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 GII in 2022, the most recent values, within the period 2012 to 2021, 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, 65 variables are hard data, 13 are composite indicators, marked with an asterisk (*), and three are survey questions from the World Economic Forum's Executive Opinion Survey, marked with a dagger (†). 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 with [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 US 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*[b] | 2021

Index that measures the likelihood and severity of political, legal, operational or security risks affecting business operations. Scores are annualized, standardized and aggregated for end Q1, Q2, Q3 and Q4.

Source: IHS Markit, Country Risk Scores (https://ihsmarkit.com/industry/economics-country-risk.html). Data year: 2021.

1.1.2. Government effectiveness*
Government effectiveness index* | 2020

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 (http://info.worldbank.org/governance/wgi). Data year: 2020.

1.2. Regulatory environment

1.2.1. Regulatory quality*
Regulatory quality index*[a] | 2020

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 (http://info.worldbank.org/governance/wgi). Data year: 2020.

1.2.2. Rule of law*

Rule of law index*[a] | 2020

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 (http://info.worldbank.org/governance/wgi). Data year: 2020.

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] | 2020

Redundancy costs measure the cost of advance notice requirements and severance payments due when terminating a redundant worker's employment, 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 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, Employing Workers Project (https://www.worldbank.org/en/research/employing-workers). Data year: 2020.

1.3. Business environment

1.3.1. Policies for doing business[†]

The extent to which governments ensure a stable policy environment for doing business[†] | 2021

Average answer to the survey question: In your country, to what extent does the government ensure a stable policy environment for doing business? [1 = not at all; 7 = to a great extent].

Source: World Economic Forum, Executive Opinion Survey 2021 (https://www.weforum.org/). Data years: 2015–2021.

1.3.2. Entrepreneurship policies and culture*

Entrepreneurship policies and culture index* | 2021

Average perception scores (five-year average) of experts on entrepreneurial policies and entrepreneurial culture (Items B, C and I3 and I4 of the GEM National Expert Survey). Experts in different fields (purposive sampling, minimum 36 experts per year) assess conditions for entrepreneurship in their country via statements (1= completely false; 10 = completely true). Country participation in GEM varies and therefore the number of experts and years on which this item is based differs according to country.

Source: Global Entrepreneurship Monitor (GEM), National Expert Survey (NES) (https://www.gemconsortium.org/wiki/1142). Data years: 2017–2021.

2. Human capital and research

2.1. Education

2.1.1. Expenditure on education, % GDP
Government expenditure on education (% of GDP) | 2020

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 (http://data.uis.unesco.org).
Data years: 2011–2021.

2.1.2. Government funding/pupil, secondary, % GDP/cap
Government funding per secondary pupil (% of GDP per capita) | 2018

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 (http://data.uis.unesco.org).
Data years: 2011–2020.

2.1.3. School life expectancy, years
School life expectancy, primary to tertiary education, both sexes (years) | 2019

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 (http://data.uis.unesco.org).
Data years: 2011–2020.

2.1.4. PISA scales in reading, maths and science
PISA scales in reading, mathematics and science | 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) (https://www.oecd.org/pisa/). Data years: 2015–2018.

2.1.5. Pupil–teacher ratio, secondary
Pupil–teacher ratio, secondary[b] | 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 (http://data.uis.unesco.org). Data years: 2011–2021.

2.2. Tertiary education

2.2.1. Tertiary enrolment, % gross
School enrolment, tertiary (% gross) | 2019

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 level, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level. The school enrolment ratio can exceed 100 percent 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 (http://data.uis.unesco.org). Data years: 2011–2021.

2.2.2. Graduates in science and engineering, %
Graduates from science, technology, engineering and mathematics programs (% of total tertiary graduates) | 2020

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.

Source: UNESCO Institute for Statistics (UIS) online database (http://data.uis.unesco.org); Eurostat database (https://ec.europa.eu/eurostat/data/database); and OECD, Main Science and Technology Indicators (MSTI) database (https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB). Data years: 2015–2020.

2.2.3. Tertiary inbound mobility, %
Tertiary inbound mobility rate (%) | 2019

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 (http://data.uis.unesco.org). Data years: 2011–2020.

2.3. Research and development (R&D)

2.3.1. Researchers, FTE/mn pop.
Researchers, full-time equivalent (FTE) (per million population)[a] | 2020

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.

