

Methodology and Computation of the Global Competitiveness Index 2017–2018

This appendix presents a short description of each pillar of the Global Competitiveness Index 2017–2018 (GCI) and of the application of the concept of stages of development to weight the Index. The appendix also presents the detailed structure of the GCI and explains how the Index is computed.

THE TWELVE PILLARS OF COMPETITIVENESS

We define *competitiveness* as the set of institutions, policies, and factors that determine the level of productivity of a country. The level of productivity, in turn, sets the level of prosperity that can be reached by an economy. The productivity level also determines the rates of return obtained by investments in an economy, which in turn are the fundamental drivers of its growth rates. In other words, a more competitive economy is one that is likely to grow faster over time.

This open-endedness is captured within the GCI by including a weighted average of many different components, each measuring a different aspect of competitiveness. The components are grouped into 12 categories, the pillars of competitiveness:

1st pillar: Institutions

The institutional environment of a country depends on the efficiency and the behavior of both public and private stakeholders. The legal and administrative framework within which individuals, firms, and governments interact determines the quality of the public institutions of a country and has a strong bearing on competitiveness and growth. It influences investment decisions and the organization of production and plays a key role in the ways in which societies distribute the benefits and bear the costs of development strategies and policies. Good private institutions are also important for the sound and sustainable development of an economy. The 2007–08 global financial crisis, along with numerous corporate scandals, has highlighted the relevance of accounting and reporting standards and transparency for preventing fraud and mismanagement, ensuring good governance, and maintaining investor and consumer confidence.

2nd pillar: Infrastructure

Extensive and efficient infrastructure is critical for ensuring the effective functioning of the economy. Effective modes of transport—including high-quality roads, railroads, ports, and air transport—enable entrepreneurs to get their goods and services to market in a secure and timely manner and facilitate the movement of workers to the most suitable jobs. Economies also depend on electricity supplies that are free from interruptions and shortages so that businesses and factories can work unimpeded. Finally, a solid and extensive telecommunications network allows for a rapid and free flow of information, which increases overall economic efficiency by helping to ensure that

businesses can communicate and decisions are made by economic actors taking into account all available relevant information.

3rd pillar: Macroeconomic environment

The stability of the macroeconomic environment is important for business and, therefore, is significant for the overall competitiveness of a country. Although it is certainly true that macroeconomic stability alone cannot increase the productivity of a nation, it is also recognized that macroeconomic disarray harms the economy, as we have seen in recent years, conspicuously in the European context. The government cannot provide services efficiently if it has to make high-interest payments on its past debts. Running fiscal deficits limits the government's future ability to react to business cycles. Firms cannot operate efficiently when inflation rates are out of hand. In sum, the economy cannot grow in a sustainable manner unless the macro environment is stable.

4th pillar: Health and primary education

A healthy workforce is vital to a country's competitiveness and productivity. Workers who are ill cannot function to their potential and will be less productive. Poor health leads to significant costs to business, as sick workers are often absent or operate at lower levels of efficiency. Investment in the provision of health services is thus critical for clear economic, as well as moral, considerations. In addition to health, this pillar takes into account the quantity and quality of the basic education received by the population, which is fundamental in today's economy. Basic education increases the efficiency of each individual worker.

5th pillar: Higher education and training

Quality higher education and training is crucial for economies that want to move up the value chain beyond simple production processes and products. In particular, today's globalizing economy requires countries to nurture pools of well-educated workers who are able to perform complex tasks and adapt rapidly to their changing environment and the evolving needs of the production system. This pillar measures secondary and tertiary enrollment rates as well as the quality of education as evaluated by business leaders. The extent of staff training is also taken into consideration because of the importance of vocational and continuous on-the-job training—which is neglected in many economies—for ensuring a constant upgrading of workers' skills.

6th pillar: Goods market efficiency

Countries with efficient goods markets are well positioned to produce the right mix of products and services given their particular supply-and-demand conditions, as well as to ensure that these goods can be

most effectively traded in the economy. Healthy market competition, both domestic and foreign, is important in driving market efficiency, and thus business productivity, by ensuring that the most efficient firms, producing goods demanded by the market, are those that thrive. Market efficiency also depends on demand conditions such as customer orientation and buyer sophistication. For cultural or historical reasons, customers may be more demanding in some countries than in others. This can create an important competitive advantage, as it forces companies to be more innovative and customer-oriented and thus imposes the discipline necessary for efficiency to be achieved in the market.

