Resource Pack for the Economics Curriculum (Secondary 4-6)

# Extension of Trade Theory, Economic Growth and Development

Personal, Social and Humanities Education Section
Curriculum Development Institute
Education Bureau 2012

# Background

This Resource Pack is published to support teachers teaching of Elective Part 2 of the Economics Curriculum (Secondary 4-6). To enhance the learning and teaching of this part, various modes of illustration of concepts are adopted in the Pack, for example, numerical examples, diagrams, authentic data and cases. Also, assessment questions are designed to check students' understanding in various sections.

This resource pack was also uploaded to the website of the Education Bureau (http://www.edb.gov.hk) for teachers' reference. If you have any comments and suggestions on this resource pack, please send them to:

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# Preface

This Resource Pack is developed for the elective topic "Extension of Trade Theory and Economic Growth and Development" covered in the Economics Curriculum, in accordance with the Economics Curriculum and Assessment Guide (Secondary 4 – 6).

The materials contained in the Resources Pack are designed to aid teachers to guide students to understand the key concepts and theories of the topic. In the part of "Extension of Trade Theory", some students may find it difficult and technical to understand the concepts of absolute advantage, comparative advantage, and gains from trade by using the production possibilities frontier (PPF). To facilitate students' understanding, this Pack starts with the PPF showing constant opportunity costs and then proceeds to the PPF showing increasing marginal opportunity costs. Of course, a step-by-step approach is always helpful for students, especially for this topic.

In the part of "Economic Growth and Development", it is important for students to understand that economic growth and development are two related, but different concepts. After that, teachers can guide students to discuss the factors affecting economic growth and development. Once students can understand these factors, teacher may lead them to examine the challenging question: "Why do some poor countries remain poor and why are some rich countries getting richer?" When touching upon this question, it is not unusual that students approach this issue with different personal views. It doesn't matter, but all discussion should be evidence-based. Therefore, try to use empirical data and evidence as far as possible to solidify classroom discussion.

Economic way of thinking does not come naturally, in particular for secondary students. A theory-and-application approach proves to be helpful. Hence, clear explanation of the theories and ample real-world examples are crucial to develop students' skills in thinking like an economist. The path of developing such skills is challenging, but rewarding.

***Charles Kwong***

*May 2012*

# Contents

# Elective Part 2

## I Extension of Trade Theory

### Learning Outcomes

After completing this topic, students should be able to explain and illustrate:

- *the* concepts of comparative advantage and gains from trade by using production possibilities frontier (PPF);
- *the relationship between* comparative advantage and globalization.

### 1. Introduction

In Topic J of the Economics curriculum, students have learnt the concepts of absolute advantage and comparative advantage. It then explained and illustrated how specialisation and trade according to comparative advantage benefit the trading countries. This topic reviews these concepts and demonstrates the gains from trade by using the model of production possibilities frontier (PPF). We begin our discussion by recapping the concepts of absolute advantage and comparative advantage. We will then introduce the model of production possibilities frontier and use the PPF to show the gains from trade.

## 2. Absolute Advantage and Comparative Advantage: A Recap

As discussed in Topic J, a country is said to have an ***absolute advantage*** over another in the production of good X if it can use the same amount of resources to produce more X than the other country. A country is said to have a ***comparative advantage*** over another in the production of good X if it can produce one unit of X at a lower opportunity cost. We can illustrate these concepts by using a simple two-country model.

Suppose there are two countries:

- Country A
- Country B

Two goods will be produced:

- food
- computer

Assume that there is only one factor input, labour. Table 1 shows the amount of food and computer that can be produced per month with one unit of labour in Country A and Country B.

**Table I**

| Amounts of Food and Computer Produced per Month by One Unit of Labour in Country A and B | | |
|---|---|---|
| | **Food** | **Computer** |
| **Country A** | 100 | 20 |
| **Country B** | 20 | 1 |

With one unit of labour, Country A can produce more food and computer than Country B. Country A is said to have an absolute advantage in producing both goods. Now, refer to Table 2 which shows the opportunity costs of producing food and computer in Country A and Country B. Although Country A produces both food and computer much more efficiently than Country B, the opportunity cost of producing food in terms of computer is lower in Country B. To put in concrete terms, Country B gives up only 0.05 unit of computer to produce 1 unit of food, but Country A has to give up 0.2 unit of computer to produce one unit of food. Hence, we say that Country B has a comparative advantage in food production over Country A. By the same analysis, Country A has a comparative advantage in producing computer as it gives up a less amount of food to produce one unit of computer.

**Table 2**

| Opportunity Cost of Producing Food and Computer in Country A and Country B | | |
|---|---|---|
| | **Food** | **Computer** |
| **Country A** | 0.2 unit of computer | 5 units of food |
| **Country B** | 0.05 unit of computer | 20 units of food |

## Don't Confuse!

*Absolute advantage looks at how productive the factor inputs are, i.e. how much goods and services can be produced by one unit of factor input (e.g. labour). On the contrary, comparative advantage looks at the opportunity costs of producing a good or service, i.e. how much other goods we have to give up in order to produce one unit of goods or services we want.*

# 3. Production Possibilities Frontier (PPF)

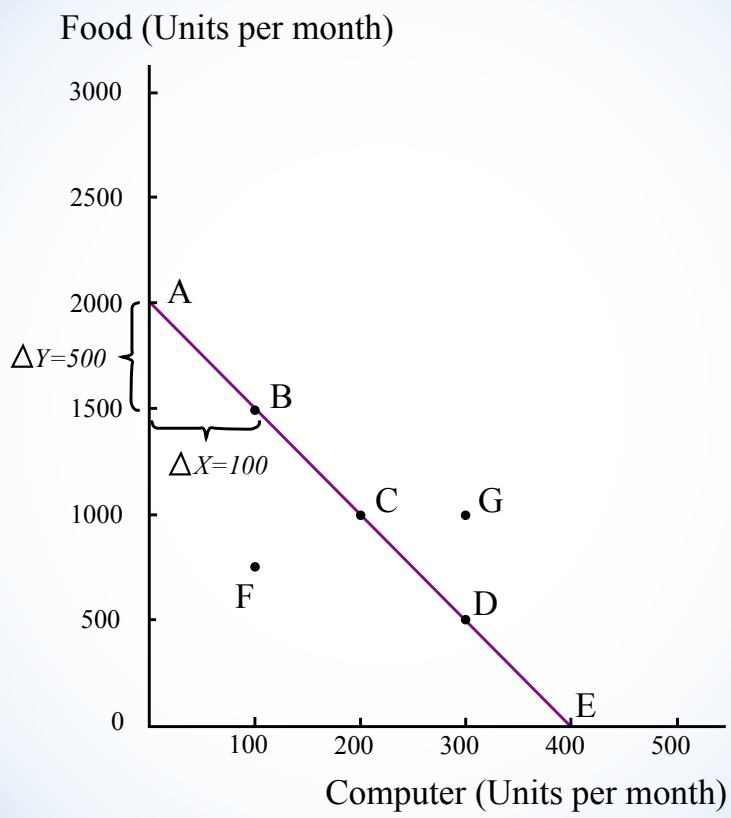
The PPF model is very useful in helping to illustrate the concepts of comparative advantage and the gains from trade. A production possibilities frontier (PPF) is a graph that shows the combinations of maximum output that the economy can produce given the available factors of production and technology.

Expanding on the above example, suppose that Country A has 20 workers while Country B has 150 workers. As assumed before, labour is the only factor input for production. Each worker in Country A can produce either 100 units of food or 20 units of computer, while each worker in Country B can produce either 20 units of food or 1 unit of computer. Based on this information, we can draw the PPFs of Country A (Figure 1) and Country B (Figure 2). If Country A spends all its resources producing food, it can produce 2,000 units of food (Point A). If it spends all its resources in producing computer, it can produce 400 units of computer (Point E). Connecting Point A and Point E, we can obtain the PPF of Country A, which shows the combinations of maximum output Country A can produce with its resources and technology. It can produce at any point on the PPF (e.g. Point B, Point C, and Point D).

However, when Country A increases its production of computer by 100 units (e.g. the production point moves from A to B), it must give up 500 units of food. The PPF is downward sloping (negatively sloped) because resources are scarce, meaning that when resources are fully utilised, more of one good can be produced only if resources are freed by producing less of other goods. The opportunity cost of producing 100 units of computer is 500 units of food production foregone or we can say that the opportunity cost of producing one unit of computer is five units of food production foregone.

The slope of the PPF ($\Delta Y/\Delta X$) thus measures the opportunity cost of producing one good in terms of the other, more specifically, it is the opportunity cost of producing good X (computer) in terms of good Y (food). In this case, the PPF is a straight line, which indicates that $\Delta Y/\Delta X$ (= 5) remains unchanged (i.e. a constant) along the PPF. It shows that the opportunity cost of producing one good in terms of other stays constant, which is termed ***constant opportunity cost***.

**Figure 1. PPF of Country A**



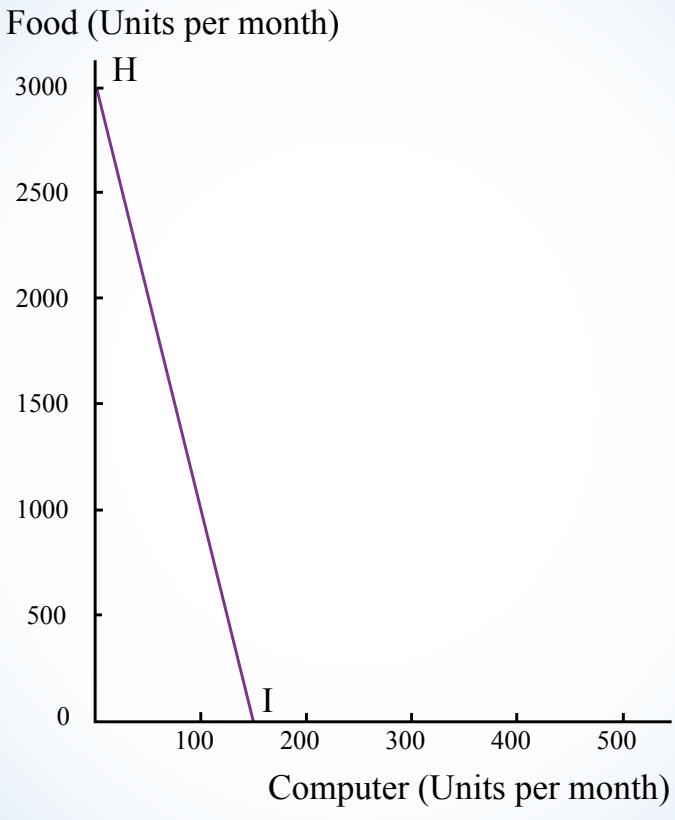

Production is technically ***efficient*** at points on the PPF as the economy has utilised all its available resources and used the best production method to produce the maximum amount of output at the current state of technology. Production at a point inside the PPF (Point F) is *inefficient* as the economy fails to use all available resources and/or used the best method of production. Production at a point outside of the PPF (Point G) is not possible or unattainable given the economy's current level of resources and technology.

## Check it out!

**As stated above, Country B has 150 workers and each worker can produce either 20 units of food or 1 unit of computer. Construct the PPF of Country B.**

***If Country B spends all its resources on producing food, it can produce 3,000 units of food (Point H). If it spends all its resources on producing computer, it can produce 150 units of computer (Point I). Connecting Point H and Point I, we can obtain the PPF of Country B (Figure 2).***

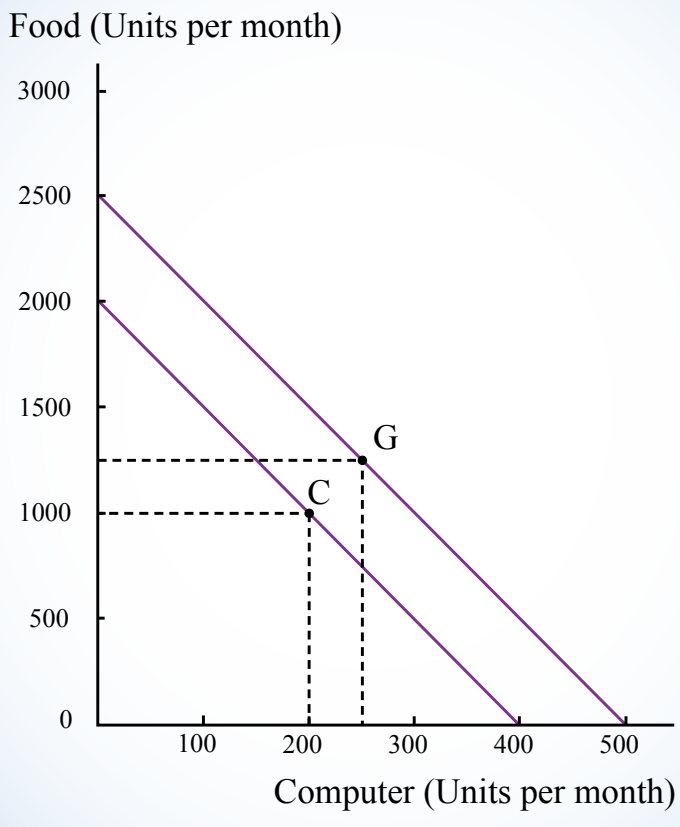
**Figure 2. PPF of Country B**



## 3.1 Shift of PPF

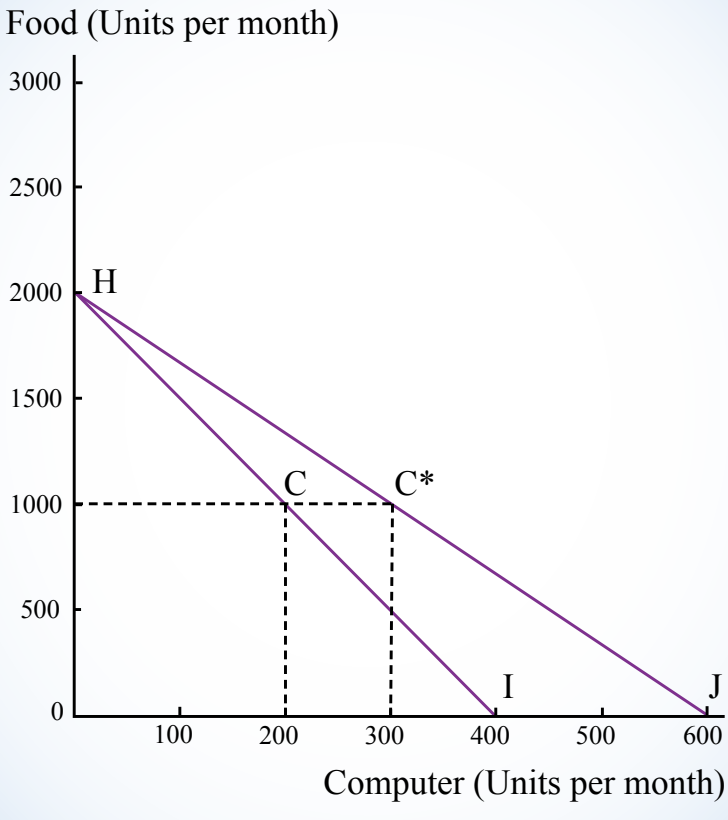
Is it possible for an economy to produce at an unattainable point such as G in Figure 1? The answer is yes, provided that we can increase the production capacity of the economy. The production capacity is determined by the availability of factor inputs including labour, capital (both human and physical capital), natural resources and the level of technology. At a certain point of time, the factor inputs are fixed and we are not able to produce at Point G. However, the factor inputs can be increased by various means. For example, labour availability can be increased by a more lax immigration policy. Physical capital can be increased by foreign direct investments (i.e. investments from abroad). Human capital can be enhanced by investing in education and on-the-job training. When factor inputs increase, production capacity increases. Then more goods, both food and computer, can be produced. The PPF shifts outward which indicates ***economic growth*** (Figure 3).

**Figure 3. Economic Growth of Country A**



In some cases, factor inputs remain unchanged, but the economy undergoes technological change. The technological change may be specific to a certain sector. For instance, if technological change in producing computer in Country A enables the same amount of workers to produce more computers without decreasing the amount of food, the economy can now enjoy more computers (300 units) while keeping the production of food unchanged at 1,000 units (Point C* in Figure 4). The PPF rotates outward from HI to HJ (Figure 4). Note that there is no change in the technology in production of food as the technological change applies only to computer production but has no impact on food production.

