Part I

Introduction

1 A first look at geography, trade, and development

1.1 Introduction

It happened on October 12, 1999 – at least, according to the United Nations (UN).[1] That was the day the human population of planet Earth officially reached 6 billion. Of course, given the inaccuracy of the data, the UN could have been off by 100 million people or so. Every day some 100 million billion sperm are released[2] and 400,000 babies are born, whereas "only" 140,000 persons die. Consequently, the world population is growing rapidly, especially since the second half of the twentieth century.

Given the average population density in the world, of about fifty people per square kilometer (Km^2), if you are part of a family with two children, your family could have about eight hectares (or twenty acres) at its disposal. The great majority of our readers will probably look around in amazement as they realize that they do not own an area close to this size. The reason is simple: the world population is unevenly distributed. But why?

There may be many reasons why people cluster together. Sociological: you like to interact with other human beings. Psychological: you are afraid of being alone. Historical: your grandfather used to live where you live now. Cultural: the atmosphere here is unlike anywhere else in the world. Geographical: the scenery is breathtaking and the beach is wonderful. We will at best cursorily discuss the above reasons for clustering. Instead, we focus attention in this book on the economic rationale behind clustering, known technically as agglomeration.

[1] The data in the first paragraph are from www.popexpo.net/english.html. Unless otherwise specified, all other empirical information in chapter 1 is based on our own calculations using data from the World Bank (WDI online) for 2005.

[2] Apparently, the UN is familiar with our sex habits.

In a sense, an economic motive behind population clustering might be a prerequisite for other motives. Psychological, sociological, cultural, and historical motives may have developed largely in response to an economic motive that brought people together to live in villages and cities. In this Chapter we briefly describe some of the characteristics of clustering of economies in space and their interactions.

1.2 Clustering and the world economy

In describing clustering, it is useful to distinguish between various levels of aggregation at which clustering occurs:

- the global level (section 1.2.1: the worldwide distribution of activity of resources);
- the continental level (section 1.2.2: production distribution in Europe); and
- the country level (section 1.2.3: urban agglomeration in India).

The main reason for looking at these different levels of aggregation is that, in understanding clustering, geographical economics shows that to a large extent the same basic forces apply to all levels of aggregation.

1.2.1 The global view

The World Bank collects and processes statistical information from virtually all countries in the world. To characterize various regions at a global scale, the World Bank aggregates country data to the seven groups illustrated in figure 1.1: (i) east Asia and the Pacific (EAP; including China and Indonesia); (ii) (east) Europe and central Asia (ECA; including Russia and Turkey); (iii) Latin America and the Caribbean (LAC; including Brazil and Mexico); (iv) the Middle East and north Africa (MNA; including Egypt); (v) south Asia (SAS; including India); (vi) sub-Saharan Africa (SSA; including Nigeria and South Africa); and (vii) the high-income countries (High; including the United States, the countries of the European Union, and Japan). We use this grouping to describe regional diversity at the global level.