7th pillar: Labor market efficiency

The efficiency and flexibility of the labor market are critical for ensuring that workers are allocated to their most effective use in the economy and provided with incentives to give their best effort in their jobs. Labor markets must therefore have the flexibility to shift workers from one economic activity to another rapidly and at low cost, and to allow for wage fluctuations without much social disruption. Efficient labor markets must also ensure clear strong incentives for employees and promote meritocracy at the workplace, and they must provide equity in the business environment between women and men. Taken together these factors have a positive effect on worker performance and the attractiveness of the country for talent, two aspects of the labor market that are growing more important as talent shortages loom on the horizon.

8th pillar: Financial market development

An efficient financial sector allocates the resources saved by a nation's population, as well as those entering the economy from abroad, to the entrepreneurial or investment projects with the highest expected rates of return rather than to the politically connected. Business investment is critical to productivity. Therefore economies require sophisticated financial markets that can make capital available for private-sector investment from such sources as loans from a sound banking sector, well-regulated securities exchanges, venture capital, and other financial products. In order to fulfill all those functions, the banking sector needs to be trustworthy and transparent, and—as has been made so clear recently—financial markets need appropriate regulation to protect investors and other actors in the economy at large.

9th pillar: Technological readiness

The technological readiness pillar measures the agility with which an economy adopts existing technologies to enhance the productivity of its industries, with specific emphasis on its capacity to fully leverage information and communication technologies (ICTs) in daily activities

and production processes for increased efficiency and enabling innovation for competitiveness. Whether the technology used has or has not been developed within national borders is irrelevant for its ability to enhance productivity. The central point is that the firms operating in the country need to have access to advanced products and blueprints and the ability to absorb and use them. Among the main sources of foreign technology, foreign direct investment (FDI) often plays a key role, especially for countries at a less advanced stage of technological development.

10th pillar: Market size

The size of the market affects productivity since large markets allow firms to exploit economies of scale. Traditionally, the markets available to firms have been constrained by national borders. In the era of globalization, international markets have become a substitute for domestic markets, especially for small countries. Thus exports can be thought of as a substitute for domestic demand in determining the size of the market for the firms of a country. By including both domestic and foreign markets in our measure of market size, we give credit to export-driven economies and geographic areas (such as the European Union) that are divided into many countries but have a single common market.

11th pillar: Business sophistication

Business sophistication concerns two elements that are intricately linked: the quality of a country's overall business networks and the quality of individual firms' operations and strategies. These factors are especially important for countries at an advanced stage of development when, to a large extent, the more basic sources of productivity improvements have been exhausted. The quality of a country's business networks and supporting industries, as measured by the quantity and quality of local suppliers and the extent of their interaction, is important for a variety of reasons. When companies and suppliers from a particular sector are interconnected in geographically proximate groups, called *clusters*, efficiency is heightened, greater opportunities for innovation in processes and products are created, and barriers to entry for new firms are reduced.

12th pillar: Innovation

The last pillar focuses on innovation. Innovation is particularly important for economies as they approach the frontiers of knowledge, and the possibility of generating more value by merely integrating and adapting exogenous technologies tends to disappear. In these economies, firms must design and develop cutting-edge products and processes to maintain a competitive edge and move toward even higher value-added activities. This progression requires an

environment that is conducive to innovative activity and supported by both the public and the private sectors. In particular, it means sufficient investment in research and development (R&D), especially by the private sector; the presence of high-quality scientific research institutions that can generate the basic knowledge needed to build the new technologies; extensive collaboration in research and technological developments between universities and industry; and the protection of intellectual property.

The interrelation of the 12 pillars

Although we report the results of the 12 pillars of competitiveness separately, it is important to keep in mind that they are not independent: they tend to reinforce each other, and a weakness in one area often has a negative impact in others. The detailed structure and methodology used to compute the GCI are presented at the end of this appendix.

STAGES OF DEVELOPMENT AND THE WEIGHTED INDEX

Although all of the pillars described above will matter to a certain extent for all economies, it is clear that they affect different economies in different ways.