**Figure 4. Technological Change in Producing Computer in Country A**



## 3.2 Specialisation and Gains from Trade

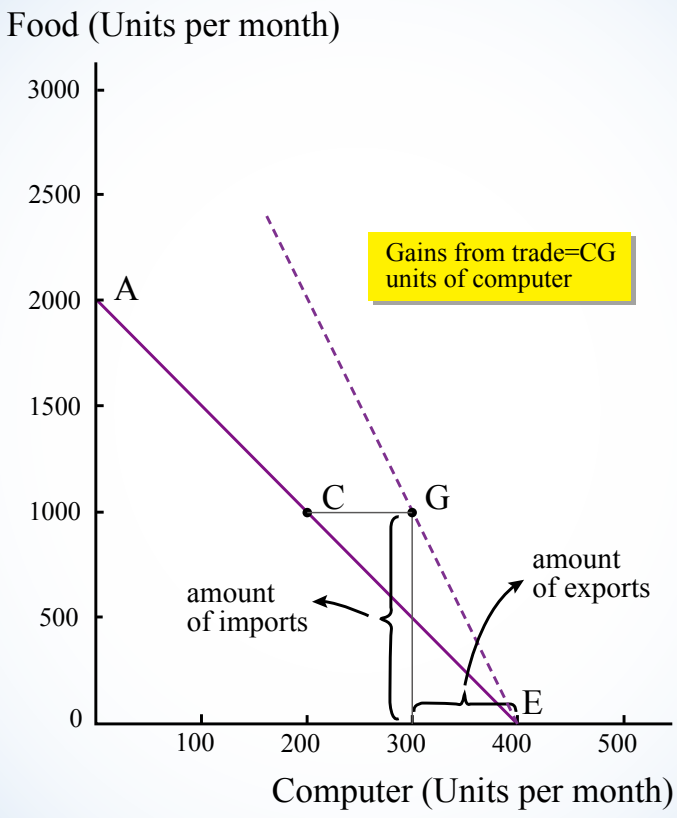
Apart from economic growth and technological change, are there any other means to raise the consumption of both goods? Once again, the answer is yes. Consumption possibilities can be enlarged by specialisation and trade. As explained and illustrated above, although Country A produces both food and computer much more efficiently than Country B, the opportunity cost of producing food in terms of computer is lower in Country B. Put another way, Country B has a *comparative advantage* in food production. Conversely, Country A has a *comparative advantage* in computer production.

In Figure 5, line AE is Country A's PPF. Suppose there is no trade, and Country A produces at Point C. Point C is the production point as well as consumption point of Country A. Its consumption is constrained by its production capacity, the PPF. Point C is called an ***autarky equilibrium*** for Country A. ***Autarky*** refers to the situation whereby a country does not engage in external trade and therefore its consumption is determined by its production.

However, suppose trade is opened up between two countries and they agree to trade at a ratio of 10 units of food for 1 unit of computer. This ratio is called the ***terms of trade***. A country's terms of trade is determined by the ratio of its export prices to its import prices.

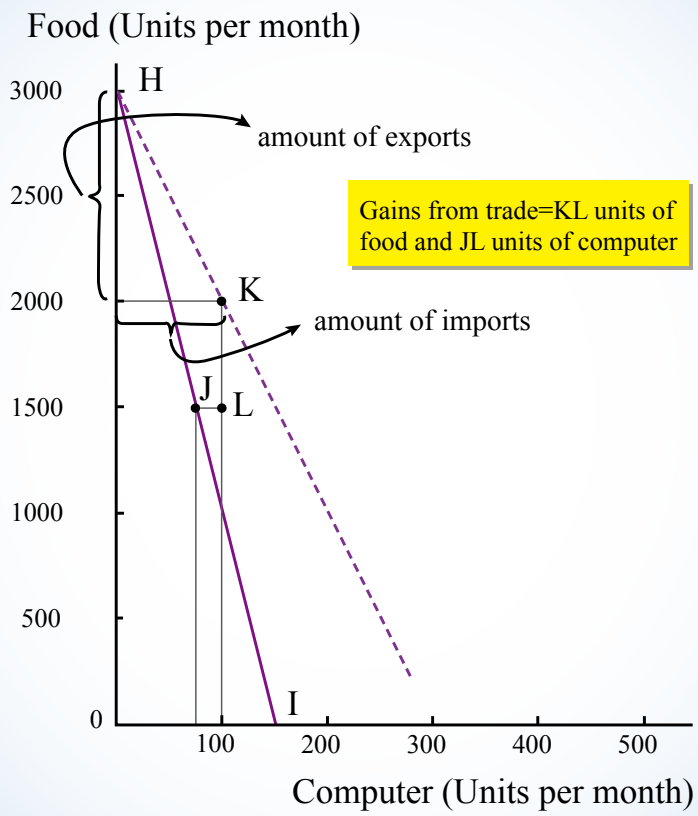
Since Country A has a comparative advantage in producing computer, it specialises in computer production. The total output for Country A is 400 units of computer and point E is Country A's production point. Remember that Country A can use one unit of computer to exchange for 10 units of food. Now, suppose it trades 100 units of computer for 1,000 units of food, it moves from Point E to Point G. Compared with Point C, Country A's original consumption point, it can now enjoy more computers (200 units to 300 units) without reducing the amount of food consumption (1000 units). The dotted line becomes the consumption possibilities frontier (CPF) of Country A after trade. Without increasing any factor inputs, specialisation and trade enlarge Country A's consumption possibilities. It attains an originally unattainable point (Point G) after engaging in specialisation and trade.

**Figure 5. Gains from Trade of Country A**




Turning to the situation in Country B (Figure 6), line HI is Country B's PPF. Suppose there is no trade and Country B produces at Point J. Point J is the production point as well as the consumption point of Country B. Since Country B has a comparative advantage in producing food, it specialises in food production. The total output for Country B is 3,000 units of food and point H is Country B's production point. Remember that Country B can use 10 units of food to exchange for one unit of computer. Now, if it trades 1,000 units of food for 100 units of computer, it moves from Point H to Point K. Compared with Point J, Country B's original consumption point, it can now enjoy more computers (from 75 to 100 units) and more food consumption (from 1,500 units to 2,000 units). The dotted line becomes the consumption possibilities frontier of Country B after trade. Without increasing any factor inputs, specialisation and trade enlarge Country B's consumption possibilities. Like Country A, Country B reaches an originally unattainable point (Point K) after engaging in specialisation and trade.

**Figure 6. Gains from Trade of Country B**




Here, we come to an important conclusion: ***if two countries specialise according to their comparative advantages and trade is opened up between the countries, then both countries can attain higher levels of consumption of both goods, despite the fact that one country is absolutely more efficient at producing both goods.***

# Don't Confuse!

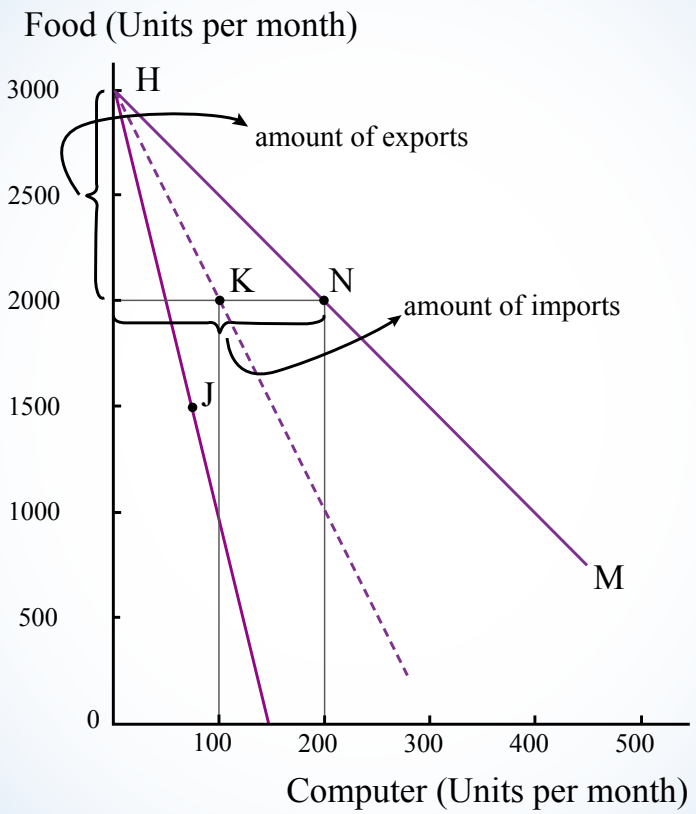
*Specialisation and gains from trade are determined by comparative advantage (opportunity cost) not absolute advantage. It is possible to increase consumption possibilities of both countries by specialisation and trade if comparative advantage exists.*

## Check it out!

**A country's terms of trade is given by the ratio of its export prices (Px) to its import prices (Pm). In the above example, Country B can exchange 1,000 units of food for 100 units of computer. (a) What is Country B's terms of trade? (b) If Country B's terms of trade is 0.2, draw the new consumption possibilities frontier (CPF) after trade. Is Country B better off or worse off?**

***(a) If Country B can exchange 1,000 units of food for 100 units of computer, it means that the price of computer is 10 times of that of food. (Explanation: In monetary terms, Country B's value of export is equal to its value of import, i.e. (1,000 * $P_{food}$) = (100 * $P_{computer}$); or (1,000 * Px) = (100 * Pm); or (Px/Pm) = (100/1,000) = 0.1) Therefore, Country B's terms of trade (Px/Pm) equals 0.1 (= 1/10).***
***(b) If Country B's terms of trade is 0.2 (= 1/5), it indicates either a rise in food price or a fall in computer price. Country B now can use 1,000 units of food to trade for 200 units of computer. In Figure 7, the slope of the consumption possibilities frontier becomes flatter. The new consumption possibilities frontier of Country B is line HM. Country B enjoys more computers (KN = 100 units) while keeping food consumption unchanged at 2,000 units (Point N). Therefore, Country B is better off when the terms of trade improves.***

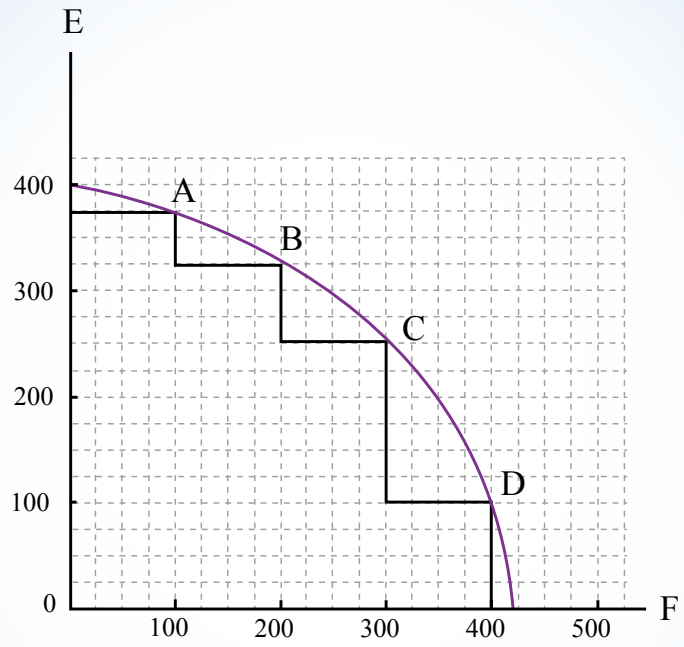
**Figure 7. CPF of Country B after Terms of Trade Improvement**



## 4. Production Possibilities Frontier with Increasing Marginal Opportunity Cost

The above analysis assumes that the economy is facing *constant opportunity cost.* However, in reality, we commonly observe increasing marginal opportunity cost, which is illustrated in Figure 8. Suppose the economy produces only two goods, electronic appliance *(E)* and food *(F)*. Moving down from Point A to Point B, the economy only gives up 50*E* to produce additional 100*F*. When it goes further from Point B to Point C, it gives up 75*E* to produce additional 100*F*. As it moves along from Point C to Point D, it gives up 150*E* to produce additional 100*F*. It demonstrates *increasing marginal opportunity cost*, meaning that more *E* must be given up in order to produce a given amount of *F* when the economy continues to increase the production of *F*. Therefore, the PPF is bowed out (concave to origin).

**Figure 8. PPF with Increasing Marginal Opportunity Cost**



Suppose there is only one factor input, labour, in the production of *E* and *F*. When the economy is producing a lot of *F* (such as Point D), labour best suited to making *E* are being used to make *F*, the labour productivity must be low. As a result, producing an additional *F* will mean a substantial loss of *E*. The marginal opportunity cost of making an additional unit of *F* is on the rise. Thus, the production possibilities frontier is getting steeper, meaning that more *E* has to be given up in order to produce one more unit of *F*.

The PPF with increasing marginal opportunity cost better reflects the real world case that factor inputs are not homogenous (i.e. not identical). They are not equally good at all kinds of production. Thus, more outputs need to be foregone as we continuously increase the production of one good.

## 4.1 Gains from Trade with Increasing Marginal Opportunity Cost

Consider that both Country A and Country B produce two goods, food (*F*) and electronic appliance (*E*). Suppose, at autarky equilibrium, Country A has a comparative advantage in producing *F* while Country B's comparative advantage lies on the production of *E*.

Figure 9a shows the production possibilities frontier, $PPF_a$, and the autarky equilibrium, D of Country *A*. Figure 9b shows the production possibilities frontier, $PPF_b$ and the autarky equilibrium, G of Country B.

**Figure 9a**

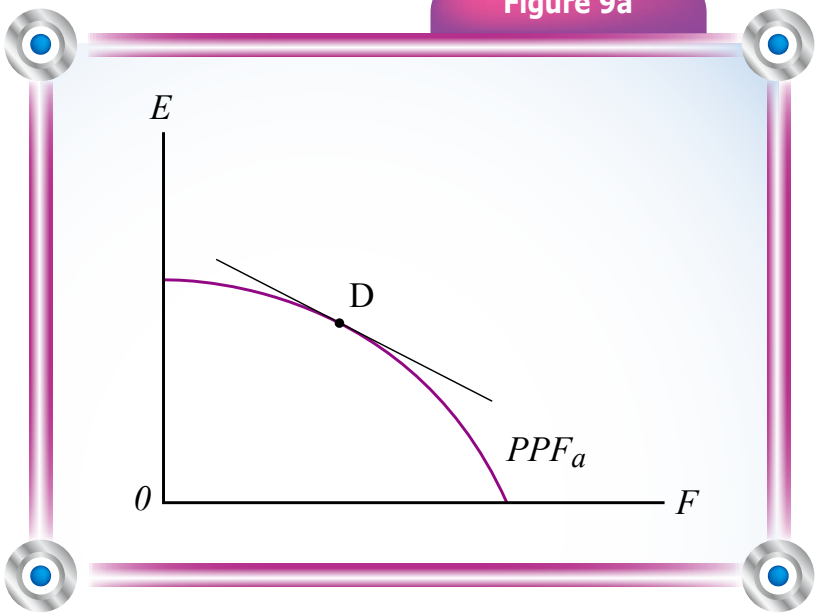
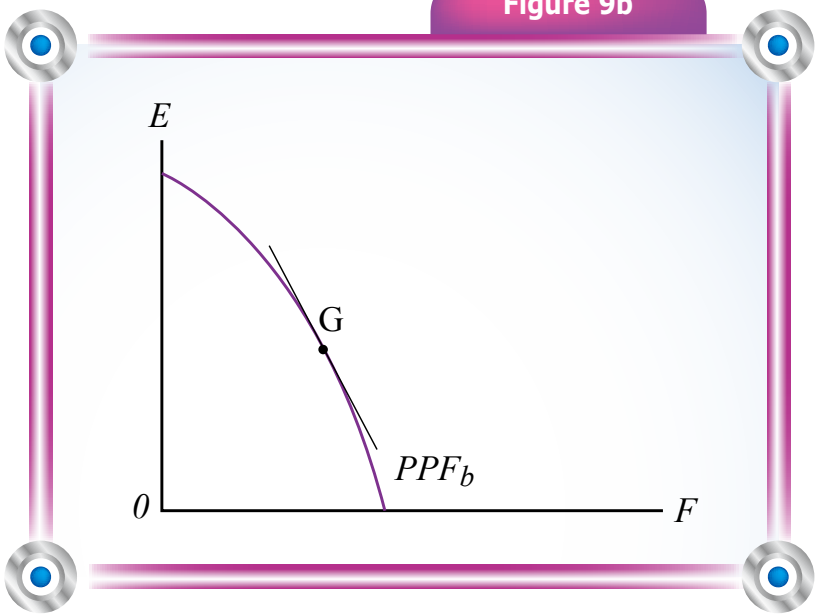



**Figure 9b**

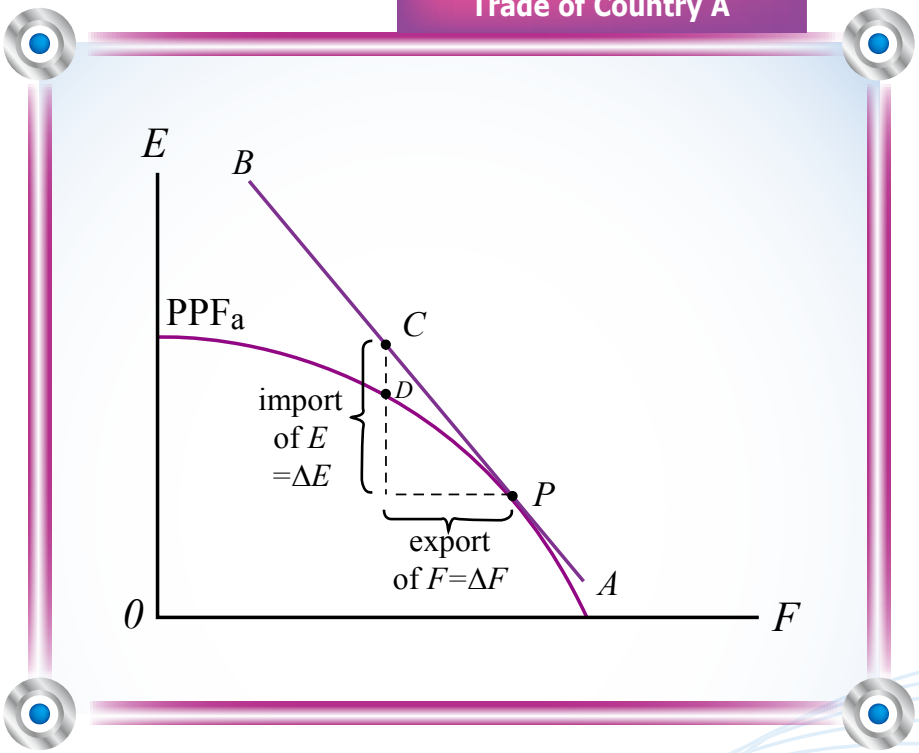


The slope of $PPF_a$ at D is smaller than that of $PPF_b$ at G. It indicates that Country A forgoes less, relative to Country B, units of *E* in order to produce one additional unit of *F*. Therefore, we can say that Country A has a comparative advantage (i.e. lower opportunity cost) in producing *F* at production point D. Similarly, Country B forgoes less, relative to Country A, units of *F* in order to produce one additional unit of *E*. Therefore, we can say that Country B has a comparative advantage (i.e. lower opportunity cost) in producing *E at production point G*.

