# BRAZIL COMPETITIVENESS REPORT

# METHODOLOGY

**Version 1.0**

Brasília-DF

April/2017

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# Contents

# 1. Introduction

Increasing the competitiveness of Brazilian industry and, consequently, that of the Brazilian economy as a whole is a priority on CNI's agenda. This is the main motivation for drawing up the **Brazil Competitiveness Report: a comparison with selected countries**, which was published for the first time in 2010 and again in 2012, 2013, 2014 and 2016.

The increasing attention being given to the issue of competitiveness has led to  the multiplication of studies and research efforts to identify the determinants of the competitiveness of companies in a country. Those efforts have led to the periodic publication of reports comparing the competitiveness of countries from that perspective.

The report **Brazil Competitiveness Report: a comparison with selected countries** falls under this line of studies and is focused on:

- A limited set of countries that, because of their economic and social characteristics and/or position in the international market, provide a more appropriate benchmark for assessing the competitive potential of Brazilian companies;
- A restricted set of variables that are more directly related to the reality of this set of countries, which were selected based on the universe of variables contemplated in reports published by international organizations.

## 1.1. Factors that affect competitiveness and associated variables

Competitiveness refers to a company's ability to compete in the market — i.e. to its ability to overcome its competitors in consumer preference. Companies are basically provided with two mechanisms to win consumer preference: price and quality.

The competitive potential of an economy can be assessed by examining the factors that influence the ability of the companies operating in it to manage those competition mechanisms effectively. For this purpose, the following elements must be considered:

- Factors that directly affect the efficiency of companies and the effectiveness with which they manage these instruments, such as:

  o Availability and cost of labor;

  o Availability and cost of capital;

  o Infrastructure and logistics;

  o Taxation;

  o Technology and innovation.

- Factors that have a bearing on the elements above and affect the performance of companies indirectly, such as:

  o Macroeconomic environment;

  o Competition and scale of the domestic market;

  o Business environment;

  o Education.

These factors were broken down into 20 sub-factors, to which 56 variables were associated. The starting point for assessing the competitiveness of Brazilian companies is the value attributed to these 56 variables in Brazil and 17 other countries. This set of variables comprises 38 economic variables disseminated in international and domestic databases, as well as 18 qualitative variables taken from surveys conducted by international organizations and disseminated in the following reports: "The Global Competitiveness Report" of the World Economic Forum; "IMD World Competitiveness Yearbook" of the IMD; "The Worldwide Governance Indicators" and "Connecting to Compete 2014 – Trade Logistics in the Global Economy," both of which are published by the World Bank.

In the 2016 report, the competitiveness determining factors tackled in the 2010 edition were reviewed and reorganized with the aim of improving their relationship with the Strategic Map of Industry 2013-2022. The Microeconomic environment factor was renamed as Competition and scale of the domestic market and the Business environment factor was created.

Regarding the variable set, variables for three factors were reviewed: Availability and cost of capital, Infrastructure and logistics and Macroeconomic environment. In this review, a more general objective was that of increasing the number of quantitative variables, replacing or complementing already

considered qualitative variables. This is the case of the new variables "Stock market size" and "Liner shipping connectivity."

Regarding Infrastructure and logistics, the "Broadband internet" and "Mobile phone" variables were replaced with the variables making up the indicators for use and access to information and communication technologies with the aim of taking into account the development of digital infrastructure in Brazil, given the progress of digital technologies affecting different areas of the economies of countries. As for the Macroeconomic environment, the analysis of the size of General government debt was complemented with data on the debt profile by including the variable "General government net debt interest payments."

The table below summarizes the distribution of the variables according to factors and sub-factors.