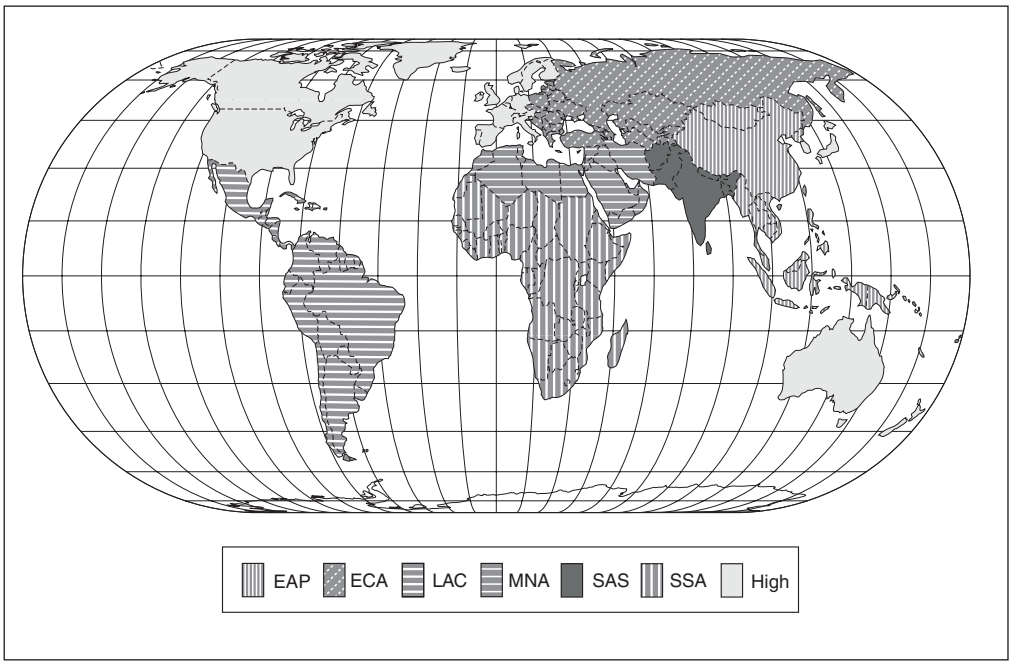
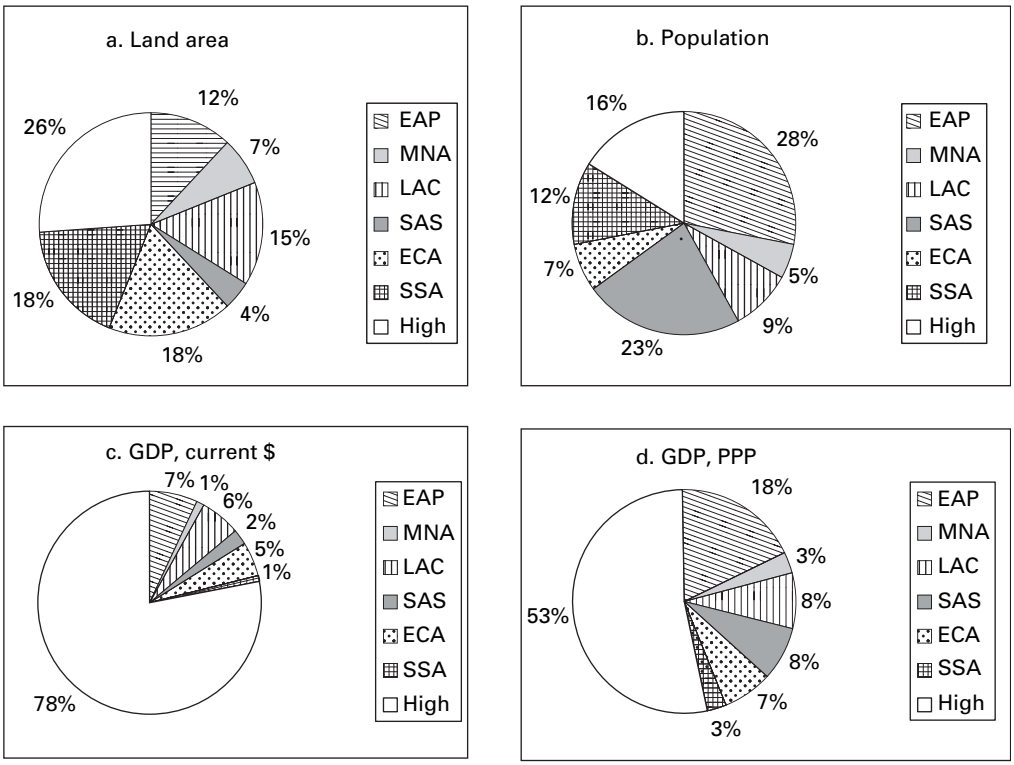


Figure 1.1 World Bank regional classification
EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and Caribbean; MNA = Middle East and North Africa; SAS = South Asia; SSA = Sub-Saharan Africa; High = High-income countries.