In Figure 10a, the autarky equilibrium of Country A, *D*, is both its production and consumption point. As Country A has a comparative advantage in producing *F*, it can specialise in producing *F* and trade with Country B at the international price. The ***international price line*** (AB) indicates the terms of trade, that is the exchange ratio between *E* and *F* (=$\Delta E/\ \Delta F$). Simply speaking, it tells how many units of *E* can be exchanged for one unit of *F*.

After specialisation, the production point of Country A is *P* and Country A can export $\Delta F$ and import $\Delta E$ to attain a consumption point at *C*. Compared with the autarky equilibrium (Point *D*), Country A now enjoys more *E* without reducing the amount of *F*. The distance between *C* and *D* indicates the gains from trade for Country A. The consumption possibilities are enlarged. Country A now attains an originally unattainable point at C.

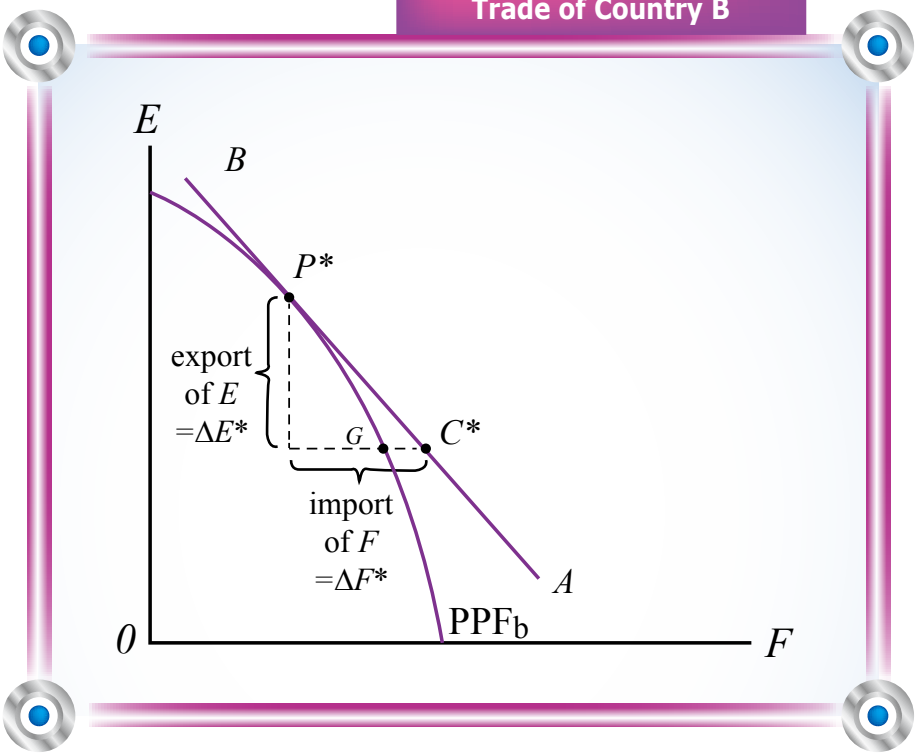
**Figure 10a. Gains from Trade of Country A**



In Figure 10b, the autarky equilibrium of Country B, *G*, is both its production and consumption point. As Country B has a comparative advantage in producing *E*, then it can specialise in producing *E* and trade with Country A at the international price line *AB*. The production point is *P** and Country B can export *ΔE** and import *ΔF** to attain a consumption point at *C**.

Country B now enjoys more *F* without reducing the amount of *E*. The distance between *G* and *C** indicates the gains from trade for Country B. The consumption possibilities are enlarged. Country B now attains an originally unattainable point at *C**. Country B is better off after specialisation and trade.

**Figure 10b. Gains from Trade of Country B**

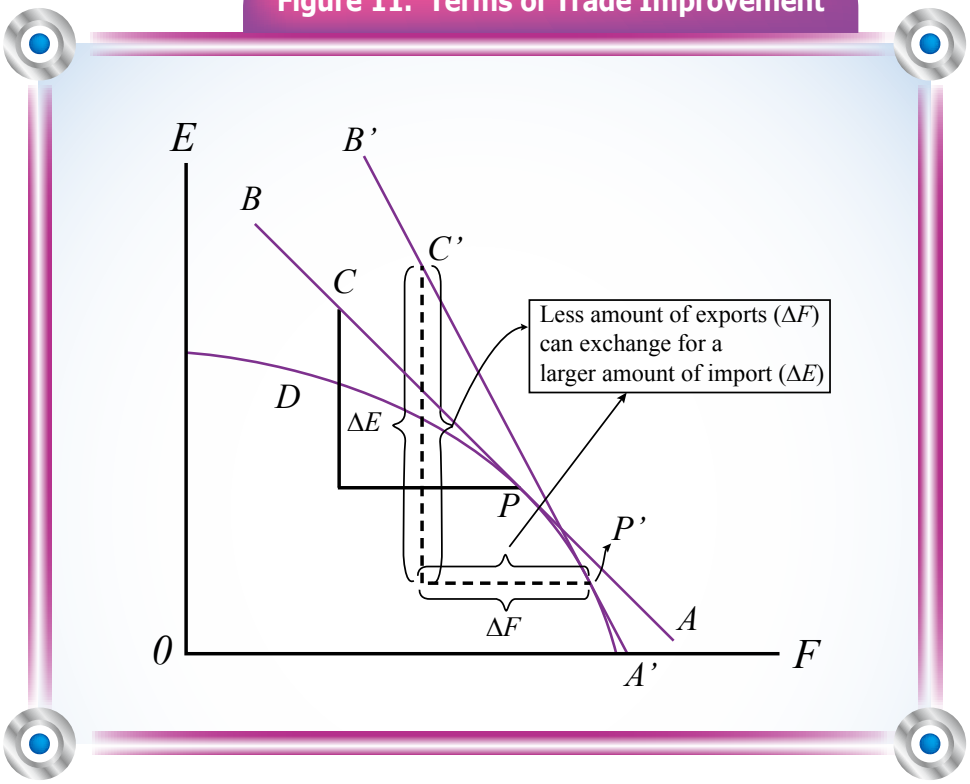


## Check it out!

**Continuing from the above example, if the international price of F increases, will Country A be better off or worse off?**

***If the international price of F increases, the price line will change from AB to A'B' with a greater slope. The terms of trade of Country A improves. It means that with a given amount of export, Country A can import more E from Country B. Comparing Point C'(the new consumption point) with Point C (the old consumption point), Country A consumes more of both E and F. Country A is better off when the terms of trade improves.***

**Figure 11. Terms of Trade Improvement**




It is worth noting that the PPF with increasing marginal opportunity cost better illustrates the real world case. However, it does not change our conclusion derived from the PPF with constant opportunity costs: ***Countries can be better off (i.e. enjoy more goods and services) if they specialise in producing goods for which they have a comparative advantage and trade their output with other countries.***

# 5. Comparative Advantage and its Relation to Globalization

## 5.1 What is Globalization

Economic globalization refers to the process of closer economic integration of the countries of the world through the increased flows of goods and services, capital, and labour.

Countries participating in globalization aim to raise living standards and promote economic growth. It gives both rich and poor countries access to overseas markets so that they can sell their goods. Countries in lack of capital can allow inflow of foreign investment, and countries with abundant capital can invest overseas to make their products at lower costs. Further, globalization opens borders so that people can travel abroad to be educated and to work. Studying abroad enhances human capital and overseas workers send home earnings to help their families and fund new businesses.

If the existence of comparative advantage and specialisation indeed bring about so many advantages to participating countries, why do so many people and interest groups oppose strongly to free trade and, in a broader context, globalization? Protests against free trade, such as the riot in Seattle in 1999 and the demonstration in Hong Kong in 2005 at the WTO (World Trade Organization) meetings, were not uncommon in the past decade. To gain a more balanced view on globalization, it is necessary to take a closer look at its pros and cons.

## 5.2 Pros of Globalization

***Gains from free trade:*** Sections 3 and 4 have explained clearly how specialisation and trade benefit the countries by enlarging their consumption possibilities, i.e. more goods and services to be consumed. Conversely, if trade is voluntary, a good will not be imported unless its net price to buyers compares favourably to the net price of domestically produced goods. In a word, specialisation and trade enable countries to enjoy more goods and services at lower prices. Besides making available more goods at lower prices, globalization has increased the variety of products accessible to consumers worldwide. A good illustration is that consumers in China now enjoy a wide range of products such

as coffee by Starbucks and iPad by Apple, which would otherwise be unavailable if China did not adopt the Reform and Opening up Policy in the late 1970s.

***Kickoff of Developing Economies:*** Globalization has caused the rapid expansion of export, particularly net export (export minus import), among developing countries since the 1960s. From 1965 to 1990, Japan's export in the world market increased from about 8 percent to 12 percent. It became the biggest exporter of manufactured goods in the world. The rise in net export promotes economic growth. This export-oriented strategy was later taken up by the *Four Asian Tigers* (or *Asian Dragons*): Hong Kong, Singapore, South Korea and Taiwan. In the 1970s and 1980s, the export of the *Four Asian Tigers* grew nearly four times faster than Japan's. These nations and regions achieved exceptionally high growth rates (in excess of 7 percent a year) in the early 1980s and 1990s. The strategy was later followed by Malaysia, Indonesia, Thailand and China in the 1980s to speed up economic growth.

***Promotion of Capital Growth:*** The opening up of country borders enables not only the flow of goods, but also capital. Productivity growth depends greatly on capital per worker and the growth rate of technology. According to the law of diminishing marginal returns, in a developed country (DC) with abundant capital per worker, the marginal rate of return on capital is on the decline. On the contrary, in a developing country (or less developed country, LDC) with limited capital per worker, the rate of return on capital will be higher. It follows that DCs have an incentive to export capital to LDCs to capture higher returns on capital and LDCs have the incentive to attract foreign direct investment to increase its marginal product of labour (i.e. labour productivity). In the 1980s and 1990s, capital-abundant countries, such as the U.S. and Japan, export capital to China and other Asian countries. The U.S. and Japan utilize the relatively cheap labour and land in China to reduce its production costs while China attracts foreign capital to enhance its labour productivity, technology and managerial skills. It benefits both the capital-exporting and capital-importing countries.

***Human Capital Enhancement:*** Advanced countries such as the U.S., the UK, Germany and Japan have comparative advantages in providing higher education. Globalization allows people from less advanced countries to receive higher education in advanced countries, hence enhance the human capital of the former. For education exporting countries, huge foreign exchange earnings are

generated by this service export. For example, the U.S. enrolled about 691,000 international students with tuition and fees estimated to a total of US$13 billion during the 2009-10 academic year. Taking into account cost of living expenses for students and their families, the total monetary income from international students is nearly US$19 billion a year.

## 5.3 Cons of Globalization

***Loss of independence:*** Some argue that by not producing what we consume, we become dependent on others in terms of imports. A good example is China's exports of rare earth elements/metals (REEs) consisting of 17 elements which are crucial for technological products. By 2010, China supplies 97 percent of the world's total production of REEs. However, China planned to cut 72 percent of REEs exports in the second half of 2010, followed by a further reduction in 2011. In response to the global concern of China's restriction on REEs production and exports, China propounds that it possesses only 50 percent of global deposits of REEs and its reduction in production is to ensure adequate reserves for domestic use and to abate pollution. Some developed countries such as Japan and the U.S. accused China of using the export quota of REEs as a tool to increase its bargaining power over economic and political issues. It was manifested by the fact that China intended to stop exporting REEs to Japan when the two countries were having severe disputes over crash between the Chinese fishing vessel and the Japanese martial vessel in the East China Sea in October 2010. However, the problem is more closely related to the global monopoly of REEs by China rather than to free trade. If the international trading system is free and competitive enough, substitutes will be developed and exported to the international market. Global monopoly is still rare in the long run. International rules should be formulated to avoid global monopoly and to ensure market competitiveness.

***Production Concentration and Price Fluctuation:*** Specialisation causes some developing countries to concentrate on a few agricultural exports (e.g. cotton or cocoa) and on a few manufactured exports (such as clothing and textile). They are therefore particularly vulnerable to international price fluctuations and volatile terms of trade. According to a study by the United Nations Conference on Trade and Development (UNCTAD, 2002), prices paid to coffee growers have declined between 1995 and 2000 by over 50 per cent in 10 out of 14 LDCs which specialised in growing and exporting coffee beans. The implication of this

for the livelihood of the people of these countries, particularly for those almost completely dependent on one to two kinds of exports, is that specialisation may lead to fluctuations in living standards.

***Structural Changes and Job Losses:*** Specialisation and trade lead to structural changes. The opponents of globalization are not confined to developing countries. For example, farmers in South Korea or workers in the U.S. manufacturing industries, who have lost their jobs because of the huge influx of low-price imported goods, form part of the opponents of globalization. In an ideal world, laid-off workers would take up new jobs in other sectors, but it is difficult in reality as they need to acquire new skills before taking up new jobs. Obtaining those skills takes time. More importantly, there is no guarantee that newly generated vacancies in other sectors would be enough to absorb the laid-off workers.

***Infant Industries and Acquired Comparative Advantage:*** In general, a developed country which already has in place a large manufacturing and capital base is *relatively* better at high-tech manufacturing. Conversely, a developing country with lots of low-skilled labour and a weak manufacturing base is *relatively* better at producing goods that require low-skilled labour, and less efficient at high-tech production. Free trade under globalization predicts that the developed country will specialise and export high-tech products and the developing country will specialise and export low skilled, labour-intensive products. Free trade will keep the trade pattern stable except that infant industries (young industries) in developing countries are temporarily protected from established industries of developed countries to build an *acquired comparative advantage.* The acquired comparative advantage can be developed by a country's educational policies (e.g. subsidised education) and industrial policies (e.g. policy favouring the inflow of capital). If the young industry is undercut and driven out of world markets at the beginning of its development by free trade, the acquired comparative advantage might never develop and the new industry would never exist in the developing country.

***Loss of national and cultural identity:*** Apart from economic considerations, some opponents to globalization are reluctant to see a huge influx of foreign goods to their countries. For example, developing countries in Asia and Middle East have opened their economies to import from the West. Foreign brands in

food (e.g. McDonald's restaurant), clothing (e.g. Levi's jeans), and electronic products (e.g. iPad) have replaced their local products. Though local consumers could enjoy a wide variety of imported goods, some people perceive it as damaging to national and cultural identities.

## 5.4 Concluding Remarks

Free trade based on comparative advantage promotes the economic well-being of the participating countries. Consumers enjoy cheaper products with greater varieties. Producers can export its capital overseas and produce their outputs at lower costs. Globalization raises incomes and improves the standards of living.

However, the opponents of globalization are concerned about the issues of distribution. Globalization implies specialisation and structural changes. The layoffs under structural changes and the vulnerable groups may intensify inequality and poverty. Therefore, redistribution of wealth may be deemed necessary. It boils down to how we "manage" globalization. It implies that government may need to devise policies to address the needs of the losers under free trade, or in a broader sense, globalization. That said, it does not mean that we should put a halt to or unnecessary hurdles on the process of globalization, though the process may not be problem-free. Although economists disagree on many issues, the vast majority of them believe that globalization does more good than harm for the world economy.