In line with well-known economic theory of stages of development, the GCI assumes that, in the first stage, the economy is *factor-driven* and countries compete based on their factor endowments—primarily unskilled labor and natural resources.^a Maintaining competitiveness at this stage of development hinges primarily on well-functioning public and private institutions (1st pillar), a well-developed infrastructure (2nd pillar), a stable macroeconomic environment (3rd pillar), and a healthy workforce that has received at least a basic education (4th pillar).

As a country becomes more competitive, productivity will increase and wages will rise with advancing development. Countries will then move into the *efficiency-driven* stage of development, when they must begin to develop more-efficient production processes and increase product quality because wages have risen and they cannot increase prices. At this point, competitiveness is increasingly driven by higher education and training (5th pillar), efficient goods markets (6th pillar), well-functioning labor markets (7th pillar), developed financial markets (8th pillar), the ability to harness the benefits of existing technologies (9th pillar), and a large domestic or foreign market (10th pillar).

Finally, as countries move into the *innovation-driven* stage, wages will have risen by so much that they are able to sustain those higher wages and the associated standard of living only if their businesses are able to compete using the most sophisticated production processes (11th pillar) and by innovating new ones (12th pillar).

Table 1: Subindex weights and income thresholds for stages of development

	STAGE OF DEVELOPMENT				
	Stage 1: Factor-driven	Transition from stage 1 to stage 2	Stage 2: Efficiency-driven	Transition from stage 2 to stage 3	Stage 3: Innovation-driven
GDP per capita (US\$) thresholds*	<2,000	2,000–2,999	3,000–8,999	9,000–17,000	>17,000
Weight for basic requirements	60%	40–60%	40%	20–40%	20%
Weight for efficiency enhancers	35%	35–50%	50%	50%	50%
Weight for innovation and sophistication factors	5%	5–10%	10%	10–30%	30%

Note: See individual economy profiles for exact applied weights.

* For economies with a high dependency on mineral resources, GDP per capita is not the sole criterion for the determination of the stage of development. See text for details.

Table 2: Classification by each stage of development

Stage 1: Factor-driven (35 economies)	Transition from stage 1 to stage 2* (15 economies)	Stage 2: Efficiency-driven (31 economies)	Transition from stage 2 to stage 3* (20 economies)	Stage 3: Innovation-driven (36 economies)
Bangladesh	Algeria (58.2, 36.4, 5.5)	Albania	Argentina (31.2, 50, 18.8)	Australia
Benin	Azerbaijan (54.5, 39.1, 6.4)	Armenia	Chile (28.6, 50, 21.4)	Austria
Burundi	Bhutan (46.5, 45.1, 8.4)	Bosnia and Herzegovina	Costa Rica (32.9, 50, 17.1)	Bahrain
Cambodia	Botswana (53.8, 39.7, 6.6)	Brazil	Croatia (32.3, 50, 17.7)	Belgium
Cameroon	Brunei Darussalam (50.2, 42.3, 7.4)	Bulgaria	Hungary (30.6, 50, 19.4)	Canada
Chad	Honduras (47.8, 44.1, 8)	Cape Verde	Latvia (27.3, 50, 22.7)	Cyprus
Congo, Democratic Rep.	Kazakhstan (43.4, 47.4, 9.1)	China	Lebanon (34.2, 50, 15.8)	Czech Republic
Ethiopia	Kuwait (49.9, 42.6, 7.5)	Colombia	Lithuania (25.3, 50, 24.7)	Denmark
Gambia, The	Mongolia (47.3, 44.5, 8.2)	Dominican Republic	Malaysia (39.1, 50, 10.9)	Estonia
Ghana	Nicaragua (57.6, 36.8, 5.6)	Ecuador	Mauritius (38.9, 50, 11.1)	Finland
Guinea	Nigeria (58.5, 36.1, 5.4)	Egypt	Oman (27.2, 50, 22.8)	France
Haiti	Philippines (41.5, 48.9, 9.6)	El Salvador	Panama (28.4, 50, 21.6)	Germany
India	Ukraine (56.1, 37.9, 6)	Georgia	Poland (31.7, 50, 18.3)	Greece
Kenya	Venezuela (55.5, 38.4, 6.1)	Guatemala	Romania (38.8, 50, 11.2)	Hong Kong SAR
Kyrgyz Republic	Vietnam (56.5, 37.6, 5.9)	Indonesia	Saudi Arabia (36.7, 50, 13.3)	Iceland
Lao PDR		Iran, Islamic Rep.	Seychelles (25.2, 50, 24.8)	Ireland
Lesotho		Jamaica	Slovak Republic (21.3, 50, 28.7)	Israel
Liberia		Jordan	Trinidad and Tobago (24.1, 50, 25.9)	Italy
Madagascar		Mexico	Turkey (35.6, 50, 14.4)	Japan
Malawi		Montenegro	Uruguay (23.3, 50, 26.7)	Korea, Rep.
Mali		Morocco		Luxembourg
Mauritania		Namibia		Malta
Moldova		Paraguay		Netherlands
Mozambique		Peru		New Zealand
Nepal		Russian Federation		Norway
Pakistan		Serbia		Portugal
Rwanda		South Africa		Qatar
Senegal		Sri Lanka		Singapore
Sierra Leone		Swaziland		Slovenia
Tajikistan		Thailand		Spain
Tanzania		Tunisia		Sweden
Uganda				Switzerland
Yemen				Taiwan, China
Zambia				United Arab Emirates
Zimbabwe				United Kingdom
				United States

