

Appendix III Sources and definitions

This appendix complements the Economy profiles and the online data tables by providing the title, description, definition and source for each of the 81 indicators included in the Global Innovation Index (GII) this year.

For all 132 economies in the GIIn 2021, the most recent values, within the period 2011 to 2020, were used for each indicator, with a few noted exceptions (see Appendix I). The year provided next to the indicator description (directly below the indicator title) corresponds to the year when data were most frequently available for economies. When more than one year is considered, the period used is indicated at the end of the indicator's source in parentheses.

Of the 81 indicators, 63 variables are hard data, 15 are composite indicators, marked with (*), and 3 are survey questions from the World Economic Forum's Executive Opinion Survey (EOS), marked with (!). In some cases, additional markings are provided at the end of the indicator description. Instances marked with ^a signal indicators that were assigned half weights and those marked ^b are indicators where higher scores indicate poorer outcomes, commonly known as "bads." Appendix I presents more details on the computation.

Some indicators are scaled during computation to make them comparable across economies. Indicators are scaled either in relation to other comparable indicators or through division by gross domestic product (GDP) in current U.S. dollars, purchasing power parity GDP in international dollars (PPP\$ GDP), population, total trade, etc. In all cases, the scaling factor used was the value that corresponded to the same year of the indicator.



1. Institutions

1.1. Political environment

1.1.1. Political and operational stability*

Political, legal, operational or security risk index^{*ab} | 2020

Index that measures the likelihood and severity of political, legal, operational or security risks affecting business operations. Scores are annualized and standardized.

Source: IHS Markit, *Country Risk Scores*, aggregated for end Q1, Q2, Q3 and Q4 2020. (<https://ihsmarkit.com/industry/economics-country-risk.html>).

1.1.2. Government effectiveness*

Government effectiveness index* | 2019

Index that reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Scores are standardized.

Source: World Bank, *Worldwide Governance Indicators*, 2019 update. (<http://info.worldbank.org/governance/wgi/#home>).

1.2. Regulatory environment

1.2.1. Regulatory quality*

Regulatory quality index^{*a} | 2019

Index that reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private-sector development. Scores are standardized.

Source: World Bank, *Worldwide Governance Indicators*, 2019 update. (<http://info.worldbank.org/governance/wgi/#home>).

1.2.2. Rule of law*

Rule of law index^{*a} | 2019

Index that reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police and the courts, as well as the likelihood of crime and violence. Scores are standardized.

Source: World Bank, *Worldwide Governance Indicators*, 2019 update. (<http://info.worldbank.org/governance/wgi/#home>).

1.2.3. Cost of redundancy dismissal

Sum of notice period and severance pay for redundancy dismissal (salary in weeks, averages for workers with 1, 5 and 10 years of tenure, with a minimum threshold of 8 weeks)^b | 2019

Redundancy costs measure the cost of advance notice requirements and severance payments due when terminating a redundant worker, expressed in weeks of salary. The average value of notice requirements and severance payments applicable to a worker with 1 year of tenure, a worker with 5 years, and a worker with 10 years are also considered. One month is recorded as 4 and 1/3 weeks. If the redundancy cost adds up to 8 or fewer weeks of salary, a value of 8 is assigned but the actual number of weeks is published. If the cost adds up to more than 8 weeks of salary, the score is the number of weeks.

Source: World Bank, *Doing Business 2020, Comparing Business Regulation in 190 Economies*. The World Bank has temporarily suspended its *Doing Business* data collection but it will be resumed at a later stage. (<https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020>).

1.3. Business environment

1.3.1. Ease of starting a business*

Ease of starting a business* | 2019

The ranking of economies on the ease of starting a business is determined by sorting their scores. These scores are the simple average of the scores for each of the component indicators. The World Bank's *Doing Business* records all procedures officially required, or commonly undertaken in practice, for an entrepreneur to start up and formally operate an industrial or commercial business, as well as the time and cost to complete these procedures and the paid-in minimum capital requirement. These procedures include obtaining all necessary licenses and permits and completing any required notifications, verifications or inscriptions for the company and employees with relevant authorities. Data are collected from limited liability companies based in the largest business cities. For 11 economies, namely Bangladesh, Brazil, China, India, Indonesia, Japan, Mexico, Nigeria, Pakistan, the Russian Federation and the United States of America, the data are also collected for the second-largest business cities.

Source: World Bank, *Doing Business 2020, Comparing Business Regulation in 190 Economies*. The World Bank has temporarily suspended its *Doing Business* data collection but it will be resumed at a later stage. (<https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020>).

1.3.2. Ease of resolving insolvency*

Ease of resolving insolvency* | 2019

Doing Business studies the time, cost and outcome of insolvency proceedings involving domestic legal entities. These variables are used to calculate the recovery rate, which is recorded as cents on the dollar recovered by secured creditors through reorganization, liquidation or debt enforcement (foreclosure or receivership) proceedings. To determine the present value of the amount recovered by creditors, *Doing Business* uses the lending rates from the International Monetary Fund, supplemented with data from central banks and the Economist Intelligence Unit.

The data for the resolving insolvency indicators are derived from questionnaire responses by local insolvency practitioners and verified through a study of laws and regulations as well as public information on insolvency systems. The ranking of economies on the ease of resolving insolvency is determined by taking the simple average of their scores for the recovery rate and the strength of the insolvency framework index. More information on the methodology is available on the *Doing Business* website (<https://www.doingbusiness.org/en/methodology/resolving-insolvency>).

Source: World Bank, *Doing Business 2020, Comparing Business Regulation in 190 Economies*. The World Bank has temporarily suspended its *Doing Business* data collection but it will be resumed at a later stage. (<https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020>).



2. Human capital and research

2.1. Education

2.1.1. Expenditure on education, % GDP

Government expenditure on education (% of GDP) | 2017

Total general (local, regional and central) government expenditure on education (current, capital and transfers), expressed as a percentage of GDP. It includes expenditure funded by transfers from international sources to government.

Source: UNESCO Institute for Statistics (UIS) online database and Eurostat (2010–19). (<http://data.uis.unesco.org>; <https://ec.europa.eu/eurostat/data/database>).

2.1.2. Government funding/pupil, secondary, % GDP/cap

Government funding per secondary pupil (% of GDP per capita) | 2017

Average total (current, capital and transfers) general government expenditure per student, at secondary level, expressed as a percentage of GDP per capita.

Source: UNESCO Institute for Statistics (UIS) online database (2010–19). (<http://data.uis.unesco.org>).

2.1.3. School life expectancy, years

School life expectancy, primary to tertiary education, both sexes (years) | 2018

Total number of years that a person of school entrance age can expect to spend within the primary to tertiary levels of education. For a child of a given age, the school life expectancy is calculated as the sum of the age-specific enrolment rates for primary to tertiary levels of education. The part of the enrolment that is not distributed by age is divided by the school-age population for the primary to tertiary level of education in which they are enrolled and multiplied by the duration of that level of education. The result is then added to the sum of the age-specific enrolment rates. A relatively high value indicates a greater probability of children spending more years in education and a higher overall retention rate within the education system. It must be noted that the expected number of years does not necessarily coincide with the expected number of grades of education completed due to grade repetition.

Source: UNESCO Institute for Statistics (UIS) online database (2010–20). (<http://data.uis.unesco.org>).

2.1.4. PISA scales in reading, maths and science

PISA scales in reading, mathematics and science^a | 2018

PISA is the OECD's (Organisation for Economic Co-operation and Development) Programme for International Student Assessment. PISA measures 15-year-olds' ability to use their reading, mathematics and science knowledge skills. Results from PISA indicate the quality and equity of learning outcomes attained around the world. The 2018 PISA survey is the seventh round of the triennial assessment.

The indicator is built using the average of the reading, mathematics and science scores for each country. PISA scores are set in relation to the variation in results observed across all test participants in a country. There is, theoretically, no minimum or maximum score in PISA; rather, the results are scaled to fit approximately normal distributions, with means around 500 score points and standard deviations around 100 score points.