**Table 1 - Factors that affect competitiveness and related variables**

| Factors, sub-factors and variables | Weight |
|---|---|
| **Availability and cost of labor** | |
| Labor cost | 50% |
| Compensation levels in manufacturing | 50% |
| Labor productivity in industry | 50% |
| Labor availability | 50% |
| Labor force participation rate | 50% |
| Labor force growth | 50% |
| **Availability and cost of capital** | |
| Capital cost | 33.3% |
| Interest rate spread | 50% |
| Real short-term interest rate | 50% |
| Capital availability | 33.3% |
| Ease of access to loans | 33.3% |
| Ease of financing through local equity market | 16.7% |
| Stock market size | 16.7% |
| Venture capital availability | 33.3% |
| Financial system performance | 33.3% |
| Banking sector assets | 50% |
| Country credit rating | 50% |

| **Infrastructure and logistics** | |
|---|---|
| Transport infrastructure | 25% |
| Quality of roads | 25% |
| Quality of railroad infrastructure | 25% |
| Quality of port infrastructure | 12.5% |
| Liner shipping connectivity | 12.5% |
| Quality of air transport infrastructure | 25% |
| Telecommunications infrastructure | 25% |
| ICT Use | 50% |
| ICT Access | 50% |
| Energy infrastructure | 25% |
| Electricity costs for industrial clients | 50% |
| Availability of electricity | 50% |
| International logistics | 25% |
| Logistic Performance Index (LPI) | 50% |
| Time and cost to export and import | 50% |
| **Taxation** | |
| Taxes | 100% |
| Collected total tax revenues | 25% |
| Total tax rate (% of profit) | 25% |
| Corporate tax rates | 25% |
| Indirect tax rates | 25% |
| **Macroeconomic environment** | |
| Macroeconomic indicators | 100% |
| Inflation | 20% |
| General government debt | 10% |
| General government net debt interest payments | 10% |
| Gross fixed capital formation | 20% |
| Direct investment flows inward | 20% |
| Real effective exchange rate | 20% |
| **Competition and scale of the domestic market** | |
| Competition | 50% |
| Trade tariffs | 50% |
| Intensity of local competition | 50% |
| Scale | 50% |
| Domestic market size | 100% |

| Business environment | |
| --- | --- |
| Government Efficiency | 50% |
| Irregular payments and bribes | 33.3% |
| Regulatory Quality | 33.3% |
| Transparency of government policymaking | 33.3% |
| Legal certainty, red tape and labor relations | 50% |
| Rule of Law | 33.3% |
| Starting a business | 33.3% |
| Flexibility of wage determination | 16.7% |
| Hiring and firing practices | 16.7% |
| **Education** | |
| Educational attainment | 33.3% |
| Gross enrolment ratio in secondary education | 25% |
| Gross enrolment ratio in tertiary education | 25% |
| Percentage of adults who have attained at least upper secondary education | 25% |
| Percentage of adults who have attained tertiary education | 25% |
| Educational assessment | 33.3% |
| Performance in mathematics | 33.3% |
| Performance in reading | 33.3% |
| Performance in science | 33.3% |
| Expenditure on education | 33.3% |
| Total public expenditure on education (% of GDP) | 50% |
| Total public expenditure on education per capita | 50% |
| **Technology and innovation** | |
| Government support | 50% |
| Gross domestic expenditure on R&D | 25% |
| Government procurement of advanced tech products | 25% |
| R&D and innovation in companies | 50% |
| Gross expenditure on R&D performed by business enterprise | 25% |
| Capacity for innovation | 25% |

## 1.2. Countries selected as a benchmark

The competitive potential of the Brazilian economy was assessed according to Brazil's relative position in relation to a set of selected countries. It were selected countries at a similar level of development and/or with a similar size as that of Brazil, countries that compete with Brazil in third markets or with an international position similar to that of Brazil, and neighboring countries.

In the 2016 Report, this set of countries includes Argentina, Australia, Canada, Chile, China, Colombia, India, Indonesia, Mexico, Peru, Poland, Russia, South Africa, South Korea, Spain, Thailand, and Turkey. It is worth mentioning that Indonesia, Peru and Thailand were included in the analysis in the 2016 edition and that Turkey was included in the 2013 edition.

The following table shows some structural characteristics of the economies of those countries.