* For economies in transition, the weights (%) applied to the Basic requirements subindex, Efficiency enhancers subindex, and the Innovation and sophistication factors subindex are reported in parentheses.

The GCI takes the stages of development into account by attributing higher relative weights to those pillars that are more relevant for an economy given its particular stage of development. To implement this concept, the pillars are organized into three subindexes, each critical to a particular stage of development.

The *basic requirements subindex* groups those pillars most critical for countries in the factor-driven stage. The *efficiency enhancers subindex* includes those pillars critical for countries in the efficiency-driven stage. And the *innovation and sophistication factors subindex* includes the pillars critical to countries in the innovation-driven stage.

The weights attributed to each subindex in every stage of development are shown in Table 1.

Two criteria are used to allocate countries into stages of development. The first is the level of GDP per capita at market exchange rates. The thresholds used are also reported in Table 1. A second criterion is used to adjust for countries that, based on income, would have moved beyond stage 1, but where prosperity is based on the extraction of resources. This is measured by the share of exports of mineral goods in total exports (goods and services), and assumes that countries with more than 70 percent of their exports made up of mineral products (measured using a five-year average) are to a large extent factor driven.^b Countries that are resource driven and significantly wealthier than economies at the technological frontier are classified in the innovation-driven stage.^c Any countries falling between two of the three stages are considered to be “in transition.” For these countries, the weights change smoothly as a country develops, reflecting the smooth transition from one stage of development to another. The classification of countries into stages of development is shown in Table 2.

STRUCTURE AND COMPUTATION OF THE INDEX

The computation of the GCI is based on successive aggregations of scores from the indicator level (i.e., the most disaggregated level) all the way up to the overall GCI score. Unless noted otherwise, we use an arithmetic mean to aggregate individual indicators within a category.^d For the higher aggregation levels, we use the percentage shown next to each category. This percentage represents the category’s weight within its immediate parent category. Reported percentages are rounded to the nearest integer, but exact figures are used in the calculation of the GCI. For example, the score a country achieves in the 11th pillar accounts for 50 percent of this country’s score in the *innovation and sophistication factors* subindex, irrespective of the country’s stage of development. Similarly, the score achieved on the subpillar *transport infrastructure* accounts for 50 percent of the score of the infrastructure pillar.

Unlike the case for the lower levels of aggregation, the weight put on each of the three subindexes (*basic requirements*, *efficiency enhancers*, and *innovation and sophistication factors*) is not fixed. Instead, it depends on each country’s stage of development, as discussed in the chapter.^e For instance, in the case of Burundi—a country in the first stage of development—the score in the *basic requirements* subindex accounts for 60 percent of its overall GCI score, while it represents just 20 percent of the overall GCI score of Sweden, a country in the third stage of development. For countries in transition between stages, the weighting applied to each subindex is reported in Table 2 above. For instance, in the case of Turkey, currently in transition from stage 2 to stage 3, the weight on each subindex is 35.6 percent, 50 percent, and 14.4 percent, respectively.