# References:

Case, K. E., Fair, R. C. and Oster, S. M. (2009), *Principles of Economics,* 9th edition, Pearson, Chapter 34.

Mackintosh, M. (2004), "Gaining from trade?" in Bromley, Simon et al., *Making the International: Economic Interdependence and Political Order,* London: Pluto Press, pp. 33-73.

Mankiw, N. G. (2009), *Principles of Economics,* 5th edition, South-Western, CENGAGE Learning, Chapter 2.

O'Sullivan, A., Sheffrin, S. M. and Perez, S. J. (2008), *Economics: Principles, Applications and Tools,* 5th edition, Pearson, Chapter 18.

United Nations Conference on Trade and Development (UNCTAD)(2002), *The Least Developed Countries Report 2002: Escaping the Poverty Trap,* Geneva: UNCTAD.

# Elective Part 2

## II Economic Growth and Development

## Learning Outcomes

After completing this topic, students should be able to:

- *understand* the various measures of economic growth and development;
- *explain* the factors affecting growth of an economy;
- *assess* the desirability and costs of economic growth;
- *understand* growth and development from comparative perspectives.

## 1. Introduction

Economic growth and development are two different, but closely related concepts. ***Economic growth*** refers to the rise in real Gross Domestic Product (GDP) and/or GDP per capita. ***Economic development*** is a broad concept encompassing economic growth and other developmental dimensions including health, education, food, clean water, environment, equality and income distribution. Therefore, growth in GDP and GDP per capita are not the only indicators of development. Other important development indicators include education attainment, literacy rates, life expectancy, levels of health and sanitation, sustainability, income disparity, employment rates, poverty reduction, status of women and children, *etc*. Since most of the development indicators relate to the well-being of humans, development economists put high emphasis on a ***human development approach***, that is: how the well-being of people in a country or region is improved throughout the course of economic growth. All countries are concerned about their economic growth and development as they directly affect the living standards and, to a large extent, the stability of their countries.

After this introduction, in Section 2 we will briefly discuss whether economic growth would necessarily lead to development. Section 3 examines the various measures of economic growth and development. The core of Section 4 focuses on what determines the growth of a country or a region and Section 5 examines policies promoting economic growth. The costs and benefits of economic growth will be assessed in Section 6. Section 7 provides an overview of growth and development from a comparative perspective.

## 2. Does Economic Growth Necessarily Lead to Development?

Higher economic growth represents a rise in a country's ability to produce and to buy goods and services. It is expected that economic growth will lead to economic development as a country has more resources to provide better education, medical services, more extensive transportation networks, and so on. This was supported by the observations on sustained economic growth beginning from the Industrial Revolution in Britain in around 1750. The use of animal and human power for production before the Industrial Revolution was replaced by the use of steam engines and mechanical power, which led to the rapid expansion of production capacities. The Industrial Revolution later spread to other countries, such as the United States, France, and Germany. The long-term economic growth since the 18$^{th}$ Century raised considerably the living standards of these countries in various developmental dimensions, such as provision of education, health services and infrastructure.

However, growth does not necessarily lead to development. Growth experiences have shown that rapid economic growth under certain circumstances does cause negative impacts on some developmental dimensions, such as income disparity and environmental degradation. To illustrate, both China and India achieved an annual growth rate of GDP up to 7 to 9 percent in the past decade, which was much higher than that of most developed and developing countries. However, the Gini coefficient, a measure of income inequality, reached 0.47 in China in 2010, surpassing the recognized warning level of 0.4. For the case of India, the 2011 Global Hunger Index (GHI) Report ranked India at 15th, among leading countries with hunger problems. India's GHI went up from 22.9 to 23.7 between 1996 and 2011, which is categorized as an "alarming" level. In addition, amid the rapid economic growth in China and India, the two countries are the fastest growing sources of greenhouse gas emissions. Further, about 40% of China's water sources are not suitable for drinking. All these indicators illustrate the point that economic growth does not necessarily promote development.

## *Knowledge Recap*

***Gini coefficient*** is the most commonly used measure of income inequality, which scales from zero to unity: zero represents perfect equality whereas unity represents perfect inequality. In general, countries with a Gini coefficient of 0.20 to 0.35 indicates *relatively equal* distribution of income, 0.35-0.50 *relatively unequal* distribution of income, and 0.50 to 0.70 *highly unequal distribution* of income. Please refer to the topic "Efficiency, Equity and the Role of Government" of the Curriculum to review the concept of Gini coefficient.

## *Knowledge Enrichment*

***Global Hunger Index (GHI)*** The Index ranks countries from 0 (no hunger) to 100 (absolute hunger), though neither of these extremes is likely to occur in real world. The higher the score, the worse the food problem of a country. Value less than 4.9 indicates "low hunger", between 5 and 9.9 indicates "moderate hunger", between 10 and 19.9 indicates "serious hunger", between 20 and 29.9 indicates "alarming", and value exceeding 30 indicates "extremely alarming" hunger problem. The index is calculated as follows:

GHI = (PUN + CUW + CM)/3

PUN: proportion of population that is undernourished (in %)

CUW: proportion of underweight in children under five (in %)

CM: proportion of children dying before the age of five (in %)

# 3. Measurement of Economic Growth and Development

***Gross domestic product (GDP)*** measures the market value of all final goods and services produced in a country during a period of time, generally one year. Real GDP is the value of final goods and services evaluated at base-year price (i.e. adjusted for price changes). ***Real GDP per capita*** is the real GDP divided by the population of a country. From the production side, real GDP tells about the actual final goods and services produced in a country. From the income side, it represents the ability of a country to buy goods and services. Therefore, changes in real GDP and real GDP per capita are common indicators for economic growth as well as change of a country's living standard. In general, a country with a higher real GDP indicates that the people in the country can enjoy more goods and services. However, in the topic "Measurement of Economic Performance", we shall discuss some shortcomings of using real GDP as a gauge of the well-being of the population. These shortcomings include the omission of leisure, lack of adjustment for negative effects of production (e.g. pollution), income distribution and so on. As mentioned in Section 2, a high economic growth rate may not entail a rise in other developmental indicators.

To come up with a more comprehensive measure of economic growth and development, United Nations Development Programme (UNDP) developed the ***Human Development Index (HDI)*** to analyse more comprehensively the comparative status of socioeconomic development in different countries. The HDI is a summary measure of three developmental dimensions: *health, access to knowledge (education) and standard of living.*

- *Health* is measured by *life expectancy at birth*. In general, better medical services in a country maintain better health conditions of the people, which in turn, have positive impact on the longevity of the people. Therefore, life expectancy is a proxy for health conditions of the people in the country.

- *Access to knowledge* is measured by the two components: mean years of schooling and expected years of schooling. The mean year of schooling refers to the average number of school years attended by the population.

The expected years of schooling measures the years of schooling that a child can expect to receive given the current enrolment rates. Both mean years and expected years of schooling reflect the degree of access to knowledge by the population in a country. The higher of the figure of mean years of schooling indicates a greater degree of access to education *at present*. A higher expected year of schooling reflects that current students have greater access to education *in the future.*

- *Income level* is measured by the gross national income (GNI). GNI is used, instead of GDP, because GNI takes into account the net income from abroad (i.e. factor income earned by residents from outside the economic territory - factor income earned by non-residents from within the economic territory). Some countries such as the Philippines receive substantial amount of remitted income from abroad. The discrepancies between GDP and GNI could be considerable. It is particularly true when world economy has been becoming more globalized in the past few decades. Therefore, GNI can better reflect the actual income received by local residents under sizeable flows of income among countries.

*Based on the* above data, three sub-indices, namely ***health index, education index*** and ***income index***, are constructed for each of the developmental dimensions. The ***HDI*** is obtained by taking the geometric mean of the three sub-indices. (*Please refer to Appendix I for the technical note of calculating the HDI.*) The HDI ranks most of the countries/regions (169 countries in 2010) in the world on a scale of 0 (lowest human development) to 1 (highest human development) into three groups: low human development (0.0 to 0.499), medium human development (0.50 to 0.799), and high human development (0.80 to 1.0). Hong Kong, China achieved a HDI of 0.862 (Rank 21) in 2010, which reflects that Hong Kong has accomplished a very high level of human development. Japan (HDI = 0.884; Rank 11) is the only country ranked higher than Hong Kong, China in Asia.

## 3.1 Advantages of HDI

- One of the major advantages of the HDI is that it offers a more balanced and comprehensive indicator to compare the developmental levels among different countries. Referring to *Appendix II, if we judge the level of development of a country* by looking only at its income level, the United States clearly excels over New Zealand. However, when we take into account other aspects such as health and education, New Zealand (HDI Rank = 3) is ranked higher than the United States (HDI Rank = 4). A multi-dimensional indicator, such as HDI, offers a more balanced view of development than a single-dimensional indicator, such as GDP or GNI.

- Important policy implications can be drawn from the HDI and its components. Some countries, such as Chile, have a moderate income level, but its HDI ranking (Rank 45) is much higher than some high-income countries such as Kuwait (Rank 47). It does reveal that *a low-income country can do much better than expected, and that little human development may be accomplished even with a high income*. For a country that has a high income level but a low HDI rank, it implies that high income has not trickled down to the general population to enhance their well-being. This situation is not uncommon in some of the higher-income oil producing countries which have been said to have experienced "growth without development".

## 3.2 Criticisms of HDI?

- One of the major criticisms of HDI is that in the long run, the HDI has a strong tendency to rise with per capita income, as wealthier countries can invest more in health and education, and this added human capital raises productivity. If country rankings in GNI do not vary much with HDI ranking in the long run, a single-dimensional income index would serve as a reliable proxy for socioeconomic development, and there would be no need to worry about such things as health and education indicators. But what is so striking is that despite this expected pattern, there is still such great variation between income and broader measures of well-being. If the two rankings are really converging, the figure of GNI per capita rank

minus HDI rank should be around 0 (e.g. range from -1 to 1). However, the data from the 7th column of the table in Appendix II does not reveal this pattern.

- Some have raised the point that HDI does not cover certain important developmental dimensions such as environmental sustainability and income distribution. However, no single developmental indicator can be "all comprehensive". Data constraint is a primary concern. If we want to construct one more sub-index on environmental sustainability, we need data available to all countries concerned. Otherwise, we could not compile a new HDI which provides meaningful comparisons among countries.

- Further, equal weight is given to each of the three sub-indices when compiling the HDI, which clearly has some value judgment behind it. However, any other weighting, without justification, could also be subjective. In practical sense, it is difficult to judge and justify which of the three dimensions is more or less important.

- Finally, no attention has been paid to the role of quality in HDI. For example, there is a big difference between an extra year of life as a healthy, well-functioning individual and an extra year with a very limited range of capabilities (such as being confined to bed). Moreover, the quality of schooling counts, not just the number of years of enrolment. Again, it should be noted that while one could imagine better proxies for health (e.g. number of doctor per 1000 people) and education (e.g. teacher-student ratio), new measures for these variables must be chosen on the criterion that sufficient data must be available to include as many countries as possible and the proxies must be better in reflecting the quality of each developmental dimension.

## Check it out!

**Referring to the 7th column of the table in Appendix II, it shows the GNI per capita rank (Rg) minus HDI rank(Rh). Some countries such as Germany (HDI rank 10) and Japan (HDI rank 11) have positive figures of (Rg - Rh) while some others such as Luxemburg (HDI rank 24) and United Arab Emirates (HDI rank 32) have negative figures. What does a positive or negative figure of (Rg - Rh) imply? Briefly explain.**

***If the figure of GNI per capita rank minus HDI rank of a country is positive, it reflects that the country obtains a lower rank in GNI, but it achieves a relatively high rank in HDI. Take Japan as an example, the figure of Rg - Rh is 11 for Japan. It implies that Japan's GNI rank is 22 (i.e. 22 - 11 = 11). It further implies that it has accomplished relatively good results in the areas of health and education. Therefore it scores a relatively high rank in overall HDI.***

***On the other hand, if the figure of Rg - Rh of a country is negative, it reflects that the country obtains a higher rank in GNI, but it achieves relatively low rank in HDI. Take United Arab Emirates as example, its figure of Rg - Rh is -28. It reflects that its GNI rank is 4 (i.e. 4 - 32 = -28). With such a high GNI rank, United Arab Emirates has only obtained a HDI rank of 32. It implies that the country has accomplished relatively poor results in the areas of health and education.***

## 4. Factors Affecting Growth of an Economy

As discussed in Section 1, economic growth refers to the rise in real Gross Domestic Product (GDP) and/or real GDP per capita. The output level of an economy is partly determined by how much goods and services are produced by each unit of labour (i.e. ***labour productivity***). We would naturally be puzzled to see that labour productivity varies among countries. Some countries such as the U.S. have much higher labour productivity than other countries such as India. It means that each worker in the U.S. can produce more goods and services than the workers in India. Does it imply that workers in India are lazier or less intelligent than the U.S. workers? Before answering this question, let us consider the following story:

*John and Jack live by the lakeside. They make their living by fishing. John has only one fish pole and each hour he can catch five fish. Jack has a boat carrying a fishnet and he catches 50 fish per hour. Jack's labour productivity is ten times of John's productivity. John is a bit unhappy when he notices that Jack is much more productive. John finally decides to buy another fish pole and learns how to manage two fish poles at the same time. After acquiring the skills, John can now catch ten fish each hour. Though Jack still catches more fish than John, their difference in productivity has been narrowed.*

The above story pinpoints the key factors determining labour productivity. Jack can catch more fish because he has more and better physical capital (the boat carrying a fishnet) to work with. John tries to improve his productivity by investing in more physical capital (buying one more fish pole) and enhancing his human capital (learning the skills of managing two fish poles at the same time). Returning to the real world, ***labour productivity is determined by how much physical capital, human capital, natural resources and technology (or technological change) available to each worker.*** Each factor is discussed as follows:

### Physical Capital

Physical capital refers to the stock of equipment and structures that are used to produce goods and services. Plants and equipment are examples of physical capital. In the above story, the fish pole and the boat carrying a fishnet are physical capital for John and Jack respectively. The more physical capital workers have, the more output they can produce (i.e. higher productivity).

### Human Capital

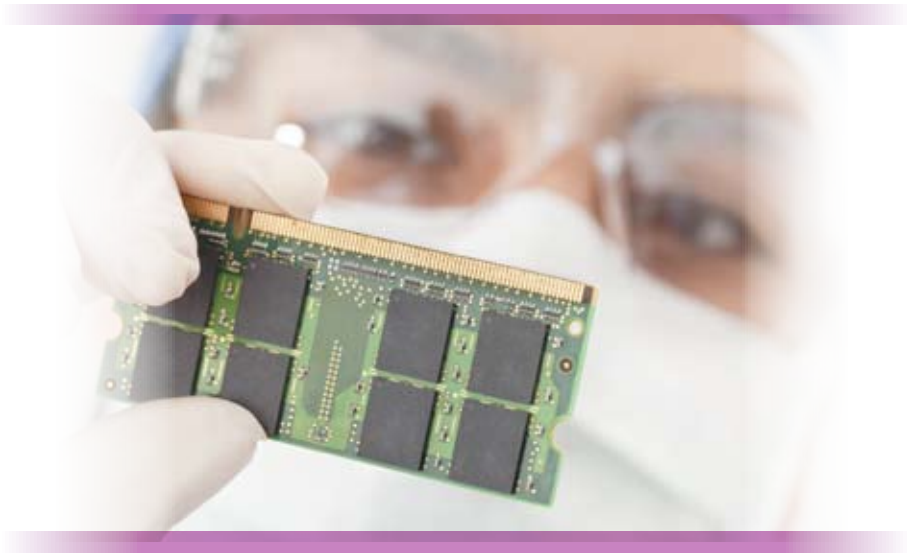
Human capital refers to the knowledge and skills that workers acquire through education, training, and experience. In our story, John's learning of the skills of managing two fish poles at the same time is an investment, and thus enhancement, of human capital. Through capital investment, John can increase his output from 5 to 10 fish per hour. More education, training and experience increase workers' productivity.

### Natural Resources

Natural resources are the inputs in the production of goods and services that are provided by nature, such as land, rivers, and mineral deposits. If John found another small lake nearby which has an abundant supply of fish, he could increase his output because of the discovery of new natural resources (the small lake). It has long been a debate between conservationists and economists about the utilisation rates of natural resources. The conservationists are concerned about the excessive use of natural resources such as oil, tin and copper. They argue that fixed supply of non-renewable resources will be used up eventually, which limits economic growth and lowers our living standard. However, most economists counter argue that as the technology has improved over time, we have discovered ways, such as recycling and development of new resources, to lower our use of non-renewable natural resources. Now plastic is used to replace tin to contain food and optic fibre is used to replace copper wire for telecommunication. Thus, most economists are not worried about shortages of natural resources.