**Table 2 – Structural characteristics of the selected countries - 2015**

| Country | Area (thousand sq. km) | Population (millions) | GDP (billion USD) | GDP per capita, PPP (thousand USD) | Agricultural products exports (billion USD) | Total exports (billion USD) | Total imports (billion USD) |
|---|---|---|---|---|---|---|---|
| South Africa | 1,219 | 55 | 315 | 13.2 | 10 | 82 | 105 |
| Argentina | 2,780 | 43 | 630 | 20.5 | 35 | 57 | 60 |
| Australia | 7,741 | 24 | 1,225 | 47.6 | 36 | 188 | 208 |
| **Brazil** | **8,516** | **204** | **1,773** | **15.6** | **80** | **191** | **179** |
| Canada | 9,985 | 36 | 1,551 | 45.6 | 64 | 408 | 436 |
| Chile | 756 | 18 | 240 | 23.5 | 20 | 63 | 63 |
| China | 9,563 | 1,373 | 11,182 | 14.3 | 73 | 2,275 | 1,682 |
| Colombia | 1,142 | 48 | 292 | 13.8 | 7 | 36 | 54 |
| South Korea | 100 | 51 | 1,378 | 36.6 | 11 | 527 | 436 |
| Spain | 506 | 46 | 1,200 | 34.9 | 49 | 282 | 309 |
| India | 3,287 | 1,293 | 2,073 | 6.2 | 35 | 267 | 392 |
| Indonesia | 1,911 | 255 | 859 | 11.1 | 40 | 150 | 143 |
| Mexico | 1,964 | 121 | 1,144 | 18.4 | 27 | 381 | 405 |
| Peru | 1,285 | 31 | 192 | 12.5 | 8 | 34 | 38 |
| Poland | 313 | 38 | 475 | 26.5 | 28 | 198 | 193 |
| Russia | 17,098 | 143 | 1,326 | 26.0 | 27 | 340 | 194 |
| Thailand | 513 | 69 | 395 | 16.1 | 36 | 214 | 203 |
| Turkey | 784 | 78 | 718 | 20.4 | 17 | 144 | 207 |

Source: World Development Indicators, World Bank; World Economic Outlook Database, Oct. 2016, IMF; Total merchandise trade e Merchandise trade by commodity, World Trade Organization.

## 2.  Periodicity

Data for the **Brazilian Competitiveness Report: a comparison with selected countries** are collected annually. The reference period of data is the most recent year available for each variable and country.

## 3.  Procedures adopted

The effect of each of the 56 variables from the standpoint of the competitiveness of Brazilian companies can be evaluated based on Brazil's position in the list of countries as ordered according to the values recorded for those variables in each of the 18 countries.   In most, but not all, cases the higher values indicate a more favorable result.

The 56 variables were aggregated into 20 sub-factors and the subsequent aggregation of those sub-factors into the nine factors mentioned above allows in turn for assessing the effect of each of these sub-factors and factors on the competitiveness of Brazilian companies.

The set of 56 variables comprises quantitative variables that reflect economic magnitudes and qualitative variables taken from surveys.

The qualitative variables are referenced on different scales, since they were taken from different surveys. Those scales were converted into a single scale (0-10  scale).

### 3.1. Calculating comparable measures (normalization)

The quantitative variables measure different magnitudes and, in many cases, they are expressed in different units. Following a procedure adopted in "The Global Competitiveness Report" of the World Economic Forum, these variables were normalized and converted into the same scale applied to the qualitative variables using the following formula:

$$VN_i^v = 10 \times \frac{(V_i - V_{min})}{(V_{max} - V_{min})} \tag{1}$$

Where: $VN_i^v$ is the normalize value of the variable *v* of country *i*; $V_{max}$ e $V_{min}$ are the maximum and minimum values in the original sample of countries from which the values for the 18 selected countries were taken, i.e. the highest and the lowest observed value, and $V_i$ is the value of country *i*.

In cases of variables where the most favorable result from the standpoint of competitiveness is the lowest value, the following formula was adopted:

$$VN_i^v = 10 - 10 \times \frac{(V_i - V_{min})}{(V_{max} - V_{min})} \tag{2}$$

## 3.2. Agregation of variables into sub-factors and factors

The scores for the sub-factor are the weighted average of the normalized variables associated with the sub-factor. The weights are shown in table 1 (above). The scores of the factors were determined by the simple average of the scores of the sub-factors associated with them.

The position of a country in the overall ranking is determined by the simple average of the scores of the nine factors.

