21st century, don't try to develop with only half of your citizenry, but take the lesson from a country that is mobilizing all of its citizens.

Figure 4.12. Rwanda's Parliament

IV. The Role of Politics

In addition to geography, poverty trap, and culture, we must include politics (and governance more generally) in our poverty checklist. Politics can fail in many ways. I include four such types of failures on the checklist: (2) bad policies; (3) financial insolvency; (5) poor governance; and (7) adverse geopolitics.

Governance is so important because the role of government in economic development is absolutely crucial. The government is vital for building the infrastructure – the roads, rail, power transmission, port services, connectivity, water, sewerage, and the rest – that is necessary for any economy to develop. Government is essential for human capital development: the health, education, and nutrition of the population, especially of the children. If the government is not performing, public schools will be miserable. If the government is not performing, health conditions will be poor. Infectious diseases such as malaria will run rampant.

An effective government is necessary to ensure economic opportunity for all, including the poorest of the poor. What happens to a very poor family that cannot make ends meet? The children in such a family, unless supported through government programs, will be unable to obtain proper health, nutrition, education, and the ability to develop skills, all of which are essential to enabling a poor child to escape from poverty. Government therefore makes possible the intergenerational mobility out of poverty by helping poor kids to get an effective start in life and to receive a high -quality education.

Government is vital for the rule of law. Of course without government, there can be anarchy and violence. If the government itself is massively corrupt, other institutions such as the banking sector will operate in a lawless environment and are doomed to fail, or at least fail to contribute to broad-based economic development. If contracts cannot be enforced, if courts are not working, then who can do business? When we see a country in crisis, in addition to the checklist of culture, poverty, geography, we want to look at the political situation across several dimensions.

Think simply about creating an effective road system in a country. This depends on effective policies (to design the road system, for example, and to hire the companies to implement it). This depends on adequate public finance; to be able to raise the needed funds, out of the budget, or bond issues, or public-private partnerships. This depends on honesty. Many road projects never produce actual roads because of the high burden of corruption. And this requires decent geopolitics. The country must be at peace. It perhaps needs one or more international partners to get the job done. Obviously roads provide just one example of how good governance combines policy, politics, finance, and foreign affairs. One can say the same about education, health care, and countless other sectors of the economy.

China, one of the fastest growing economies, has excelled in developing the capacity of government at all levels to undertake large-scale infrastructure investments. Rapid inter-city rail now provides a tremendous national transport system. Major cities have urban metro systems. Mass electrification has enabled rapid industrialization. China is an example where the government has played an essential role in enabling very rapid growth. On the other side, there are many poor countries where governments have not yet had the capacity, focus, or interest to undertake the large-scale infrastructure investments needed for effective development.

Government also has to regulate key sectors of the economy. Finance is one of them. Unregulated banking systems tend to get into crisis. The whole world experienced this in 2008 when the deregulation on Wall Street, at the very epicenter of the world's financial system, caused a massive financial crisis that spread throughout all of the arteries and veins of international finance. Government dropped the ball because powerful financial lobbies in Washington had successfully urged the deregulation of Wall Street. Wall Street gained massive profits; the rest of society suffered massive losses. When government fails or when governments encourage or allow illegality or fraud in the banking systems, financial panics often ensue.

Corporate lobbying can result in a massive amount of corruption and massive failures of the regulatory process. Corruption, of course, is not measured very well: corrupt companies and governments do not exactly go out of their way to document what they are doing! One leading NGO, Transparency International, provides a useful global public service by collating various kinds of surveys on public attitudes towards corruption, most importantly how pervasive the public feels corruption to be in practice. A map of the Transparency International results for 2013 is shown in Figure 4.13. Countries in light yellow (Canada and Scandinavia) are considered to be the least corrupt countries. Those in red are considered by the poll respondents to be highly corrupt.