The 2018 scores for China correspond to the provinces/municipalities of Beijing, Shanghai, Jiangsu and Zhejiang only. The 2018 scores for Azerbaijan correspond only to the capital Baku. The 2018 average scores for Spain are based only on the scores for mathematics and science, as the reading scores were not published by the OECD due to implausible student response behavior.

Source: OECD Programme for International Student Assessment (PISA) (2015–18). (www.pisa.oecd.org).

2.1.5. Pupil–teacher ratio, secondary

Pupil–teacher ratio, secondary^{ab} | 2019

The number of pupils enrolled in secondary school divided by the number of secondary school teachers (regardless of their teaching assignment). Where the data are missing for the secondary education level as a whole, the ratios for upper-secondary are reported; if these are also missing, the ratios for lower-secondary are reported instead. A high pupil–teacher ratio suggests that each teacher has to be responsible for a large number of pupils. In other words, the higher the pupil–teacher ratio, the lower the relative access of pupils to teachers.

Source: UNESCO Institute for Statistics (UIS) online database (2010–20). (<http://data.uis.unesco.org>).

2.2. Tertiary education

2.2.1. Tertiary enrolment, % gross

School enrolment, tertiary (% gross) | 2018

The ratio of total tertiary enrolment, regardless of age, to the population of the age group that officially corresponds to the tertiary level of education. Tertiary education, whether or not at an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level. The school enrolment ratio can exceed 100% due to grade repetition and the inclusion of under-aged and over-aged students, who are early or late entrants.

Source: UNESCO Institute for Statistics (UIS) online database (2010–20). (<http://data.uis.unesco.org>).

2.2.2. Graduates in science and engineering, %

Graduates from Science, Technology, Engineering and Mathematics programs (% of total tertiary graduates) | 2018

The share of all tertiary-level graduates in natural sciences, mathematics, statistics, information and technology, manufacturing, engineering and construction as a percentage of all tertiary-level graduates. Data for Israel, Japan, Mexico, the Republic of Korea, the United Kingdom and the United States of America are taken from the OECD Main Science and Technology Indicators database. Data for Malta, Portugal and Romania are taken from Eurostat.

Source: UNESCO Institute for Statistics (UIS) online database; Eurostat database; and OECD, Main Science and Technology Indicators (MSTI) database, March 2021 (2010–20). (<http://data.uis.unesco.org>; <https://ec.europa.eu/eurostat/data/database>; https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB).

2.2.3. Tertiary inbound mobility, %

Tertiary inbound mobility rate (%)^a | 2018

The number of students from abroad studying in a given country as a percentage of the total tertiary-level enrolment in that country.

Source: UNESCO Institute for Statistics (UIS) online database (2010–19). (<http://data.uis.unesco.org>).

2.3. Research and development (R&D)

2.3.1. Researchers FTE/mn pop.

Researchers, full-time equivalent (FTE) (per million population) | 2019

Researchers in R&D are professionals engaged in the conception or creation of new knowledge. They conduct research and improve or develop concepts, theories, models, techniques, instrumentation, software or operational methods. Data collected from UNESCO Institute for Statistics, Eurostat and OECD Main Science and Technology Indicators.

Source: UNESCO Institute for Statistics (UIS) online database; Eurostat; OECD, Main Science and Technology Indicators (MSTI) database, March 2021 (2010–19). (<http://data.uis.unesco.org>; <https://ec.europa.eu/eurostat/data/database>; https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB).

2.3.2. Gross expenditure on R&D (GERD), % GDP

Gross expenditure on R&D (% of GDP) | 2019

Total domestic intramural expenditure on R&D during a given period as a percentage of GDP. “Intramural R&D expenditure” is all expenditure for R&D performed within a statistical unit or sector of the economy during a specific period, regardless of the source of funding. Data collected from UNESCO Institute for Statistics, Eurostat and OECD Main Science and Technology Indicators.

Source: UNESCO Institute for Statistics (UIS) online database; Eurostat, Eurostat database; OECD, Main Science and Technology Indicators (MSTI) database, 2021 (2010–19). (<http://data.uis.unesco.org>; <https://ec.europa.eu/eurostat/data/database>; https://stats.oecd.org/Index.aspx?DataSet-Code=MSTI_PUB).

2.3.3. Global corporate R&D investors, top 3, mn US\$

Average expenditure of the top three global companies by R&D, million US\$ | 2020

Average expenditure on R&D of the top three global companies. If a country has fewer than three global companies listed, the figure is either the average of the sum of the two companies listed or the total for a single listed company. A score of 0 is given to countries with no listed companies. The data include economies outside the European Union (EU).

Source: The 2020 EU Industrial R&D Investment Scoreboard. (<https://iri.jrc.ec.europa.eu/scoreboard/2020-eu-industrial-rd-investment-scoreboard>).

2.3.4. QS university ranking, top 3*

Average score of the top three universities according to the QS world university ranking* | 2020

Average score of the top three universities per country. If fewer than three universities are listed in the QS ranking of the global top 1,000 universities, the sum of the scores of the listed universities is divided by three, thus implying a score of zero for the non-listed universities. The 2021 ranking corresponds to data extracted in 2020.

Source: QS Quacquarelli Symonds Ltd, *QS World University Ranking, Top Universities*. (<https://www.topuniversities.com/university-rankings/world-university-rankings/2021>).



3. Infrastructure

3.1. Information and communication technologies (ICTs)

3.1.1. ICT access*

ICT access index^{*a} | 2019

The ICT access index, previously part of the International Telecommunication Union (ITU) ICT Development Index, is a composite index that weights five ICT indicators (20% each): (1) Fixed telephone subscriptions per 100 inhabitants; (2) Mobile cellular telephone subscriptions per 100 inhabitants; (3) International Internet bandwidth (bit/s) per Internet user; (4) Percentage of households with a computer; and (5) Percentage of households with Internet access.

Source: GII calculations based on the World Telecommunication/ICT Indicators Database (released January 2020) following the methodology of the ITU ICT Development Index 2017. (<https://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2017.aspx>).

3.1.2. ICT use*

ICT use index^{*a} | 2019

The ICT use index, previously part of the International Telecommunication Union (ITU) ICT Development Index, is a composite index that weights three ICT indicators (one third each): (1) Percentage of individuals using the Internet; (2) Fixed (wired) broadband Internet subscriptions per 100 inhabitants; (3) Active mobile broadband subscriptions per 100 inhabitants.

Source: GII calculations based on the World Telecommunication/ICT Indicators Database (released January 2020) following the methodology of the ITU ICT Development Index 2017. (<https://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2017.aspx>).

3.1.3. Government's online service*

Government's online service index^{*a} | 2020

The Online Services Index component of the E-Government Development Index is a composite indicator measuring the use of ICTs by governments in delivering public services at the national level. To arrive at a set of Online Service Index values for 2020, a total of 215 online United Nations Volunteer researchers from 96 countries, covering 66 languages, assessed each country's national website in the native language, including the national portal, e-services portal and e-participation portal, as well as the websites of the related ministries of education, labor, social

services, health, finance and environment, as applicable. The total number of points scored by each country is normalized to a range of 0 to 1. The online index value for a given country is equal to the actual total score less the lowest total score divided by the range of total score values for all countries.

Note: The precise meaning of these values varies from one edition of the Survey to the next, as understanding of the potential of e-government changes and the underlying technology evolves. See the link below for more details.

Source: United Nations Public Administration Network, *E-Government Survey 2020*. (<https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020>).