Indicators that are not derived from the Executive Opinion Survey are identified by an asterisk (*) in the following list. Appendix D, Technical Notes and Sources, provides detailed information about each of these indicators. To make the aggregation possible, the indicators are converted to a 1-to-7 scale in order to align them with the Survey results. We apply a min-max transformation, which preserves the order of, and the relative distance between, country scores.^f

Indicators that are followed by the designation “½” enter the GCI in two different pillars. In order to avoid double counting, we assign a half-weight to each instance.^g

	Weight (%) within immediate parent category
BASIC REQUIREMENTS	20–60% ^e
1st pillar: Institutions	25%
A. Public institutions	75%
1. Property rights.....	20%
1.01 Property rights	
1.02 Intellectual property protection ^{1/2}	
2. Ethics and corruption.....	20%
1.03 Diversion of public funds	
1.04 Public trust in politicians	
1.05 Irregular payments and bribes	
3. Undue influence.....	20%
1.06 Judicial independence	
1.07 Favoritism in decisions of government officials	
4. Public-sector performance.....	20%
1.08 Wastefulness of government spending	
1.09 Burden of government regulation	
1.10 Efficiency of legal framework in settling disputes	
1.11 Efficiency of legal framework in challenging regulations	
1.12 Transparency of government policymaking	
5. Security.....	20%
1.13 Business costs of terrorism	
1.14 Business costs of crime and violence	
1.15 Organized crime	
1.16 Reliability of police services	
B. Private institutions	25%
1. Corporate ethics.....	50%
1.17 Ethical behavior of firms	
2. Accountability.....	50%
1.18 Strength of auditing and reporting standards	
1.19 Efficacy of corporate boards	
1.20 Protection of minority shareholders' interests	
1.21 Strength of investor protection*	
2nd pillar: Infrastructure	25%
A. Transport infrastructure	50%
2.01 Quality of overall infrastructure	
2.02 Quality of roads	
2.03 Quality of railroad infrastructure ^h	
2.04 Quality of port infrastructure	
2.05 Quality of air transport infrastructure	
2.06 Available airline seat kilometers*	
B. Electricity and telephony infrastructure	50%
2.07 Quality of electricity supply	
2.08 Mobile telephone subscriptions* ^{1/2}	
2.09 Fixed telephone lines* ^{1/2}	
3rd pillar: Macroeconomic environment	25%
3.01 Government budget balance*	
3.02 Gross national savings*	
3.03 Inflation* ⁱ	
3.04 Government debt*	
3.05 Country credit rating*	
4th pillar: Health and primary education	25%
A. Health	50%
4.01 Business impact of malaria ^j	
4.02 Malaria incidence* ^j	
4.03 Business impact of tuberculosis ^j	
4.04 Tuberculosis incidence* ^j	
4.05 Business impact of HIV/AIDS ^j	

4.06 HIV prevalence* ^j	
4.07 Infant mortality*	
4.08 Life expectancy*	

B. Primary education	50%
4.09 Quality of primary education	
4.10 Primary education enrollment rate*	

EFFICIENCY ENHANCERS35–50%^e

5th pillar: Higher education and training.....17%

A. Quantity of education.....33%

5.01 Secondary education enrollment rate*	
5.02 Tertiary education enrollment rate*	

B. Quality of education.....33%

5.03 Quality of the educational system	
5.04 Quality of math and science education	
5.05 Quality of management schools	
5.06 Internet access in schools	

C. On-the-job training.....33%

5.07 Local availability of specialized research and training services	
5.08 Extent of staff training	

6th pillar: Goods market efficiency17%

A. Competition.....67%

1. Domestic competition.....variable^k

6.01 Intensity of local competition	
6.02 Extent of market dominance	
6.03 Effectiveness of anti-monopoly policy	
6.04 Effect of taxation on incentives to invest	
6.05 Total tax rate*	
6.06 Number of procedures required to start a business ^l	
6.07 Time required to start a business* ^l	
6.08 Agricultural policy costs	

