Distance

CHAPTER 2

Deng Xiaoping, generally seen as the architect of China's resurgence as an economic superpower, insisted on openness to world markets. He also insisted on concerted development of the country's coastal areas, like Shanghai and Guangzhou, as launching grounds for connecting to these markets. When asked about the growing wealth disparities between the coast and the interior, he reportedly countered, "If all of China is to become prosperous, some [areas] must get rich before others."

This chapter shows that all successful developers support Deng's insight. But his wisdom may have eluded leaders in the developing world, even the few lauded as visionaries, as later chapters in the Report will show. For decades, "spatially balanced growth" has been a mantra of policy makers in many developing countries. It was an obsession of planners in the former Soviet Union (see box 2.5). And it has been the objective of governments of various political hues in the Arab Republic of Egypt, Brazil, India, Indonesia, Mexico, Nigeria, the Russian Federation, South Africa, and other great developing nations. There has even been a strong commitment to spatially balanced development in the economic history of many developed countries. The United Kingdom pursued it between the late 1920s and 1980s,[1] and Canada did so between the late 1950s and late 1980s.[2] But in these cases, even with the popularity of these policies, Deng's insight remained valid.

Indeed, the concentration of economic activity and the convergence of living standards can happen in parallel. Development in the United States was accompanied by a rapidly rising concentration of manufacturing activity in a relatively small area of the northeast and eastern part of the Midwest at the turn of the twentieth century.[3] Throughout this process, U.S. states witnessed a slow, if sometimes halting, convergence of per capita incomes.[4] Today, roughly half of the U.S. population is in only five states,[5] but long-term unemployment disparities among states have been fairly small since World War II.

The convergence of living standards in the United States has been assisted by the willingness of workers to "pull up their roots" and relocate.[6] But basic welfare indicators have converged even in countries where such a willingness has been less evident, because development has been accompanied by the spread of public services. Take France and Germany. Even though Paris generates 28 percent of France's gross domestic product (GDP)[7] using only 2 percent of its land, infant mortality rates in the country show little spatial variation. The lagging area of Lorraine had the highest rate, 4.5 deaths per 1,000 live births in 2005, but this is not much higher than the national average of 3.8.[8] In Germany the leading area of Hamburg—with an economic density of €114 million of GDP per square kilometer—enjoyed a GDP per capita more than twice that of the northeastern lagging area of Mecklenburg-Vorpommern and an economic density more than one hundred times higher. Despite the phenomenal differences in economic density between these

areas, there is no difference in basic welfare. The numbers of physicians and hospital beds per 1,000 habitants in both Hamburg and Mecklenburg-Vorpommern closely track the national averages.[9]

This chapter presents stylized facts about economic concentration in parts of a country, usually called "leading areas," and the convergence in living standards between households in these areas and those in distant or disconnected parts, called "lagging areas," in the same country. It introduces the concept of economic distance, which is related to but not the same as physical distance. When supplemented with the economic density discussed in chapter 1, distance helps characterize the spatial transformations that accompany development and that may be necessary for rapid economic growth.

The main findings:

- ***As countries develop and integrate internally, location matters more for economic activity but less for social welfare.*** Greater economic mass (which accumulates where firms carry out production) and higher living standards (reflected in household consumption, poverty, and access to basic services) are not spatially synonymous. During the early phases of development, infrastructure and social services tend to be confined to areas of economic mass. But as countries develop and integrate internally, the distinction between leading and lagging areas becomes sharper for economic mass and more blurred for living standards.
- ***The spatial concentration of economic activity first rises and then levels off.*** As an economy changes from agrarian to industrial, the spatial distribution of people and economic production becomes more compact. Within a country, agglomeration and city-periphery integration give rise to metropolitan areas and leading areas of dense economic mass. This process eventually levels off, and the spatial distribution of economic activity stabilizes.
- ***Spatial disparities in living standards follow an inverted-U path, widening in the early stages of economic development, and remaining high for a long period before slowly converging.*** As a country industrializes, it concentrates its limited initial human and physical capital in leading areas, those with high growth potential. Areas distant from the new density lag. Spatial disparities in productivity and income can persist for generations, even with mobile labor and capital. History points to persistent spatial divergence in living standards in today's developed countries in their earlier stages of development, followed by slow convergence many years after they attained high income.[10]
- ***Technological progress and globalization have increased market potential in the leading areas of developing countries, intensifying concentration and amplifying spatial disparities.*** Although the basic forces shaping the internal economic geography of developing countries are the same as those that earlier shaped the economic landscapes of today's developed countries, the magnitudes have changed. Larger international markets, better transportation, and improved communication technologies mean that leading areas in open developing countries have greater market potential than industrial countries did in their early development. So the forces for spatial divergence between leading and lagging areas are now stronger.

Defining distance

Density, discussed in chapter 1, is also relevant at the country level. Denser concentrations of economic activity increase choice and opportunity. They ensure greater market potential for the exchange of goods, services, information, and factors of production. This chapter examines the disparities in economic mass and welfare between areas within countries, linking these disparities to the distance from economic density. So while chapter 1 discussed changes at the local scale—where the most relevant spatial dimension is density—this chapter addresses the spatial transformations at the country scale, where both density and distance are relevant. Chapter 3 will propose that although density and distance also matter for world regions, the most important dimension at the international scale is

division—political barriers to the flows of goods, entrepreneurship, people, and information between nations.

As the crow flies? Distance as an economic, not Euclidean, concept

Distance refers to the ease or difficulty for goods, services, labor, capital, information, and ideas to traverse space. It measures how easily capital flows, labor moves, goods are transported, and services are delivered between two locations. Distance, in this sense, is an economic concept, not just a physical one. Although economic distance is generally related to Euclidean (straight-line) distances between two locations and the physical features of the geography separating them, the relationship is not always straightforward. One reason is that distance for the exchange of goods is different from that for the migration of people.

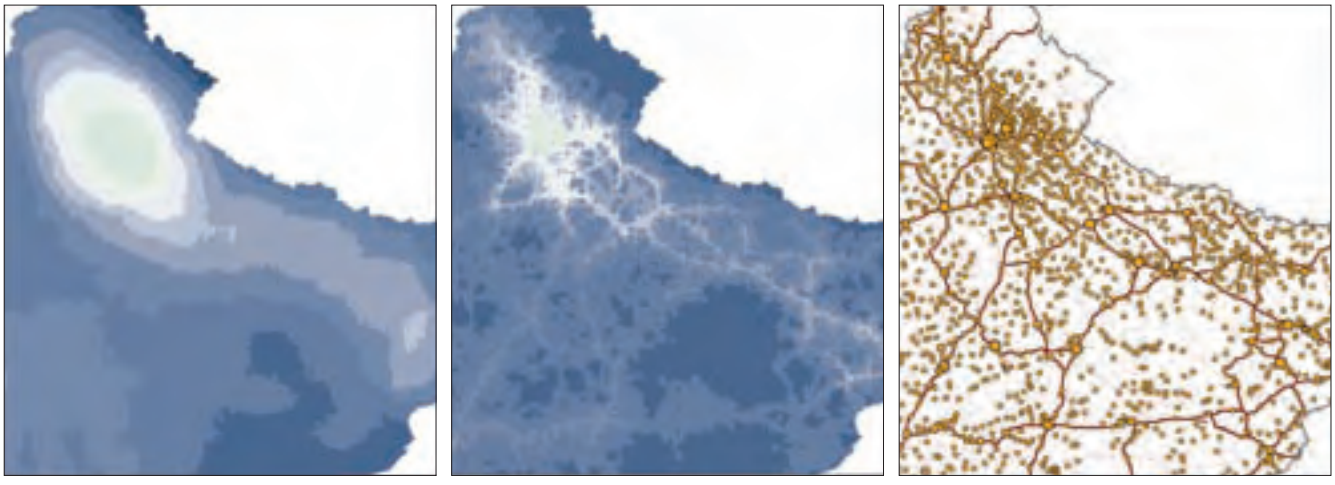
For trade in goods and services, distance captures time and monetary costs. The placement and quality of transport infrastructure and the availability of transport can dramatically affect the economic distance between any two areas, even though the Euclidean distance between them could be identical. Two villages may have the same straight-line distance to a city, but one could be near a national highway, the other on an unpaved rural road. Based on straight-line distance, most of India is well connected to markets in dense settlements. But people in many parts of India have difficulty getting to markets because of the travel time, determined by the type and quality of roads and other transport infrastructure (see map 2.1).

For labor mobility, distance also captures the "psychic costs" of separation from familiar territory. Between 1985 and 1995, the share of migrants in a Chinese province originating from another province fell as distance between the provinces increased. And additional costs exist for migration between nonneighboring provinces.[11] So, as with trade, economic distance for migration is related to, but not synonymous with, physical distance. In this Report, the destination of interest is a location with the greatest economic density or highest market potential. Distance is thus a metaphor for access to markets.

Manmade barriers, including policies, can also increase distance. Roadblocks and local barricades—improvised "toll stations" for local police and others to extract payments—are common for journeys by road in many Sub-Saharan countries.[12] And where local political autonomy is high, there may be territorial fragmentation as policies of protection are pursued at the local level. Map 2.2 shows the time to human settlements, assuming few or no manmade barriers. Distances can be long, even in high-income countries.

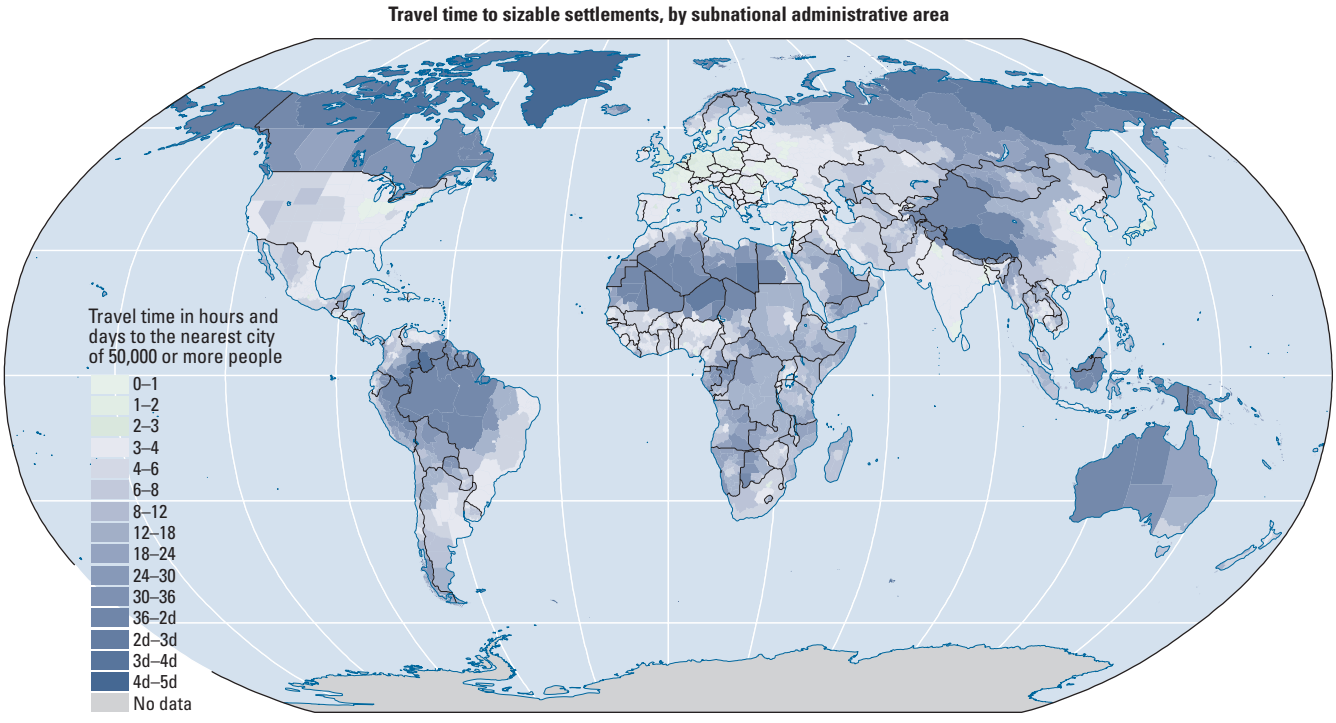
Map 2.1 Access to markets is not a straight line

a. Based on Euclidean distance **b. Based on economic distance** **c. Roads and settlements**



Source: WDR 2009 team.
Note: The lighter color represents greater access to places with economic mass.