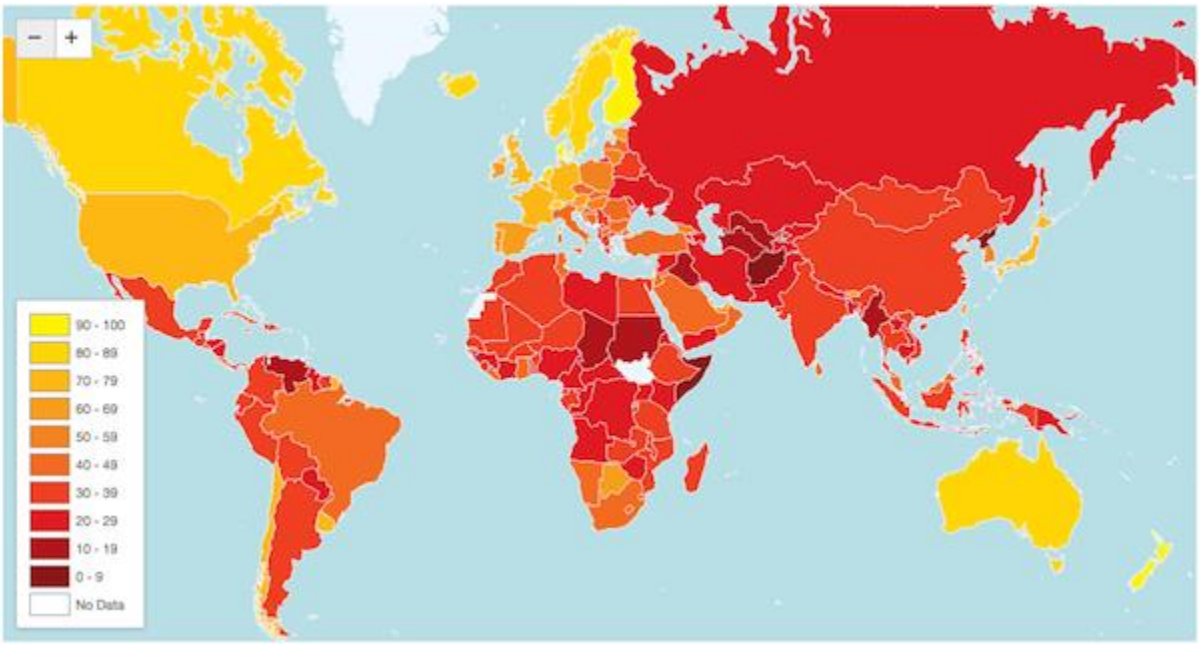

Figure 4.13. Corruption Perceptions (2013)

Governments have a major role to ensure that even children from poor families have the chance of social and economic mobility. That requires public help for poor families, particularly to help poor children gain access to quality daycare, pre-school, nutrition, health care, and a safe environment. Such investments for poor children have all been demonstrated time and again to be tremendously powerful in enabling children, especially from poor households, to get that necessary added boost so that they have a good shot at prosperity.

Governments differ significantly in their readiness to help children in poor families, and indeed to fight poverty more generally. Within the high-income countries of the OECD, there is tremendous variation between governments in their investments in social areas, such as protection against poverty and provision of social services. Figure 4.14 shows a graph of public social expenditures as a share of national income for the OECD countries. At the high end of such investments (measured as a share of GDP) are the Scandinavian social democracies; at the opposite end of the scale are countries including the United States, Japan, and Ireland, where public help for poor families and poor children is very low. The

consequences of this are that these children in these countries have a much higher risk of growing up in poverty, and a much greater chance of ending up poor as adults.