**Figure 1 – Aggregation process**



Step 2

- 56 Variables

- 20 Sub-factors

- 9 Factors

Overall ranking

Step 1

Step 3
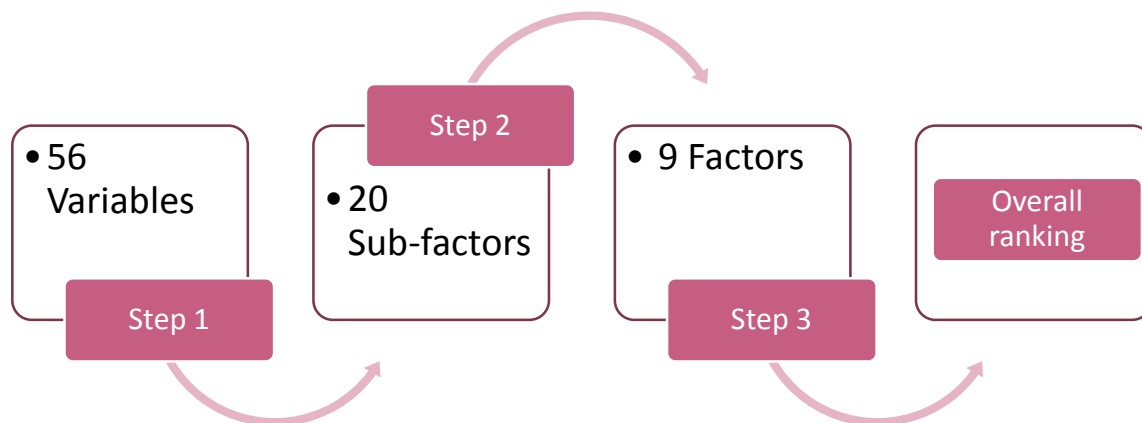
## 3.3. Treatment of missing data

For calculating the annual Brazil Competitiveness Report ranking, data is collected for the 56 variables and the availability of data for the 18 selected countries is checked.

There are cases in which no information on some of the variables for a country is available in the reference year, i.e. the last year available. In such cases, the most recent data available is repeated for the reference year. For example, if the reference year of a certain variable is 2015 and the most recent data available for a country is 2014, then the value for 2014 is repeated for 2015.

When the data for a country is very outdated or when no data is available for a country in any year of the series for a given variable, such missing data is excluded from the calculation of the sub-factor scores. The weighted average of the available normalized variables is calculated (the weight attributed to missing data is equally redistributed in the remaining variables).

However, if more than 50% of the variables making up a sub-factor are excluded, then the score of a country in the sub-factor is not calculated. At the factor level, if more than 50% of the scores of the sub-factors making up a factor are excluded, the country's score in the factor is not calculated.

Regarding the overall ranking, if no score can be calculated for a country for any of the nine factors, such missing value is estimated. This estimation process is carried out in four steps:

1.  The factor scores are calculated based on the simple average of the variables for which data is available for a country.
2.  Based on the scores calculated in step 1, a new ranking of countries is calculated in the factor in question (ranking based on a limited number of variables).
3.  In the original ranking (the ranking based on the values of all variables associated with the factor in question), a score consistent with the position of the country for which data is missing as determined in step 2 is checked.
4.  Based on this score and its adjacent scores, a simple average is calculated to estimate the score of the country for which data is   missing.

# 4. Description and source of the variables

The following table describes with details the variables used to evaluate the competitive potential of countries and informs the sources of data.

**Table 3 – Variables and sources**

| Name | Description | Source [Original source] |
|---|---|---|
| **Availability and cost of labor** | | |
| Labor cost | | |
| Compensation levels in manufacturing | Total hourly compensation in manufacturing (wages plus supplementary benefits), US$. | IMD World Competitiveness Yearbook |
| Labor productivity in industry | Related GDP (PPP) per person employed in industry, US$. | IMD World Competitiveness Yearbook |
| Labor availability | | |
| Labor force participation rate | Labour force participation rate: labor force as a percentage of the total population over 15 years old. | Key Indicators of the Labour Market (KILM) – International Labour Organization (ILO) |
| Labor force growth | Annual percentage change. | IMD World Competitiveness Yearbook |
| **Availability and cost of capital** | | |
| Capital cost | | |
| Interest rate spread | Lending rate minus deposit rate. | IMD World Competitiveness Yearbook |
| Real short-term interest rate | Real discount or bank rate. | IMD World Competitiveness Yearbook |
| Capital availability | | |
| Ease of access to loans | Variable generated from answers to the question: In your country, how easy is it for businesses to obtain a bank loan? [1 = extremely difficult; 7 = extremely easy]. | The Global Competitiveness Report, World Economic Forum. [Executive Opinion Survey.] |
| Ease of financing through local equity market | Variable generated from answers to the question: In your country, to what extent can companies raise money by issuing shares and/or bonds on the capital market? [1 = not at all; 7 = to a great extent]. | The Global Competitiveness Report, World Economic Forum. [Executive Opinion Survey.] |