Map 2.2 Distances can be long even in the developed world



Contributed by Andrew Nelson; see Uchida and Nelson (2008) for this Report.

Locations close to markets have a natural advantage

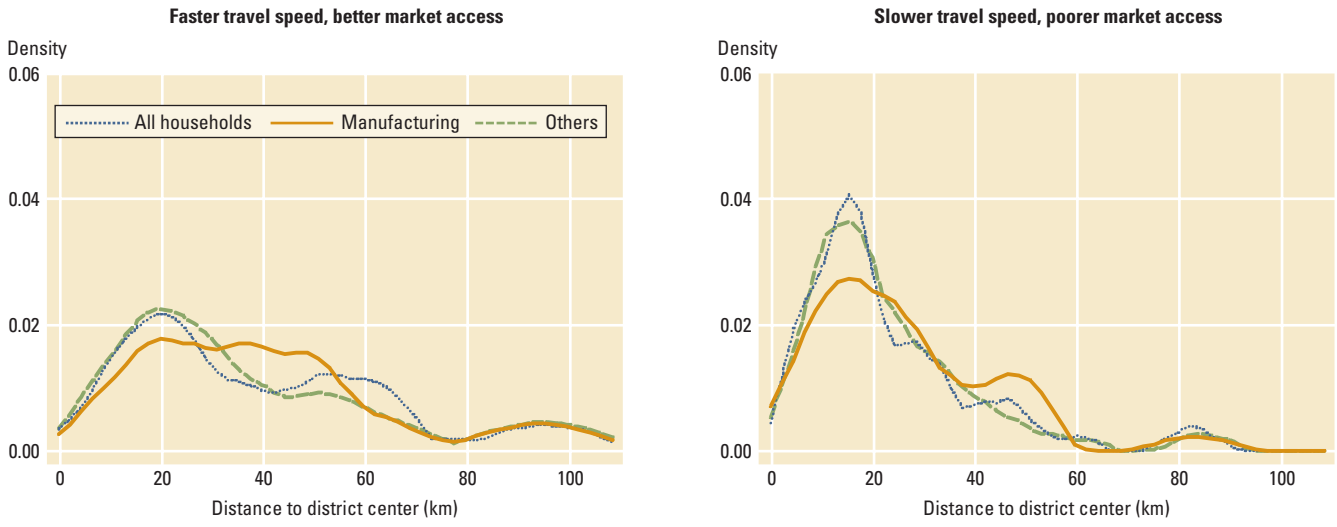
Provincial governments in 1980 in China heightened their administrative powers under decentralization reforms. They used these powers to protect local firms—raising tariffs and imposing bans on shipments from other provinces. Imports between provinces fell from 50 percent of GDP to 38 percent between 1992 and 1997, while local absorption of goods within provinces rose from 68 percent to 72 percent. The magnitudes are similar to those for goods crossing the U.S.-Canada border and international borders in the European Union (EU).[13] China's *hukou* system of permanent household registration—linking place of residence with access to consumer goods, employment opportunities, and social protection—similarly reduced internal migration.[14]

Distance to density affects spatial movements in goods, services, information, knowledge, and people. Commuting, migration, telecommunication, information flows, and shipments of goods connect originating and receiving areas. Most spatial interactions, such as learning and trade, are beneficial. But some are harmful, such as the spread of disease. The main determinant of the strength of these interactions is distance. Waldo Tobler's *First Law of Geography* states that "everything is related to everything else, but near things are more related than distant things."[15] Areas closer to economic density have easier access to beneficial interactions and exchanges.

In Indonesia better road connections shorten travel time and the distance to economic centers, creating larger agglomerated areas. Because of good roads and easier access to markets, villages 60 kilometers from the district center generate as much manufacturing activity as the district center itself, and the well-connected periphery becomes part of the agglomerated area. But in poorly connected peripheries, the density of economic activity falls off rapidly beyond 25 kilometers from the center (figure 2.1).

Spillovers from proximity to density show up in both developed and developing countries. In European manufacturing, an area's total factor productivity growth is positively and significantly related to the density of manufacturing production in neighboring areas. And faster demand growth in neighboring areas stimulates, through spillovers,

Figure 2.1 Manufacturing activity in Indonesia flourishes in areas with shorter economic distance to density



Source: Yamauchi and others, forthcoming.

faster total factor productivity growth.[16] In Canada, North York and Waterloo are, thanks to proximity and local research universities, becoming an extended part of the Toronto information and communication technology (ICT) hub. Firms closer to Toronto do better than those farther away.[17]

The phenomenon is repeated in emerging economies. When a network of highways surrounding Jakarta was built in the 1980s, many firms moved out of the center to save on land and congestion costs. But they stayed near the metropolitan region to have access to the large market.[18] Similar but less pronounced is the pattern in other Indonesian agglomerations, where growth has been strongest in peripheral areas surrounding megacities.[19] In Brazil industries moved out of greater São Paulo to the lower-wage populated periphery. Following the transport corridors, these industries moved through São Paulo state and into the neighboring state of Minas Gerais. In the Republic of Korea the early decentralization of manufacturing from Seoul was to peripheral locations within an hour's drive. Only in the 1990s did industries decentralize to towns and rural areas.[20]

The natural way to reduce distance is for people to migrate

A leading area of dense economic activity, through its market opportunities, creates incentives for firms and workers to move there. Responding to these incentives, firms and workers enlarge the market opportunities available in the dense area. The result is a circular and cumulative process of dense areas continually gaining workers and firms from less dense areas. In this process, migration balances the distribution of population against the spatial disparity in economic density. Reducing distance-related costs or spatial frictions increases movements of people, firms, and ideas—as well as those of goods and services—and thus brings less developed areas into the national system of production. With trade, the mobility of people is probably the most potent mechanism for integrating areas of low economic density with markets of high density. But for internal migration to bring about a convergence in living standards, large population movements may be necessary over generations.

Every year, approximately 40 million people in the United States change residences, and 8 million people change states.[21] The reason for this mobility is that economic production is concentrated in a few parts of the country, and accessing this economic density generally means moving closer to it.

People moving to economically dense areas contribute to production and boost their incomes. But they also increase competition among workers in dense areas, reducing it in less dense areas, and contributing to the convergence of living standards between low- and high-productivity areas.

Among today's industrial countries, the quickest convergence occurred between 1870 and 1913, largely driven by the largest flows of people from Europe to emerging markets in Asia and the Americas. For Ireland between 1851 and 1908, mass outmigration contributed at least a third to the catch-up in Irish real wages with those in the United States and Britain—by reducing competition in the domestic labor market. The virtual cessation of catch-up or convergence among the industrial countries between the two world wars was attributed largely to more restrictive immigration policies.[22,23]

Density in leading areas, distance for lagging areas

Subnational areas, when compared, should ideally be defined according to economic criteria that correspond to fairly self-contained labor markets and zones of economic activity. But data on such functionally defined economic areas are hard to come by.[24] So subnational areas are more commonly defined by administrative or political boundaries. Such definitions can bias econometric analysis (see box 2.1), but they have the advantage of corresponding to the areas for defining and implementing subnational policy. This chapter examines administratively or politically defined areas based on different data sources, ranging from national accounts and household surveys to terrestrial grid cells of 1° longitude by 1° latitude.

In this Report, leading areas have a high economic density, and lagging areas have a long distance-to-density. An area is more likely to be lagging the farther it is from

BOX 2.1 *Defining an area: impossible or NUTS?*

Subnational policy analysis relies on data for areas that range from small primary sampling units to districts, and to states or provinces. Typically, these areas are defined administratively or politically, reflecting historical characteristics more than current patterns. For instance, the existing administrative structure of the EU's member states generally consists of two levels, such as *länder* and *kreise* in Germany, *regions* and *départements* in France, *comunidades autónomas* and *provincias* in Spain, and *regioni* and *provincie* in Italy. The *Nomenclature of Territorial Units for Statistics* (NUTS) provides a single uniform classification of territorial units for producing regional statistics for the EU. The first two administrative levels in most member states correspond to NUTS 2 and NUTS 3. NUTS 1, a larger unit representing the major socioeconomic regions, often does not correspond to existing administrative units within member states.

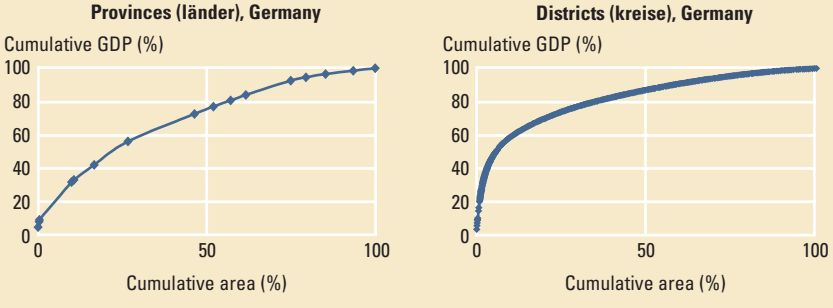
Which spatial scale to use, or how best to define a subnational area, depends on the issue and the information available. But the choice can dramatically affect the conclusions drawn from studying social and economic conditions across different parts of a country—for two reasons.

- First, areas are not defined keeping in mind the policy issues. For instance, within-area differences in employment or poverty can be as large as between-area differences. Any change in the boundaries between areas could change the results. The potential implications are succinctly summarized by the title of a classic paper on this topic, "A Million or So Correlation Coefficients."[a]
- Second, analytical findings depend on the aggregation or spatial scale, the ecological fallacy of inferring characteristics of individuals from aggregate data. The classic study by Robinson (1950) illustrates this problem.[b] A broader aggregation will yield smaller differences between units of analysis—and lower variances. So, results can differ significantly depending on the size of the units.

The figure below shows the density of economic activity for Germany's 16 provinces (*länder*) and 439 districts (*kreise*). The highly aggregated data indicate that 30 percent of GDP is produced on 10 percent of the country's area, and the more disaggregated data show that almost 60 percent of GDP is produced on the same 10 percent. Aggregate information can be useful, but be mindful of these biases.

Source: WDR 2009 team.
a. Openshaw and Taylor 1979.
b. Using state level data for the United States, the study showed that the proportion of foreign-born people is positively correlated with the proportion literate in English, suggesting that native-born Americans were more likely to be illiterate. Analyzing the same relationship using individual data showed a negative correlation.

Different spatial scales yield different results because of an aggregation bias



Source: Estimates based on Nordhaus 2006.

leading areas because greater distance-to-density implies a lack of integration into the economy of leading areas. It also implies poorer access to the "thick" markets of capital, labor, goods, services, and ideas, and the spillovers of knowledge and information they provide. A lagging area is usually a remote part of the country with one or more of the following features: high poverty, low productivity and income, high unemployment, and stagnant growth, which are typically the criteria governments use to define lagging areas.