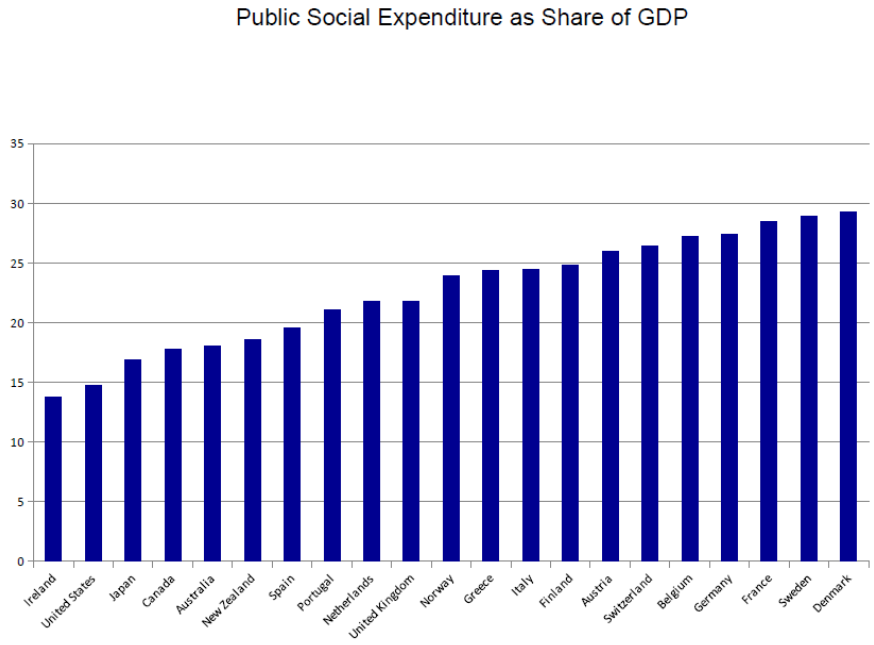

Figure 4.14. Public Social Expenditure as Share of GDP

Not surprisingly, poverty rates for children are lowest in the Scandinavian social democracies, where the social spending is highest. Child poverty rates are highest in the United States, Mexico, Italy, and Turkey, countries that invest much less in social programs as a share of national income. This pattern is clearly evident in Figure 4.15, which plots social expenditures as a share of gross national product (on the horizontal axis) compared to the child poverty rate (on the vertical axis). Even among high-income market economies, we see there is a huge variation. Some countries attend to the needs of the poor and create conditions for high social and economic mobility. Other countries, alas including my own (the United States), more or less leave their poor to their fate, resulting in a lack of intergenerational mobility and thereby a replication of poverty across generations.

Figure 8 Social expenditures and child poverty

Social expenditures in the graph are those going to persons of working age (and hence exclude pensions). Expenditure on education and health is not included. The child poverty rate is as in Figure 1 (based on a poverty line of 50 per cent of the national median).

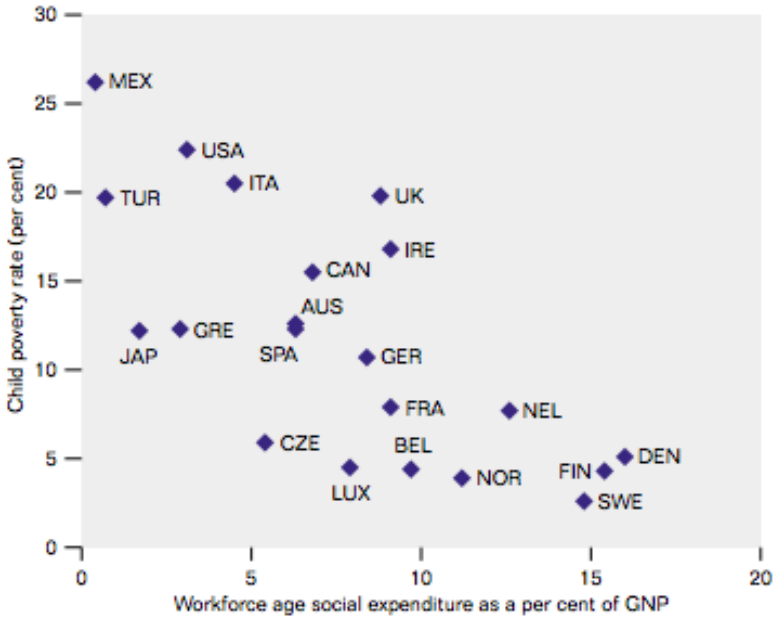

Figure 4.15. Social Expenditures vs Child Poverty

In order to reduce child poverty through funding higher levels of social expenditure as a share of national income, governments must collect higher taxation, and with clearer explanations to their citizens of how their money is used. As demonstrated by the graph in Figure 4.16 of taxes as a share of GNP, once again the Scandinavian countries willingly incur higher taxes in order to reduce child poverty and to create conditions of social equality more generally. It is the countries at the other end of the scale, such as the United States, that have a low tax to national income ratio, and that as a result invest much lower shares of national income in the social areas. The consequence for the US is a much higher inequality of income, a much higher rate of child poverty, and a much lower rate of social and income mobility across generations. While the United States has long viewed itself as the land of opportunity and social mobility, unfortunately this largely is no longer true.