3.1.4. E-participation*

Online E-Participation Index^{*a} | 2020

The E-Participation Index (EPI) is derived as a supplementary index to the United Nations E-Government Survey. It extends the scope of the Survey by focusing on government use of online services in providing information to its citizens (“e-information sharing”), interacting with stakeholders (“e-consultation”) and engaging in decision-making processes (“e-decision-making”). A country’s EPI reflects the e-participation mechanisms that are deployed by its government in comparison to all other countries. The purpose of this measure is not to prescribe any specific practice, but rather to offer insight into how different countries are using online tools to promote interaction between government and citizens, as well as between citizens, for the benefit of all. As the EPI is a qualitative assessment based on the availability and relevance of participatory services available on government websites, the comparative ranking of countries is for illustrative purposes only and serves as an indicator of the broad trends in promoting citizen engagement. The index ranges from 0 to 1, with 1 showing greater e-participation. Mathematically, the EPI is normalized by taking the total score value for a given country, subtracting the lowest total score for any country in the survey and dividing by the range of total score values for all countries.

Note: The precise meaning of these values varies from one edition of the Survey to the next, as understanding of the potential of e-government changes and the underlying technology evolves. See the link below for more details.

Source: United Nations Public Administration Network, *E-Government Survey 2020*. (<https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020>).

3.2. General infrastructure

3.2.1. Electricity output, GWh/mn pop.

Electricity output (GWh per million population)^a | 2018

Electricity production, measured at the terminals of all alternator sets in a station. In addition to hydropower, coal, oil, gas and nuclear power generation, this indicator covers generation by geothermal, solar, wind, tide and wave energy, as well as that from combustible renewables and waste. Production includes the output of plants that are designed to produce solely electricity as well as the output of combined heat and power plants. Electricity output in GWh is scaled by population.

Source: International Energy Agency (IEA) *World Energy Balances*, July 2020 edition and February 2021 edition (selected economies) (2018–19). (<https://www.iea.org/reports/world-energy-balances-overview>).

3.2.2. Logistics performance*

Logistics Performance Index^{*a} | 2018

A multidimensional assessment of logistics performance, the Logistics Performance Index (LPI) ranks 160 countries, combining data on six core performance components into a single aggregate measure including customs performance, infrastructure quality and timeliness of shipments. The data used in the ranking come from a survey of logistics professionals who are asked questions about the foreign countries in which they operate. The LPI’s six components are: (1) Customs: the efficiency of customs and border management clearance; (2) Infrastructure: the quality of trade and transport infrastructure; (3) International shipments: the ease of arranging competitively priced shipments; (4) Services quality: the competence and quality of logistics services; (5) Tracking and tracing: the ability to track and trace consignments; and (6) Timeliness: the frequency with which shipments reach consignees within scheduled or expected delivery times. The LPI therefore consists of both qualitative and quantitative measures and helps to build profiles of logistics friendliness for these countries.

Source: World Bank and Turku School of Economics, *Logistics Performance Index 2018*; Arvis *et al.*, 2018, *Connecting to Compete 2018: Trade Logistics in the Global Economy – The Logistics Performance Index and its Indicators*. (<https://data.worldbank.org/indicator/LP.LPI.OVRL.XQ>; <https://openknowledge.worldbank.org/bitstream/handle/10986/29971/LPI2018.pdf>).

3.2.3. Gross capital formation, % GDP

Gross capital formation (% of GDP) | 2020

Gross capital formation is expressed as the ratio of total investment in current local currency to GDP in current local currency. Investment or gross capital formation is measured by the total value of the gross fixed capital formation and changes in inventories and acquisitions less disposals of valuables for a unit or sector, on the basis of the System of National Accounts (SNA) 1993.

Source: International Monetary Fund, World Economic Outlook Database, October 2020. (<https://www.imf.org/en/Publications/SPROLLs/world-economic-outlook-databases>).

3.3. Ecological sustainability

3.3.1. GDP/unit of energy use

GDP per total energy supply (per thousand 2015 PPP\$ GDP) | 2018

Purchasing power parity gross domestic product (2015 PPP\$ GDP) per total energy supply (TES). TES is made up of the cost of production + imports – exports – international marine bunkers – international aviation bunkers +/- stock changes. GDP/TES is an indicator of energy productivity.

Source: International Energy Agency (IEA) *World Energy Balances*, July 2020 edition (2018–19). (<https://www.iea.org/reports/world-energy-balances-overview>)

3.3.2. Environmental performance*

Environmental Performance Index* | 2020

The 2020 Environmental Performance Index (EPI) ranks 180 countries on different categories covering environmental health and ecosystem vitality. These indicators provide a gauge of how close countries are to achieving established environmental policy targets. The EPI offers a scorecard that highlights leaders and laggards in environmental performance and provides practical guidance for countries that aspire to move toward a sustainable future. The index ranges from 0 to 100, with 100 indicating best performance.

Source: Yale University and Columbia University, 2020 Environmental Performance Index. (<https://epi.yale.edu/epi-results/2020/component/epi>).

3.3.3. ISO 14001 environmental certificates/bn PPP\$ GDP

ISO 14001 Environmental management systems – Number of certificates issued (per billion PPP\$ GDP) | 2019

ISO 14001 specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance. ISO 14001 is intended for use by an organization that is seeking to manage its environmental responsibilities in a systematic manner that contributes to the environmental pillar of sustainability. ISO 14001 helps an organization to achieve the intended outcomes of its environmental management system, providing value for the environment, the organization itself and interested parties. Consistent with the organization's environmental policy, the intended outcomes of an environmental management system include enhancement of environmental performance, fulfillment of compliance obligations and achievement of environmental objectives. ISO 14001 is applicable to any organization, regardless of size, type or nature, and applies to the environmental aspects of its activities, products and services that the organization determines it can either control or influence from a life cycle perspective. ISO 14001 does not state specific environmental performance criteria. It can be used in whole or in part to systematically improve environmental management. Claims of conformity to ISO 14001, however, are not acceptable unless all its requirements are incorporated into an organization's environmental management system and fulfilled without exclusion. The data are reported per billion PPP\$ GDP.

Source: International Organization for Standardization, *ISO Survey of Certifications to Management System Standards*, 2019; International Monetary Fund, World Economic Outlook Database, October 2020. (<https://www.iso.org/the-iso-survey.html>; <https://www.imf.org/en/Publications/SPROLLs/world-economic-outlook-databases>).



4. Market sophistication

4.1. Credit

4.1.1. Ease of getting credit*

Ease of getting credit* | 2019

The ranking of economies on the ease of getting credit is determined by sorting their scores for getting credit.

These scores are the score for the sum of the strength of the legal rights index (range 0–12) and the depth of credit information index (range 0–8). The World Bank's *Doing Business* measures the legal rights of borrowers and lenders with respect to secured transactions through one set of indicators and the reporting of credit information through another. The first set of indicators measures whether certain features that facilitate lending exist within the applicable collateral and bankruptcy laws. The second set measures the coverage, scope and accessibility of credit information available through credit reporting service providers, such as credit bureaus or credit registries. Although *Doing Business* compiles data on getting credit for public registry coverage (% of adults) and for private bureau coverage (% of adults), these indicators are not included in the ranking.

Source: World Bank, *Doing Business 2020, Comparing Business Regulation in 190 Economies*. The World Bank has temporarily suspended its *Doing Business* data collection but it will be resumed at a later stage. (<https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020>).

4.1.2. Domestic credit to private sector, % GDP

Domestic credit to private sector (% of GDP) | 2019

Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not allow transferable deposits but do accept such liabilities as time and savings deposits). Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds and foreign exchange companies.

Source: International Monetary Fund, International Financial Statistics and data files; World Bank and OECD GDP estimates; extracted from the World Bank's World Development Indicators database (2010–19). (<https://data.imf.org>; <http://data.worldbank.org>).

4.1.3. Microfinance gross loans, % GDP

Microfinance institutions: Gross loan portfolio (% of GDP)^a | 2018

Combined gross loan balances of microfinance institutions (current US\$) in a country as a percentage of its GDP (current US\$).

Source: Microfinance Information Exchange, MIX Market database; International Monetary Fund, World Economic Outlook Database, October 2020 (2011–19). (<https://datacatalog.worldbank.org/dataset/mix-market>; <https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx>).