Source: UNESCO Institute for Statistics (UIS) online database (http://data.uis.unesco.org); Eurostat database (https://ec.europa.eu/eurostat/data/database); OECD, Main Science and Technology Indicators (MSTI) database (https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB); and Ibero-American and Inter-American Network of Science and Technology Indicators (RICYT) (http://www.ricyt.org/en/). Data years: 2012–2021.

2.3.2. Gross expenditure on R&D, % GDP

Gross expenditure on R&D (% of GDP)[a] | 2020

Gross expenditure on R&D (GERD) is the 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.

Source: UNESCO Institute for Statistics (UIS) online database (http://data.uis.unesco.org); Eurostat database (https://ec.europa.eu/eurostat/data/database); OECD, Main Science and Technology Indicators (MSTI) database (https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB); and Ibero-American and Inter-American Network of Science and Technology Indicators (RICYT) (http://www.ricyt.org/en/). Data years: 2013–2021.

2.3.3. Global corporate R&D investors, top 3, mn USD

Average expenditure of a country's top three global companies on R&D, million USD | 2021

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 2021 EU Industrial R&D Investment Scoreboard (https://iri.jrc.ec.europa.eu/scoreboard/2021-eu-industrial-rd-investment-scoreboard). Data year: 2021.

2.3.4. QS university ranking, top 3*

Average score of the top three universities according to the QS world university ranking* | 2021

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 2022 ranking corresponds to data published in June 2021.

Source: QS Quacquarelli Symonds Ltd, QS World University Rankings, Top Universities (https://www.topuniversities.com/university-rankings/world-university-rankings/2022). Data year: 2021.

3. Infrastructure

3.1. Information and communication technologies (ICTs)

3.1.1. ICT access*

ICT access index*[a] | 2020

The ICT access index is a composite index that assigns weights to four ICT indicators (25 percent each): (1) Percentage of the population covered by mobile networks (at least 3G, at least LTE/WiMax); (2) Mobile cellular telephone subscriptions per 100 inhabitants; (3) International internet bandwith (bit/s) per internet user; and (4) Percentage of households with internet access.

Source: World Intellectual Property Organization (https://www.wipo.int/); and World Telecommunication/ICT indicators Database (February 2022 edition) (https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx). Data year: 2020.

3.1.2. ICT use*
ICT use index*[a] | 2020

The ICT use index is a composite index that assigns weights to four ICT indicators (25 percent 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; and (4) Mobile broadband internet traffic (gigabytes/subscriptions).

Source: World Intellectual Property Organization (https://www.wipo.int/); and World Telecommunication/ICT indicators Database (February 2022 edition) (https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx). Data year: 2020.

3.1.3. Government's online service*
Government online service index*[a] | 2020

The Online Service 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, undertook an E-Government Survey that 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.

Source: Division for Public Institutions and Digital Government (formerly the Division for Public Administration and Development Management), United Nations Department of Economic and Social Affairs (UN DESA), E-Government Survey 2020 (https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020). Data year: 2020.

3.1.4. E-participation*
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 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.

Source: Division for Public Administration and Development Management (DPADM), United Nations Department of Economic and Social Affairs (UN DESA), E-Government

Survey 2020 (https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020). Data year: 2020.

3.2. General infrastructure

3.2.1. Electricity output, GWh/mn pop.
Electricity output (GWh per million population) | 2020

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) (https://www.iea.org/reports/world-energy-balances-overview). Data years: 2019–2020.

3.2.2. Logistics performance*
Logistics Performance Index* | 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 that includes 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, Logistics Performance Index 2018 (https://lpi.worldbank.org/; https://openknowledge.worldbank.org/handle/10986/29971); and Arvis *et al.*, 2018, *Connecting to Compete 2018: Trade Logistics in the Global Economy – The Logistics Performance Index and its Indicators*. Data year: 2018.

3.2.3. Gross capital formation, % GDP
Gross capital formation (% of GDP) | 2021

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 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data year: 2021.

3.3. Ecological sustainability

3.3.1. GDP/unit of energy use
GDP per total energy supply (per thousand 2015 PPP$ GDP) | 2019

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 2021 edition (https://www.iea.org/reports/world-energy-balances-overview). Data years: 2019–2020.

3.3.2. Environmental performance*
Environmental Performance Index* | 2022

The 2022 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, 2022 Environmental Performance Index (https://epi.yale.edu/). Data year: 2022.

3.3.3. ISO 14001 environmental certificates/bn PPP$ GDP
ISO 14001 Environmental management systems – Number of certificates issued (per billion PPP$ GDP) | 2020

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, 2020 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October); and International Monetary Fund, World Economic Outlook Database, October 2021. Data year: 2020.