In developing countries, lagging areas tend to be remote places where basic needs, such as access to sanitation and electricity, are not met. In developed countries, lagging areas are locations with poorer job prospects than leading areas, but no differences in basic welfare. So distance and market access, in this Report, capture a wide range of criteria that different countries use to define a lagging area (see box 2.2).

It follows that distance-to-density is the cause of low income per capita, labor productivity, and real wages—and of the high rates of poverty and unemployment. In the United Kingdom, economic density in the leading London and southeast areas produces a wage premium of 18 percent, which

BOX 2.2 *How developed and developing countries define lagging areas: a quick survey*

In this Report, a lagging area is defined as a place distant from density. How does this definition compare with how policy makers in developing and developed countries have, today and historically, defined lagging areas?

Usually, the criteria national governments use to classify an area as "lagging," "disadvantaged," or "backward" are linked to explicit strategies or policies for spatial or regional development. The criteria might be vague or precise. They might relate to a single indicator of economic performance or to a weighted average of several. And they might reflect the definition of lagging areas at different spatial scales.

- *Vague.* UK regional policy in the 1980s classified a lagging area as being either a "development area" or an "intermediate area." But the law was vague in the criteria it set to designate such areas. "In exercising his powers under the preceding provisions of this section [in the designation of development and intermediate areas] the Secretary of State shall have regard to all the circumstances actual and expected, including the state of employment and unemployment, population changes, migration and objectives of regional policies."[a]
- *Precise and simple.* EU regional or "cohesion" policy for the period 2007–13 defines lagging areas as those qualifying for assistance under the "convergence objective," equated with NUTS2 areas with a GDP per capita of less than 75 percent of the EU average.[b] These areas are budgeted to receive around 71 percent of funds under the convergence objective. But, even in EU regional policy, funding is available on more favorable (and complicated) terms for those areas whose GDP per capita is not only less than 75 percent of the EU average, but which are in a country whose GDP per capita is less than 90 percent of the EU average. These areas are considered to be "more lagging."[c]
- *Precise and complicated.* Between 1982 and 1987 Canada's Department of Regional Industrial Expansion used a development index to classify areas for allocations under its Industrial and Regional Development Program. The index assigned a 50 percent weight to an area's unemployment, a 40 percent weight to its personal income, and a 10 percent weight to the fiscal capacity of the province to identify 15 percent of the "least developed."[d]
- *Sophisticatedly defined and measured.* To identify areas considered as lagging, Mexico's microregional strategy uses a "marginalization index" based on indicators of access to such basic services as electricity and drinking water, and indicators of the quality of dwelling conditions and the proportion of the local working population that is poorly paid.[e] It is mainly targeted at remote rural communities in the south, because the "remoteness of rural communities often translates into conditions of poverty and a substantial lack of access to a wide range of basic public services."[f]

Mexico is noteworthy not only because of the sophistication of the measure used to identify lagging areas, but also because of the sophisticated manner of defining areas. Rather than using crude administrative boundaries to define areas, geographical information system (GIS) techniques are used to consider an area's geographical proximity, ethnic and cultural identity, and geoeconomic characteristics.

So the criteria that different countries use to identify lagging areas depend on the level of development and on domestic political considerations. High levels of poverty and marginalization define lagging areas in developing countries, and a high rate of unemployment often defines them in developed countries.

India's 10th Five-Year Plan (2002–07) identifies the northeastern region as "backward" and "disadvantaged" and thus deserving special policy attention. EU regional policy, under its convergence objective, makes special provisions for "the outermost regions," deemed to require additional assistance.

This Report's definition of lagging areas—as distant from density—captures this wide range of criteria.

Contributed by Mark Roberts.
a. Industrial Development Act 1982, chapter 52, part I, para. (3); bold emphasis added.
b, c. http://europa.eu/pol/reg/index_en.htm, "Activities of the European Union—Regional Policy," 2008.
d. Atkinson and Powers 1987.
e. Villarreal 2005; OECD 2003, p. 6.
f. OECD 2003.

distant areas in the north and southwest of England and in Scotland and Wales do not enjoy.[25] In Indonesia the potential profitability of firms in textiles and other sectors is negatively related to distance-to-density: more distance, less profit. This is true for distance-to-density within the country and for distance to an international port and thus to the density in international markets.[26] Again, lagging areas unable to attract investment and employment are those with a high distance-to-density.

As in today's rich countries, distance-to-density affects incomes in emerging market countries. In China good market access produces higher individual wages, even after controlling for individual, sector-, and province-specific attributes, living cost differences, and human capital externalities.[27] In Brazil lagging areas economically distant from São Paulo and other large markets have lower wages, and improving an area's growth prospects largely depends on reducing distance.[28] In Brazil's leading area, economic density implies a wage premium of 13 percent, comparable to that in European countries.[29,30] In Mexico the southern rural areas—distant from the economic density in Mexico City and the United States—have the lowest wages and highest poverty.

Lagging areas in many countries are home to ethnic minorities. Tribal, racial, and religious differences in access to resources show up as spatial disparities. In a vicious cycle, disparities between areas that coincide with different ethnic groups can deepen political divisions and fuel tensions, contributing to greater divergence in living standards. They can even fuel civil conflict that is difficult to extinguish, causing "development in reverse" (see box 2.3).[31]

BOX 2.3 *Dangerous disparities: when divisions aggravate distance*

The academic literature argues that internal labor migration is the strongest force for convergence in economic and other measures of household welfare across areas of a country. But differences in language, religion, ethnicity, and race are probably one of the strongest barriers to internal migration, a troubling dilemma for policy makers. The ethnic, linguistic, and religious barriers that may keep households from taking advantage of many opportunities to arbitrage geographic differences for employment and earnings can be the same barriers that cage poor people in lagging areas, perpetuate their poverty, and sharpen spatial disparities.

Disparities in East Asia. In Thailand 17 percent of people in the northeast are poor, compared with 0.5 percent in Bangkok. About half of Thailand's ethnic minority groups live in the Northeast. In Indonesia poverty and welfare indicators are persistently worse in West Kalimantan—home to such ethnic minorities as the Dayak, Bugis, and Sambas—than in Java, home to Indonesia's ethnic majority.

Disparities in South Asia. In India the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura make up the lagging northeast. Except for the Assamese, the population is predominantly tribal, speaks Tibeto-Burman and Austro-Asiatic languages, and has a strong genetic similarity with the people of East Asia. Hinduism is the dominant religion, but the proliferation of Christianity has set the area apart from the rest of India. By conventional measures of economic welfare and development, northeastern states rank among the lowest in India.

Disparities in Africa. A study of 11 Sub-Saharan countries found that ethnicity was on its own a strong predictor of differences in child mortality, but when combined with geography, it continued to predict the probability of survival among children. For instance, in Côte d'Ivoire, mortality among two year olds fell much faster from 1970 to 1994 for the Baoule than for other ethnic groups. Children of Ashanti women in Ghana were about 20 percent less likely to die than other children. In Uganda, Baganda children under five were a third less likely to die than children of other ethnic groups.

A 2005 study on spatial inequalities by the World Institute for Development Economics Research at the United Nations University in Helsinki (UNU-WIDER) conjectured that "Spatial inequality is a dimension of inequality overall, but it has added significance when spatial and regional divisions align with political and ethnic tensions to undermine social and political stability."[a] These somewhat abstract words chillingly foreshadowed the violence in Kenya in early 2008, which left 1,500 people dead and another 250,000 displaced. Violence began over the disputed outcome of a presidential election in late December 2007, quickly exposing deep ethnic cleavages that demarcate Kenya's economic and political geography. Communal fighting was most pronounced around the town of El Doret in the Rift Valley, and on the outskirts of Kisumu in the Western district of the country. The Rift Valley and Western districts are among Kenya's economically lagging areas and are the traditional home places of the minority Kalenjin, Luo, Kisi, and Luhya tribes, who along with other ethnic minorities in these areas harbor resentments related to economic deprivation and neglect.

Source: Brockerhoff and Hewett 2000.
a. Kanbur and Venables 2005.

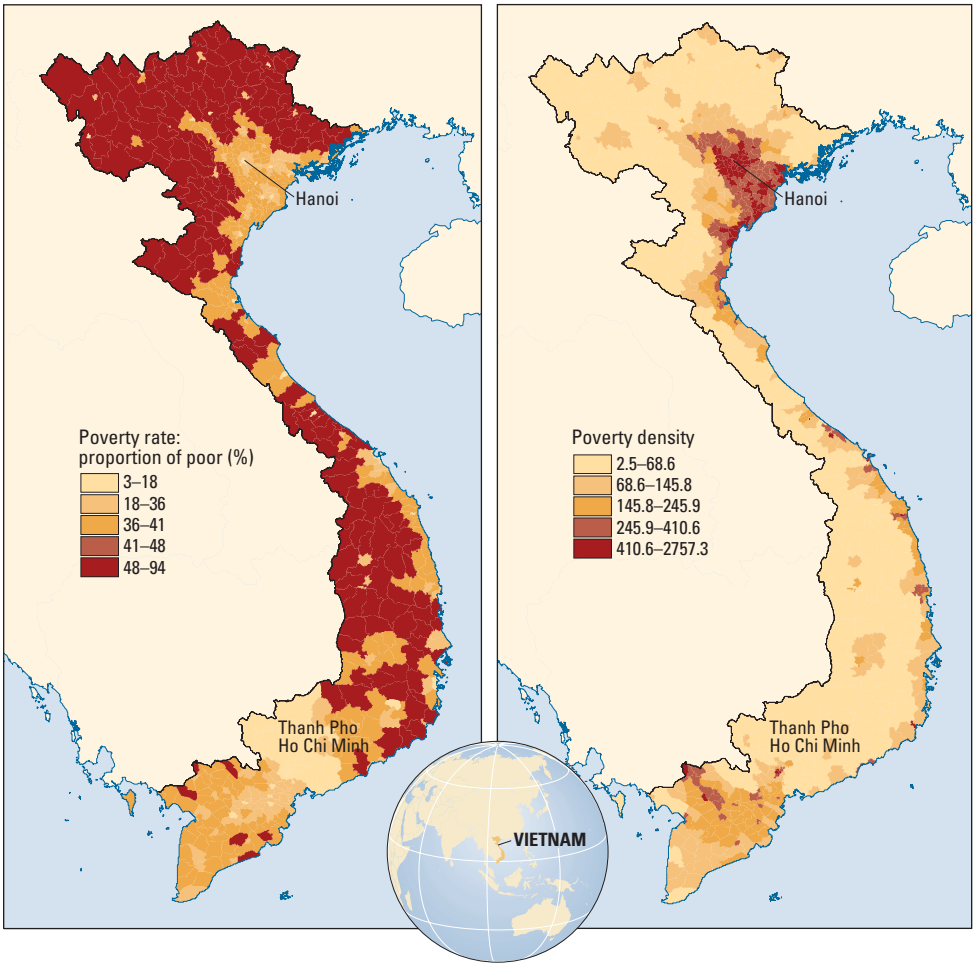
Lagging areas have higher poverty rates, leading areas have more poor people

The rate of poverty (the poverty headcount) is related to distance, and the mass of poverty is related to density. Lagging areas tend to have a higher proportion of poor residents, and the leading areas tend to contain a higher share of the country's poor people, because of the dense population in leading areas. Vietnam's lagging inland areas have the highest poverty rate, but its prosperous leading areas contain the mass of poor people (see map 2.3). And in Honduras the country's poverty mass is concentrated in its two leading areas of Tegucigalpa and San Pedro Sula, while distant eastern areas generally have a high poverty rate (map 2.4).