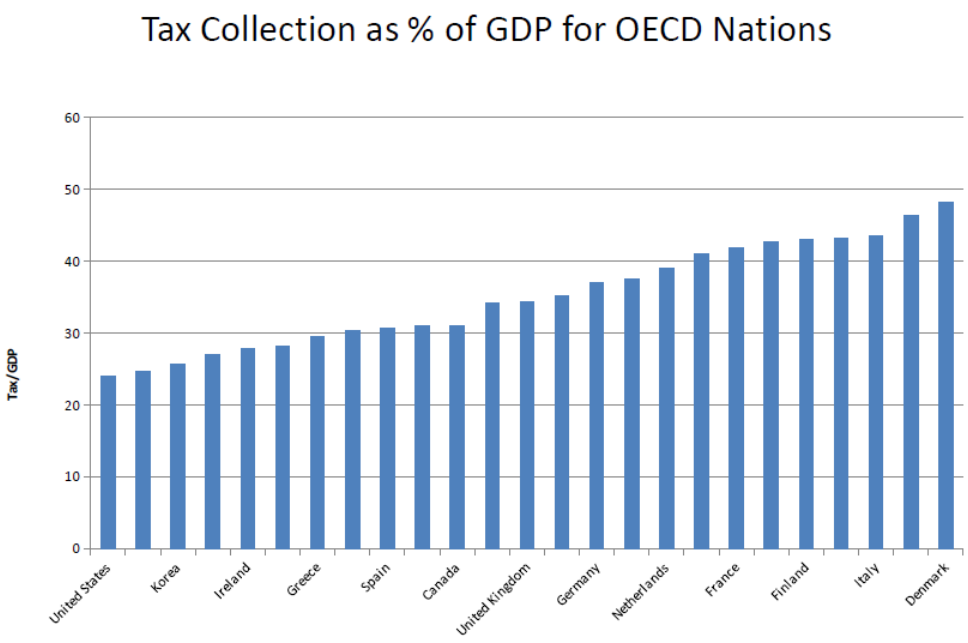

Figure 4.16. Tax Collection as Percent of GDP (OECD)

It is a kind of scourge for societies to become so divided between the rich and poor. One of the pillars of sustainable development is social inclusion: that everybody should have a chance, including children born into poor families. To achieve social inclusion, we will need to focus on the proactive, positive role of government. Is it doing its job to make sure a poor child has the chance to get ahead? When governments carry out that role, they provide a major boost for sustainable development.

V. Which Countries Are Still Stuck in Poverty?

In our quest to understand sustainable development and economic development, we have focused on the modern era of economic growth, and have undertaken a differential diagnosis to understand why the moving ripples of economic development have reached some places in the world and failed to reach others. We can now put the pieces together by focusing on the areas in the world that are still stuck below the threshold of self-sustaining growth. Using the $2,000 dollars per person per year threshold as a marker, the map of global development in Figure 3.6 shows that those countries shown in red are still below that takeoff level today. These remaining regions are mainly tropical Africa; a number of landlocked countries including Afghanistan, Nepal, Mongolia, and Laos; and a few other parts of the world. Without question we must regard sub-Saharan Africa as the greatest challenge of development, as it is still the place in the world with the highest poverty rates and with the biggest challenges in meeting basic needs.

The good news is that in recent years, especially since the year 2000, economic growth in sub-Saharan Africa has picked up. There have been major advances in some key areas of disease control, improved access to education, and building infrastructure. However, there is still not self-sustaining, rapid and dynamic growth, though this prospect now feels very much within reach. We can do a differential

diagnosis on sub-Saharan Africa, and ask what we learn about sustainable development by taking that multi-dimensional view of a region.

The African tropics have many distinctive features that are relevant for economic development. The disease burden is very heavily concentrated in the tropics, where malaria, vector borne diseases such as dengue fever, and worm infections prevail. Agriculture can be very difficult. There is often water scarcity with the very high temperatures, a vulnerability to drought, and a high instability of rainfall. The depletion of soil nutrients can be extremely pernicious in the tropical context. There is nothing impossible about these challenges, because diseases like malaria are fully controllable; but they need to be controlled. They are serious issues and have their highest burden in these geographic areas, and so special attention needs to be given to those challenges.

We have noted that Africa has the distinctive feature of the most landlocked countries of any continent. Roughly one-third of African countries are landlocked: 16 of the 54 countries. This is a big problem, but it is worth pausing to ask why this is the case. One key reason is the colonial legacy. Nature does not draw national boundaries; politicians do. When the politicians divided up Africa, notably at the Berlin Conference of 1884-1885, they divided it up into little parcels, and often cut across natural ecological areas or artificially divided ethnic groups. This difficult legacy made it hard for many populations to even reach the coasts. The distance from the ports may also have to do with history in another sense. Some historians have argued that as a defense against the slave trade, some African populations moved from the coasts to the interior, where they would be safer from capture.

There is also a physical geographic aspect to these distances as well. In many parts of Africa the coastal physical environment is rather hostile. In East Africa, around Somalia and Kenya, the coast tends to be very dry. The easterly winds do not bring precipitation to the coast, but to the highlands in the interior. This means that the high population densities in East Africa are not at the coast but are in landlocked interior countries like Rwanda or Uganda, where there is much more rainfall than in the port areas like Mombasa, Kenya, which is in a much drier region.