4. Market sophistication

4.1. Credit

4.1.1. Finance for startups and scaleups*
Finance for startups and scaleups* | 2021

Average perception scores (five-year average) of experts on finance for starting and growing firms (item A of the GEM National Expert Survey). Experts in different fields (purposive sampling, minimum 36 experts per year) assess conditions for entrepreneurship in their country via statements (1=completely false; 10 = completely true). Country participation in GEM varies and therefore the number of experts and years on which this item is based differs according to country.

Source: Global Entrepreneurship Monitor (GEM), National Expert Survey (NES) (https://www.gemconsortium.org/wiki/1142). Data years: 2017–2021.

4.1.2. Domestic credit to private sector, % GDP
Domestic credit to private sector (% of GDP) | 2020

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 (https://data.imf.org); and World Bank and OECD GDP estimates, extracted from the World Bank's World Development Indicators database (https://databank.worldbank.org/source/world-development-indicators). Data years: 2013–2020.

4.1.3. Loans from microfinance institutions, % GDP
Loans from all microfinance institutions (% of GDP) | 2020

Outstanding loans from all microfinance institutions in a country as a percentage of its GDP.

Source: International Monetary Fund, Financial Access Survey (https://data.imf.org/?sk=E5DCAB7E-A5CA-4892-A6EA-598B5463A34C). Data years: 2014–2020.

4.2. Investment

4.2.1. Market capitalization, % GDP
Market capitalization of listed domestic companies (% of GDP, three-year average) | 2020

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 (https://www.world-exchanges.org/our-work/statistics); and extracted from the World Bank's World Development Indicators database (https://databank.worldbank.org/source/world-development-indicators). Data years: 2011–2020.

4.2.2. Venture capital investors, deals/bn PPP$ GDP
Number of venture capital deals invested in (per billion PPP$ GDP, three-year average) | 2021

Refinitiv 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, 2019 and December 31, 2021, with the data aggregated by the location of the investing firm. The data represent the three-year average of 2019–21 deals invested in and are reported per billion PPP$ GDP.

Source: Refinitiv (a London Stock Exchange Group (LSEG) business) Eikon (private equity screener) accessed March 21, 2022 (https://solutions.refinitiv.com/eikon-trading-software); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data years: 2019–2021.

4.2.3. Venture capital recipients, deals/bn PPP$ GDP
Number of venture capital deals received (per billion PPP$ GDP, three-year average) | 2021

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, 2019 and December 31, 2021, with the data aggregated by the location invested in. The data represent the three-year average of 2019–21 deals received and are reported per billion PPP$ GDP.

Source: Refinitiv (an LSEG business) Eikon (private equity screener) accessed March 21, 2022 (https://solutions.refinitiv.com/eikon-trading-software); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data years: 2019–2021.

4.2.4. Venture capital received, value, % GDP
Total value of venture capital received (% of GDP, three-year average) | 2021

Refinitiv data on the monetary value of 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, 2019 and December 31, 2021, with the data aggregated by the location invested in. The data represent the three-year average of reported deal value, in current USD (billions), received and are reported per billion PPP$ GDP.

Source: Refinitiv (an LSEG business) Eikon (private equity screener) accessed March 21, 2022 (https://solutions.refinitiv.com/eikon-trading-software); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data years: 2019–2021.

4.3. Trade, diversification, and market scale

4.3.1. Applied tariff rate, weighted avg., %
Tariff rate, applied, weighted average, all products (%)[b] | 2020

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. Data extracted from the World Bank's World Development Indicators database.

Source: World Bank, based on data from United Nations Conference on Trade and Development's Trade Analysis Information System (TRAINS) database and the World Trade Organization's Integrated Database (IDB) and Consolidated Tariff Schedules (CTS) database (http://data.worldbank.org). Data years: 2013–2020.

4.3.2. Domestic industry diversification
Domestic industry diversification (based on manufacturing output)[b] | 2019

The Herfindahl-Hirschman Index (HHI) for a country's domestic industry is 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). 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).

Source: United Nations Industrial Development Organization (UNIDO), Industrial Statistics Database, two-digit level of the International Standard Industrial Classification (ISIC) Revision 3 (INDSTAT 2 2022), Enhancing the Quality of Industrial Policies (EQuIP) Tool 4: Diversification – Domestic and Export Dimensions, 2015 (http://stat.unido.org). Data years: 2012–2020.