Economic concentration in leading areas

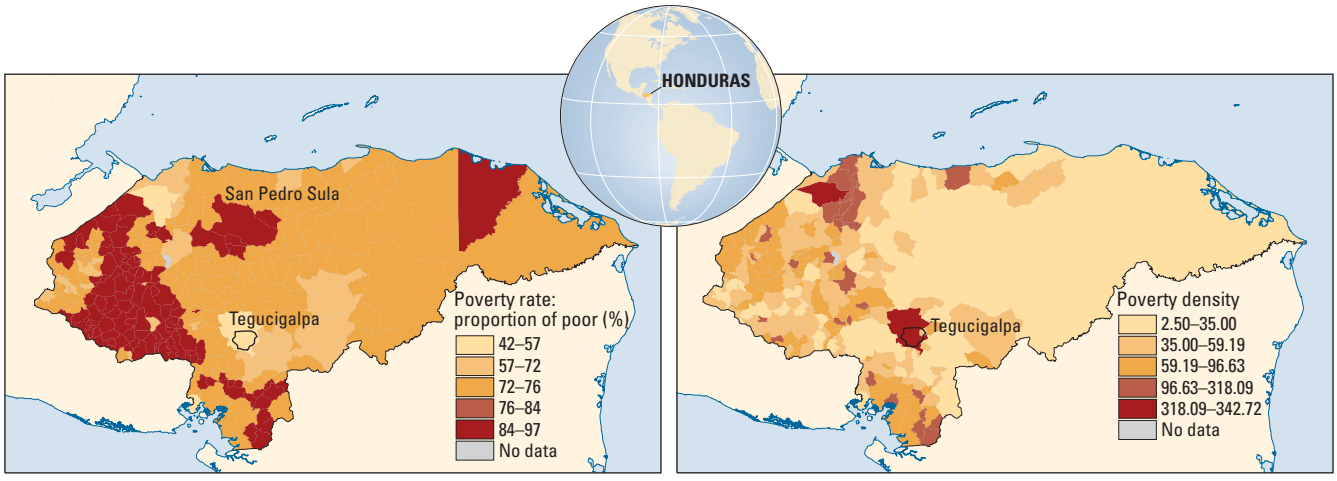
As economies develop, economic activity generally becomes more concentrated, not less. In about a quarter of the world's nations—such as Botswana, Brazil, Norway, Russia, and Thailand—more than half of national income is generated on less than 5 percent of the land area. In half of all nations—such as Argentina, Saudi Arabia, Slovenia, and Zambia—a third or more of national income is generated on less than 5 percent of land. Only one country in 10 has a dispersed economic mass, with less than a tenth of national income generated on 5 percent of its land. Among the few countries with this high spatial dispersion: Bangladesh, the Democratic Republic of Korea, the Netherlands, and Poland.[32]

Map 2.3 Vietnam's poverty rate is higher in lagging inland areas, but its poverty mass is greater in leading coastal areas



Source: The Poverty Mapping Project. Columbia University, using data from Minot, Baulch, and Epprecht 2003.

Map 2.4 The poverty rate is high in distant eastern Honduras, but the poor are concentrated in the two largest metropolitan areas



Source: The Poverty Mapping Project. Columbia University, using data from Robles 2003.

This section presents the historical experience of selected industrialized countries. Spanning more than a century, this section shows how these countries experienced rapidly rising spatial concentrations, followed by a leveling off. It then turns to a large sample of developed and developing countries to document how the concentration of economic mass rises with a country's development.

Rapidly rising concentration in the early stages of development, then a leveling

It is difficult to come by data that track the evolution of spatial concentrations of economic activity.[33] The information available reveals that economic development, in its early stages, is accompanied by a rapidly rising spatial concentration in a country. Not only does the volume of economic activity grow, but its generation becomes more compressed into a smaller land area. Leading areas benefit most from this compression and growth.

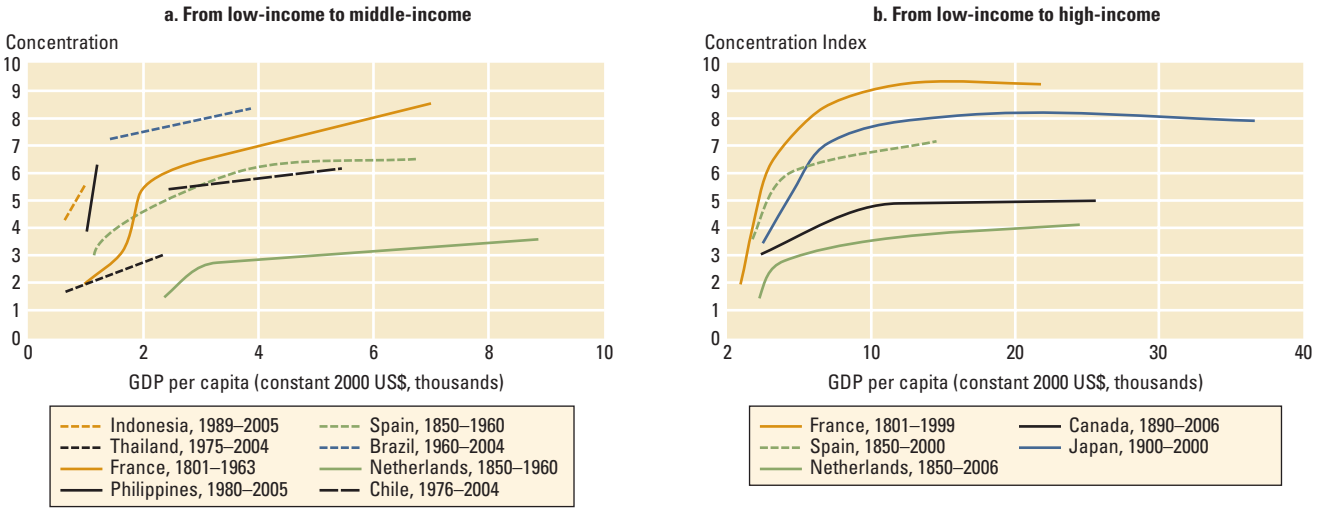
Economic concentration in the Ile de France—the leading area of France, with about 2 percent of the country's land—increased rapidly from a value of around two times the hypothetical share in 1801 to three times in 1851 and to six times by 1910.[34] It continued to rise, but less rapidly, to nine times that share in 1960. French GDP per capita grew from less than $1,000 in 1801 to $7,000 in 1960. From 1960 on, however, its economic concentration stabilized, even though its GDP per capita tripled. In Canada and the Netherlands the increases were not as dramatic, but both countries experienced the same pattern of rapidly rising concentrations at low levels of development, followed by a leveling off as GDP per capita rose past $10,000 (see figure 2.2).[35]

Patterns are similar in today's developing countries. As Thailand industrialized and grew rapidly, the concentration in the leading Bangkok metropolitan area increased from 1.8 in 1975 to 3.1 in 2004, while GDP per capita increased fourfold. In Brazil too, the concentration in the leading São Paulo area edged upward from 7.3 in 1960 to 8.4 in 2004, as the country's GDP per capita almost tripled.

For Japan during its post–World War II industrialization, the concentration in its leading area of greater Tokyo increased from a high of 7.1 in 1955 to about 8 in 1970 as its GDP per capita more than doubled. This increasing spatial concentration eventually levels off, as the spatial distribution of economic activity in a country stabilizes. After 1970, the concentration in greater Tokyo stabilized.

In the United States as GDP per capita rapidly increased from $1,806 in 1850 to $4,091 in 1900,[36] concentration came in the manufacturing belt of Green Bay–St. Louis–Baltimore–Portland ME, which accounted for three-quarters of U.S. manufacturing employment. Over the next 60 years, the belt's share of manufacturing employment remained stable at two-thirds to three-quarters.[37] Despite structural changes in the U.S. economy and shifting patterns of economic concentration, that concentration remained stable after 1960.

Figure 2.2 Rising density of economic mass accompanies development over decades, even centuries



Sources: WDR team estimates based on national accounts—statistical yearbooks of various years in respective countries. 1890 data for Canada come from Green (1969). Data on France are based on population numbers from Catin and Van Huffel (2003); Barro and Sala-I-Martin (2004). Data on Japan, the Netherlands, and Spain came from the Staff City Population Database, Human Settlements Group, International Institute for Environment and Development (IIED).

Another corroborative piece of evidence of rising concentration comes from the falling share of land area occupied by 80 percent of the U.S. population in the densest counties from 25 percent of the U.S. land areas in 1900 to 17 percent in 2000.[38]

As countries grow beyond $10,000 GDP per capita, concentration tends to stabilize, with the details differing. The concentration in the leading area is greater in Canada, France, and Japan than it is in the Netherlands and the United States. For developing countries too, Brazil, Indonesia, and the Philippines seem to be on paths toward greater spatial concentration than either Chile or Thailand.

International comparisons of concentration today support historical trends

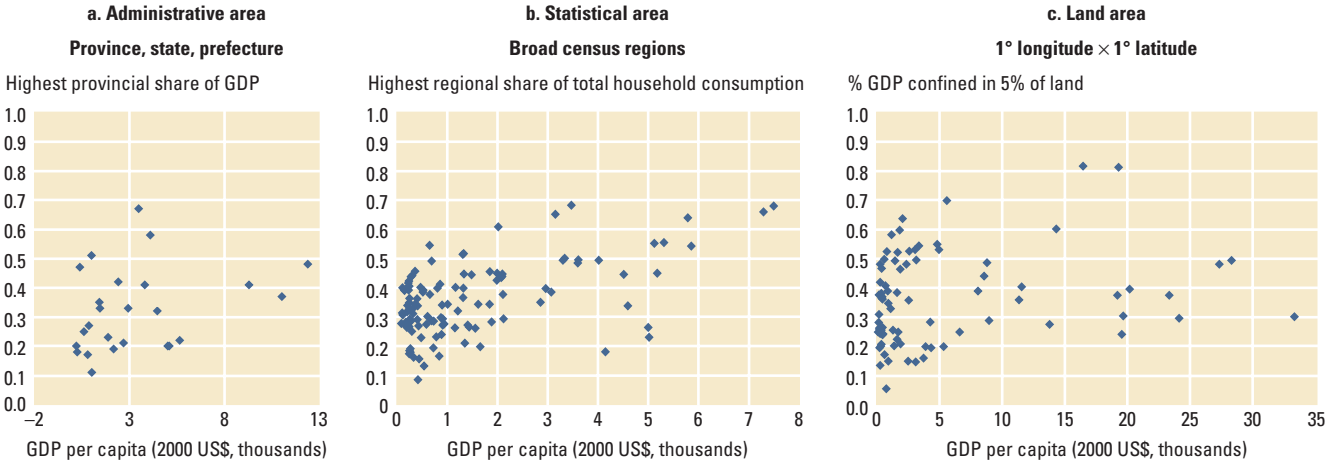
The relationship between a country's development and its spatial concentration holds for countries at different levels of development. It holds for countries based on administrative areas (Canadian provinces, Japanese prefectures, Russian oblasts, and U.S. states), statistical areas (the nine census regions of the United States, the three regions in Ecuador), and land areas (terrestrial grid cells of 1° longitude by 1° latitude). And it holds for different measures of concentration.

Administrative areas. Different countries have different numbers of administrative areas, which may be of different geographic sizes. But controlling for these factors, a comparison of 24 developing countries—ranging from Mozambique with a GDP per capita of $211 to Greece with more than $12,000—reveals the same pattern as the historical experiences of Canada and France. The share of national GDP produced in the leading administrative area tends to increase with the level of development (see figure 2.3, panel a).