The colonial legacy played other adverse roles as well. At the time of Africa's independence in the late 1950s and into the 1960s and onward, there were very few Africans with higher educations. On the eve of independence in 1960, the Democratic Republic of Congo had fewer than 20 university graduates in a population of 13 million. The European powers did not provide education, which they saw as a political risk. When African nation achieved independence, many countries had just a tiny fraction of the population with high-school degree, much less a university education.

The European powers also left behind a deficient physical infrastructure. Figure 4.17 compares the map of Africa's railway system today with the Indian railway system in 1947, built largely during the British colonial period. In India, there is a full railway grid because the single ruling colonial power, Great Britain, created a unified infrastructure, in part to facilitate the extraction of India's natural resources, such as India's cotton for use in England's cotton mills. In Africa, where there were more difficult topographical and geographical conditions, and many political divisions, the European colonial powers

did not sit down together to construct a railway network. Each imperial power typically constructed its own rail, for example from a port to a mine or plantation. The rail system left by colonial powers therefore was not a grid, but just individual lines running from ports to interior locations that were important to the colonial powers. Africa's lack of effective rail grid has left an enormous burden for Africa. When India had its agricultural Green Revolution of the 1960s, its railways played a crucial role in bringing fertilizer into the interior, and bringing grain from the interior to the national economy. But in Africa, the rail cannot serve that purpose, since it does not exist. Even in the 21st century, Africa's rail network still has to be built.

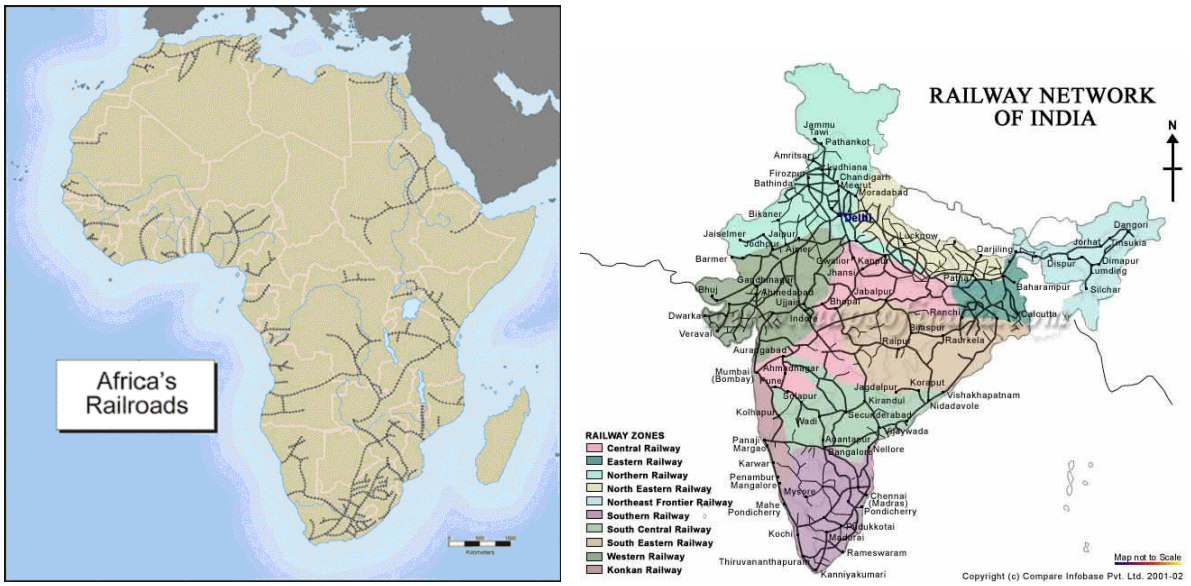

Figure 4.17. Africa's Railroads (today) & India's Railroads (1947)

The legacies of colonial rule in Africa, in short, have been extremely pernicious. This is not an explanation of everything, as there is never a single factor explanation. A differential diagnosis does not necessarily yield a simple answer. We do not need more simplistic answers, but we need accurate answers. A differential diagnosis helps with accuracy by identifying the challenges that need to be addressed.

Our conclusions must not be occasions for pessimism, however. I have emphasized that historical or geographical burdens are not fate; they are not destiny; they are reasons for action. The problems of extreme poverty in Africa and elsewhere can be solved. The tools for such solutions are more powerful than ever, in education, health care, agriculture, power, transport, finance, and many other areas. There are proven methods of public policy to scale up these solutions. We will explore many of those practical solutions in the chapters ahead.