4.2. Investment

4.2.1. Ease of protecting minority investors*

Ease of protecting minority investors* | 2019

This ranking is the sum of the scores for the extent of conflict of interest regulation index and the extent of shareholder governance index. The extent of conflict of interest regulation index measures the protection of shareholders against directors' misuse of corporate assets for personal gain by distinguishing three aspects of regulation that address conflicts of interest: (1) transparency of related-party transactions (extent of disclosure index); (2) shareholders' ability to sue and hold directors liable for self-dealing (extent of director liability index); (3) access to evidence and allocation of legal expenses in shareholder litigation (ease of shareholder suits index). The extent of shareholder governance index measures shareholders' rights in corporate governance by distinguishing three aspects of good governance: (1) shareholders' rights and role in major corporate decisions (extent of shareholder rights index); (2) governance safeguards protecting shareholders from undue board control and entrenchment (extent of ownership and control index); (3) corporate transparency on ownership stakes, compensation, audits and financial prospects (extent of corporate transparency index). The index also measures whether a subset of relevant rights and safeguards are available in limited companies. The data come from a questionnaire administered to corporate and securities lawyers and are based on securities regulations, company laws, civil procedure codes and court rules of evidence.

Source: World Bank, *Doing Business 2020, Comparing Business Regulation in 190 Economies*. The World Bank has temporarily suspended its *Doing Business* data collection but it will be resumed at a later date. (<https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020>).

4.2.2. Market capitalization, % GDP

Market capitalization of listed domestic companies (% of GDP, three-year average) | 2019

Market capitalization (also known as “market value”) is the share price times the number of shares outstanding (including their several classes) for listed domestic companies. Investment funds, unit trusts, and companies whose only business goal is to hold shares of other listed companies are excluded. Data are the average of the end-of-year values for the last three years.

Source: World Federation of Exchanges database; extracted from the World Bank’s World Development Indicators database (2011–19). (<https://www.world-exchanges.org/our-work/statistics>; <http://data.worldbank.org>).

4.2.3. Venture capital investors, deals/bn PPP\$ GDP

Number of venture capital deals invested in (per billion PPP\$ GDP, three-year average) | 2020

Refinitiv Eikon data on private equity deals, per deal, with information on the location of the firm investing in a venture capital (VC) deal, among other details. The data extraction corresponds to a query on VC deals between January 1, 2018 and December 31, 2020, with the data aggregated by the location of the investing firm. The data represent the three-year average of 2018–20 deals invested in and are reported per billion PPP\$ GDP.

Source: Refinitiv (a London Stock Exchange Group (LSEG) business) Eikon (private equity screener) accessed April 23, 2021; International Monetary Fund, World Economic Outlook Database, October 2020 (2018–20). (<https://solutions.refinitiv.com/eikon-trading-software>; <https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases>).

4.2.4. Venture capital recipients, deals/bn PPP\$ GDP

Number of venture capital deals received (per billion PPP\$ GDP, three-year average) | 2020

Refinitiv data on private equity deals, per deal, with information on the location of the firm receiving the VC investment, among other details. The data extraction corresponds to a query on VC deals between January 1, 2018 and December 31, 2020, with the data aggregated by the location invested

in. The data represent the three-year average of 2018–20 deals received and are reported per billion PPP\$ GDP.

Source: Refinitiv (an LSEG business) Eikon (private equity screener) accessed April 23, 2021; International Monetary Fund, World Economic Outlook Database October 2020 (2018–20). (<https://solutions.refinitiv.com/eikon-trading-software>; <https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases>).

4.3. Trade, diversification, and market scale

4.3.1. Applied tariff rate, weighted avg., %

Tariff rate, applied, weighted average, all products (%)^{ab} | 2019

Weighted average applied tariff is the average of effectively applied rates weighted by the product import shares corresponding to each partner country. Data are classified using the Harmonized System of trade at the six- or eight-digit level. Tariff line data were matched to Standard International Trade Classification (SITC) revision 3 codes to define commodity groups and import weights. As far as possible, specific rates have been converted to their ad valorem equivalent rates and have been included in the calculation of weighted average tariffs. Effectively applied tariff rates at the six- and eight-digit product level are averaged for products in each commodity group. When the effectively applied rate is unavailable, the most favored nation rate is used instead.

Source: World Bank, based on data from United Nations Conference on Trade and Development’s (UNCTAD) Trade Analysis Information System (TRAINS) database and the World Trade Organization’s (WTO) Integrated Database (IDB) and Consolidated Tariff Schedules (CTS) Database; extracted from World Bank’s World Development Indicators database (2013–19). (<http://data.worldbank.org>; <https://www.wto.org>).

4.3.2. Domestic industry diversification

Domestic industry diversification (based on manufacturing output)^b | 2018

Herfindahl-Hirschman Index (HHI) for the domestic industry defined as the sum of the squared shares of sub-sectors in total manufacturing output. The HHI is a measure of concentration and can help to determine the extent to which a country’s industrial system is diversified across different industrial sub-sectors (or, conversely, concentrated in a few industrial sub-sectors). In the context of measuring domestic industry diversification, the HHI is calculated by squaring the shares of individual

sub-sectors in total domestic manufacturing output and then summing the squares. A country with a perfectly diversified industrial system will have an index close to zero, whereas a country that is active in only one industrial sub-sector will have a value of one (least diversified). That is, the more diversified a country's industry is, the lower its HHI value will be.

Source: United Nations Industrial Development Organization (UNIDO), Industrial Statistics Database, two-digit level of International Standard Industrial Classification (ISIC) Revision 3 (INDSTAT 2 2021); EQUIP (Enhancing the Quality of Industrial Policies) *Tool 4: Diversification – Domestic and Export Dimensions*, 2015 (2011–19) (<http://stat.unido.org>; www.equip-project.org/wp-content/uploads/2015/08/EQUIP_Tool-4_V150821.pdf).

4.3.3. Domestic market scale, bn PPP\$

Domestic market scale as measured by GDP, bn PPP\$ | 2020

The domestic market size is measured by GDP based on the PPP valuation of country GDP, in current international dollars (billions).

Source: International Monetary Fund, World Economic Outlook Database, October 2020. (<https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases>).



5. Business sophistication

5.1. Knowledge workers

5.1.1. Knowledge-intensive employment, %

Employment in knowledge-intensive services (% of workforce) | 2019

Sum of people in categories 1 to 3 as a percentage of total people employed, according to the International Standard Classification of Occupations (ISCO). Categories included in ISCO-08 are: 1 Managers; 2 Professionals; 3 Technicians and Associate Professionals. Where ISCO-08 data were not available, ISCO-88 data were used. Categories included in ISCO-88 are: 1 Legislators, senior officials and managers; 2 Professionals; 3 Technicians and associate professionals.

Source: International Labour Organization (ILO), ILOSTAT Database of Labour Statistics (2010–20). (www.ilo.org/ilostat).

5.1.2. Firms offering formal training, %

Firms offering formal training (% of firms) | 2019

The percentage of firms offering formal training programs for their permanent, full-time employees in the sample of firms in the World Bank's Enterprise Survey in each country.

Source: World Bank, Enterprise Surveys (2010–20). (www.enterprisesurveys.org).

5.1.3. GERD performed by business, % GDP

GERD: Performed by business enterprise (% of total GDP) | 2019

Gross expenditure on R&D performed by business enterprise as a percentage of GDP. For the definition of GERD, see indicator 2.3.2.

Source: UNESCO Institute for Statistics (UIS) online database; Eurostat, Eurostat database; OECD, Main Science and Technology Indicators (MSTI) database, 2019 (2010–19). (<http://data.uis.unesco.org>; <https://ec.europa.eu/eurostat/data/database>; https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB).

5.1.4. GERD financed by business, %

GERD financed by business enterprise (% of total GERD) | 2018

Gross expenditure on R&D financed by business enterprise as a percentage of total gross expenditure on R&D. For the definition of GERD, see indicator 2.3.2. Plurinational State of Bolivia and Burkina Faso use data for 2009.