Statistical areas. Statistical areas, broad census regions, can differ from administrative areas. The United States has nine statistical areas but 50 states; Canada has five statistical areas but 10 provinces and three territories. A country's statistical office generally uses these areas to stratify its sampling frame for household surveys, with the areas corresponding to the geographic partitions of a country such as east and west.[39] Despite the difference in aggregation, the data for statistical areas suggest the same relationship between concentration, measured by consumption rather than GDP, and development (see figure 2.3, panel b).

Land areas. Terrestrial grid cells of 1° longitude by 1° latitude, each corresponding to a land area of 100 square kilometers can provide purer geographic resolution.[40] Spatial concentration within a country can then be measured as the share of national GDP generated on the densest 5 percent of

Figure 2.3 Measures based on national accounts, household surveys, and geoscaled economic data confirm the historical pattern of a rising concentration of economic mass with the level of development



Source: Panel a: National accounts at national statistical office Web sites or Yearbooks; panel b: World Bank staff estimates of more than 120 household surveys in 75 countries (data set is described in detail in Montenegro and Hirn 2008); panel c: World Bank staff estimates from http://gecon.edu.yale.

its land.[41] The stylized pattern of rising concentration of GDP with development using historical data is the same as that using contemporary data. The relationship between development and economic concentration is positive and roughly linear when comparing developing countries with a GDP per capita of less than $10,000. But this relationship starts to level off when higher-income countries are included in the sample (figure 2.3, panel c).

The rising concentration of production with economic development is not an artifact of the number of subnational areas across countries or of the different sizes of land area in the countries (see table 2.1). Consider Tanzania, Italy, France, and Sweden, with similar numbers of administrative areas (21 or 22). Tanzania's leading area of Dar-es-Salaam generates 15 percent of national GDP, Italy's leading area of Lombardia, 21 percent. France and Sweden, each with a higher GDP per capita than Italy, also have higher concentrations in their leading areas.

For a set of countries partitioned into five statistical areas—ranging from Argentina to Tajikistan—the concentration of consumption in the leading area increases with development. Among medium-size countries with about 300,000 square kilometers of land area, Ghana and Lao People's Democratic Republic (both low-income countries) have markedly lower spatial GDP concentrations measured by spatial Gini coefficients[42] than Poland (a lower-middle-income country) and New Zealand (a high-income country). Poland and New Zealand have lower spatial Gini coefficients than richer Norway and the United States. The pattern also holds for small and large countries.

Divergence, then convergence—between leading and lagging areas

When production is primarily agrarian, economic activity tends to be evenly distributed across space. Productivity differences are also moderate, varying naturally with soil quality and climate. But as an economy develops and production expands in manufacturing and services, some areas become more attractive to firms and workers. Some are endowed with natural or "first nature" geographic advantages.[43] For example, a strategic coastal location makes an area a natural choice for a port (as with New York and Philadelphia in the United States). For others areas not so blessed by nature, their economic pull might be linked to a "second nature" historical accident. An example is Boston, saved from economic decline by an influx of immigrant labor fleeing the Irish potato famine. For Irish immigrants it was cheaper to travel from Liverpool to Boston than to New York.

Economic development brings with it greater market integration, which facilitates the mobility of people and capital and allows for greater trade, forces benefiting the leading

Table 2.1 Administrative, statistical, and geographic area measures all point to rising spatial concentrations of economic activity with development

Administrative areas	Country	GDP per capita	Number of administrative areas	Share of GDP in the leading area (%)
	Tanzania	324	21	15
	Italy	19,480	21	21
	France	22,548	22	29
	Sweden	31,197	22	29
Statistical areas	**Country**	**GDP per capita**	**Number of statistical areas**	**Share of household consumption in the leading area (%)**
	Tajikistan	204	5	30.2
	Mongolia	406	5	34.6
	El Salvador	1,993	5	43.9
	Brazil	3,597	5	51.6
	Argentina	7,488	5	64.7
Land areas	**Country**	**GDP per capita**	**Land area (km^2)**	**Spatial Gini coefficient**
	Ghana	211	227,540	0.48
	Lao PDR	231	230,800	0.48
	Poland	3,099	311,888	0.52
	New Zealand	11,552	267,990	0.55
	Norway	27,301	304,280	0.64

Sources: Administrative area information for Tanzania is from http://www.nbs.go.tz/nationalaccount/index.htm; information for France, Italy, and Sweden are from the Annex in *Growing Regions, Growing Europe*. Statistical area information is from more than 120 household surveys fielded during the 2000s for more than 80 countries (data set described in detail in Montenegro and Hirn 2008). Land area information is from http://gecon.edu.yale, which is based on 1990 information.
Note: GDP per capita estimates are in 2000 U.S. dollars for the particular year of the household survey.

areas. And by attracting people and firms, leading areas fuel agglomeration economies, becoming centers for innovation and growth and driving the national economy. But the process does not go on forever. Agglomeration economies start to be offset by congestion and pollution, the diseconomies of agglomeration. So the spatial concentration in leading areas starts to level off.

What, then, of the income and welfare disparities that accompany this pattern of first rising and then stable economic concentration? Is there a tendency for lagging areas to catch up with leading ones as economic development progresses? What is the role of government policies in facilitating this convergence?

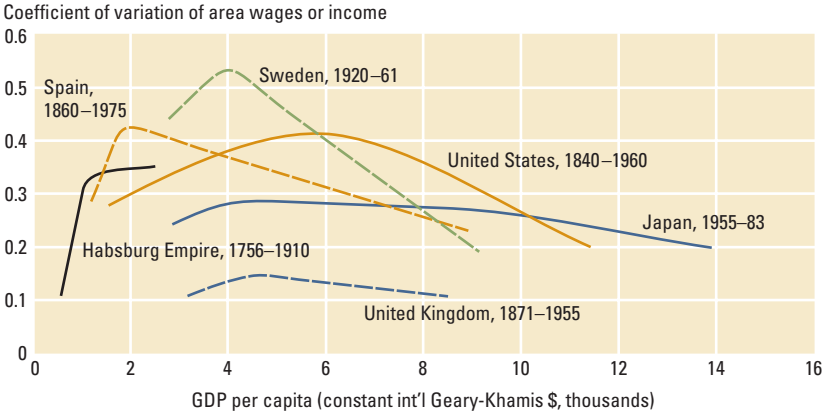
For today's developed countries, spatial inequalities in income and welfare rose early, followed by slow convergence

In today's developed countries, per capita incomes initially diverged between subnational areas, and convergence began to set in as GDPs per capita approached $10,000, following an inverted-U relationship (see figures 2.4 and 2.5 and table 2.2).[44]

Across areas of the United Kingdom, the coefficient of variation of GDP per capita increased by almost 40 percent between 1871 and 1911.[45] During this period, Britain went from a modern-day Namibia to a Jordan or the former Yugoslavia.[46] After World War II, GDP per capita across areas of the United Kingdom displayed a slow convergence, continuing until the late 1970s, when spatial inequalities stabilized.[47]

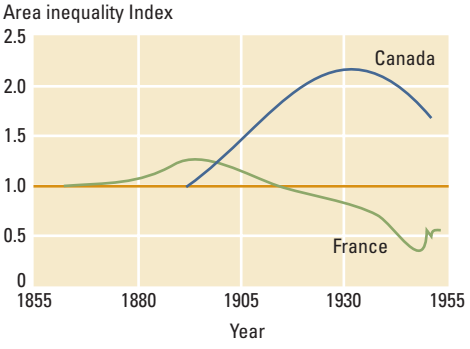
In the United States, the dispersion of per capita income across states increased between 1840 and 1880, coinciding with the rise of the manufacturing belt in the North, and the Civil War and its aftermath. The end of the Civil War marked the beginning of integration between states in the North and the South, and spatial dispersion in per capita income began to narrow. Because the southern states remained more dependent on agriculture, lagging areas of the United States suffered a setback in the 1920s because of a sharp drop in the relative prices of agricultural goods. Once this shock dissipated, the slow convergence between lagging and leading areas resumed with few interruptions until the 1990s, when disparities among states stabilized.[48]

Figure 2.4 Spatial inequality rose and remained high before slowly declining as economies approached $10,000 in GDP per capita



Sources: United States: Williamson 1965; Habsburg Empire: Good 1986; Sweden: Williamson 1965; Spain: Martinez-Galarraga 2007; Japan: Mutlu 1991.

Figure 2.5 Subnational disparities in income and wages persisted for more than 70 years in Canada and France



Sources: Canada: Green 1969; France: Williamson 1965.
Note: Canada data are based on provincial per capita gross value added; France data are based on department agricultural wages.

Table 2.2 Spatial inequality varied through different phases of development

		Phase of economic development			
Country	**Spatial disparity measure**	**Early**	**Middle**		**Advanced**
United States		**1774**	**1790**	**1840**	**1860**
	Relative deviation regional GDP per capita from U.S. average	30	31	56	66
Italy		**1861**	**1911**	**1936**	**1951**
	Index of regional percent agriculture labor force	6.55	9.41	12.7	14.2
Canada		**1901**	**1911**	**1941**	**1951**
	Index of regional percent agriculture labor force	7.14	9.88	12.6	10.2
England		**1767**	**1795**	**1867–70**	**1898–1914**
	Maximum-minimum in county agriculture wages	3s 11d	8s 2d	11s 0d	7s 4d
Austria		**1869**	**1890**		**1910**
	Maximum-minimum regional percent agriculture labor force	0.32	0.35		0.40
Spain		**1860**	**1914**	**1955**	**1975**
	Maximum-minimum ratio regional GDP per capita	1.76	2.33	2.22	1.74
Australasia		**1860**	**1880**		**1900**
	Coefficient of variation regional GDP per capita	0.30	0.35		0.10

Sources: United States: Good 1986; Italy: Williamson 1965; Canada: Williamson 1965; England: Hunt 1986; Austria: Good 1986; Spain: Martinez-Galarraga 2007; Australasia (Australia, New Zealand, and Tasmania): Cashin (1995).
Note: For Spain, the maximum is the top five and the minimum is the bottom five. For England, the currency is in shillings (s) and pence (d).

Canada and France also exhibit the same inverted-U-shaped pattern of rising spatial disparities in the early stages of development—spanning two generations—followed by slow convergence (see figure 2.5). In France the spatial dispersion of wages across *départements* increased between 1855 and 1900, when convergence set in. In Canada the spatial dispersion of average gross value added between areas increased between 1890 and 1910, carrying over to 1929 and starting to fall by 1956.[49] In Italy, Germany, and Spain, the convergence in per capita income gradually set in many years after these economies reached high income—after World War II—followed by stable income disparities (see figure 2.6).

Government policies can facilitate this convergence. In Japan, for example, investments in social services in lagging areas were increased as concentration of economic production accelerated. By making

BOX 2.4 *Correcting geographic disparities in postwar Japan*

In 1970, Prime Minister Eisaku Sato and the Cabinet initiated the New Economic and Social Development Plan and the New Integrated Spatial Development Plan (Shin-Zenso). The objective was to address disparities in living standards, as a result of accelerated growth in industrial areas around Tokyo, Nagoya, and Osaka along the Pacific Coast during the early postwar years. An excerpt in the Shin-Zenso summarized the government's vision:

> Among many problems concerning spatial disparities, disparities in living standards are more serious than those in per capita income. From this standpoint, the construction of the basic services and social institutions must be accelerated in rural towns, and new policies must be adopted to improve the living conditions of their surrounding areas above a certain minimum level.