Figures 1.2 and 1.3 illustrate some key economic data for the above global regional classification. Further details of these data, as used in the rest of this chapter, are summarized in the appendix to this chapter (table A1.1). There is considerable variation in land area (figure 1.2a), from 4.8 million km^2 (4 percent of the world total) for south Asia to 33 million km^2 (26 percent of the world total) for the high-income countries. This may, of course, simply be an artifact of the classification method. The same holds, necessary changes being made, for the large differences in population size (figure 1.2b), ranging from 305 million people (5 percent) for north Africa to 1,885 million people (28 percent) for east Asia. The variation becomes more striking when we investigate the ratio of these two measures – that is, the population density (figure 1.3c). The number of persons per square kilometer varies from twenty for Europe and central Asia to 307 for South Asia, which is about fifteen times



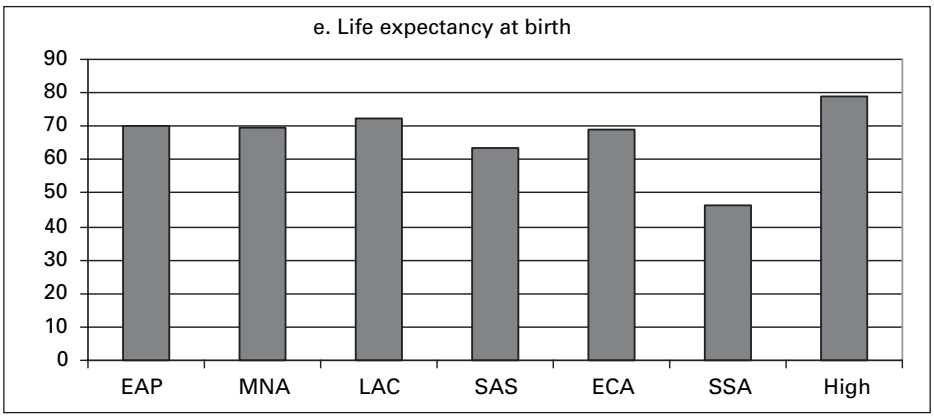


Figure 1.2 Life expectancy and regional shares of population, land, and income, 2005
Source: WDI online. GDP = gross domestic product; PPP = purchasing power parity.