Source: UNESCO Institute for Statistics (UIS) online database; Eurostat, Eurostat database; OECD, Main Science and Technology Indicators (MSTI) database, 2019 (2010–19). (<http://data.uis.unesco.org>; <https://ec.europa.eu/eurostat/data/database>; https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB).

5.1.5. Females employed w/advanced degrees, %
Females employed with advanced degrees, % total employed (25+ years old)^a | 2019

The percentage of females employed with advanced degrees out of total employed. The employed comprise all persons of working age who, during a specified brief period, were in one of the following categories: (1) paid employment; or (2) self-employment. Data are disaggregated by level of education, which refers to the highest level of education completed, classified according to the International Standard Classification of Education (ISCE). Data for Canada are based on Table 14-10-0020-01 of the country's Labour Force Survey estimates.

Source: International Labour Organization, ILOSTAT Database of Labour Statistics; Statistics Canada. Table 14-10-0020-01 Unemployment rate, participation rate and employment rate by educational attainment, annual, accessed February 10, 2020 (2011–20). (www.ilo.org/ilostat; <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410002001>).

5.2. Innovation linkages

5.2.1. University–industry R&D collaboration[†]

The extent to which businesses and universities collaborate on R&D^{†a} | 2020

Average answer to the survey question: In your country, to what extent do businesses and universities collaborate on research and development (R&D)? [1 = not at all; 7 = to a great extent]

Source: World Economic Forum, Executive Opinion Survey 2020 (2018–20), Appendix C of *The Global Competitiveness Report 2020*. (www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2020.pdf).

5.2.2. State of cluster development and depth[†]
How widespread clusters are[†] | 2020

Average answer to the survey question: In your country, how widespread are well-developed and deep clusters (geographic concentrations of firms, suppliers, producers of related products and services, and specialized institutions in a particular

field)? [1 = nonexistent; 7 = widespread in many fields].

Source: World Economic Forum, Executive Opinion Survey 2020 (2018–20), Appendix C of *The Global Competitiveness Report 2020*. (www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2020.pdf).

5.2.3. GERD financed by abroad, % GDP

GERD financed by abroad (% of total GDP) | 2018

Percentage of gross expenditure on R&D financed by abroad (billions, national currency) – that is, with foreign financing as a percentage of GDP (billions, national currency). For the definition of GERD, see indicator 2.3.2.

Source: UNESCO Institute for Statistics (UIS) online database; Eurostat, Eurostat database; OECD, Main Science and Technology Indicators (MSTI) database, 2019 (2010–19). (<http://data.uis.unesco.org>; <https://ec.europa.eu/eurostat/data/database>; https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB).

5.2.4. Joint venture/strategic alliance deals/bn PPP\$ GDP

Number of joint venture/strategic alliance deals, fractional counting (per billion PPP\$ GDP, three-year average) | 2020

Refinitiv's data on joint ventures/strategic alliances, per deal, with details on the country of origin of partner firms, among others. The data extraction corresponds to a query on joint venture/strategic alliance deals between January 1, 2018 and December 31, 2020. The nation of each company participating in a deal (n companies per deal) is allocated, per deal, a score equivalent to $1/n$ (with the effect that all country scores add up to the total number of deals). The data are reported per billion PPP\$ GDP.

Source: Refinitiv (an LSEG business) SDC Platinum database; International Monetary Fund World Economic Outlook Database, October 2020. (<https://www.refinitiv.com/en/financial-data/deals-data/joint-venture-deals>; <https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases>).

5.2.5. Patent families/bn PPP\$ GDP

Number of patent families filed in at least two offices (per billion PPP\$ GDP) | 2017

A patent family is a set of interrelated patent applications filed in one or more countries or jurisdictions to protect the same invention. Patent families containing applications filed in at least two

different offices is a subset of patent families where protection of the same invention is sought in at least two different countries. In this report, “patent families data” refers to patent families containing applications filed in at least two intellectual property (IP) offices; the data are scaled by PPP\$ GDP (billions). A patent is a set of exclusive rights granted by law to applicants for inventions that are new, non-obvious and industrially applicable. A patent is valid for a limited period of time (generally 20 years) and within a defined territory. The patent system is designed to encourage innovation by providing innovators with time-limited exclusive legal rights, thus enabling them to reap the rewards of their innovative activity.

Source: World Intellectual Property Organization, Intellectual Property Statistics; International Monetary Fund, World Economic Outlook Database, October 2020. (www.wipo.int/ipstats; <https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases>).

5.3. Knowledge absorption

5.3.1. Intellectual property payments, % total trade

Charges for use of intellectual property, i.e., payments (% of total trade, three-year average) | 2019

Charges for the use of intellectual property not included elsewhere, i.e., payments (% of total trade), average of three most recent years or most recent. Value is calculated according to the Extended Balance of Payments Services Classification EBOPS 2010 – that is, code SH: Charges for the use of intellectual property not included elsewhere, as a percentage of total trade. Total trade is defined as the sum of total imports of code G goods and code SOX commercial services (excluding government goods and services not included elsewhere) plus total exports of code G goods and code SOX commercial services (excluding government goods and services not included elsewhere), divided by 2. According to the sixth edition of the International Monetary Fund's *Balance of Payments Manual*, the item “Goods” covers general merchandise, net exports of goods under merchanting and non-monetary gold. The “commercial services” category is defined as being equal to “services” minus “government goods and services not included elsewhere.” Receipts are between residents and non-residents for the use of proprietary rights (such as patents, trademarks, copyrights, industrial processes and designs, including trade secrets and franchises), and for licenses to reproduce or distribute (or both) intellectual property embodied in produced originals or prototypes (such as copyrights on books and manuscripts, computer software,

cinematographic works and sound recordings) and related rights (such as for live performances and television, cable or satellite broadcast).

Source: World Trade Organization, Trade in Commercial Services database, values based on the classification of the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual* and Balance of Payments database. (<https://www.imf.org/external/pubs/ft/bop/2007/pdf/bpm6.pdf>; www.oecd.org/std/its/EBOPS-2010.pdf).

5.3.2. High-tech imports, % total trade

High-tech imports (% of total trade) | 2019

High-technology imports as a percentage of total trade. High-technology exports and imports contain technical products with a high intensity of R&D, defined by the Eurostat classification, which is based on Standard International Trade Classification (SITC) Revision 4 and the OECD definition. Commodities belong to the following sectors: aerospace; computers and office machines; electronics – telecommunications; pharmacy; scientific instruments; electrical machinery; chemistry; non-electrical machinery; and armament.

Source: World Trade Organization, United Nations, Comtrade Database; Eurostat, *Annex 5: High-tech aggregation by SITC Rev. 4*, April 2009 (2015–19). (<http://comtrade.un.org>; http://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an5.pdf).

5.3.3. ICT services imports, % total trade

Telecommunications, computer, and information services imports (% of total trade)^a | 2019

Telecommunications, computer, and information services as a percentage of total trade according to the OECD's Extended Balance of Payments Services Classification EBOPS 2010, coded SI: Telecommunications, computer, and information services. For the definition of total trade, see indicator 5.3.1.

Source: World Trade Organization, Trade in Commercial Services database, values based on the classification of the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual* and Balance of Payments database. (<https://www.imf.org/external/pubs/ft/bop/2007/pdf/bpm6.pdf>; www.oecd.org/std/its/EBOPS-2010.pdf).

5.3.4. FDI net inflows, % GDP

Foreign direct investment (FDI), net inflows (% of GDP, three-year average)^a | 2019

Foreign direct investment is the average of the most recent three years of net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This data series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP.

Source: International Monetary Fund, International Financial Statistics and Balance of Payments databases, World Bank, International Debt Statistics, and World Bank and OECD GDP estimates; extracted from the World Bank's World Development Indicators database, 2019 (2018–19). (<http://data.worldbank.org>).