4.3.3. Domestic market scale, bn PPP$
Domestic market scale as measured by GDP, bn PPP$ | 2021

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 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data year: 2021.

5. Business sophistication

5.1. Knowledge workers

5.1.1. Knowledge-intensive employment, %
Employment in knowledge-intensive services (% of workforce) | 2021

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 (https://ilostat.ilo.org). Data years: 2011–2021.

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 (https://www.enterprisesurveys.org). Data years: 2011–2021.

5.1.3. GERD performed by business, % GDP
GERD performed by business enterprises (% of GDP) | 2020

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

Source: UNESCO Institute for Statistics (UIS) online database (http://data.uis.unesco.org); Eurostat database (https://ec.europa.eu/eurostat/data/database); OECD, Main Science and Technology Indicators (MSTI) database (https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB); and Ibero-American and Inter-American Network of Science and Technology Indicators (RICYT) (http://www.ricyt.org/en/). Data years: 2011–2020.

5.1.4. GERD financed by business, %
GERD financed by business enterprises (% of GERD) | 2019

Gross expenditure on R&D financed by business enterprises as a percentage of total gross expenditure on R&D. For the definition of GERD, see indicator 2.3.2.

Source: UNESCO Institute for Statistics (UIS) online database (http://data.uis.unesco.org); Eurostat database (https://ec.europa.eu/eurostat/data/database); OECD, Main Science and Technology Indicators (MSTI) database (https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB); and Ibero-American and Inter-American Network of Science and Technology Indicators (RICYT) (http://www.ricyt.org/en/). Data years: 2011–2020.

5.1.5. Females employed w/advanced degrees, %
Females employed with advanced degrees, % total employed (25+ years old) | 2021

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 (https://ilostat.ilo.org); and Statistics Canada, Table 14-10-0020-01 Unemployment rate, participation rate and employment rate by educational attainment, annual (https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410002001). Data years: 2012–2021.

5.2. Innovation linkages

5.2.1. University–industry R&D collaboration[†]
The extent to which businesses and universities collaborate on R&D[†] | 2021

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 2021 (https://www.weforum.org/). Data years: 2014–2021.

5.2.2. State of cluster development and depth[†]
How widespread clusters are[†] | 2021

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 2021 (https://www.weforum.org/). Data years: 2015–2021.

5.2.3. GERD financed by abroad, % GDP
GERD financed by abroad (% of GDP) | 2019

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 (http://data.uis.unesco.org); Eurostat database (https://ec.europa.eu/eurostat/data/database); OECD, Main Science and Technology Indicators (MSTI) database (https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB); and Ibero-American and Inter-American Network of Science and Technology Indicators (RICYT) (http://www.ricyt.org/en/). Data years: 2013–2020.

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) | 2021

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, 2019 and December 31, 2021. 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 (https://www.refinitiv.com/en/financial-data/deals-data/joint-venture-deals); and International Monetary Fund World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data years: 2019–2021.

5.2.5. Patent families/bn PPP$ GDP
Number of patent families filed in at least two offices (per billion PPP$ GDP) | 2018

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 (www.wipo.int/ipstats); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data year: 2018.

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) | 2020

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 year. 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 and United Nations Conference on Trade and Development, Trade in Commercial Services database (https://stats.wto.org/). Data years: 2012–2020.

5.3.2. High-tech imports, % total trade
High-tech imports (% of total trade) | 2020

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 (see http://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an5.pdf). 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: United Nations Comtrade Database (http://comtrade.un.org); and World Trade Organization and United Nations Conference on Trade and Development (https://stats.wto.org/). Data years: 2015–2020.

5.3.3. ICT services imports, % total trade
Telecommunications, computer and information services imports (% of total trade) | 2020

Telecommunications, computer and information services imports 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. Values are 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. For the definition of total trade, see indicator 5.3.1.

Source: World Trade Organization and United Nations Conference on Trade and Development, Trade in Commercial Services database (https://stats.wto.org/). Data years: 2016–2020.

5.3.4. FDI net inflows, % GDP
Foreign direct investment (FDI) net inflows (% of GDP, three-year average) | 2020

FDI net inflow 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. Data extracted from the World Bank's World Development Indicators database.

Source: International Monetary Fund, International Financial Statistics and Balance of Payments databases (https://data.imf.org/; https://www.worldbank.org/en/programs/debt-statistics); and World Bank, International Debt Statistics. Data years: 2018–2020.