## Technological Change

Technological change refers to an advance in knowledge which improves ways to produce goods and services, that is to improve the production efficiency of goods and services. Technological change consists of at least two elements: *advance in knowledge* (or an invention) and *innovation*. Advance in knowledge, such as the invention of optic fibre, always happens in universities and laboratories. The invention finally used to produce an existing product more efficiently is called innovation (e.g. optic fibre to replace metal wires in telecommunication). Advance in knowledge is not confined to scientific knowledge. Advance in managerial knowledge, accounting procedures and data management can also be used to improve the production efficiency of a firm. Technological change cannot be measured directly. It can be measured indirectly by looking at the change in the quantity of output a firm can produce using given quantity of inputs. Some economists use other indirect measures such as the number of patents registered by a firm or a region to indicate technological change.



***Knowledge Enrichment***

***The Production Function and Economic Growth***

The above discussion examines how economic growth is determined by the availability of physical capital, human capital, natural resources and technology. Economists always use a production function to analyse how labour productivity is affected by the availability of physical capital, human capital, natural resources and technology. A production function describes the relationship between the quantity of inputs used in production and the quantity of output from production. The production function is generally written as follows:

$$Y = A\,F(L, K, H, N)$$

where $Y$ = output, $L$ = quantity of labour, $K$ = quantity of physical capital, $H$ = quantity of human capital, N = quantity of natural resources, A reflects the available production technology, and $F(\cdot)$ is a function that shows how inputs are combined to produce output.

Assume that the production function has a property called ***constant returns to scale***, which means that as all inputs are doubled, output will exactly double. This property can be illustrated mathematically as follows:

$$xY = A\,F(xL, xK, xH, xN)$$

where x =2 if inputs are doubled and x =3 if inputs are tripled.

By setting x = 1/$L$, and we obtain the following:

$$Y/L = A\,F(1, K/L, H/L, N/L)$$

The above function shows that the output per labour ($Y/L$) (i.e. labour productivity) is determined by physical capital available to each labour ($K/L$), human capital available to each labour ($H/L$) and natural resources available to each labour ($N/L$) at the current state of technology ($A$).

## 5. Public Policies Promoting Growth of an Economy

Economic growth, as discussed in Section 3, cannot completely reflect the level of development. Steady and positive economic growth not only enables people to enjoy more goods and services, but also makes available more resources for better public services, such as education and medical care, which are vital to enhancing living standards. Therefore, almost all governments make efforts to devise public policies to promote economic growth. Some important growth policies are discussed below:

**Policies to increase savings:** The amount of capital accumulation in an economy is determined by its rate of saving. The more savings in an economy, the more funds are available for investment. Government can promote saving through tax exemptions on interests and dividend earned from deposits and financial assets. Other means include the introduction of private pension plans such as the Mandatory Provident Fund in Hong Kong. By requiring workers to deposit money into their private pension accounts, the balances are then invested in stock and bond markets. The funds are finally used by firms for capital investment.

**Foreign direct investment:** Savings by domestic residents are not the only way for a country to invest in new capital. Countries could adopt favourable investment policies, such as tax exemption and low land rent, to attract foreign investment. Foreign investment basically takes two major forms. First, when a capital investment is owned and operated by a foreign company, it is called *foreign direct investment* (FDI). To illustrate, if a U.S. firm invests capital directly in China and sets up a factory to produce its product, it is a case of FDI in China from the U.S. Second, when a capital investment is financed with foreign money but operated by domestic residents, it is called *foreign portfolio investment* (FPI). For example, when a U.S. unit trust company buys a Chinese stock and the funding is finally used to invest in capital goods by the Chinese firm, it is a case of FPI in China by a U.S. investor. Both FDI and FPI increase the stock of capital in China. Foreign investment is particularly important for less developed countries (LDCs) as they have relatively low saving rates and thus are in lack of capital.

**Trade promotion:** Some countries have tried to achieve faster economic growth by avoiding transacting with the rest of the world (*inward-oriented policies*). They want to limit the import volume to avoid money flowing out of their economies. However, previous discussion on trade shows that free trade allows a country to specialise in what it does best and thus consumes beyond its production possibilities. Throughout the second half of the 20$^{th}$ century, outward-oriented policies adopted by South Korea, Taiwan, Singapore and Hong Kong are conducive to economic growth.

**Education Policy:** Education is an investment in human capital, which has a positive impact on labour productivity. A study based on historical data indicates that increase in human capital (education and training) accounted for 19% of the growth of the U.S. economy during the period 1929-1982. However, investment in human capital also has an opportunity cost. When students study in school, they cannot produce goods and services for consumption. In LDCs, this opportunity cost is considered to be high. Therefore, student dropout rates in LDCs are high. One of the possible solutions to the dropout problem is government subsidies on education in these countries.

**Population Policy:** When population growth is faster than the GDP growth, it reduces GDP per capita. Each member of the population enjoys less goods and services. The living standards are lowered. More importantly, high population growth reduces capital per worker because rapid growth in the number of workers forces the capital stock to be shared more thinly. It lowers labour productivity and future economic growth. To address this issue, effective birth control policy can be implemented to limit population growth.

**Property Rights and Political Stability:** When we say a person who has property rights over an asset or resource, we mean that he has the exclusive right to use (control), transfer, and obtain the income derived from the asset or resource. Protection of property rights and promotion of political stability are two other important ways that policymakers can improve economic growth. There is little incentive for investors to produce if there is no guarantee that their products cannot be taken illegally by others or confiscated by the government. Contracts must also be enforced effectively. Countries with loose enforcement of property rights or unstable political conditions will also have difficulty in attracting domestic and foreign investment.

**Research and Development (R&D):** As discussed in Section 4, technology is an important determinant for economic growth. R&D is the primary source for technological change. However, R&D is always costly and risky. A government can promote technological change by providing research grants and tax incentives for firms or institutions engaged in R&D. The patent system also encourages research by granting an inventor the exclusive right to produce the product for a specified number of years. It guarantees the inventors the ability to capture exclusive profits to cover its costs in R&D and provides incentives for future R&D.

# 6. Desirability and Costs of Economic Growth

## 6.1 Desirability of Economic Growth

The above discussion entails a fact that most countries are eager to put forward pro-growth policies. It implies that economic growth must bring benefits which the society desires. Some major benefits of economic growth are highlighted below:

**Living standards enhancement:** Higher real GDP means more goods and services are produced and enjoyed by the people. A higher GDP is important for poverty reduction.

**Employment creation:** Economic growth creates more job opportunities. Higher employment stimulates consumption, which in turn encourages investment. Higher investment boosts future rounds of economic growth. Higher employment has the added benefit of reducing government expenditure on welfare, in particular unemployment allowance. Government will then have more resources to implement policies for the development of the economy.

**Increase in quality and varieties of goods and services:** People in the old days did not have the chance to enjoy many of the conveniences we take for granted today, such as television, air conditioning, computers, iPad and better medicine. Because of economic growth and the accompanied technological advancement, the average household today may enjoy a "richer" life, in terms of quality and varieties of goods and services, than a well-off person may a century ago.

**Better public services:** Higher GDP means higher tax revenue for governments, which enables them to provide better public services such as education and medical care that have a direct bearing on the well-being of the general public.

**Promoting technological change:** In relation to the previous point, with higher fiscal revenue, governments are more able to subsidise education and R&D, which are crucial for technological change. Further, economic growth causes higher consumption and firms derive higher income for future R&D.

## 6.2 Costs of Economic Growth

Economic growth, measured in changes in real GDP, brings obvious benefits. However, some negative impacts of economic growth are not measured or indicated by the GDP figures. Some "immeasurable" negative impacts have become more apparent in the past few decades. Some more prominent impacts are examined below:

### Trade-off between current and future consumption

As mentioned before, resources saved for capital accumulation is an important drive of economic growth. More saving means more fund for investment. With more investment, we need to forgo resources for current consumption. However, through investment, the future income will increase so as the future consumption. Therefore, one of the costs of economic growth is to forgo current consumption for future consumption.

### Resources exhaustion, pollution and sustainable development

Economic growth involves production which inevitably increases resources exhaustion such as the substantial use of clean water, extensive deforestation and huge consumption of oil and other fossil fuels. The rapid exhaustion of natural resources brings out two important issues: *sustainability and pollution*.

- **Sustainability:** Sustainability refers to balanced economic growth and environment preservation. In economic terms, it is a balance between current and future economic growth. Sustainability emphasizes the importance of fulfilling the needs of current generation without compromising the needs and welfare of future generation. Another embedded meaning of sustainability is that *the stock of overall assets should remain constant or rises over time.* The conservationists are more pessimistic in this regard. They tend to predict that the rapid exhaustion of natural resources by current generation will reduce the resources available for the future generation, which threatens the sustainability in the long run. On the contrary, economists, in general, are more optimistic. They argue that technological changes in the past show that new sources of resource, such as solar and nuclear energy, and new materials, such as synthetic fibre, would be developed to replace existing fuel and materials.

- **Pollution:** Growth-related pollution is everywhere. Dumping hazardous waste on soil and water is common in rapidly industrialising countries. Greenhouse gases emitted by economic activities have been intensifying global warming. The quality of life is adversely affected by pollution, but it is not reflected in growth indicators such as GDP growth rates. It is not uncommon that countries record high growth figures, but face a deteriorating environment. China can best illustrate this point in that it accomplished an average growth rate of 8-9 percent per annum in the past two decades, but ranks beside the U.S. as one of the top two greenhouse gases emitting countries. In addition, as pointed out in Section 2, about 40% of China's water sources are not suitable for drinking.

### Creation of unnecessary needs

To maintain growth, firms need to create new models to attract new demand. For example, mobile phone producers regularly release new models with changes in design and minor upgrades in functions. The fundamental functions of the mobile phone are basically unchanged. Firms create demand by managing the taste of consumers through advertising, fancy designs and other marketing strategies. Some economists therefore argue that the new models actually are not desperately needed by the consumers. The resources used for the new models could better be utilised for other products which satisfy intrinsic needs.

## Income distribution

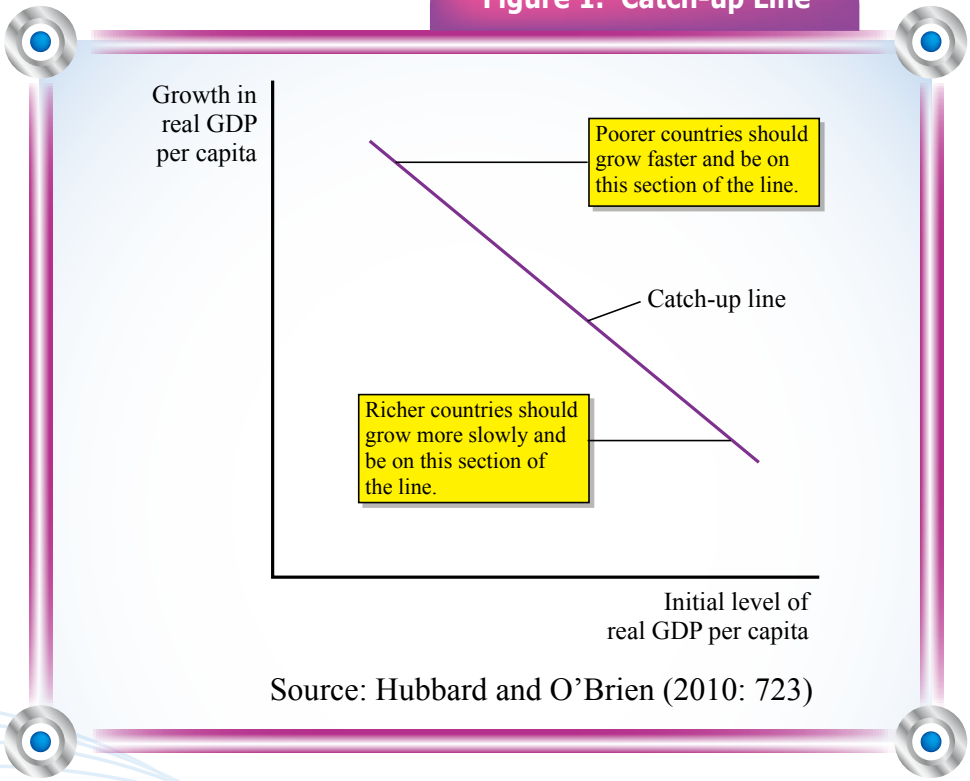
Consider two cases: Country A has 100 persons and each of them earns annual incomes of $50,000 and the GDP of Country A is $5 million. Country B also has 100 persons and 10 of them earn annual income of $500,000 and 90 suffer from possessing nothing. The GDP of Country B is the same as Country A, that is, $5 million. Which country is better off? Economists could not easily reach a consensus, but most people, including social scientists, generally prefer the income distribution of Country A because the benefits of economic growth is more evenly distributed and more people can enjoy the fruits, goods and services, brought about by economic growth. However, it is not rare to observe that uneven income distribution, or income disparity, is associated with rapid economic growth, particularly in developing countries. In developing countries, capital is relatively scarce and labour is abundant and so the return on capital is higher than that of labour. As rich people possess more capital, they are able to reap higher returns than the poor during the course of economic growth. The end result is that as the rich gets richer the poor remains poor. Nevertheless, some economists argue that since the poor also earn more under economic growth, they will acquire more physical and human capital, which will eventually enhance their productivity and income in the long run. The pattern of uneven income distribution will gradually vanish. That said, though the theoretical prediction is basically sound, narrowing the income gap in the long run is not always a must for developing countries. For instance, the Gini coefficients of Thailand, the Philippines and China are still higher than 0.4.

# 7. International Comparison

Productivity growth depends very much on capital per worker and the growth rate of technology. According to the law of diminishing marginal returns a developed country (DC) with abundant capital per worker, any additional capital provided for the worker will not greatly increase the marginal product of the labour. Therefore, the rate of return on capital is marginal in a DC. On the contrary, in a developing country (or less developed country, LDC) with limited capital per labour, the rate of return on capital will be high. It follows that DCs have an incentive to export capital to LCDs to capture higher return on capital and LDCs have the incentive to attract foreign direct investment to increase its marginal product of labour and, hence labour productivity. Economic theory predicts that a relatively poor country can grow faster than the rich countries by adopting existing (already developed) technology and attracting capital. It follows that the poor countries can ***catch up*** with the rich countries in the long run (***economic convergence***).

**Catch-up line:** A downward sloping curve showing the relationship between the level of productivity (or level of per capita income) and the growth of productivity. It predicts that the level of GDP per capita (or income per capita) in poor countries will grow faster than in rich countries.

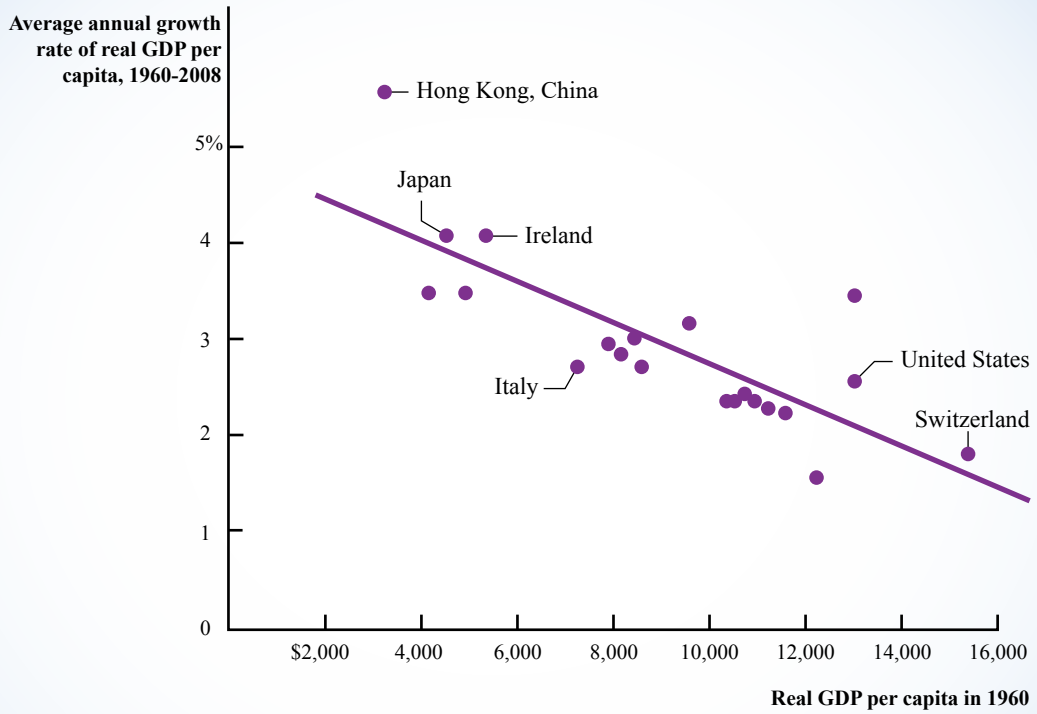
**Figure 1. Catch-up Line**




Source: Hubbard and O'Brien (2010: 723)

Figure 2 plots real GDP per capita in 1960 against growth in real GDP per capita from 1960 to 2008 for a number of high-income countries. It is noted that richer countries, such as the U.S. and Switzerland, grew slower than less rich countries/regions such as Japan, Ireland, and Hong Kong, China. The catch-up phenomenon is observed among high-income countries.