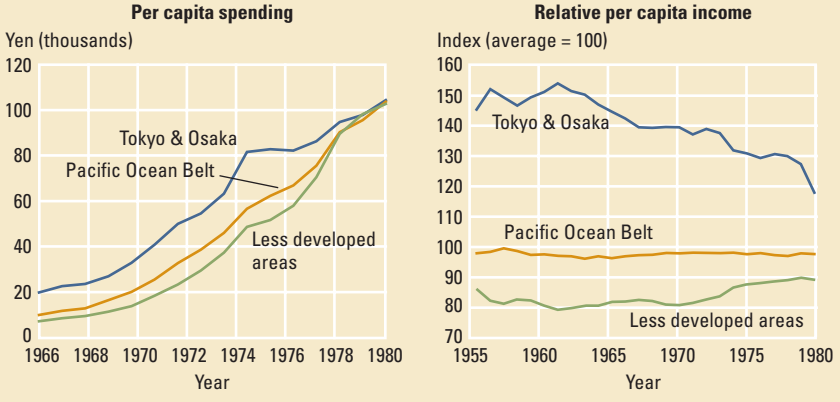
These plans continued to provide public investment in basic services and social institutions (for example, public utilities, medical facilities, and school buildings) to industrialized areas. But additional investments were made in the less developed areas, to achieve at least a minimal level of living standards for all places. The result was a rapid catch-up in investment in basic services and social institutions in less developed areas relative to the more industrialized areas (see the figure immediately to the right).

Both the general account budget of the central government and the Fiscal Investment and Loan Program were instrumental in mobilizing financial resources. The general account budget of the central government provided earmarked budget transfers to local governments in addition to nonearmarked transfers. Among the earmarked budget transfers, a substantial amount was allocated for investments in basic services (for example, rural roads) and social institutions under cost-sharing arrangements with the local government.

The Fiscal Investment and Loan Program pooled public funds from such sources as postal savings and public pension insurance premiums and then channeled them for investments in housing and social institutions to improve welfare in less developed areas. These policies were effective in corralling large investments toward achieving universal attainment of basic living standards. Per capita income converged between leading and other areas during the 1970s (see the figure on the right, below). Labor migration from rural to large urban areas was pronounced throughout the 1950s and 1960s, but it tapered off after the mid-1970s.

Sources: Cabinet Council 1972; Hayashi 2003; Kamada, Okuno, and Futagami 1998; Ministry of Finance 2008; Nakajima 1982; Okuma 1980; Overseas Economic Cooperation Fund 1995; Policy Research Institute for Land 2001; Sakamaki 2006.

Rising investments in social services facilitate convergence in incomes



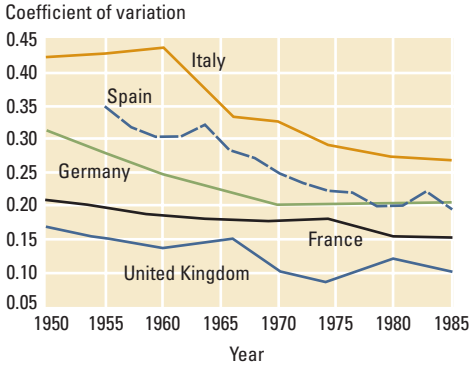
Contributed by Keijiro Otsuka and Megumi Muto.

the labor force more mobile, this led to falling geographic disparities in incomes (box 2.4).

For developing countries, spatial disparities in living standards between subnational areas first rise and then fall with development

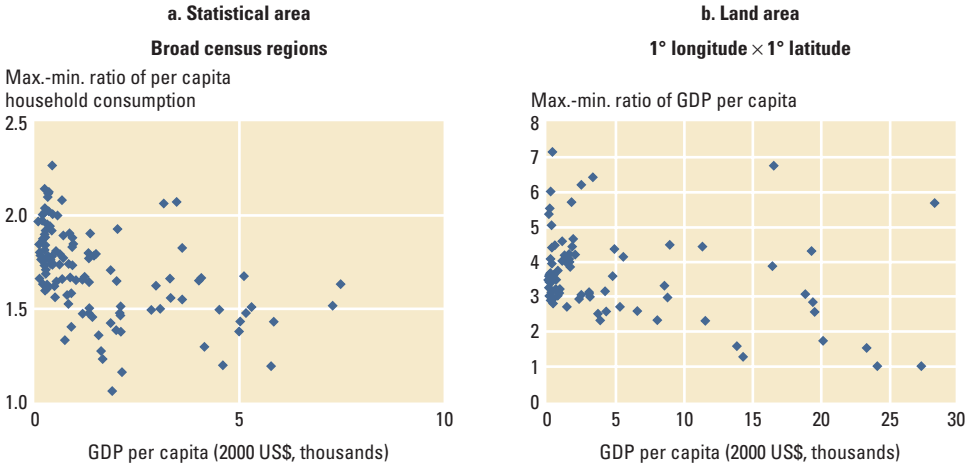
Comparing a large number of countries at different levels of development reveals that spatial disparities in per capita product and welfare diminish with level of development (see figure 2.7). This is consistent with most developing countries being clustered on the upward-sloping section of the inverted-U-shaped relationship between development and spatial inequality—and with the developed countries on the

Figure 2.6 Spatial disparities have narrowed slowly in Europe since World War II



Sources: de la Fuente 2000; Barro, Sala-I-Martin, Blanchard, and Hall 1991.

Figure 2.7 Contemporary comparisons of countries indicate that disparity in welfare among subnational areas fall with economic development



Source: Panel a: World Bank staff estimates of more than 120 household surveys fielded during 2000s in more than 80 countries; panel b: World Bank staff estimates from http://gecon.edu.yale, which is information in 1990.

downward-sloping part of the relationship. The conclusion is based on two sources of information. The first source comes from more than 120 household surveys covering more than 80 developing countries, from the Democratic Republic of Congo with a GDP per capita of less than $100, to Argentina with more than $7,500. The second source is based on the geophysically scaled economic data of terrestrial grid-cells of 1° longitude by 1° latitude for 90 countries that span the full spectrum of development, from Ethiopia with a GDP per capita of less than $200, to Japan with a GDP of more than $30,000.[50]

The household survey data offer an added advantage because individual household consumption is a better measure of welfare than income. Similar households in different areas of a developing country can have an average gap in household consumption of 70 percent simply as a result of location.[51] In Nicaragua, a six-person household headed by a primary-educated 40-year-old male in the lagging area of Matagalpa-Jinotega consumes half of what an equivalent household consumes in the leading area of Managua. In Canada and the United States a household in the lowest GDP per capita area consumes 20 percent less than an equivalent household in the highest. In Japan the area of residence means even less for the gap in consumption.

As countries become more developed, the disparities in welfare purely attributable to location diminish.[52] This pattern holds after controlling for the land area of a country and its number of administrative areas. Among countries partitioned into five areas,

Table 2.3 Household survey and subnational gross product data corroborate the pattern of declining spatial disparities in welfare with development

Statistical area	Country	GDP per capita	Number of statistical areas	Leading-lagging area disparity in household consumption (minimum-maximum ratio)
	Cambodia	234	5	1.89
	Bangladesh	286	5	1.73
	Colombia	1,989	5	1.54
	Thailand	2,109	5	1.52
	Argentina	7,489	5	1.48
	Canada	23,392	5	1.22
Land area	**Country**	**GDP per capita**	**Land area (km^2)**	**Leading-lagging area disparity in per capita gross product (minimum-maximum ratio)**
	Philippines	920	300,000	5.43
	Poland	3,099	311,888	4.63
	New Zealand	11,552	267,990	3.35
	Norway	27,301	304,280	1.78
	Japan	33,280	364,600	0.35

Sources: Estimates of consumption disparity are from more than 120 household surveys fielded during the 2000s for more than 80 countries. Estimates of disparity in gross product are from, which comes from information gathered in 1990.
Note: GDP per capita estimates are based on constant 2000 U.S. dollars for the particular years of the surveys.

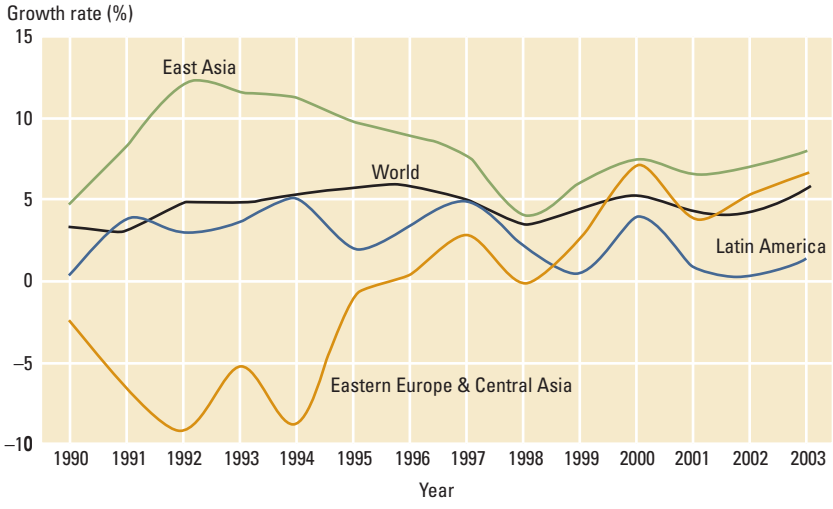
Bangladesh and Cambodia, both with GDP per capita less than $300,[53] had spatial gaps in consumption between their leading and lagging areas of 89 percent and 73 percent, respectively. For Colombia and Thailand (with GDPs per capita of approximately $2,000) the equivalent gaps are about 50 percent. For Canada (with a GDP per capita of $20,000) the gap is less than 25 percent. Among the medium-size countries, spatial disparities in welfare follow the same pattern, falling across the spectrum from developing to industrialized countries. The same is true for larger and smaller countries (see table 2.3).

Fast-growing countries see spatial disparities in income widen

East Asian growth has outstripped both the world economy and the growth of other developing regions. As they moved from plan to market, Eastern European and Central Asian countries have also grown faster than the world (see figure 2.8). As in the early stages of development in today's industrialized countries, development in East Asia, Central Asia, and Eastern Europe has brought widening gaps. In Southeast Asia the disparities in incomes per capita between leading and lagging areas has grown wider (see figure 2.9). In China too, the spatial dispersion in GDP per capita increased over the last decade (see figure 2.10). All this is consistent with the findings of the UNU-WIDER research program.

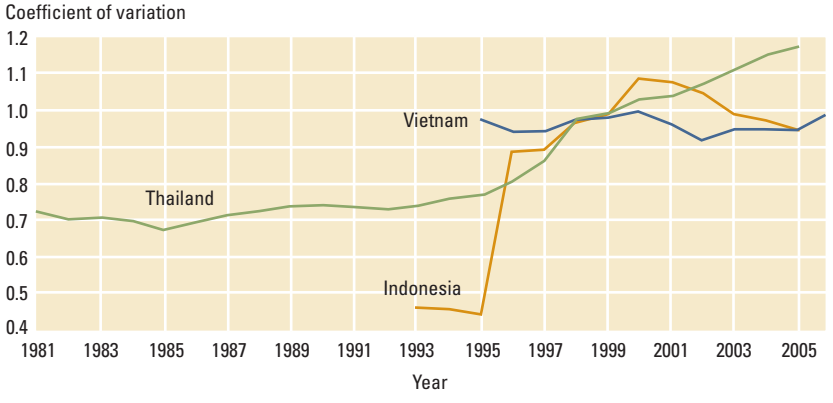
In Eastern Europe and Central Asia, too, disparities among subnational areas in labor productivity and income widened. In Russia income per capita in the lagging subnational area in 1985 was half the national average, and that in the leading area, twice the national average. Since then, income per capita in the lagging area has fallen to a quarter of the national average, while that in the leading area increased to five times the national average.[54] This divergence occurred during a reshaping of Russia's economic geography as state industries in remote areas collapsed, and economic activity started to respond to spatial variations in market potential (see box 2.5). Similarly, the Czech Republic, Hungary, Poland, and the Slovak Republic have

Figure 2.8 Economic growth in East Asia and Eastern Europe is faster than the world's growth



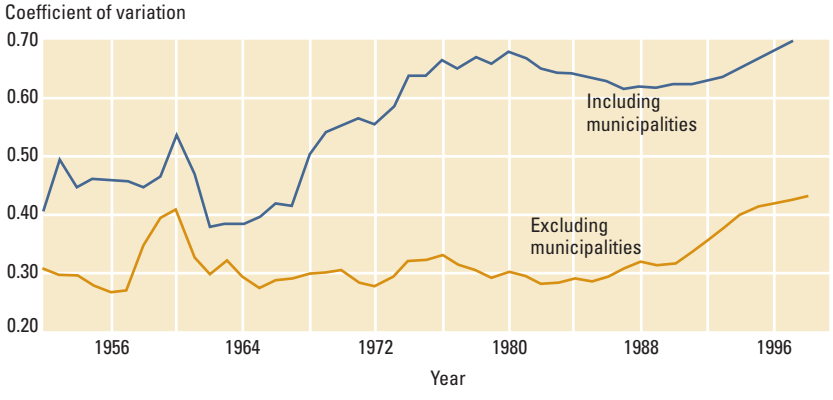
Source: World Bank 2005e.