| | | |
|---|---|---|
| Stock market size | Market value for listed domestic companies. Percentage of GDP. | World Bank [World Federation of Exchanges database] |
| Venture capital availability | Variable generated from answers to the question: In your country, how easy is it for start-up entrepreneurs with innovative but risky projects to obtain equity funding? [1 = extremely difficult; 7 = extremely easy]. | The Global Competitiveness Report, World Economic Forum. [Executive Opinion Survey.] |
| **Financial system performance** | | |
| Banking sector assets | Percentage of GDP. | IMD World Competitiveness Yearbook |
| Country credit rating | Rating on a scale of 0-100 assessed by the Institutional Investor Magazine. | IMD World Competitiveness Yearbook |
| **Infrastructure and logistics** | | |
| **Transport infrastructure** | | |
| Quality of roads | In your country, how is the quality (extensiveness and condition) of road infrastructure [1 = extremely poor-among the worst in the world; 7 = extremely good-among the best in the world]. | The Global Competitiveness Report, World Economic Forum. [Executive Opinion Survey.] |
| Quality of railroad infrastructure | Variable generated from answers to the question: In your country, how is the quality (extensiveness and condition) of the railroad system [1 = extremely poor-among the worst in the world; 7 = extremely good-among the best in the world]. | The Global Competitiveness Report, World Economic Forum. [Executive Opinion Survey.] |
| Quality of port infrastructure | Variable generated from answers to the question: In your country, how is the quality (extensiveness and condition) of seaports (for landlocked countries, assess access to seaports) [1 = extremely poor- among the worst in the world; 7 = extremely good-among the best in the world]. | The Global Competitiveness Report, World Economic Forum. [Executive Opinion Survey.] |
| Liner shipping connectivity | Index generated from the average of five components: (a) the number of ships; (b) the total container-carrying capacity of those ships; (c) the maximum vessel size; (d) the number of services; and (e) the number of companies that deploy container ships on services from and to a country's ports. The base year is 2004 and the base value is the maximum value in 2004. | United Nations Conference on Trade and Development, Statistics [UNCTAD, Division on Technology and Logistics, based on Containerization International Online (www.ci-online.co.uk) and Lloyds List Intelligence] |
| Quality of air transport infrastructure | Variable generated from answers to the question: In your country, how is the quality (extensiveness and condition) of airports [1 = extremely poor- among the worst in the world; 7 = extremely good-among the best in the world]. | The Global Competitiveness Report, World Economic Forum. [Executive Opinion Survey.] |

| Energy infrastructure | | |
|---|---|---|
| Electricity costs for industrial clients | US$ per kwh. | IMD World Competitiveness Yearbook |
| Availability of electricity | Ratio between electricity output and GDP, expressed in TWh/US$ trillion. | Calculate based on data from CO2 Emissions from Fuel Combustion Highlights (2015 Edition), IEA, Paris. |
| Telecommunications infrastructure | | |
| ICT Use | Aggregation of the weighted values (33% each) of three indicators: (1) percentage of individuals using the Internet; (2) fixed (wired)-broadband Internet subscriptions per 100 inhabitants; (3) active mobile- broadband subscriptions per 100 inhabitants. | International Telecommunication Union (ITU) Measuring the Information Society Report |
| ICT Access | Aggregation of the weighted values (20% each) of five indicators: (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. | International Telecommunication Union (ITU) Measuring the Information Society Report |
| International logistics | | |
| Logistic Performance Index (LPI) | Aggregation of the values (1-5 scale) of six components: (1) the efficiency of customs and border management; (2) the quality of trade and transport infrastructure; (3) the ease of arranging competitively priced shipments; (4) the competence and quality of logistics services; (5) the ability to track and trace consignments; (6) the frequency with which shipments reach consignees within scheduled or expected delivery times. | Connecting to Compete. Trade Logistics in the Global Economy, World Bank |
| Time and cost to export and import | Distance to frontier (0-100 scale). Simple average of scores in eight indicators: (1) time and cost for documentary compliance when exporting; (2) time and cost for border compliance when exporting; (3) time and cost for documentary compliance when importing; (4) time and cost for border compliance when importing. | World Bank, Doing Business |
| **Taxation** | | |
| Taxes | | |
| Collected total tax revenues | Percentage of GDP. | IMD World Competitiveness Yearbook |