**Figure 2. Growth of Real GDP Per Capita of High-Income Countries/Regions**




Source: Hubbard and O'Brien (2010: 723)

Is catch-up observed in most countries? Table 1 shows the GNI per capita of ten representative high and low countries in 2001 and 2010. It clearly reveals that the income gap between rich and poor countries are still very huge, though the gap is narrowing. The average income of rich countries was 93.5 times that of the poor countries in 2001 and the figure dropped to 62.6 in 2010. Does it imply convergence among rich and poor countries? Figure 3 plots the real GDP per capita in 1960 and the average annual growth rate of real GDP per capita of about 100 high-income countries and low-income countries during the period 1960-2008. Some countries that had low levels of real GDP per capita in 1960, such as Nigeria, Madagascar, and the Democratic Republic of the Congo, actually experienced negative economic growth. Other countries that started with low levels of real GDP per capita, such as Malaysia and South Korea, grew rapidly. Some middle-income countries in 1960, such as Venezuela, hardly grew between 1960 and 2008, while others, such as Israel, experienced significant growth. The figure reveals that ***catch-up is found in some countries, but not all.***

Cambodia, a low-income country

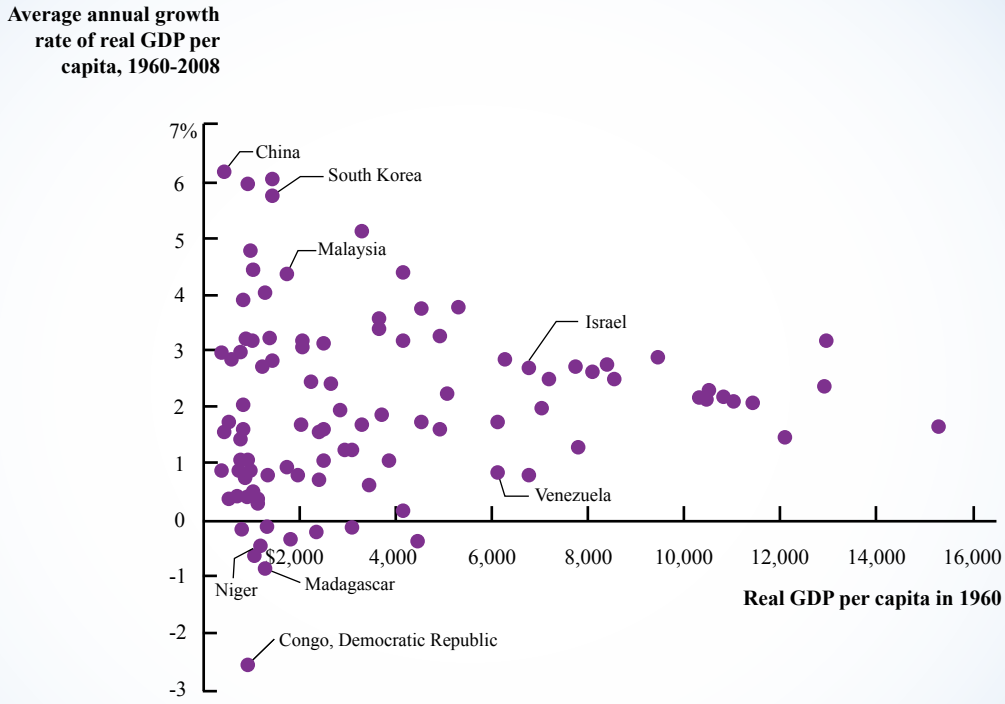
**Table I**

| Gross National Income Per capita among High and Low Income Countries/Regions* in 2001 and 2010 | | |
|---|---|---|
| **Country** | **2001** | **2010** |
| **High Income Countries /Regions** | **US$** | **US$** |
| Denmark | 30,640 | 59,210 |
| France | 23,120 | 42,390 |
| Germany | 24,020 | 43,290 |
| Hong Kong,China | 25,930 | 32,780 |
| Japan | 35,120 | 42,130 |
| Luxemburg | 42,900 | 79,630 |
| Norway | 37,530 | 85,340 |
| Switzerland | 37,790 | 70,030 |
| United Kingdom | 25,860 | 38,560 |
| United States | 35,480 | 47,240 |
| Average of HIC | 30,839 | 54,060 |
| **Low Income Countries /Regions** | | |
| Bangladesh | 380 | 700 |
| Cambodia | 310 | 760 |
| Ethiopia | 130 | 390 |
| Ghana | 300 | 1,230 |
| India | 460 | 1,340 |
| Mozambique | 230 | 440 |
| Pakistan | 480 | 1,050 |
| Nepal | 230 | 480 |
| Nigeria | 320 | 1,180 |
| Yemen | 460 | 1,070 |
| Average of LIC | 330 | 864 |
| Average of HIC/ Average of LIC | 93.5 | 62.6 |

Notes: * According to World Bank, economies are divided into four groups according to 2010 GNI per capita. The groups are: low income, US$1,005 or less; lower middle income, US$1,006 - US$3,975; upper middle income, US$3,976 - US$12,275; and high income, US$12,276 or more.

Source: adapted from the World Bank Data Table http://data.worldbank.org/indicator/NY.GNP.PCAP.CD (accessed on 12 Dec 2011)

**Figure 3. Catch-up among High and Low Income Countries**




Source: Hubbard and O'Brien (2010: 724)

The above figure suggests that when we enlarge the sample size for analysis, we can find little tendency for the low-income countries to grow relatively rapidly. It implies that some obstacles are hindering the spread of capital and technology to some relatively poor countries. Absolute and relative poverty persist among nations, as indicated by the fact that 3 billion people, about 40% of the world population, lives on less than US$2 per day. Every year 3 million people die for lack of immunization, 1 million die from malaria, and 3 million people die from water-related diseases.

***Knowledge Enrichment***

***The economic growth of advanced countries slow down?***

Economic growth causes higher savings and consumption. In some cases, however, the marginal propensity to consume (MPC) increases along with economic growth. The rise in current consumption raises the living standards of current generation. Nonetheless, higher MPC implies lower marginal propensity to save (MPS), which reduces the loanable funds available to the financial sector for capital investment. Lower capital investment reduces the economic growth of the future generation whose consumption and living standards will be hampered. In a word, high current consumption creates a negative "external" effect to the future generation. The current high consumption in the U.S. and the European countries are likely to lower their future economic growth.

New York, United States

# 7.1 What hinders the growth in LDCs?

**Regulation and Legal Rights:** The cost of setting up a business is high in some LDCs. To illustrate, it takes 36 months to set up a retail business and 6 years and 11 months to set up a housing construction firm in Peru. Further, property rights are poorly protected in the LDCs. The high transaction costs associated with setting up a firm and the loosely enforced property rights hinder the inflow of FDI.

**Lack of Human Capital:** In order to adopt existing technology or to invent new products, a strong base of human capital is necessary. Human capital can be enhanced through education and on-the-job training. Inadequate investment in human capital hampers the application of existing and new technology. Though the rate of returns to education is positive, poor families cannot afford the costs of education. Huge disparities in education attainment are found among rich and poor countries.

**Table 2**

| Number of years of Schooling in Rich and Poor Countries | | |
|---|---|---|
| **Rank** | **Countries** | **Years of Schooling** |
| **TOP 10** | | |
| # 1 | United States | 12 |
| # 2 | Norway | 11.8 |
| # 3 | New Zealand | 11.7 |
| # 4 | Canada | 11.6 |
| # 5 | Sweden | 11.4 |
| # 6 | Australia | 10.9 |
| # 7 | Switzerland | 10.5 |
| # 8 | Germany | 10.2 |
| # 9 | Finland | 10 |
| # 10 | Poland | 9.8 |
| **Bottom 10** | | |
| 91 | Nepal | 2.4 |
| = 93 | Benin | 2.3 |
| = 93 | The Gambia | 2.3 |
| # 95 | Sudan | 2.1 |
| # 96 | Afghanistan | 1.7 |
| # 97 | Mozambique | 1.1 |
| # 98 | Niger | 1 |
| # 99 | Mali | 0.9 |
| # 100 | Guinea-Bissau | 0.8 |
| | Weighted average: | 6.2 |

Source: http://www.nationmaster.com/graph/edu_ave_yea_of_sch_of_adu-education-average-years-schooling-adults (accessed on 12 Dec 2011)

**Population Growth:** To increase the capital per worker, the increase in capital must be faster than that of population. However, fertility rate (births per woman) is higher in most developing countries than in developed countries. To illustrate, fertility rate in Sub-Saharan Africa is up to 4-5 while the rate is less than 2 in the U.S. and Australia. Poor countries with high population growth spend a major share of their income in consumption, resulting in a low saving rate of around 10 per cent in least-developed countries. High population growth with low saving rates limits the growth of capital per capita, which constrains labour productivity.

**Foreign Direct Investment:** The lack of domestic savings in LDCs creates a need to attract FDI from capital-abundant countries. However, as mentioned above, some LDCs suffer poor governance and property rights are not effectively enforced and protected, which are not conducive to FDI.

**Physical Geography:** Some countries are endowed with favourable conditions and others are not. For example, the U.S. has inherited a vast continent rich with natural resources, with fertile soil and ample rainfall, extensive navigable rivers and coastal lines. All these conditions are conducive to domestic production and foreign trade. On the contrary, many of the world poorest countries are severely hindered by high transport costs because they are landlocked and in lack of navigable rivers and long coastal lines. Many other poor countries are trapped in arid conditions with low agricultural productivity or prolonged droughts.

**Governance Failures:** Economic development requires a government oriented towards development. The government has many fundamental roles to play such as establishing an independent and effective legal system, prioritize the development of infrastructure, devising favourable policy to attract FDI. Ineffective governance, either caused by corrupted governments or civil wars, is one of the most common impediments to domestic and foreign investment.

# References:

Case, K. E., Fair, R. C. and Oster, S. M. (2009), *Principles of Economics*, 9th edition, Pearson, Chapter 32.

Hubbard, R. G. and O'Brien, A. P. (2010), *Economics*, 3rd edition, Pearson, Chapter 22.

Mankiw, N. G. (2009), *Principles of Economics*, 5th edition, South-Western, CENGAGE Learning, Chapter 25.

O'Sullivan, A., Sheffrin, S. M. and Perez, S. J. (2008), *Economics: Principles, Applications and Tools*, 5th edition, Pearson, Chapter 8.

Sachs, J. (2005), *The End of Poverty: How Can We Make It Happen in Our Lifetime*, London: Penguin, pp. 49-73.

Todaro, M. P. and Smith, S.C. (2009), *Economic Development*, Harlow: Addison Wesley, pp. 49-56 and 485-6.

United Nations Development Programme (2010), *Human Development Report 2010*, New York: United Nations Development Programme, Chapter 1.

# Appendix I

## Technical Note: Calculating the Human Development Index

The Human Development Index (HDI) is a summary measure of human development. It measures the average achievements in a country in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living. The HDI is the geometric mean of normalized indices measuring achievements in each dimension.

## Data sources

- Life expectancy at birth: UNDESA (2009d)
- Mean years of schooling: Barro and Lee (2010)
- Expected years of schooling: UNESCO Institute for Statistics (2010a)
- Gross national income (GNI) per capita: World Bank (2010g) and IMF (2010a)

## Creating the dimension indices

The first step is to create subindices for each dimension. Minimum and maximum values (goalposts) need to be set in order to transform the indicators into indices between 0 and 1. Because the geometric mean is used for aggregation, the maximum value does not affect the relative comparison (in percentage terms) between any two countries or periods of time. The maximum values are set to the actual observed maximum values of the indicators from the countries in the time series, that is, 1980-2010. The minimum values will affect comparisons, so values that can be appropriately conceived of as subsistence values or "natural" zeros are used. Progress is thus measured against minimum levels that a society needs to survive over time. The minimum values are set at 20 years for life expectancy, at 0 years for both education variables and at $163 for per capita gross national income (GNI). The life expectancy minimum is based on long-run historical evidence from Maddison (2010) and Riley (2005).Societies can subsist without formal education, justifying the education minimum. A basic level of income is necessary to ensure survival: $163 is the lowest value attained by any country in recorded history (in Zimbabwe in 2008) and corresponds to less than 45 cents a day, just over a third of the World Bank's $1.25 a day poverty line.

# Goalposts for the Human Development Index in this Report

| Dimension | Observed maximum | Minimum |
|---|---|---|
| Life expectancy | 83.2 (Japan, 2010) | 20.0 |
| Mean years of schooling | 13.2 (United States, 2000) | 0 |
| Expected years of schooling | 20.6 (Australia, 2002) | 0 |
| Combined education index | 0.951 (New Zealand, 2010) | 0 |
| Per capita income (PPP $) | 108,211 (United Arab Emirates, 1980) | 163 (Zimbabwe, 2008) |

Having defined the minimum and maximum values, the subindices are calculated as follows:

$$\text{Dimension index} = \frac{\text{actual value - minimum value}}{\text{maximum value - minimum value}} \qquad (1)$$

For education, equation 1 is applied to each of the two subcomponents, then a geometric mean of the resulting indices is created and finally, equation 1 is reapplied to the geometric mean of the indices, using 0 as the minimum and the highest geometric mean of the resulting indices for the time period under consideration as the maximum. This is equivalent to applying equation 1 directly to the geometric mean of the two subcomponents. Because each dimension index is a proxy for capabilities in the corresponding dimension, the transformation function from income to capabilities is likely to be concave (Anand and Sen 2000c). Thus, for income the natural logarithm of the actual minimum and maximum values is used.

## Aggregating the subindices to produce the Human Development Index

The HDI is the geometric mean of the three dimension indices:

$$(I_{Life}^{1/3} \cdot I_{Education}^{1/3} \cdot I_{Income}^{1/3}) \qquad (2)$$

Expression 2 embodies imperfect substitutability across all HDI dimensions. It thus addresses one of the most serious criticisms of the linear aggregation formula, which allowed for perfect substitution across dimensions. Some substitutability is inherent in the definition of any index that increases with the values of its components.

**Example: China**

| Indicator | Value |
|---|---|
| Life expectancy at birth (years) | 73.5 |
| Mean years of schooling (years) | 7.5 |
| Expected years of schooling (years) | 11.4 |
| GNI per capita (PPP USS) | 7,263 |

*Note: Values are rounded.*

$$\text{Life expectancy index} = \frac{73.5 - 20}{83.2 - 20} = 0.847$$

$$\text{Mean years of schooling index} = \frac{7.5 - 0}{13.2 - 0} = 0.568$$

$$\text{Expected years of schooling index} = \frac{11.4 - 0}{20.6 - 0} = 0.553$$

$$\text{Education index} = \frac{\sqrt{0.568 \cdot 0.553} - 0}{0.951 - 0} = 0.589$$

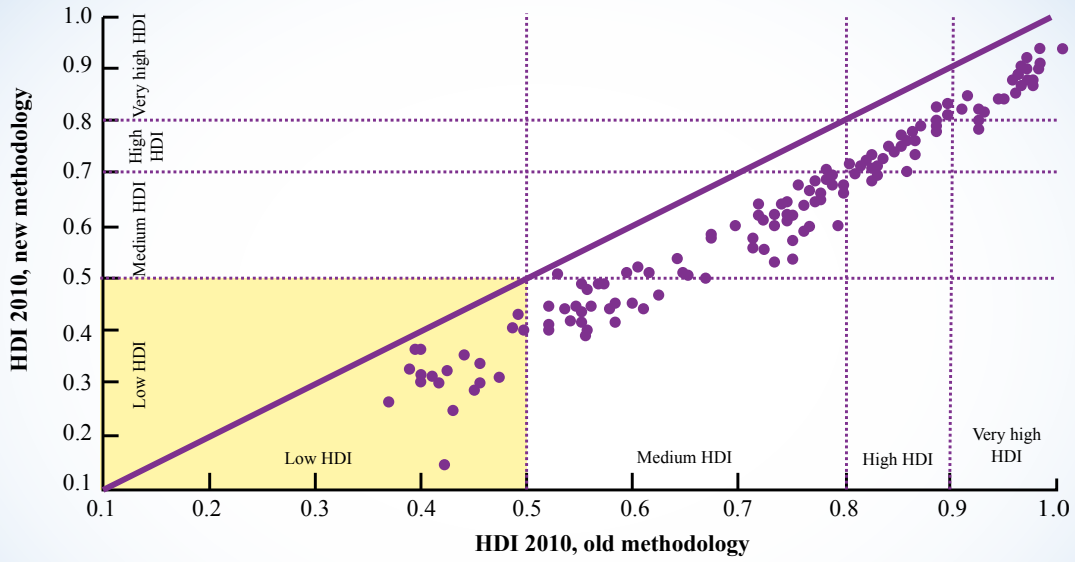
$$\text{Income index} = \frac{\ln(7{,}263) - \ln(163)}{\ln(108{,}211) - \ln(163)} = 0.584$$

$$\text{Human Development Index} = \sqrt[3]{0.847 \cdot 0.589 \cdot 0.584} = 0.663$$

# Overall effects of the Human Development Index methodological improvements

The methodological improvements in the HDI, using new indicators and the new functional form, result in substantial changes (figure T1.1). Adopting the geometric mean produces lower index values, with the largest changes occurring in countries with uneven development across dimensions. The geometric mean has only a moderate impact on HDI ranks. Setting the upper bounds at actual maximum values has less impact on overall index values and has little further impact on ranks.