Figure 2.9 Disparities in per capita gross product have been rising between leading and lagging areas in Southeast Asia



Source: Hamaguchi forthcoming.

Figure 2.10 Steady rise in inequality of per capita provincial gross product in China since 1990



Source: Demurger and others 2002.

BOX 2.5 *Spatial inefficiency and the downfall of the Soviet Union*

The Earth hosts many vast and harsh spaces, but few governments have put as much energy into the development of such places as Russia did under the Soviet government.

The effort to develop Russia's eastern areas was substantially increased under Stalin's rule. A forced industrialization attempted to shift production to the east and create new economic bases in the country's geographic heart. Equalization of economic (especially industrial) mass across Russia was seen as the way to make development uniform across space. "Balanced industrial growth" remained a slogan for a long time. In the 1930s the new areas received more than 50 percent of the central investment, financed mainly by expropriating wealth from agriculture. The new areas absorbed only capital at first. Visible effects appeared during World War II, although the most productive zones were close to the front, like the Ural-Volga, where 58 percent of factories evacuated from the west of the USSR were placed.

An accounting of this centralized, directive effort to spread out economic mass is depressing. Alexei Mints, the Soviet geographer, dismissed as propaganda the claims that directed investment boosted backward areas and created cities "from zero" under the five-year plans. The reality was more prosaic: the "opening up" of eastern raw material fields coincided with the growth of manufacturing in the west. The shift eastward, Mints wrote, occurred mostly in the European part.[a] In reality, Russia's demographic and economic geocenter had moved only as far east as the river Belaya in Bashkiria by 1990; eight of Russia's 11 time zones lay to the east of the Belaya. Industrial Siberia grew in absolute terms, but its share did not exceed one-fifth under the Soviet price system that favored final goods at the expense of raw materials, transportation, and energy (see the table below).

The Soviet social infrastructure overlapped with industrial development. Health centers, schools, recreational, cultural, sports, and communal-housing facilities—called *sotscultbyt*—generally belonged to enterprises. This overlap was especially evident in large companies in remote areas, such as the transpolar city of Noril'sk. This tradition was combined, somewhat paradoxically, with a vigorous redistribution of funds between sectoral and regional departments. Profits were seized and then given back—not necessarily to the same place—in capital goods and assets. The share of enterprises under the all-Union jurisdiction reached 70 percent in the reigns of Stalin and Brezhnev. The central government (Sovmin) controlled less than 20 percent of industrial profits obtained on Russian soil.

Industrial deconcentration, together with price system distortions and an expensive arms race, would bring the Soviet system down. In the late 1980s both the elite and the masses in almost every area or republic claimed that it bore the burdensome duty of a land that "fed the others." The slogan of regional *khozraschet* (self-repayment and economic accounting) soon grew into political separatism and contributed to the demise of the Soviet Union.

After the Soviet Union collapsed, the Russian Federation became more integrated with the world market. Russia found itself more resource abundant, but also less populated. The market revaluation of resources and assets shrank the economic mass of distant zones and poles, but deteriorating infrastructure did not reduce, and in some cases, increased economic distance. Industry-tied public services also collapsed in the 1990s, as firms were privatized or transferred to their *sotscultbyt* to municipal authorities. For some time under Yeltsin, the revenues of federal and regional/local budgets were officially equal (50:50). In the 2000s, though, the rules were changed in favor of the Federation (60:40 when the external debt payments were made, reduced later to 55:45). But expenditures stayed at 50:50 because of growing transfers.

Today, center-region financial relations are again based on the principle of redistribution, though less so than in the Soviet Union. But industry is now more fuel and material based. After decades of equalization plans, the economy sees widening disparities in regional per capita product.

The figures on the next page show this for 1990 and 2005, using old Soviet net material and new gross regional product (GRP) methods and prices. The two leaders, Tyumen oblast in Western Siberia and Moscow in the center, remained the same. But the gap between leading and lagging areas skyrocketed from 5 to 43. With redistribution, the leading-lagging gap in each area's average personal income in 2005 was 11. Only 20 of 88 regions exceed the Russian average in per capita GRP, and only 22 in income. Most poor areas reduced the gap in living standards with the help of transfers.

Spatial shifts in the Russian Federation, 1900–2000

Indicator/region	1900	1925	1950	1975	2000	1900	1925	1950	1975	2000
	Number of workers, millions					Production, billion rubles, in 2000 prices				
Absolute figures	1.9	2.2	10.8	21.4	13.3	22	37	579	4,705	4,759
By type of region[a]	Percent					Percent (in current prices)				
Old industrial[b]	64	61	42	40	33	50	65	68	42	32
New European	30	33	39	41	47	33	31	27	38	40
Eastern (Asiatic)	6	6	19	19	20	17	4	5	20	28

a. Author's calculations based on various statistical and literary sources. b. Includes St. Petersburg and suburbs, the center (including Nizhniy Novgorod) and the mid-Urals.

BOX 2.5 *Spatial inefficiency and the downfall of the Soviet Union—continued*

Differences in regional product widened
Current prices, percent of Russian average

Note: Vertical lines show range of values within an area, and diamonds represent the area mean.

Welfare in remote areas has become less dependent on economic mass in contemporary Russia. The trend is not seen as satisfactory by some Russian observers and policy makers, but what should be done about it is not clear. The policy debate ranges between two polar visions: reinforcing the redistributive system across space based on a wider sharing of oil and gas profits, or a forced diversification of regional economies based on military-industrial activities and research and development initiatives. While the debate continues, Russia's experience under the Soviet government offers policy lessons. Particularly for a country with the world's largest land area, spatial policy choices and their efficiency could mean the difference between economic progress and stagnation.

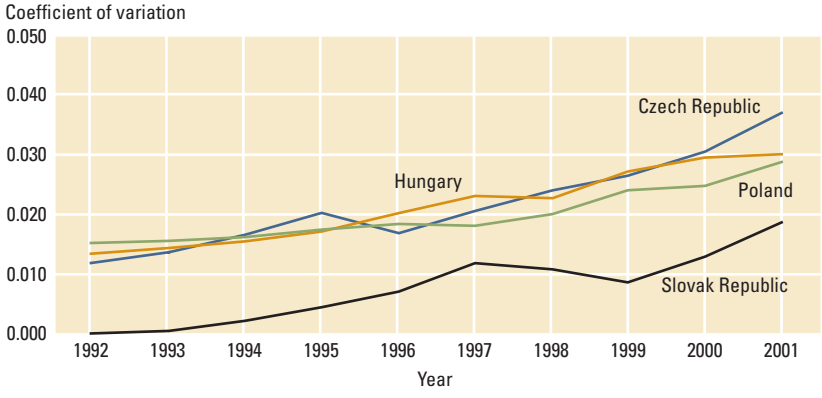
Contributed by Andrei Treyvish.
a. Mints 1974, pp. 20–54.

all witnessed increased spatial disparities across subnational areas since the beginning of transition (see figure 2.11).

The East Asian and Eastern European countries appear to be on the rising part of the inverted-U curve. Economic activity is still concentrating in a small number of favored leading areas, with agglomeration economies increasing their productivity, wages, and income per capita. The lagging areas, insufficiently integrated into the national economy, have not yet captured spillovers from the leading areas.

The dynamics of geographic divergence in East Asia, Eastern Europe, and Central Asia have generally been a "race to the top." All subnational areas experienced gains in average wages and household incomes, though the biggest gains have gone to the

Figure 2.11 Income disparities between areas widened as Eastern European nations moved from plan to market



Source: Ezcurra and Pascual 2007.

leading areas.[55] Among the poorest provinces in China, the southwest region had GDP per capita growth of 7.7 percent over 1979–98, the central region 7.8 percent, and the northwest region 8.4 percent.[56] East Asian countries saw phenomenal declines in poverty from more than 450 million poor living on less than $1 a day in 1990 to about 120 million in 2007.[57] For Eastern Europe and Central Asia, the divergence between 1998 and 2003 was associated with a fall of 40 million in the region's poor living on less than $2 a day, mainly because the mass of poverty is in leading areas.[58]

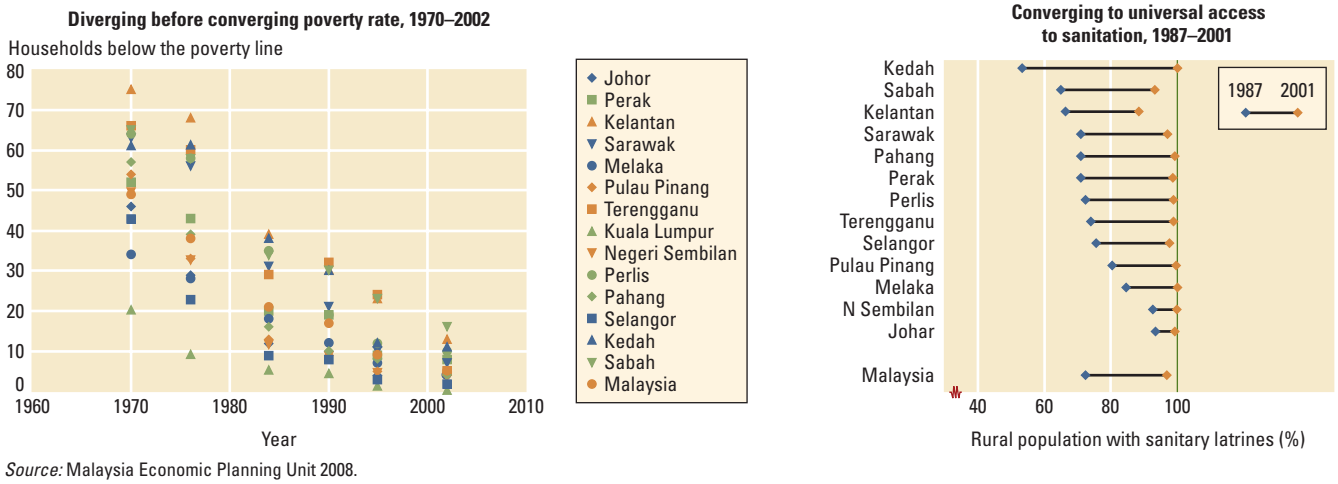
Some relatively closed or middle-income countries had incomes converge

In upper-middle-income Brazil, the dispersion of state per capita income around the national mean fell from a coefficient of variation of 0.65 in 1970 to 0.49 in 1995.[59] Chile witnessed spatial convergence in GDP per capita across subnational areas between 1960 and 2001, when its GDP per capita more than doubled from $4,270 to $10,538.[60] Upper-middle-income South Africa also had per capita incomes converge between its towns and cities from 1990 to 2000.[61] For Colombia, a relatively closed economy, the ratio of GDP per capita in the leading *departamento* of Santafé de Bogotá to the lagging *departamento* of Choco fell from 10 to 6 during 1950–60 and to 3.1 in 1990.[62]

As incomes diverge, health and education converge

Many developing countries have had subnational Millennium Development Indicators across areas converge, so even though disparities in income and material well-being widened, basic welfare has become more equal. In Indonesia the coefficient of variation across provinces for average years of schooling fell from 0.43 in 1971 to 0.15 in 2000, and that for the poverty rate fell from 0.42 to 0.35.[63] In Thailand infant mortality rates narrowed from a minimum-maximum gap of 6 percentage points between the leading and lagging areas in 1980 to 0.7 percentage points in 2000,[64] around a national mean of six deaths per 1,000 live births. In Vietnam the gap in malnutrition rates between leading and lagging areas fell from 20 percentage points in 1998 to 15 percentage points in 2004, accompanying an overall improvement for all areas.[65] In China territorial disparities in the human development index declined between 1995 and 2003. The disparity between the best-performing province (Beijing) and the worst-performing province (Tibet) declined from 0.26 in 1995 to 0.19 in 2003 for life expectancy, and from 0.50 to 0.32 for the human development index. The gap for literacy rates also declined between 1990 and 2003, from 58 to 51 percentage points.[66] The convergence of basic welfare in rapidly growing East Asian countries is epitomized by Malaysia (see figure 2.12).