5.3.5. Research talent, % in businesses

Researchers in business enterprise (%) | 2019

Researchers in the business enterprise sector (measured in full-time equivalence, FTE) refers to researchers as professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, as well as in the management of these projects, broken down by the sectors in which they are employed (business enterprise, government, higher education and private non-profit organizations). In the context of R&D statistics, the business enterprise sector includes all firms, organizations and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price, and the mainly private non-profit institutions serving them; the core of this sector is made up of private enterprises.

Source: UNESCO Institute for Statistics (UIS) online database; Eurostat; OECD, Main Science and Technology Indicators (MSTI) database, March 2021 (2010–19). (<http://data.uis.unesco.org>; <https://ec.europa.eu/eurostat/data/database>; https://stats.oecd.org/Index.aspx?DataSet-Code=MSTI_PUB).



6. Knowledge and technology outputs

6.1. Knowledge creation

6.1.1. Patents by origin/bn PPP\$ GDP

Number of resident patent applications filed at a given national or regional patent office (per billion PPP\$ GDP) | 2019

The definition of a patent can be found in the description of indicator 5.2.5. A resident patent application refers to an application filed with an IP office for or on behalf of the first-named applicant's country of residence. For example, an application filed with the Japan Patent Office by a resident of Japan is considered a resident application for Japan. Similarly, an application filed with the European Patent Office (EPO) by an applicant who resides in any of the EPO member states, for example Germany, is considered a resident application for that member state (Germany). Data are scaled by PPP\$ GDP (billions).

Source: World Intellectual Property Organization, Intellectual Property Statistics; International Monetary Fund, World Economic Outlook Database, October 2020 (2010–19). (www.wipo.int/ipstats; <https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases>).

6.1.2. PCT patents by origin/bn PPP\$ GDP

Number of Patent Cooperation Treaty applications (per billion PPP\$ GDP)^a | 2020

A PCT application refers to an international patent application filed through the WIPO-administered Patent Cooperation Treaty (PCT). The PCT system makes it possible to seek patent protection for an invention simultaneously in a number of countries by filing a single international patent application. The origin of PCT applications is defined by the residence of the first-named applicant. Data are available only for those economies which are PCT Contracting States (153 to date). Data are scaled by PPP\$ GDP (billions).

Source: World Intellectual Property Organization, Intellectual Property Statistics; International Monetary Fund, World Economic Outlook Database, October 2020. (www.wipo.int/ipstats; <https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases>).

6.1.3. Utility models by origin/bn PPP\$ GDP

Number of resident utility model applications filed at the national patent office (per billion PPP\$ GDP) | 2019

A utility model (UM) is a special form of patent right. The terms and conditions for granting a UM are slightly different from those for patents and include a shorter term of protection and less stringent patentability requirements. A resident UM application refers to an application filed with an IP office for or on behalf of the first-named applicant's country of residence. For example, an application filed with the IP office of Germany by a resident of Germany is considered a resident application for Germany. Data are scaled by PPP\$ GDP (billions).

Source: World Intellectual Property Organization, Intellectual Property Statistics; International Monetary Fund, World Economic Outlook Database, October 2020 (2010–19). (www.wipo.int/ipstats; <https://www.imf.org/en/Publications/SPROLLs/world-economic-outlook-databases>).

6.1.4. Scientific and technical articles/bn PPP\$ GDP

Number of scientific and technical journal articles (per billion PPP\$ GDP) | 2020

The number of articles published in science and technology. This encompasses 182 different research categories belonging to research areas including engineering, chemistry, physics, environmental sciences, computer science, mathematics, biochemistry, molecular biology, oncology, agriculture, cell biology and many more. Article counts are taken from a set of journals covered by the Science Citation Index Expanded (SCIE) and the Social Sciences Citation Index (SSCI). Articles are classified by year of publication and assigned to each economy on the basis of the institutional address(es) listed in the article.

Articles are counted on a count basis (rather than a fractional basis) – that is, for articles with collaborating institutions from multiple economies, each economy receives credit on the basis of its participating institutions. The data are reported per billion PPP\$ GDP.

Source: Clarivate, Web of Science, accessed March 15, 2021; International Monetary Fund, *World Economic Outlook Database*, October 2020. (<https://clarivate.com/webofsciencegroup/solutions/web-of-science>; <https://www.imf.org/en/Publications/SPROLLs/world-economic-outlook-databases>).

6.1.5. Citable documents H-index

The H-index is the economy's number of published articles (H) that have received at least H citations | 2020

The H-index expresses the journal's number of articles (H) that have received at least H citations. It quantifies both journal scientific productivity and scientific impact, and is also applicable to scientists, journals, and so on. The H-index is tabulated from the number of citations received in subsequent years by articles published in a given year, divided by the number of articles published that year.

Source: SCImago (2021) SJR – SCImago Journal & Country Rank, retrieved March 2021. (www.scimagojr.com).

6.2. Knowledge impact

6.2.1. Labor productivity growth, %

Growth rate of GDP per person employed (% , three-year average) | 2020

Growth rate of real GDP per person employed, average of three most recent available years (2018, 2019, 2020). Growth of GDP per person engaged provides a measure of labor productivity (defined as output per unit of labor input). GDP per person employed is GDP divided by total employment in the economy.

Source: The Conference Board Total Economy Database™ Output, Labor and Labor Productivity, 1950–2020, April 2021 preliminary release. (<https://www.conference-board.org/data/economydatabase>).

6.2.2. New businesses/th pop. 15–64

New business density (new registrations per thousand population, 15–64 years old)^a | 2018

Number of newly registered corporations per 1,000 persons of working-age (15–64 years old). The units of measurement are private, formal sector companies with limited liability. Data corrections relative to the 2016 survey were implemented by the World Bank for Panama.

Source: World Bank, *Doing Business 2020, Entrepreneurship Project* (2009–18). (<https://www.doingbusiness.org/en/data/exploretopics/entrepreneurship>).

6.2.3. Software spending, % GDP

Total computer software spending
(% of GDP) | 2020

Computer software spending includes the total value of purchased or leased packaged software, such as operating systems, database systems, programming tools, utilities and applications. It excludes expenditures for internal software development and outsourced custom software development. The data are a combination of actual figures and estimates. Data are reported as a percentage of GDP.

Source: IHS Markit, Information and Communication Technology Database. (<https://www.ihs.com/index.html>).

6.2.4. ISO 9001 quality certificates/bn PPP\$ GDP

ISO 9001 Quality management systems – number of certificates issued (per billion PPP\$ GDP) | 2019

ISO 9001 specifies requirements for a quality management system when an organization needs to demonstrate its ability to provide products and services that meet both customer and applicable statutory and regulatory requirements. It aims to enhance customer satisfaction through the effective application of the system, including processes for improving the system and ensuring conformity to customer and applicable statutory and regulatory requirements. All the requirements of ISO 9001 are generic and are intended to be applicable to any organization, regardless of its type or size, or the products and services it provides. The data are reported per billion PPP\$ GDP.

Source: International Organization for Standardization (ISO), *ISO Survey of Certifications to Management System Standards*, 2019; International Monetary Fund, World Economic Outlook database, October 2020. (<https://www.iso.org/the-iso-survey.html>; <https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases>).

6.2.5. High-tech manufacturing, %

High-tech and medium-high-tech manufacturing
(% of total manufacturing output) | 2018

High-technology and medium-high-technology output as a percentage of total manufacturing output, on the basis of the OECD classification of Technology Intensity Definition, itself based on International Standard Industrial Classification (ISIC) Revision 4 and ISIC Revision 3, and using data from the INDSTAT 2 database of the United Nations Industrial Development Organization (UNIDO).