**Figure T1.1. Human Development Index 2010: new and old methodologies**




Source: HDRO calculations using data from the HDRO database.

# Analysis of historical trends in this Report

The analysis of historical trends in chapters 2 and 3 uses a different version of the HDI, the hybrid HDI, which applies the same aggregation formula as the new HDI to the set of indicators and sources used in previous Reports (since 1995) in order to allow more extensive analysis over time. Linear interpolation was used to fill missing values when both earlier and later values were present. When unavailable for the whole time period, gross enrolment ratios were projected using the last available value (for forward projections) and the first available value (for backward projections). A sensitivity analysis showed that the results of the analysis were robust to alternative extrapolation techniques. See Gidwitz and others (2010) for further details on the construction of this data set.

The analysis in chapters 2 and 3 also uses the deviation from fit criterion to comparatively evaluate changes over time in the hybrid HDI. This measure evaluates the progress of countries compared with the average progress of countries with a similar initial HDI level. It is calculated as the residual of a second degree fractional polynomial regression of the annual percentage growth rate of the HDI on the logarithm of its initial HDI value. Statistical table 2 reports the country rank in the deviation from fit for the HDI for 1980-2010. See Royston and Altman (1994) for a description of regression models based on fractional polynomial functions of a continuous covariate.

Note:
Appendix I is extracted from United Nations Development Programme (2010), Human Development Report 2010, New York: United Nations Development Programme, pp. 216-217.

# Appendix II

## Human Development Index and its components

| HDI rank | | Human Development Index (HDI) value[a] | Life expectancy at birth (years) | Mean years of schooling (years) | Expected years of schooling (years) | Gross national income (GNI) per capita (PPP 2008 $) | GNI per capita rank minus HDI rank | Nonincome HDI value |
|---|---|---|---|---|---|---|---|---|
| | | 2010 | 2010 | 2010 | 2010[b] | 2010 | 2010 | 2010 |
| **VERY HIGH HUMAN DEVELOPMENT** | | | | | | | | |
| 1 | Norway | **0.938** | 81.0 | 12.6 | 17.3 | 58,810 | 2 | 0.954 |
| 2 | Australia | **0.937** | 81.9 | 12.0 | 20.5 | 38,692 | 11 | 0.989 |
| 3 | New Zealand | **0.907** | 80.6 | 12.5 | 19.7 | 25,438 | 30 | 0.979 |
| 4 | United States | **0.902** | 79.6 | 12.4 | 15.7 | 47,094 | 5 | 0.917 |
| 5 | Ireland | **0.895** | 80.3 | 11.6 | 17.9 | 33,078 | 20 | 0.936 |
| 6 | Liechtenstein | **0.891** | 79.6[c] | 10.3[d] | 14.8 | 81,011[e,f] | -5 | 0.861 |
| 7 | Netherlands | **0.890** | 80.3 | 11.2 | 16.7 | 40,658 | 4 | 0.911 |
| 8 | Canada | **0.888** | 81.0 | 11.5 | 16.0 | 38,668 | 6 | 0.913 |
| 9 | Sweden | **0.885** | 81.3 | 11.6 | 15.6 | 36,936 | 8 | 0.911 |
| 10 | Germany | **0.885** | 80.2 | 12.2 | 15.6 | 35,308 | 9 | 0.915 |
| 11 | Japan | **0.884** | 83.2 | 11.5 | 15.1 | 34,692 | 11 | 0.915 |
| 12 | Korea, Republic of [g] | **0.877** | 79.8 | 11.6 | 16.8 | 29,518 | 16 | 0.918 |
| 13 | Switzerland | **0.874** | 82.2 | 10.3 | 15.5 | 39,849 | -1 | 0.889 |
| 14 | France | **0.872** | 81.6 | 10.4 | 16.1 | 34,341 | 9 | 0.898 |
| 15 | Israel | **0.872** | 81.2 | 11.9 | 15.6 | 27,831 | 14 | 0.916 |
| 16 | Finland | **0.871** | 80.1 | 10.3 | 17.1 | 33,872 | 8 | 0.897 |
| 17 | Iceland | **0.869** | 82.1 | 10.4 | 18.2 | 22,917 | 20 | 0.928 |
| 18 | Belgium | **0.867** | 80.3 | 10.6 | 15.9 | 34,873 | 3 | 0.888 |
| 19 | Denmark | **0.866** | 78.7 | 10.3 | 16.9 | 36,404 | -1 | 0.883 |
| 20 | Spain | **0.863** | 81.3 | 10.4 | 16.4 | 29,661 | 6 | 0.897 |
| 21 | Hong Kong, China (SAR) | **0.862** | 82.5 | 10.0 | 13.8 | 45,090 | -11 | 0.860 |
| 22 | Greece | **0.855** | 79.7 | 10.5 | 16.5 | 27,580 | 8 | 0.890 |
| 23 | Italy | **0.854** | 81.4 | 9.7 | 16.3 | 29,619 | 4 | 0.882 |
| 24 | Luxembourg | **0.852** | 79.9 | 10.1 | 13.3 | 51,109 | -18 | 0.836 |
| 25 | Austria | **0.851** | 80.4 | 9.8 | 15.0 | 37,056 | -9 | 0.859 |
| 26 | United Kingdom | **0.849** | 79.8 | 9.5 | 15.9 | 35,087 | -6 | 0.860 |
| 27 | Singapore | **0.846** | 80.7 | 8.8 | 14.4[h] | 48,893 | -19 | 0.831 |
| 28 | Czech Republic | **0.841** | 76.9 | 12.3 | 15.2 | 22,678 | 10 | 0.886 |
| 29 | Slovenia | **0.828** | 78.8 | 9.0 | 16.7 | 25,857 | 3 | 0.853 |
| 30 | Andorra | **0.824** | 80.8[c] | 10.4[i] | 11.5 | 38,056[j,k] | -15 | 0.817 |
| 31 | Slovakia | **0.818** | 75.1 | 11.6 | 14.9 | 21,658 | 12 | 0.854 |
| 32 | United Arab Emirates | **0.815** | 77.7 | 9.2 | 11.5 | 58,006 | -28 | 0.774 |

# Human Development Index and its components

| HDI rank | Human Development Index (HDI) value[a] | Life expectancy at birth (years) | Mean years of schooling (years) | Expected years of schooling (years) | Gross national income (GNI) per capita (PPP 2008 $) | GNI per capita rank minus HDI rank | Nonincome HDI value |
|---|---|---|---|---|---|---|---|
| | 2010 | 2010 | 2010 | 2010[b] | 2010 | 2010 | 2010 |
| **VERY HIGH HUMAN DEVELOPMENT** | | | | | | | |
| 33 Malta | **0.815** | 80.0 | 9.9 | 14.4 | 21,004[l] | 11 | 0.850 |
| 34 Estonia | **0.812** | 73.7 | 12.0 | 15.8 | 17,168 | 13 | 0.864 |
| 35 Cyprus | **0.810** | 80.0 | 9.9 | 13.8 | 21,962 | 6 | 0.840 |
| 36 Hungary | **0.805** | 73.9 | 11.7 | 15.3 | 17,472 | 10 | 0.851 |
| 37 Brunei Darussalam | **0.805** | 77.4 | 7.5 | 14.0 | 49,915 | -30 | 0.769 |
| 38 Qatar | **0.803** | 76.0 | 7.3 | 12.7 | 79,426[m] | -36 | 0.737 |
| 39 Bahrain | **0.801** | 76.0 | 9.4 | 14.3 | 26,664 | -8 | 0.809 |
| 40 Portugal | **0.795** | 79.1 | 8.0 | 15.5 | 22,105 | 0 | 0.815 |
| 41 Poland | **0.795** | 76.0 | 10.0 | 15.2 | 17,803 | 4 | 0.834 |
| 42 Barbados | **0.788** | 77.7 | 9.3 | 13.4[n] | 21,673 | 0 | 0.806 |
| **HIGH HUMAN DEVELOPMENT** | | | | | | | |
| 43 Bahamas | **0.784** | 74.4 | 11.1[b,o] | 11.6 | 25,201[p] | -9 | 0.788 |
| 44 Lithuania | **0.783** | 72.1 | 10.9 | 16.0 | 14,824 | 7 | 0.832 |
| 45 Chile | **0.783** | 78.8 | 9.7 | 14.5 | 13,561 | 11 | 0.840 |
| 46 Argentina | **0.755** | 75.7 | 9.3 | 15.5 | 14,603 | 6 | 0.821 |
| 47 Kuwait | **0.771** | 77.9 | 6.1 | 12.5 | 55,719 | -42 | 0.714 |
| 48 Latvia | **0.769** | 73.0 | 10.4 | 15.4 | 12,944 | 13 | 0.822 |
| 49 Montenegro | **0.769** | 74.6 | 10.6[b,q] | 14.4[h] | 12,491 | 16 | 0.825 |
| 50 Romania | **0.767** | 73.2 | 10.6 | 14.8 | 12,844 | 13 | 0.820 |
| 51 Croatia | **0.767** | 76.7 | 9.0 | 13.8 | 16,389 | -2 | 0.798 |
| 52 Uruguay | **0.765** | 76.7 | 8.4 | 15.7 | 13,808 | 3 | 0.810 |
| 53 Libyan Arab Jamahiriya | **0.755** | 74.5 | 7.3 | 16.5 | 17,068 | -5 | 0.775 |
| 54 Panama | **0.755** | 76.0 | 9.4 | 13.5 | 13,347 | 4 | 0.796 |
| 55 Saudi Arabia | **0.752** | 73.3 | 7.8 | 13.5 | 24,726 | -20 | 0.742 |
| 56 Mexico | **0.750** | 76.7 | 8.7 | 13.4 | 13,971 | -3 | 0.785 |
| 57 Malaysia | **0.744** | 74.7 | 9.5 | 12.5 | 13,927 | -3 | 0.775 |
| 58 Bulgaria | **0.743** | 73.7 | 9.9 | 13.7 | 11,139 | 10 | 0.795 |
| 59 Trinidad and Tobago | **0.736** | 69.9 | 9.2 | 11.4 | 24,233 | -23 | 0.719 |
| 60 Serbia | **0.735** | 74.4 | 9.5 | 13.5 | 10,449 | 11 | 0.788 |
| 61 Belarus | **0.732** | 69.6 | 9.3[b,q] | 14.6 | 12,926 | 1 | 0.763 |
| 62 Costa Rica | **0.725** | 79.1 | 8.3 | 11.7 | 10,870 | 7 | 0.768 |
| 63 Peru | **0.723** | 73.7 | 9.6 | 13.8 | 8,424 | 14 | 0.788 |
| 64 Albania | **0.719** | 76.9 | 10.4 | 11.3 | 7,976 | 19 | 0.787 |
| 65 Russian Federation | **0.719** | 67.2 | 8.8 | 14.1 | 15,258 | -15 | 0.729 |

# Human Development Index and its components

| HDI rank | Human Development Index (HDI) value[a] | Life expectancy at birth (years) | Mean years of schooling (years) | Expected years of schooling (years) | Gross national income (GNI) per capita (PPP 2008 $) | GNI per capita rank minus HDI rank | Nonincome HDI value |
|---|---|---|---|---|---|---|---|
| | 2010 | 2010 | 2010 | 2010[b] | 2010 | 2010 | 2010 |
| **HIGH HUMAN DEVELOPMENT** | | | | | | | |
| 66 Kazakhstan | **0.714** | 65.4 | 10.3 | 15.1 | 10,234 | 6 | 0.756 |
| 67 Azerbaijan | **0.713** | 70.8 | 10.2[b,o] | 13.0 | 8,747 | 8 | 0.769 |
| 68 Bosnia and Herzegovina | **0.710** | 75.5 | 8.7[b,q] | 13.0 | 8,222 | 12 | 0.771 |
| 69 Ukraine | **0.710** | 68.6 | 11.3 | 14.6 | 6,535 | 20 | 0.794 |
| 70 Iran, Islamic Republic of | **0.702** | 71.9 | 7.2 | 14.0 | 11,764 | -3 | 0.725 |
| 71 The former Yugoslav Republic of Macedonia | **0.701** | 74.5 | 8.2 | 12.3 | 9,487 | 3 | 0.742 |
| 72 Mauritius | **0.701** | 72.1 | 7.2 | 13.0 | 13,344 | -13 | 0.712 |
| 73 Brazil | **0.699** | 72.9 | 7.2 | 13.8 | 10,607 | -3 | 0.728 |
| 74 Georgia | **0.698** | 72.0 | 12.1[b,q] | 12.6 | 4,902 | 26 | 0.805 |
| 75 Venezuela, Bolivarian Republic of | **0.696** | 74.2 | 6.2 | 14.2 | 11,846 | -9 | 0.716 |
| 76 Armenia | **0.695** | 74.2 | 10.8 | 11.9 | 5,495 | 19 | 0.787 |
| 77 Ecuador | **0.695** | 75.4 | 7.6 | 13.3 | 7,931 | 7 | 0.749 |
| 78 Belize | **0.694** | 76.9 | 9.2 | 12.4 | 5,693 | 16 | 0.782 |
| 79 Colombia | **0.689** | 73.4 | 7.4 | 13.3 | 8,589 | -3 | 0.732 |
| 80 Jamaica | **0.688** | 72.3 | 9.6 | 11.7 | 7,207 | 6 | 0.748 |
| 81 Tunisia | **0.683** | 74.3 | 6.5 | 14.5 | 7,979 | 1 | 0.729 |
| 82 Jordan | **0.681** | 73.1 | 8.6 | 13.1 | 5,956 | 10 | 0.755 |
| 83 Turkey | **0.679** | 72.2 | 6.5 | 11.8 | 13,359 | -26 | 0.679 |
| 84 Algeria | **0.677** | 72.9 | 7.2 | 12.8 | 8,320 | -6 | 0.716 |
| 85 Tonga | **0.677** | 72.1 | 10.4 | 13.7 | 4,038 | 23 | 0.792 |
| **MEDIUM HUMAN DEVELOPMENT** | | | | | | | |
| 86 Fiji | **0.669** | 69.2 | 11.0 | 13.0 | 4,315 | 21 | 0.771 |
| 87 Turkmenistan | **0.669** | 65.3 | 9.9[b,o] | 13.0[h] | 7,052 | 1 | 0.719 |
| 88 Dominican Republic | **0.663** | 72.8 | 6.9 | 11.9 | 8,273 | -9 | 0.695 |
| 89 China | **0.663** | 73.5 | 7.5 | 11.4 | 7,258 | -4 | 0.707 |
| 90 El Salvador | **0.659** | 72.0 | 7.7 | 12.1 | 6,498 | 0 | 0.711 |
| 91 Sri Lanka | **0.658** | 74.4 | 8.2 | 12.0 | 4,886 | 10 | 0.738 |
| 92 Thailand | **0.654** | 69.3 | 6.6 | 13.5[n] | 8,001 | -11 | 0.683 |
| 93 Gabon | **0.648** | 61.3 | 7.5 | 12.7 | 12,747 | -29 | 0.637 |
| 94 Suriname | **0.646** | 69.4 | 7.2[b,q] | 12.0 | 7,093 | -7 | 0.681 |
| 95 Bolivia, Plurinational State of | **0.643** | 66.3 | 9.2 | 13.7 | 4,357 | 11 | 0.724 |