Figure 2.12 In Malaysia, geographic convergence in basic welfare accompanied economic growth



Source: Malaysia Economic Planning Unit 2008.

For Mexican states, rates of adult literacy and infant mortality converged from 1940 to 2002, as did life expectancy and enrollment rates from 1990 to 2002.[67] In Egypt the gap in female primary school enrollment rates between the best- and worst-performing governorates narrowed from 41 percentage points in 1995 to 25 in 2004, as did the literacy rate and the gender gap in literacy between 1986 and 2001.[68]

Not all countries have experienced spatial convergence in the Millennium Development Indicators. Countries in South Asia and Africa still have wide internal disparities. In India and Sri Lanka the disparities across states remained large between 1981 and 1991,[69,70] though there have been absolute improvements both nationwide and in the country's lagging areas. In Sri Lanka poverty was reduced in all provinces between 1991 and 2007, with the fastest reduction in its leading western province.[71] In Kenya provincial gaps in primary and secondary school enrollment rates remained large between 1999 and 2004, but more important, all areas made progress, including the lagging Northeast.[72]

What's different for today's developers?

In *The Wealth of Nations,* published in 1776, Adam Smith wrote, "It is upon the sea coast, and along the banks of navigable rivers, that industry of every kind naturally begins to sub-divide and improve itself, and it is frequently not till a long time after that those improvements extend themselves to the inland parts of the country."[73] What Smith wrote in 1776 could apply equally to the spatial processes in China's modern economic development. What, if anything, is different for today's developing countries?

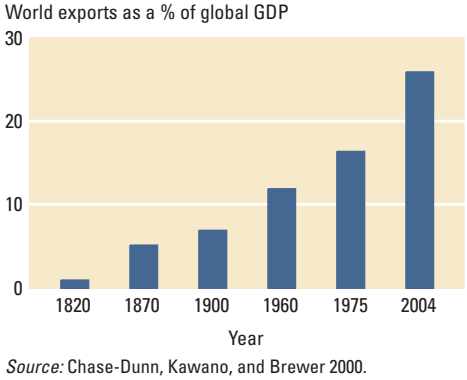
In some fundamental respects, very little. Smith's key point was that a country's economic development, in its early stages, tends to be led by subnational areas that provide the greatest potential access to markets and thus to density. But subnational areas distant from density, inland areas in Smith's example, tend to be left behind. Only later in the development process do these lagging areas share more of the benefits of development as a slow subnational convergence in living standards sets in. This basic thesis holds true today.

But there are some important differences for modern-day developing countries:

- Given the phenomenal size of today's global market, development relies more on pursuing an outward-oriented strategy in which leading areas compete and trade globally.
- The rapid transformation of internal economic geography—and the spatial disparities in today's developing countries—will likely be greater than in industrial countries during their early stages of development.
- Because redistributive mechanisms take time to build and mature, labor mobility and market connectivity are more potent mechanisms to integrate lagging areas into national economies. Globalization and technological progress in transportation and communication potentially provide a wider range of means to bridge the economic distance between leading and lagging areas.

Global markets are more important. Because of greater integration today, global markets are more important than domestic markets than at any time in history. The market potential of leading areas is higher in today's developing countries than it was in today's developed countries during the nineteenth and early twentieth centuries, thanks to the rapid growth of trade since the end of

Figure 2.13 Today's developing countries face a more integrated world



Source: Chase-Dunn, Kawano, and Brewer 2000.

World War II. Indeed, the growth of trade has been about twice that of world income in recent decades.[74] Trade as a proportion of world GDP is now more than 25 times its level in 1820 (see figure 2.13). So development under protectionist policies might have been a viable (if not optimal) strategy in the nineteenth and early twentieth centuries.[75] But a protectionist strategy is much less likely to be viable today, especially in the light of recent failures of such policies in Latin America and Sub-Saharan Africa.

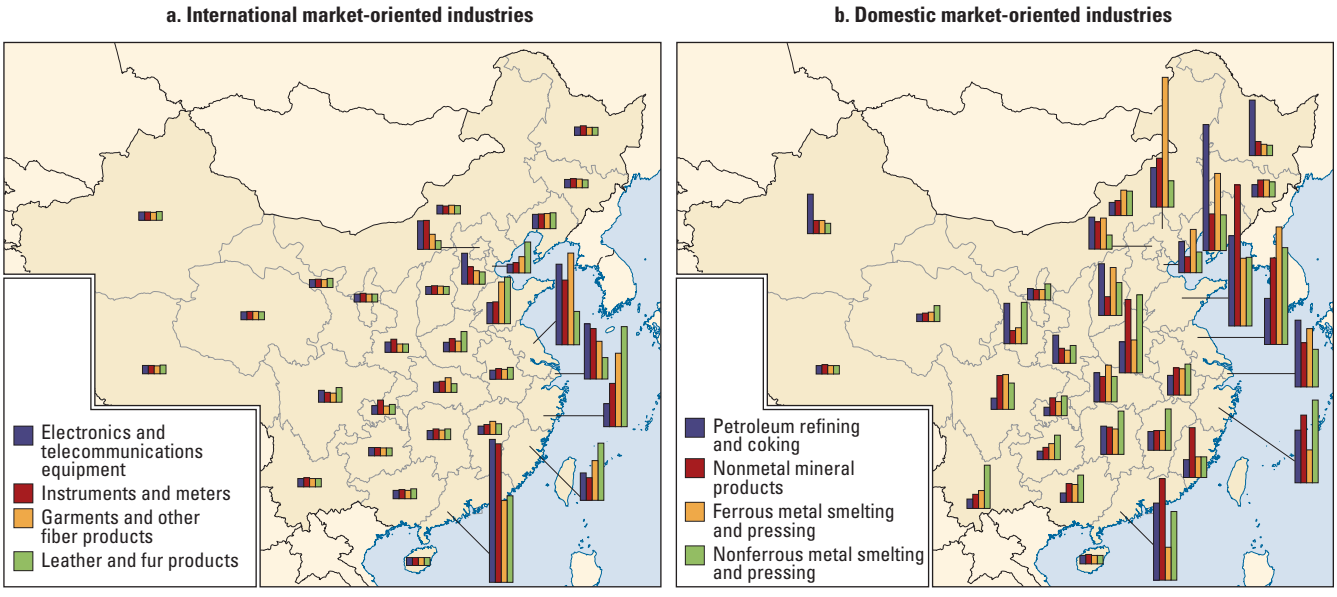
When a country is relatively closed, an area's market potential is determined mainly by its distance to density within the country. But once it is open, distance or access to international markets also becomes important, and border and coastal areas tend to gain in their shares of economic activity. Structural shifts in patterns of trade can alter the topography of market potential in a country: previously leading areas, perhaps favored by policy, lose out and decline as their distance to new leading areas increases. This is illustrated by Britain, China, and Mexico.

Openness matters for distance. Before Mexico liberalized trade in 1985, the distance to Mexico City was the primary determinant of an area's market potential. But with liberalization, distance to density in the United States also became important, and border areas such as Ciudad Juarez, Mexicali-Calexico, Nogales, and Tijuana had large increases in market potential and growth, whereas Mexico City had some depopulation and dispersion of its manufacturing activity.[76]

In China, during Mao's era of self-sufficiency, heavy industries were promoted in interior provinces, which received 71 percent of state investment between 1966 and 1970. Many companies in Shanghai and other coastal cities were relocated to the interior and mountainous provinces of Guizhou, Hubei, and Sichuan.[77] But since China has become more open to foreign trade and investment, coastal areas flourished as gateways to overseas markets, but many interior areas floundered. Export-oriented industries (garments, electronics, leather) are concentrated in coastal provinces, while domestic market-oriented industries (metals, nonferrous smelting) are dispersed (see map 2.5).[78]

The costs of transport and telecommunications matter more. Sea coasts and navigable rivers are natural locations for leading areas because, in Smith's day, shipping was the most cost-effective way of transporting goods to domestic and international

Map 2.5 Exporting industries concentrate in coastal areas to minimize distance to the global market



Source: He forthcoming.

markets. But technological progress has led to large reductions in the cost of transporting goods and in telecommunications (see chapter 6). New (non-water-based) modes of transport and the information technology revolution have reshaped the landscape of economic density.

Access to knowledge is easier. So today's developing countries can take advantage of world markets of unprecedented size and can access these markets with greater ease. At the same time, greater flows of foreign direct investment, expanding twice as fast as world trade, increase access to knowledge at the world's technological frontier.[79] For the most successful developing countries (mainly in East Asia) of recent decades, the result has been national growth—driven by leading areas—far faster than that of today's developed countries in the early stages of their development.

With such rapid growth in leading areas, the geographic disparities in today's developing countries are far larger. Take China, for example, whose GDP per capita is roughly equivalent to that of Britain in 1911. London then had a GDP per capita around 1.7 times the national average, whereas East Anglia had a GDP per capita two-thirds that average.[80] In China today, the comparable figures are 3.3 for the leading area of Shanghai and one-third for the lagging area of Guizhou.[81] Shanghai has a GDP per capita ($16,044), roughly equivalent to the British average in 1988, while Guizhou has a level ($1,653) close to the British average in 1830.[82]

Although comparisons between China and Britain need to be made with caution because of the different geographic scales of the two countries, the basic point remains. When today's rich countries were developing during the nineteenth and early twentieth centuries, the growth of their leading areas was constrained to the rate of growth of their domestic markets and the world technological frontier. These constraints limited the extent to which spatial disparities could increase in their early stages of development. In sharp contrast, for today's developing countries, these constraints no longer exist. Although the absence of these constraints helps developing countries, the potential disparities that can arise between leading and lagging areas in the early stages of development are much larger.

Although the spatial inequality between leading and lagging areas in today's developing countries will follow the same inverted-U shaped path, the features of this path will differ. The ascent is likely to be steeper in the initial stages of development. Set against this faster rise in disparities, however, is the opportunity for faster convergence between lagging and leading areas as development progresses—because modern information and communications technologies offer a wider range of methods to bridge the economic distance between leading and lagging areas.