5.3.5. Research talent, % in businesses
Researchers in business enterprise (%) | 2020

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 (http://data.uis.unesco.org); Eurostat database (https://ec.europa.eu/eurostat/data/database); OECD, Main Science and Technology Indicators (MSTI) database (https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB); and Ibero-American and Inter-American Network of Science and Technology Indicators (RICYT) (http://www.ricyt.org/en/). Data years: 2013–2020.

⬚ 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) | 2020

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 to be 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 to be a resident application for that member state (Germany). Data are scaled by PPP$ GDP (billions).

Source: World Intellectual Property Organization, Intellectual Property Statistics (https://www.wipo.int/ipstats); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data years: 2014–2020.

6.1.2. PCT patents by origin/bn PPP$ GDP
Number of Patent Cooperation Treaty (PCT) applications (per billion PPP$ GDP) | 2021

A PCT application refers to an international patent application filed through the WIPO-administered Patent Cooperation Treaty. 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 (156 to date). Data are scaled by PPP$ GDP (billions).

Source: World Intellectual Property Organization, Intellectual Property Statistics (https://www.wipo.int/ipstats); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data year: 2021.

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) | 2020

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 (https://www.wipo.int/ipstats); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data years: 2015–2020.

6.1.4. Scientific and technical articles/bn PPP$ GDP
Number of scientific and technical journal articles (per billion PPP$ GDP) | 2021

The number of articles published in the fields of 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 21, 2022 (https://clarivate.com/webofsciencegroup/solutions/web-of-science); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data year: 2021.

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 | 2021

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, SJR – SCImago Journal & Country Rank, retrieved May 2022 (https://www.scimagojr.com). Data year: 2021.

6.2. Knowledge impact

6.2.1. Labor productivity growth, %
Growth rate of GDP per person employed (%, five-year average) | 2021

Growth rate of real GDP per person employed, average of five most recent available years (2017–2021). 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™, April 2022 (https://www.conference-board.org/data/economydatabase). Data year: 2021.

6.2.2. New businesses/th pop. 15–64
New business density (new registrations per thousand population, 15–64 years old) | 2020

The number of newly registered firms with limited liability per 1,000 working-age people (aged 15–64 years old) per calendar year (new business density rate).

Source: World Bank, Entrepreneurship Database (https://www.worldbank.org/en/programs/entrepreneurship). Data years: 2012–2020.

6.2.3. Software spending, % GDP
Total computer software spending (% of GDP) | 2021

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). Data year: 2021.

6.2.4. ISO 9001 quality certificates/bn PPP$ GDP
ISO 9001 Quality management systems – number of certificates issued (per billion PPP$ GDP) | 2020

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 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) Survey 2020 (https://www. iso.org/the-iso-survey.html); and International Monetary Fund, World Economic Outlook database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/ October). Data year: 2020.

6.2.5. High-tech manufacturing, %
High-tech and medium-high-tech manufacturing (% of total manufacturing output) | 2019

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 (https://www.oecd.org/sti/ind/48350231.pdf), itself based on International Standard Industrial Classification (ISIC) Revision 4 and Revision 3, and using data from the INDSTAT 2 and INDSTAT 4 databases of the United Nations Industrial Development Organization (UNIDO).

Source: United Nations Industrial Development Organization (UNIDO), Industrial Statistics Database INDSTAT 2 2022 and INDSTAT 4 2022 (https://stat.unido.org). Data years: 2012–2020.

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) | 2020

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 year. 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). Values are 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. For the definition of total trade, see indicator 5.3.1.

Source: World Trade Organization and United Nations Conference on Trade and Development, Trade in Commercial Services database (https://stats.wto.org/). Data years: 2015–2020.

6.3.2. Production and export complexity
The Economic Complexity Index | 2019

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 import those products) 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). Data year: 2019.

6.3.3. High-tech exports, % total trade
High-tech exports (% of total trade) | 2020

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: United Nations Comtrade Database (http://comtrade.un.org); World Trade Organization and United Nations Conference on Trade and Development (https://stats.wto.org/); and Trade Data Monitor (https://www.tradedatamonitor.com/). Data years: 2015–2020.

6.3.4. ICT services exports, % total trade
Telecommunications, computer and information services exports (% of total trade) | 2020

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

Source: World Trade Organization and United Nations Conference on Trade and Development, Trade in Commercial Services database (https://stats.wto.org/). Data years: 2016–2020.