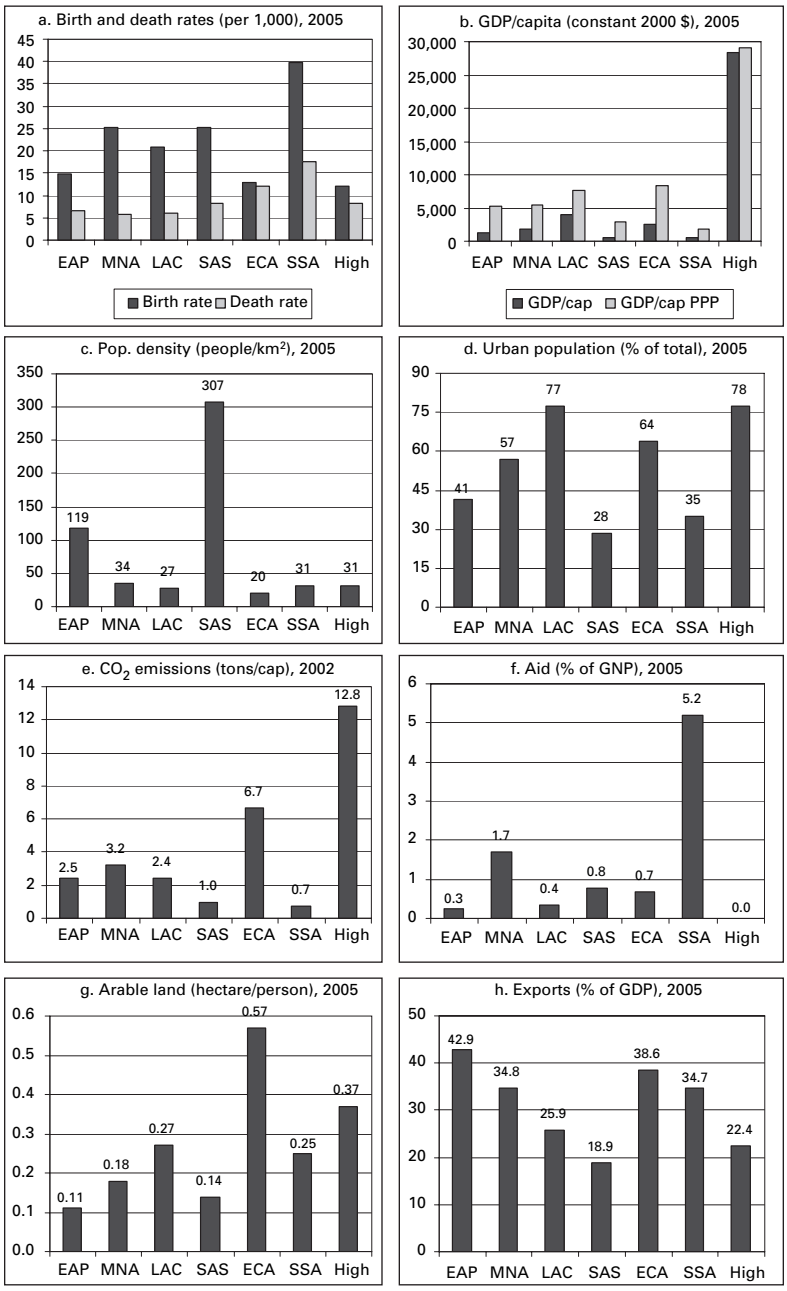


Figure 1.3 Characteristics of global regions
Source: WDI online. GNP = gross national product.

higher. There is thus an enormous difference in the distribution of the population, even at a high level of aggregation. We return to this issue in the next section. For now, we concentrate on some of the other characteristics of the World Bank regions.

Figure 1.2c clearly shows that the distribution of economic mass, as measured by the total value of all goods and services produced in each global region, is very skewed: the gross domestic product of the high-income countries accounts for 78 percent of world production calculated in current US dollars, using only 16 percent of the world population. Measured similarly, sub-Saharan Africa accounts for 1 percent of world production using 12 percent of the world population. These production levels translate into enormous differences in per capita income, ranging from $745 per year in sub-Saharan Africa to $35,130 per year for the high-income countries. A word of caution is in order at this point, however. If we want to compare gross national product – that is, GDP plus the value of goods and services produced by residents of a country abroad – in different countries we have to express this in a common unit of measurement, usually the US dollar. Since the exchange rates tend to fluctuate strongly, the World Bank calculates an average over three years for conversion (the "Atlas" method). These are the statistics reported above. Price levels for non-tradable goods and services differ considerably between countries however. Going to a movie in the United States may cost you $8, while going to the same movie in Tanzania may cost you less than $1. Getting a haircut in Amsterdam will cost you at least $10, rather than the $2 you will pay in Manila. To correct for these differences in "purchasing power," the United Nations spends a lot of time and effort gathering data on the prices of thousands of goods and services in virtually all countries, so as to calculate as accurately as possible "purchasing power parity" exchange rates.

A better estimate of the economic size of a region is therefore given when we use PPP exchange rates rather than current dollars (or the Atlas method). It turns out that $1 in China or India will deliver you approximately the same consumption basket as $4 in the United States or more than $6 in Japan. Figure 1.2d shows that, even after correction for PPP, the high-income countries still produce most goods and services (roughly 53 percent of world production), leading to somewhat smaller, but still sizable, differences in per capita income (figure 1.3b).

Most other characteristics are correlated with income per capita; see table A1.2 in the appendix. People with higher incomes tend to live longer