Source: United Nations Industrial Development Organization (UNIDO), Industrial Statistics Database INDSTAT 2, 2020; OECD, Directorate for Science, Technology and Industry, Economic Analysis and Statistics Division, “ISIC Rev. 3 Technology Intensity Definition: Classification of Manufacturing Industries into Categories Based on R&D Intensities” (2010–18). (<https://stat.unido.org>; www.oecd.org/sti/ind/48350231.pdf).

6.3. Knowledge diffusion

6.3.1. Intellectual property receipts, % total trade

Charges for use of intellectual property, i.e., receipts (% total trade, three-year average)^a | 2019

Charges for the use of intellectual property not included elsewhere, i.e. receipts (% of total trade), average of three most recent years or most recent. Value is calculated according to the Extended Balance of Payments Services Classification EBOPS 2010 – that is, code SH: Charges for the use of intellectual property not included elsewhere, as a percentage of total trade. Receipts are between residents and non-residents for the use of proprietary rights (such as patents, trademarks, copyrights, industrial processes and designs, including trade secrets and franchises), and for licenses to reproduce or distribute (or both) intellectual property embodied in produced originals or prototypes (such as copyrights on books and manuscripts, computer software, cinematographic works and sound recordings) and related rights (such as for live performances and television, cable, or satellite broadcast). For the definition of total trade, see indicator 5.3.1.

Source: World Trade Organization, Trade in Commercial Services database, values based on the classification of the sixth (2009) edition of the International Monetary Fund’s *Balance of Payments and International Investment Position Manual* and Balance of Payments database (2010–19). (<https://www.imf.org/external/pubs/ft/bop/2007/pdf/bpm6.pdf>; www.oecd.org/std/its/EBOPS-2010.pdf).

6.3.2. Production and export complexity

The Economic Complexity Index^a | 2018

The Economic Complexity Index is a ranking of countries based on the diversity and complexity of their export basket. High-complexity countries are home to a range of sophisticated, specialized capabilities and are therefore able to produce a highly diversified set of complex products. Determining the economic complexity of a country is not solely dependent on a country’s productive knowledge. Information about how many capabilities the country has is contained not only in

the absolute number of products that it makes, but also in the ubiquity of those products (the number of countries that export the product) and in the sophistication and diversity of the products that those other countries make. Economic complexity expresses the diversity and sophistication of the productive capabilities embedded in the exports of each country.

Source: The Atlas of Economic Complexity, Growth Lab at Harvard University. (<https://atlas.cid.harvard.edu>).

6.3.3. High-tech exports, % total trade

High-tech exports (% of total trade) | 2019

High-technology exports as a percentage of total trade. See indicator 5.3.2 for details. Data for Hong Kong, China are corrected for re-exports using data from the Trade Data Monitor.

Source: World Trade Organization, United Nations, Comtrade database; Eurostat, *Annex 5: High-tech aggregation by SITC Rev. 4*, April 2009 (2015–19). (<http://comtrade.un.org>; https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an5.pdf).

6.3.4. ICT services exports, % total trade

Telecommunications, computer, and information services exports (% of total trade) | 2019

Telecommunications, computer, and information services as a percentage of total trade according to the Extended Balance of Payments Services Classification EBOPS 2010, coded SI: Telecommunications, computer, and information services.

Source: Source: World Trade Organization, Trade in Commercial Services database, values based on the classification of the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual* and Balance of Payments database (2019). (<https://www.imf.org/external/pubs/ft/bop/2007/pdf/bpm6.pdf>; www.oecd.org/std/its/EBOPS-2010.pdf).



7. Creative outputs

7.1. Intangible assets

7.1.1. Trademarks by origin/bn PPP\$ GDP

Number of classes in resident trademark applications issued at a given national or regional office (per billion PPP\$ GDP) | 2019

A trademark is a sign used by the owner of certain products or provider of certain services to distinguish them from the products or services of other companies. A trademark can consist of words or a combination of words and other elements, such as slogans, names, logos, figures and images, letters, numbers, sounds and moving images. The procedures for registering trademarks are governed by the legislation and procedures of national and regional IP offices. Trademark rights are limited to the jurisdiction of the IP office that registers the trademark. Trademarks can be registered by filing an application at the relevant national or regional office(s) or by filing an international application through the Madrid System. A resident trademark application refers to an application filed with an IP office for or on behalf of the first-named applicant's country of residence. For example, an application filed with the Japan Patent Office by a resident of Japan is considered to be a resident application for Japan. Similarly, an application filed with the Office for Harmonization in the Internal Market (OHIM) by an applicant who resides in any of the EU member states, such as France, is considered to be a resident application for that member state (France). This indicator is based on class count – the total number of goods and services classes specified in resident trademark applications. Data are scaled by PPP\$ GDP (billions).

Source: World Intellectual Property Organization, Intellectual Property Statistics; International Monetary Fund, World Economic Outlook Database, October 2020 (2012–19). (www.wipo.int/ipstats; <https://www.imf.org/en/Publications/SPROLLs/world-economic-outlook-databases>).

7.1.2. Global brand value, top 5,000, % GDP

Global brand value of the top 5,000 brands (per billion PPP\$ GDP) | 2020

Sum of global brand values, top 5,000 as a percentage of GDP. Brand Finance calculates brand value using the royalty relief methodology, which determines the value that a company would be willing to pay to license its brand if it did not own it. The methodology is compliant with industry standards set in ISO 10668. This approach involves estimating the future revenue attributable to a brand and calculating a royalty rate that would be

charged for the use of the brand. Brand Finance's study is based on publicly available information on the largest brands in the world. This indicator assesses the economy's brands in the top 5,000 global brand database and produces the sum of the brand values corresponding to that economy. This sum is then scaled by GDP. A score of 0 is assigned where there are no brands in the country that make the top 5,000 ranking. A score of n/a is assigned where Brand Finance has been unable to determine if there are brands from the country that would rank within the top 5,000 due to data availability limitations.

Source: Brand Finance database; International Monetary Fund, World Economic Outlook Database, October 2020. (<https://brandirectory.com>; <https://brandfinance.com/knowledge-centre>; <https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases>).

7.1.3. Industrial designs by origin/bn PPP\$ GDP

Number of designs contained in resident industrial design applications filed at a given national or regional office (per billion PPP\$ GDP)^a | 2019

An industrial design is a set of exclusive rights granted by law to applicants to protect the ornamental or aesthetic aspect of their products. An industrial design is valid for a limited period of time and within a defined territory. A resident industrial design application refers to an application filed with the IP office for or on behalf of the applicant's country of residence. For example, an application filed with the Japan Patent Office by a resident of Japan is considered to be a resident application for Japan. Similarly, an application filed with the Office for Harmonization in the Internal Market (OHIM) by an applicant who resides in any of the OHIM member states, such as Italy, is considered to be a resident application for that member state (Italy). This indicator is based on design count – the total number of designs contained in the resident industrial design applications. Data are scaled by PPP\$ GDP (billions).

Source: World Intellectual Property Organization, Intellectual Property Statistics; International Monetary Fund, World Economic Outlook Database, October 2020 (2014–19). (www.wipo.int/ipstats; <https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases>).

7.1.4. ICTs and organizational model creation[†]

Extent to which ICTs enable new organizational models[†] | 2018

Average answer to the question: In your country, to what extent do ICTs enable new organizational models (e.g., virtual teams, remote working, telecommuting) within companies? [1 = not at all; 7 = to a great extent]

Source: World Economic Forum, Executive Opinion Survey 2019. (www3.weforum.org/docs/WEF_GCR_2019_Appendix_B.pdf).

7.2. Creative goods and services

7.2.1. Cultural and creative services exports, % total trade

Cultural and creative services exports (% of total trade)^a | 2019

Creative services exports as a percentage of total exports according to the Extended Balance of Payments Services Classification EBOPS 2010 – that is, EBOPS code SI3: Information services; code SJ22: Advertising, market research, and public opinion polling services; code SK1: Audio-visual and related services; and code SK23: Heritage and recreational services as a percentage of total trade. See indicator 5.3.1 for the full definition of total trade.