# Human Development Index and its components

| HDI rank | Human Development Index (HDI) value[a] | Life expectancy at birth (years) | Mean years of schooling (years) | Expected years of schooling (years) | Gross national income (GNI) per capita (PPP 2008 $) | GNI per capita rank minus HDI rank | Nonincome HDI value |
|---|---|---|---|---|---|---|---|
| | 2010 | 2010 | 2010 | 2010[b] | 2010 | 2010 | 2010 |
| **MEDIUM HUMAN DEVELOPMENT** | | | | | | | |
| 96 Paraguay | **0.640** | 72.3 | 7.8 | 12.0 | 4,585 | 9 | 0.714 |
| 97 Philippines | **0.638** | 72.3 | 8.7 | 11.5 | 4,002 | 12 | 0.726 |
| 98 Botswana | **0.633** | 55.5 | 8.9 | 12.4 | 13,204 | -38 | 0.613 |
| 99 Moldova, Republic of | **0.623** | 68.9 | 9.7 | 12.0 | 3,149 | 19 | 0.729 |
| 100 Mongolia | **0.622** | 67.3 | 8.3 | 13.5 | 3,619 | 12 | 0.710 |
| 101 Egypt | **0.620** | 70.5 | 6.5 | 11.0 | 5,889 | -8 | 0.657 |
| 102 Uzbekistan | **0.617** | 68.2 | 10.0[b,q] | 11.5 | 3,085 | 17 | 0.721 |
| 103 Micronesia, Federated States of | **0.614** | 69.0 | 8.8[b,o] | 11.7[r] | 3,266[s] | 13 | 0.709 |
| 104 Guyana | **0.611** | 67.9 | 8.5 | 12.2 | 3,302 | 11 | 0.702 |
| 105 Namibia | **0.606** | 62.1 | 7.4 | 11.8 | 6,323 | -14 | 0.629 |
| 106 Honduras | **0.604** | 72.6 | 6.5 | 11.4 | 3,750 | 5 | 0.676 |
| 107 Maldives | **0.602** | 72.3 | 4.7 | 12.4 | 5,408 | -11 | 0.636 |
| 108 Indonesia | **0.600** | 71.5 | 5.7 | 12.7 | 3,957 | 2 | 0.663 |
| 109 Kyrgyzstan | **0.598** | 68.4 | 9.3 | 12.6 | 2,291 | 17 | 0.726 |
| 110 South Africa | **0.597** | 52.0 | 8.2 | 13.4 | 9,812 | -37 | 0.581 |
| 111 Syrian Arab Republic | **0.589** | 74.6 | 4.9 | 10.5[r] | 4,760 | -9 | 0.627 |
| 112 Tajikistan | **0.580** | 67.3 | 9.8 | 11.4 | 2,020 | 22 | 0.709 |
| 113 Viet Nam | **0.572** | 74.9 | 5.5 | 10.4 | 2,995 | 7 | 0.646 |
| 114 Morocco | **0.567** | 71.8 | 4.4 | 10.5 | 4,628 | -10 | 0.594 |
| 115 Nicaragua | **0.565** | 73.8 | 5.7 | 10.8 | 2,567 | 7 | 0.652 |
| 116 Guatemala | **0.560** | 70.8 | 4.1 | 10.6 | 4,694 | -13 | 0.583 |
| 117 Equatorial Guinea | **0.538** | 51.0 | 5.4[b,q] | 8.1 | 22,218 | -78 | 0.454 |
| 118 Cape Verde | **0.534** | 71.9 | 3.5[b,o] | 11.2 | 3,306 | -4 | 0.573 |
| 119 India | **0.519** | 64.4 | 4.4 | 10.3 | 3,337 | -6 | 0.549 |
| 120 Timor-Leste | **0.502** | 62.1 | 2.8[b,o] | 11.2 | 5,303 | -23 | 0.485 |
| 121 Swaziland | **0.498** | 47.0 | 7.1 | 10.3 | 5,132 | -23 | 0.482 |
| 122 Lao People's Democratic Republic | **0.497** | 65.9 | 4.6 | 9.2 | 2,321 | 3 | 0.548 |
| 123 Salomon Islands | **0.494** | 67.0 | 4.5[b,o] | 9.1 | 2,172 | 6 | 0.550 |
| 124 Cambodia | **0.494** | 62.2 | 5.8 | 9.8 | 1,868 | 12 | 0.566 |
| 125 Pakistan | **0.490** | 67.2 | 4.9 | 6.8 | 2,678 | -4 | 0.523 |
| 126 Congo | **0.489** | 53.9 | 5.9 | 9.3 | 3,258 | -9 | 0.503 |
| 127 São Tomé and Príncipe | **0.488** | 66.1 | 4.2[b,o] | 10.2 | 1,918 | 8 | 0.553 |

# Human Development Index and its components

| HDI rank | Human Development Index (HDI) value[a] | Life expectancy at birth (years) | Mean years of schooling (years) | Expected years of schooling (years) | Gross national income (GNI) per capita (PPP 2008 $) | GNI per capita rank minus HDI rank | Nonincome HDI value |
|---|---|---|---|---|---|---|---|
| | 2010 | 2010 | 2010 | 2010[b] | 2010 | 2010 | 2010 |
| **LOW HUMAN DEVELOPMENT** | | | | | | | |
| 128 Kenya | **0.470** | 55.6 | 7.0 | 9.6 | 1,628 | 10 | 0.541 |
| 129 Bangladesh | **0.469** | 66.9 | 4.8 | 8.1 | 1,587 | 12 | 0.543 |
| 130 Ghana | **0.467** | 57.1 | 7.1 | 9.7 | 1,385 | 14 | 0.556 |
| 131 Cameroon | **0.460** | 51.7 | 5.9 | 9.8 | 2,197 | -3 | 0.493 |
| 132 Myanmar | **0.451** | 62.7 | 4.0 | 9.2 | 1,596 | 8 | 0.511 |
| 133 Yemen | **0.439** | 63.9 | 2.5 | 8.6 | 2,387 | -9 | 0.453 |
| 134 Benin | **0.435** | 62.3 | 3.5 | 9.2 | 1,499 | 8 | 0.491 |
| 135 Madagascar | **0.435** | 61.2 | 5.2[b,o] | 10.2 | 953 | 22 | 0.550 |
| 136 Mauritania | **0.433** | 57.3 | 3.7 | 8.1 | 2,118 | -5 | 0.454 |
| 137 Papua New Guinea | **0.431** | 61.6 | 4.3 | 5.2 | 2,227 | -10 | 0.447 |
| 138 Nepal | **0.428** | 67.5 | 3.2 | 8.8 | 1,201 | 12 | 0.506 |
| 139 Togo | **0.428** | 63.3 | 5.3 | 9.6 | 844 | 22 | 0.557 |
| 140 Comoros | **0.428** | 66.2 | 2.8[b,o] | 10.7 | 1,176 | 12 | 0.507 |
| 141 Lesotho | **0.427** | 45.9 | 5.8 | 10.3 | 2,021 | -8 | 0.448 |
| 142 Nigeria | **0.423** | 48.4 | 5.0[b,q] | 8.9 | 2,156 | -12 | 0.436 |
| 143 Uganda | **0.422** | 54.1 | 4.7 | 10.4 | 1,224 | 5 | 0.491 |
| 144 Senegal | **0.411** | 56.2 | 3.5 | 7.5 | 1,816 | -7 | 0.433 |
| 145 Haiti | **0.404** | 61.7 | 4.9 | 6.8[n] | 949 | 13 | 0.493 |
| 146 Angola | **0.403** | 48.1 | 4.4[b,o] | 4.4 | 4,941 | -47 | 0.353 |
| 147 Djibouti | **0.402** | 56.1 | 3.8[b,q] | 4.7 | 2,471 | -24 | 0.394 |
| 148 Tanzania, United Republic of | **0.398** | 56.9 | 5.1 | 5.3 | 1,344 | -1 | 0.441 |
| 149 Côte d'Ivoire | **0.397** | 58.4 | 3.3 | 6.3 | 1,625 | -10 | 0.420 |
| 150 Zambia | **0.395** | 47.3 | 6.5 | 7.2 | 1,359 | -5 | 0.434 |
| 151 Gambia | **0.390** | 56.6 | 2.8 | 8.6 | 1,358 | -5 | 0.426 |
| 152 Rwanda | **0.385** | 51.1 | 3.3 | 10.6 | 1,190 | -1 | 0.432 |
| 153 Malawi | **0.385** | 54.6 | 4.3 | 8.9 | 911 | 6 | 0.463 |
| 154 Sudan | **0.379** | 58.9 | 2.9 | 4.4 | 2,051 | -22 | 0.373 |
| 155 Afghanistan | **0.349** | 44.6 | 3.3 | 8.0 | 1,419 | -12 | 0.358 |
| 156 Guinea | **0.340** | 58.9 | 1.6[b,t] | 8.6 | 953 | 0 | 0.380 |
| 157 Ethiopia | **0.328** | 56.1 | 1.5[b,o] | 8.3 | 992 | -2 | 0.357 |
| 158 Sierra Leone | **0.317** | 48.2 | 2.9 | 7.2 | 809 | 4 | 0.360 |
| 159 Central African Republic | **0.315** | 47.7 | 3.5 | 6.3 | 758 | 4 | 0.363 |
| 160 Mali | **0.309** | 49.2 | 1.4 | 8.0 | 1,171 | -7 | 0.312 |
| 161 Burkina Faso | **0.305** | 53.7 | 1.3[b,q] | 5.8 | 1,215 | -12 | 0.303 |
| 162 Liberia | **0.300** | 59.1 | 3.9 | 11.0 | 320 | 5 | 0.509 |

# Human Development Index and its components

| HDI rank | Human Development Index (HDI) value[a] | Life expectancy at birth (years) | Mean years of schooling (years) | Expected years of schooling (years) | Gross national income (GNI) per capita (PPP 2008 $) | GNI per capita rank minus HDI rank | Nonincome HDI value |
|---|---|---|---|---|---|---|---|
| | 2010 | 2010 | 2010 | 2010[b] | 2010 | 2010 | 2010 |
| **LOW HUMAN DEVELOPMENT** | | | | | | | |
| 163 Chad | **0.295** | 49.2 | 1.5[b,o] | 6.0 | 1,067 | -9 | 0.298 |
| 164 Guinea-Bissau | **0.289** | 48.6 | 2.3[b,q] | 9.1 | 538 | 1 | 0.362 |
| 165 Mozambique | **0.284** | 48.4 | 1.2 | 8.2 | 854 | -5 | 0.300 |
| 166 Burundi | **0.282** | 51.4 | 2.7 | 9.6 | 402 | 0 | 0.400 |
| 167 Niger | **0.261** | 52.5 | 1.4 | 4.3 | 675 | -3 | 0.285 |
| 168 Congo, Democratic Republic of the | **0.239** | 48.0 | 3.8 | 7.8 | 291 | 0 | 0.390 |
| 169 Zimbabwe | **0.140** | 47.0 | 7.2 | 9.2 | 176 | 0 | 0.472 |
| **OTHER COUNTRIES OR TERRITORIES** | | | | | | | |
| Antigua and Barbuda | - | - | - | - | 17,924 | - | - |
| Bhutan | - | 66.8 | - | 11.3 | 5,607 | - | - |
| Cuba | - | 79.0 | 10.2 | 17.7 | - | - | 0.892 |
| Dominica | - | - | - | 12.5 | 8,549 | - | - |
| Eritrea | - | 60.4 | - | 5.5 | 643 | - | - |
| Grenada | - | 75.8 | - | 13.4 | 7,998 | - | - |
| Iraq | - | 68.5 | 5.6 | 9.7 | - | - | 0.600 |
| Kiribati | - | - | - | 12.3 | 3,715 | - | - |
| Korea, Democratic People's Rep. of | - | 67.7 | - | - | - | - | - |
| Lebanon | - | 72.4 | - | 13.5 | 13,475 | - | - |
| Marshall Islands | - | - | 9.8[b,o] | 13.0 | - | - | 0.766 |
| Monaco | - | - | - | - | - | - | - |
| Nauru | - | - | - | 8.5 | - | - | - |
| Occupied Palestinian Territories | - | 73.9 | - | 13.1 | - | - | - |
| Oman | - | 76.1 | - | 11.1 | 25,653 | - | - |
| Palau | - | - | 12.1[b,o] | 14.9 | - | - | 0.836 |
| Saint Kitts and Nevis | - | - | - | 12.3 | 14,196 | - | - |
| Saint Lucia | - | 74.2 | - | 13.0 | 8,652 | - | - |
| Saint Vincent and the Grenadines | - | 72.0 | - | 13.5 | 8,535 | - | - |
| Samoa | - | 72.2 | - | 12.2 | 4,126 | - | - |
| San Marino | - | - | - | - | - | - | - |
| Seychelles | - | - | - | 14.7 | 19,128 | - | - |
| Somalia | - | 50.4 | - | 1.8[r] | - | - | - |
| Tuvalu | - | - | - | 11.2 | - | - | - |
| Vanuatu | - | 70.8 | - | 10.4 | 3,908 | - | - |

# Human Development Index and its components

| HDI rank | Human Development Index (HDI) value[a] | Life expectancy at birth (years) | Mean years of schooling (years) | Expected years of schooling (years) | Gross national income (GNI) per capita (PPP 2008 $) | GNI per capita rank minus HDI rank | Nonincome HDI value |
|---|---|---|---|---|---|---|---|
| | 2010 | 2010 | 2010 | 2010[b] | 2010 | 2010 | 2010 |
| **Developed** | | | | | | | |
| OECD | **0.879** | 80.3 | 11.4 | 15.9 | 37,077 | - | 0.904 |
| Non-OECD | **0.844** | 80.0 | 10.0 | 13.9 | 42,370 | - | 0.845 |
| **Developing** | | | | | | | |
| Arab States | **0.588** | 69.1 | 5.7 | 10.8 | 7,861 | - | 0.610 |
| East Asia and the Pacific | **0.643** | 72.6 | 7.2 | 11.5 | 6,403 | - | 0.692 |
| Europe and Central Asia | **0.702** | 69.5 | 9.2 | 13.6 | 11,462 | - | 0.740 |
| Latin America and the Caribbean | **0.704** | 74.0 | 7.9 | 13.7 | 10,642 | - | 0.746 |
| South Asia | **0.516** | 65.1 | 4.6 | 10.0 | 3,417 | - | 0.551 |
| Sub-Saharan Africa | **0.389** | 52.7 | 4.5 | 9.0 | 2,050 | - | 0.436 |
| Very high human development | **0.878** | 80.3 | 11.3 | 15.9 | 37,225 | - | 0.902 |
| High human development | **0.717** | 72.6 | 8.3 | 13.8 | 12,286 | - | 0.749 |
| Medium human development | **0.592** | 69.3 | 6.3 | 11.0 | 5,134 | - | 0.634 |
| Low human development | **0.393** | 56.0 | 4.1 | 8.2 | 1,490 | - | 0.445 |
| Least developed countries | **0.386** | 57.7 | 3.7 | 8.0 | 1,393 | - | 0.441 |
| World | **0.624** | 69.3 | 7.4 | 12.3 | 10,631 | - | 0.663 |

**NOTES**

**a** See Appendix I for details on how the HDI is calculated.
**b** Refers to an earlier year than that specified.
**c** To calculate the HDI, unpublished estimates from UNDESA (2009d) were used. The data are not published because the population is below 100,000.
**d** Assumes the same adult mean years of schooling as Switzerland.
**e** Based on the growth rate of GDP per capita in purchasing power parity (PPP) US dollars for Switzerland from IMF (2010a).
**f** Based on data on GDP from the United Nations Statistics Division's National Accounts: Main Aggregates Database, data on population from UNDESA (2009d) and the PPP exchange rate for Switzerland from World Bank ( 2010g).
**g** In keeping with common usage, the Republic of Korea is referred to as South Korea in the body of this Report.
**h** Based on cross-country regression.
**i** Assumes the same adult mean years of schooling as Spain
**j** Based on the growth rate of GDP per capita in PPP US dollars for Spain from IMF (2010a).
**k** Based on data on GDP from the United Nations Statistics Division's National Accounts: Main Aggregates Database, data on population from UNDESA (2009d) and the PPP exchange rate for Spain from World Bank ( 2010g).
**l** 2007 prices.
**m** Based on the ration of GNI in US dollars to GDP in US dollars from World Bank (2010g).
**n** UNESCO Institute for Statistics (2009).
**o** Based on data on years of schooling of adults from household surveys in the World Bank's International Income Distribution Database.
**p** Based on implied PPP conversion factors from IMF (2010a), data on GDP per capita in local currency unit and the ration between GNI and GDP in US dollars from World Bank (2010g).
**q** Based on data from United Nations Children's Fund Multiple Indicator Cluster Surveys.
**r** Refers to primary and secondary education only from UNESCO Institute for Statistics (2010a).
**s** Based on the growth rate of GDP per capita in PPP US dollars for Fiji from IMF (2010a).
**t** Based on data from Measure DHS Demographic and Health Surveys.

**SOURCES**

**Column 1**: Calculated based on data from UNDESA (2009d), Barro and Lee (2010), UNESCO Institute for Statistics (2010a), World Bank (2010g) and IMF (2010a).
**Column 2**: UNDESA (2009d).
**Column 3**: Barro and Lee (2010).
**Column 4**: UNESCO Institute for Statistics (2010a).
**Column 5**: Based on data on GNI per capita and GDP per capita in PPP US dollars (current and constant prices) from World Bank (2010g) and implied growth rates of GDP per capita from IMF (2010a).
**Column 6:** Calculated based on GNI per capita rank and HDI rank.
**Column 7:** Calculated based on data in columns 2-4.

Note:

Appendix II is extracted from United Nations Development Programme (2010), Human Development Report 2010, New York: United Nations Development Programme, pp. 143-147.