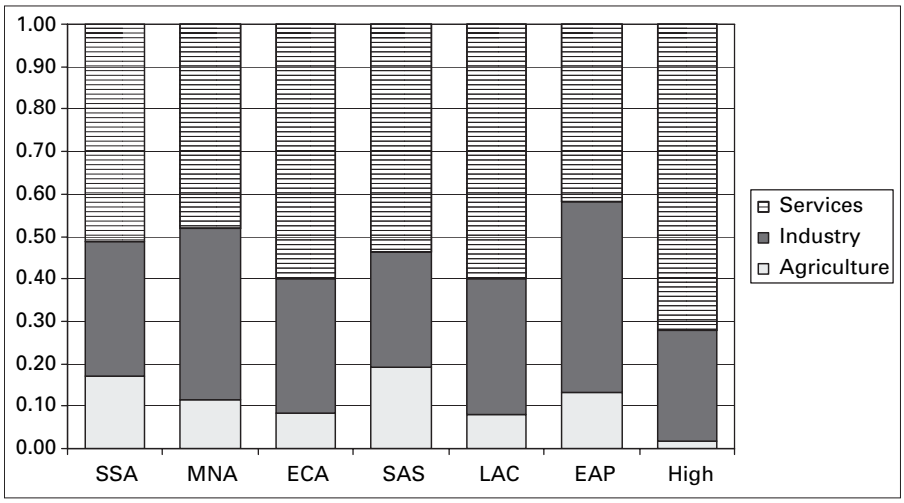


Figure 1.4 Sectoral distribution of GDP, global regions (value added, share of total), 2005
Source: WDI online. Regions are ordered from left to right in increasing GDP/cap, PPP.

(figure 1.2a), have more arable land at their disposal (figure 1.3g), have fewer children (figure 1.3a), live in cities (figure 1.3d), receive little foreign aid (figure 1.3f), and pollute more, especially greenhouse gases (figure 1.3e). Of course, there are some noteworthy exceptions. For example, (east) Europe and central Asia has (relative to PPP income per capita) a lot of arable land available (figure 1.3g), is highly urbanized (figure 1.3d), and is a heavy CO_2 emitter (figure 1.3e). Similarly, Latin America, north Africa, and the Middle East are also highly urbanized.

Other variables are only weakly correlated with per capita income. Although death rates, for example, are particularly high in poor sub-Saharan Africa (in part as a result of the AIDS epidemic, which also causes a low life expectancy), they are lower in Latin America, north Africa and the Middle East than in the high-income countries, which are confronted with a rapidly aging population. Remarkably, perhaps, the openness of the global regions, as measured by the percentage of GDP exported, is hardly correlated with income per capita. We return to this issue later in the chapter. Figure 1.4 illustrates the main sectoral composition of output in the various regions, with respect to agriculture, industry, and services. The share of output generated in the agricultural sector clearly declines, and in the services sector clearly increases, as the per capita income level increases. Regarding industry, the development is less clear-cut, as the share of output

generated by industry tends to be low for low-income *and* high-income countries.

This subsection shows, *inter alia*, that the world population is very unevenly distributed when viewed at a large scale, identifying only seven regions in the world. Economic activity is even more unevenly distributed than population, whether measured using current dollars (and the Atlas method) or using purchasing power parity. Moreover, we indicated that at this large scale there is a strong correlation between the degree of urbanization and per capita income (see table A1.2). The next two subsections "zoom in" on the distribution of activity in two steps, first at the continental level for nations and then at the level for cities. It concludes the latter by drawing attention to a remarkable empirical regularity known as the rank size distribution.

1.2.2 Production distribution in Europe[3]

Figure 1.5 illustrates the first "zooming in" step, for which we picked the continent of Europe as an example. In terms of the regional classification of section 1.2, about a half of the countries in the figure, mainly in the west, belong to the region of high-income countries, while the other half is part of the (east) Europe and central Asia (ECA) region. Regional economists have long felt a need to measure the unevenness of the distribution of economic activity, and subsequently to identify and analyze core–periphery structures. Chapter 2 explains this "market potential" approach in more detail, but the general procedure is to calculate an indicator of market potential at the regional level, taking into consideration the size of economic markets in the vicinity of this region, corrected for distance to this market.

Andrew Copus (1999) studies 1,105 European regions, where he defines a "center" (usually the largest city, but sometimes the geometric center) and calculates detailed travel times to other centers, taking into consideration the type of road, ferries, waiting times for ferries and crossing a border, driving speeds in mountains and urban areas, rest times for drivers, etc.[4] Copus uses this and the market potential approach to construct a periphery index, ranging from zero for the most central region (with the highest potential) to 100 for the peripheral region (with the lowest potential).

[3] This subsection is based on Jeroen Hinloopen and Charles van Marrewijk (2005).
[4] The distance of a region to itself equals one-third of the axis of the smallest rectangle containing the region.