Source: World Trade Organization, Trade in Commercial Services database, values based on the classification of the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual* and Balance of Payments database (2011–19). (<https://timeseries.wto.org>; www.oecd.org/std/its/EBOPS-2010.pdf).

7.2.2. National feature films/mn pop. 15–69

Number of national feature films produced (per million population, 15–69 years old)^a | 2017

A feature film is defined as a film with a running time of 60 minutes or longer. It includes works of fiction, animation and documentaries. It is intended for commercial exhibition in cinemas. Feature films produced exclusively for television broadcasting, as well as newsreels and advertising films, are excluded. Data are reported per million population aged 15–69 years old.

Source: UNESCO Institute for Statistics (UIS) online database; United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2019 Revision* (population) (2010–17). (<http://data.uis.unesco.org>; <https://population.un.org/wpp>).

7.2.3. Entertainment and media market/th pop. 15–69

Global entertainment and media market (per thousand population, 15–69 years old)^a | 2020

The Global Entertainment & Media Outlook (the Outlook) is a comprehensive source of global analyses and five-year forecasts of consumer and advertising spending across different territories and entertainment and media segments.

The E-sports dataset has been expanded with the addition of E-sports media rights, providing a richer picture of this fast-emerging market. A number of changes have also been made to the segmentation of the Outlook to better reflect the shape of the modern entertainment and media market. The Music and Radio segments have been merged, along with the new Podcasts data, to create the new Music, radio and podcasts segment, reflecting the growing interconnectedness of the audio entertainment market. Additionally, the Video games segment has been merged with E-sports to create the new Video games and e-sports segment, capturing the close relationship between the two markets.

The figures for Algeria, Bahrain, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, the Islamic Republic of Iran, Malta, Tunisia and Yemen were estimated from a total corresponding to Middle East and North Africa (MENA) countries using a breakdown of total GDP (current US\$) for the above-mentioned countries to define referential percentages.

Source: Calculations were derived from PwC's *Global Entertainment and Media Outlook, 2020–2024*; United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2019 Revision* (population); World Economic Outlook Database, October 2020 (current US\$ GDP); Middle East & North Africa in the World Bank's DataBank. (www.pwc.com/outlook; <https://population.un.org/wpp>; <https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases>; <http://data.worldbank.org/region/middle-east-and-north-africa>).

7.2.4. Printing and other media, % manufacturing

Printing publications and other media output (% of manufacturing total output)^a | 2018

Printing and reproduction of recorded media output (ISIC Revision 4 Division 18, group 181 with class 1811 and 1812 and group 182 with class 1820) as a percentage of total manufacturing output (ISIC Revision 4, section C). Where data for ISIC Revision 4 were not available, data from ISIC Revision 3 were used (ISIC Revision 3 group 222, classes 2221, 2222 and 2230).

Source: United Nations Industrial Development Organization, Industrial Statistics Database; four-digit level of International Standard Industrial Classification (ISIC) Revision 4 (INDSTAT 4 2020) and ISIC Revision 3 (2010–18). (<https://stat.unido.org>).

7.2.5. Creative goods exports, % total trade

Creative goods exports (% of total trade) | 2019

Total value of creative goods exports (current US\$) over total trade. For the definition of total trade, see indicator 5.3.1.

Source: United Nations, Comtrade database; 2009 UNESCO Framework for Cultural Statistics, Table 3, *International trade of cultural goods and services defined with the Harmonised System (HS) 2007 codes*; World Trade Organization, Trade in Commercial Services database, itself based on the sixth (2009) edition of the International Monetary Fund's *Balance of Payments and International Investment Position Manual* and Balance of Payments database (2012–19). (<http://comtrade.un.org>; <https://unstats.un.org/unsd/statcom/doc10/BG-FCS-E.pdf>; https://www.wto.org/english/res_e/statis_e/tradeserv_stat_e.htm; <https://www.oecd.org/sdd/its/EBOPS-2010.pdf>).

7.3. Online creativity

7.3.1. Generic top-level domains (TLDs)/th pop. 15–69

Generic top-level domains (TLDs) (per thousand population, 15–69 years old) | 2020

A generic top-level domain (TLD) is one of the categories of TLDs maintained by the Internet Assigned Numbers Authority (IANA) for use on the Internet. Generic TLDs can be unrestricted (.com, .info, .net and .org) or restricted – that is, used on the basis of fulfilling eligibility criteria (.biz, .name and .pro). Of these, the statistic covers the five generic domains .biz, .info, .org, .net and .com. Generic domains .name and .pro, and sponsored domains (.arpa, .aero, .asia, .cat, .coop, .edu, .gov, .int, .jobs, .mil, .museum, .tel and .travel) are not included. Neither are country-code top-level domains (refer to indicator 7.3.2). The statistic represents the total number of registered domains (i.e., net totals by December 2020, existing domains + new registrations – expired domains). Data are collected on the basis of a 4 percent random sample of the total population of domains drawn from the root zone files (a complete listing of active domains) for each TLD. The geographic location of a domain is determined by the registration address for the domain name registrant that is returned from a whois query. These registration data are parsed by country and

postal code and then aggregated to any number of geographic levels, such as county, city or economy. The original hard data were scaled by thousand population, 15–69 years old. For confidentiality reasons, only normalized values are reported; while relative positions are preserved, magnitudes are not.

Source: ZookNIC Inc; United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2019 Revision* (population). (www.zooknic.com; <https://population.un.org/wpp>).

7.3.2. Country-code TLDs/th pop. 15–69

Country-code top-level domains (TLDs) (per thousand population, 15–69 years old) | 2020

A country-code top-level domain (TLD) is one of the categories of TLDs maintained by the Internet Assigned Numbers Authority (IANA) for use on the Internet. Country-code TLDs are two-letter domains especially designated for a particular economy, country or autonomous territory. The statistic represents the total number of registered domains (i.e., net totals by December 2020, existing domains + new registrations – expired domains). Data are collected from the registry responsible for each country-code TLD and represent the total number of domain registrations in the country-code TLD. Each country-code TLD is assigned to the country with which it is associated rather than based on the registration address of the registrant. ZookNIC reports that, for the country-code TLDs it covers, 85–100 percent of domains are registered in the same country; the only exceptions are the country-code TLDs that have been licensed for worldwide commercial use. Data are reported per thousand population, 15–69 years old. For confidentiality reasons, only normalized values are reported; while relative positions are preserved, magnitudes are not.

Source: ZookNIC Inc; United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2019 Revision* (population). (www.zooknic.com; <https://population.un.org/wpp>).

7.3.3. Wikipedia edits/mn pop. 15–69

Wikipedia yearly edits by country (per million population, 15–69 years old) | 2020

Data extracted from Wikimedia Foundation's internal data sources. For every country with more than 100,000 edit counts in 2020, the data from 2020 are used. Data are reported per million population, 15–69 years old. Data from China are treated as missing and classified as “n/a.”

Source: Wikimedia Foundation; United Nations, Department of Economic and Social Affairs, Population Division. *World Population Prospects: The 2019 Revision* (population). (<https://wikimediafoundation.org>; <https://esa.un.org/unpd/wpp>).

7.3.4. Mobile app creation/bn PPP\$ GDP

Global downloads of mobile apps (scaled by per billion PPP\$ GDP) | 2020

Global downloads of mobile apps, by origin of the headquarters of the developer/firm, scaled by PPP\$ GDP (billions). Global downloads are compiled by App Annie Intelligence, public data sources and the company's proprietary forecast model based on data from Google Play Store and iOS App Store in each country between January 1, 2020 and December 31, 2020. Since data for China are not available for Google Play Store and only for iOS App Store, data from China are treated as missing and classified as “n/a.”

Source: App Annie Intelligence; International Monetary Fund, *World Economic Outlook Database*, October 2020 (2016–20). (<https://www.appannie.com>; <https://www.imf.org/en/Publications/SPROLLS/world-economic-outlook-databases>).