7. Creative outputs

7.1. Intangible assets

7.1.1. Intangible asset intensity, top 15, %
Intangible asset value as a percentage of the firm's total value, average of the top 15 firms | 2021

The data cover a global list of firms for which intangible asset value and total firm value are observed. Only the top 15 firms of each economy are considered, ranked by intangible assets in absolute terms (in USD). Countries with fewer than 15 firms are not considered. For each firm, the intangible asset value is divided by the firm's total value before computing the arithmetic mean across the top 15 firms for each economy.

Source: Brand Finance Global Intangible Finance Tracker (https://brandirectory.com/reports/gift-2021). Data year: 2021.

7.1.2. 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) | 2020

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 (www. wipo.int/ipstats); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data years: 2012–2020.

7.1.3. Global brand value, top 5,000, % GDP
Global brand value of the top 5,000 brands (% of GDP) | 2021

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 (https://brandirectory.com/); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data year: 2021.

7.1.4. 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) | 2020

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 (www. wipo.int/ipstats); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data years: 2014–2020.

7.2. Creative goods and services

7.2.1. Cultural and creative services exports, % total trade
Cultural and creative services exports (% of total trade) | 2020

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. Values are 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. See indicator 5.3.1 for the full definition of total trade.

Source: World Trade Organization and United Nations Conference on Trade and Development, Trade in Commercial Services database (https://stats.wto.org/). Data years: 2012–2020.

7.2.2. National feature films/mn pop. 15–69
Number of national feature films produced (per million population, 15–69 years old) | 2019

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: OMDIA (https://omdia.tech.informa.com/products/cinema-and-movies-intelligence-service); and United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects 2019 (https://population.un.org/wpp/). Data years: 2015–2019.

7.2.3. Entertainment and media market/th pop. 15–69
Global entertainment and media market (per thousand population, 15–69 years old) | 2021

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

Source: PwC, Global Entertainment and Media Outlook, 2021–2025 (www.pwc.com/outlook); United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects 2019 (https://population.un.org/wpp); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data year: 2021.

7.2.4. Printing and other media, % manufacturing
Printing publications and other media output (% of manufacturing total output) | 2019

Printing and reproduction of recorded media output (the sum of 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 and ISIC Revision 3 (INDSTAT 4 2022) (https://stat.unido.org). Data years: 2011–2019.

7.2.5. Creative goods exports, % total trade
Creative goods exports (% of total trade) | 2020

Total value of creative goods exports (current USD) over total trade. Creative goods exports based on the 2009 UNESCO Framework for Cultural Statistics, Table 3, International trade of cultural goods and services defined with the Harmonized System (HS) 2007 codes; World Trade Organization and United Nations Conference on Trade and Development, 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. For the definition of total trade, see indicator 5.3.1.

Source: United Nations Comtrade Database (http://comtrade.un.org); and World Trade Organization and United Nations Conference on Trade and Development (https://stats.wto.org/). Data years: 2015–2020.

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) | 2021

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 as of December 2021, 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 the required 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 (https://www.zooknic.com); and United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects 2019 (https://population.un.org/wpp). Data year: 2021.

7.3.2.   Country-code TLDs/th pop. 15–69
Country-code top-level domains (TLDs) (per thousand population, 15–69 years old) | 2021

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 as of December 2021, 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 (https://www.zooknic.com); and United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects 2019 (https://population.un.org/wpp). Data year: 2021.

7.3.3. GitHub commit pushes received/mn pop. 15–69
GitHub commit pushes received (per million population, 15–69 years old) | 2021

GitHub is the world's largest host of source code, and a commit is the term used for a change on this platform. One or more commits can be saved (or pushed) to projects (or repositories). Thus, "GitHub commit pushes received" refers to the number of batched changes received by publicly-available projects on GitHub within a specific economy.

Source: GitHub (https://github.com/); and United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects 2019 (https://population.un.org/wpp/). Data year: 2021.

7.3.4. Mobile app creation/bn PPP$ GDP
Global downloads of mobile apps (per billion PPP$ GDP, two-year average) | 2021

Global downloads of mobile apps, by origin of the headquarters of the developer/firm, scaled by PPP$ GDP (billions). Global downloads are compiled by data.ia, public data sources and the company's proprietary forecast model based on data from Google Play Store and iOS App Store in each country. 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: data.ia (formerly App Annie) (https://www.data.ai/en/); and International Monetary Fund, World Economic Outlook Database, October 2021 (https://www.imf.org/en/Publications/WEO/weo-database/2021/October). Data years: 2019–2021.