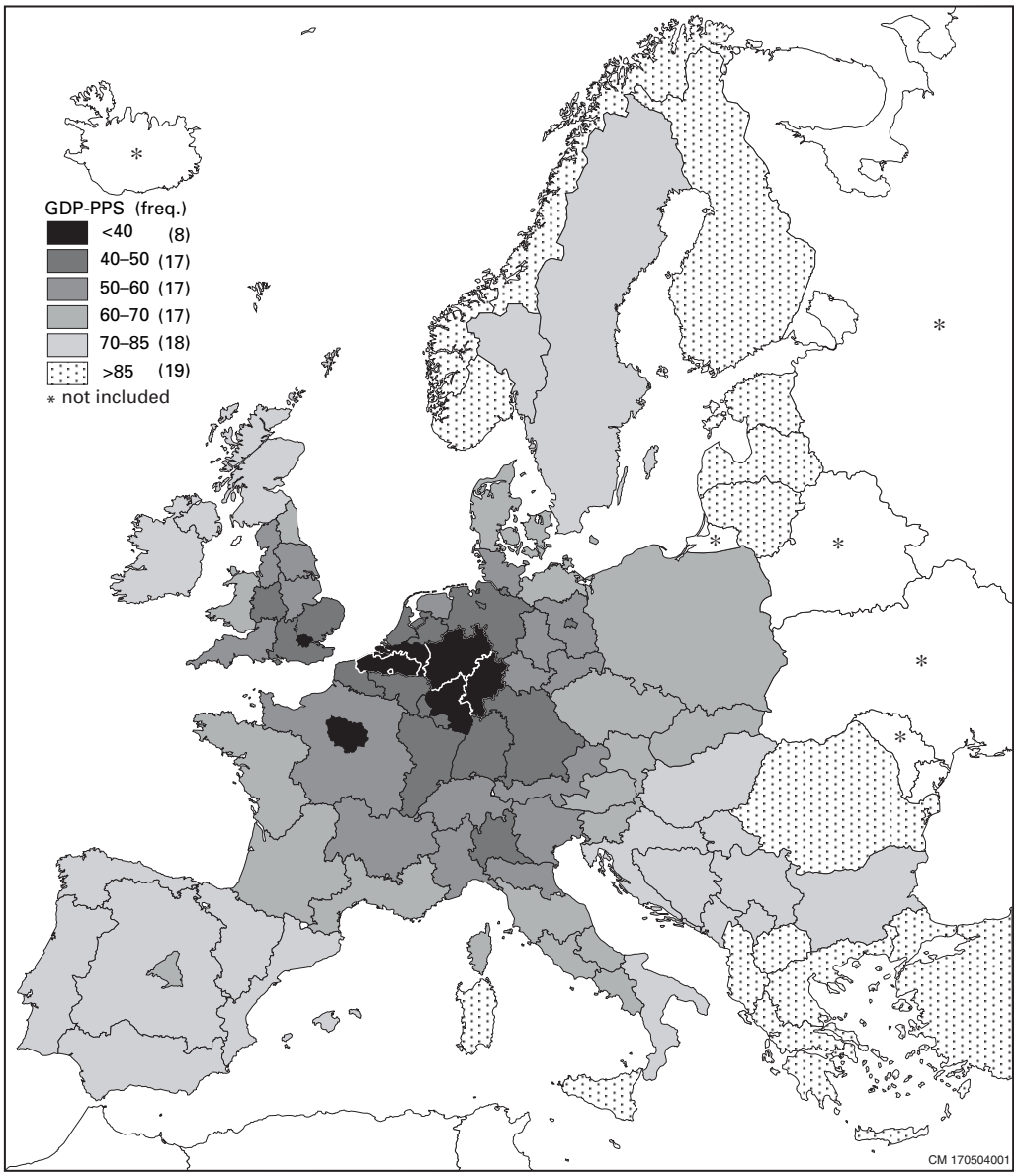


Figure 1.5 Core–periphery structures in Europe
Note: GDP-PPS = gross domestic product corrected for purchasing power.
Source: Hinloopen and van Marrewijk (2005); GDP-PPS = gross domestic product corrected for purchasing power.