2. Foreign competition.....variable^k

6.09 Prevalence of trade barriers	
6.10 Trade tariffs*	
6.11 Prevalence of foreign ownership	
6.12 Business impact of rules on FDI	
6.13 Burden of customs procedures	
6.14 Imports as a percentage of GDP* ^m	

B. Quality of demand conditions.....33%

6.15 Degree of customer orientation	
6.16 Buyer sophistication	

7th pillar: Labor market efficiency17%

A. Flexibility.....50%

7.01 Cooperation in labor-employer relations	
7.02 Flexibility of wage determination	
7.03 Hiring and firing practices	
7.04 Redundancy costs*	
7.05 Effect of taxation on incentives to work	

B. Efficient use of talent.....50%

7.06 Pay and productivity	
7.07 Reliance on professional management ^{1/2}	
7.08 Country capacity to retain talent	
7.09 Country capacity to attract talent	
7.10 Female participation in labor force*	

8th pillar: Financial market development.....17%**A. Efficiency.....50%**

- 8.01 Financial services meeting business needs
- 8.02 Affordability of financial services
- 8.03 Financing through local equity market
- 8.04 Ease of access to loans
- 8.05 Venture capital availability

B. Trustworthiness and confidence50%

- 8.06 Soundness of banks
- 8.07 Regulation of securities exchanges
- 8.08 Legal rights index*

9th pillar: Technological readiness17%**A. Technological adoption.....50%**

- 9.01 Availability of latest technologies
- 9.02 Firm-level technology absorption
- 9.03 FDI and technology transfer

B. ICT use.....50%

- 9.04 Internet users*
- 9.05 Broadband Internet subscriptions*
- 9.06 Internet bandwidth*
- 9.07 Mobile broadband subscriptions*
- 2.08 Mobile telephone subscriptions*^{1/2}
- 2.09 Fixed telephone lines*^{1/2}

10th pillar: Market size.....17%**A. Domestic market size75%**

- 10.01 Domestic market size index*ⁿ

B. Foreign market size25%

- 10.02 Foreign market size index*⁰

INNOVATION AND SOPHISTICATION FACTORS5–30%^e**11th pillar: Business sophistication50%**

- 11.01 Local supplier quantity
- 11.02 Local supplier quality
- 11.03 State of cluster development
- 11.04 Nature of competitive advantage
- 11.05 Value chain breadth
- 11.06 Control of international distribution
- 11.07 Production process sophistication
- 11.08 Extent of marketing
- 11.09 Willingness to delegate authority
- 7.07 Reliance on professional management^{1/2}

12th pillar: R&D Innovation.....50%

- 12.01 Capacity for innovation
- 12.02 Quality of scientific research institutions
- 12.03 Company spending on R&D
- 12.04 University-industry collaboration in R&D
- 12.05 Government procurement of advanced technology products
- 12.06 Availability of scientists and engineers
- 12.07 PCT patent applications*
- 1.02 Intellectual property protection^{1/2}

NOTES

- a See Chapter 1.1 of *The Global Competitiveness Report 2007–2008* for a complete description of how we have adapted Michael Porter's theory for the present application.

- b In order to capture the resource intensity of the economy, we use as a proxy the exports of mineral products as a share of overall exports according to the sector classification developed by the International Trade Centre in their Trade Performance Index. In addition to crude oil and gas, this category also contains all metal ores and other minerals as well as petroleum products, liquefied gas, coal, and precious stones. The data used cover the years 2012 through 2016. Further information on these data can be found at <http://www.intracen.org/itc/market-info-tools/trade-statistics/>

All countries with more than 70 percent of their exports made up of mineral products are considered to be to some extent factor driven. The stage of development for these countries is adjusted downward smoothly depending on the exact primary export share. The higher the minerals export share, the stronger the adjustment and the closer the country will move to stage 1. For example, a country that exports 95 percent of mineral exports and that, based on the income criteria, would be in stage 3 will be in transition between stages 1 and 2. The income and primary exports criteria are weighted identically. Stages of development are dictated solely by income for countries that export less than 70 percent minerals. Countries that export only primary products would automatically fall into the factor-driven stage (stage 1).

- c In practice, this applies to countries where the GDP per capita at current market prices has, for the past five years, been above an average of that of economies at the technology frontier. Countries at the technology frontier are the 10 countries with the highest number of Patent Cooperation Treaty patent applications per capita.

- d Formally, for a category i composed of K indicators, we have:

$$category_i = \frac{\sum_{k=1}^K indicator_k}{K}$$

- e As described above, the weights are as specified in Table 1 of this appendix. Refer to individual country/economy profiles at the end of this *Report* for the exact weights used in the computation of each economy's GCI score.

- f Formally, we have:

$$6 \times \left(\frac{\text{country score} - \text{sample minimum}}{\text{sample maximum} - \text{sample minimum}} \right) + 1$$

The *sample minimum* and *sample maximum* are, respectively, the lowest and highest country scores in the sample of economies covered by the GCI. In some instances, adjustments were made to account for extreme outliers. For those indicators for which a higher value indicates a worse outcome (e.g., disease incidence, government debt), the transformation formula takes the following form, thus ensuring that 1 and 7 still correspond to the worst and best possible outcomes, respectively:

$$-6 \times \left(\frac{\text{country score} - \text{sample minimum}}{\text{sample maximum} - \text{sample minimum}} \right) + 7$$

- g For those categories that contain one or several half-weight indicators, country scores are computed as follows:

$$\frac{(\text{sum of scores on full-weight variables}) + \frac{1}{2} \times (\text{sum of scores on half-weight variables})}{(\text{count of full-weight variables}) + \frac{1}{2} \times (\text{count of half-weight variables})}$$

- h "N/Apl." is used for economies where there is no regular train service or where the network covers only a negligible portion of the territory. Assessment of the existence of a network was conducted by the World Economic Forum based on various sources.

- i In order to capture the idea that both high inflation and deflation are detrimental, inflation enters the model in a U-shaped manner as follows: for values of inflation between 0.5 and 2.9 percent, a country receives the highest possible score of 7. Outside this range, scores decrease linearly as they move away from these values.

- j The impact of malaria, tuberculosis, and HIV/AIDS on competitiveness depends not only on their respective incidence rates but also on how costly they are for business. Therefore, in order to estimate the impact of each of the three diseases, we combine its incidence rate with the Survey question on its perceived cost to businesses. To combine these data we first take the ratio of each country's disease incidence rate relative to the highest incidence rate in the whole sample. The inverse of this ratio is then multiplied by each country's score on the related Survey question. This product is then normalized to a 1-to-7 scale. Note that countries with zero reported incidence receive a 7, regardless of their scores on the related Survey question. In the case of malaria, countries receive a 7 if the World Health Organization (WHO) has classified them as malaria-free countries or included them in the supplementary list of areas where malaria has never existed or has disappeared without specific measures.
- k The *competition* subpillar is the weighted average of two components: *domestic competition* and *foreign competition*. In both components, the included indicators provide an indication of the extent to which competition is distorted. The relative importance of these distortions depends on the relative size of domestic versus foreign competition. This interaction between the domestic market and the foreign market is captured by the way we determine the weights of the two components. Domestic competition is the sum of consumption (C), investment (I), government spending (G), and exports (X), while foreign competition is equal to imports (M). Thus we assign a weight of $(C + I + G + X)/(C + I + G + X + M)$ to *domestic competition* and a weight of $M/(C + I + G + X + M)$ to *foreign competition*.
- l Indicators 6.06 and 6.07 combine to form one single indicator.
- m For indicator 6.14, imports as a percentage of GDP, we first apply a log-transformation and then a min-max transformation.
- n The size of the domestic market is constructed by taking the natural log of the sum of the gross domestic product valued at purchased power parity (PPP) (indicator 10.03) plus the total value (PPP estimates) of imports of goods and services (indicator 6.14), minus the total value (PPP estimates) of exports of goods and services (indicator 10.04). Data are then normalized on a 1-to-7 scale. PPP estimates of imports and exports are obtained by taking the product of exports as a percentage of GDP and GDP valued at PPP.
- o The size of the foreign market is estimated as the natural log of the total value (PPP estimates) of exports of goods and services, normalized on a 1-to-7 scale. PPP estimates of exports are obtained by taking the product of exports as a percentage of GDP (indicator 10.04) and GDP valued at PPP (10.03).