| Total tax rate (% of profit) | Total taxes paid by a company as a percentage of its profits (the profit or corporate income tax, social contributions and labor taxes paid by the employer, property taxes, property transfer taxes, dividend tax, capital gains tax, financial transactions tax, waste collection taxes, vehicle and road taxes, and any other small taxes or fees). | World Bank, Doing Business |
|---|---|---|
| Corporate tax rates | Corporate tax rates. | Tax Rates Online, KPMG. |
| Indirect tax rates | Indirect tax rates. | Tax Rates Online, KPMG. |

| **Macroeconomic environment** | | |
|---|---|---|
| Macroeconomic indicators | | |
| Inflation | Annual percent change in consumer price index (year average). | The Global Competitiveness Report, World Economic Forum. |
| General government debt | Percentage of GDP. | The Global Competitiveness Report, World Economic Forum. |
| General government net debt interest payments | Interest payments on government debt, obtained by the difference between General government net lending/borrowing and General government primary net lending/borrowing. Percentage of GDP. | Calculated based on data from World Economic Outlook Database, IMF. |
| Gross fixed capital formation | Percentage of GDP. | IMD World Competitiveness Yearbook |
| Direct investment flows inward | Percentage of GDP. | IMD World Competitiveness Yearbook |
| Real effective exchange rate | Real effective exchange rate (monthly average) on the reference date, expressed as a percentage of the arithmetic average of the monthly rates observed in the last five years. | Prepared by CNI, based on the real effective exchange rate estimated by the Bank for International Settlements. |

| **Competition and scale of the domestic market** | | |
|---|---|---|
| Competition | | |
| Trade tariffs | Trade-weighted average tariff rate. The weights are the trade patterns of the importing country's reference group. | The Global Competitiveness Report, World Economic Forum. [International Trade Centre; Trade Competitiveness Map Data] |
| Intensity of local competition | Variable generated from answers to the question: In your country, how intense is competition in the local markets? [1 = not intense at all; 7 = extremely intense]. | The Global Competitiveness Report, World Economic Forum. [Executive Opinion Survey.] |

| Scale | | |
|---|---|---|
| Domestic market size | Sum of gross domestic product plus value of imports of goods and services, minus value of exports of goods and services, normalized on a 1-7 (best) scale. | The Global Competitiveness Report, World Economic Forum. |
| **Business environment** | | |
| Government Efficiency | | |
| Regulatory Quality | Index generated based on perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance. | The Worldwide Governance Indicators, |
| Irregular payments and bribes | Variable generated from answers to the following questions: In your country, how common is it for firms to make undocumented extra payments or bribes connected with (a) imports and exports; (b) public utilities; (c) annual tax payments; (d) awarding of public contracts and licenses; (e) obtaining favorable judicial decisions? [1 = very common; 7 = never occurs]. | The Global Competitiveness Report 2016-2017, World Economic Forum. [World Economic Forum, Executive Opinion Survey. |
| Transparency of government policymaking | Variable generated from answers to the question: In your country, how easy is it for companies to obtain information about changes in government policies and regulations affecting their activities? [1 = extremely difficult; 7 = extremely easy]. | The Global Competitiveness Report 2016-2017, World Economic Forum. [World Economic Forum, Executive Opinion Survey. |
| Legal certainty, red tape and labor relations | | |
| Rule of Law | Index generated based on 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. Ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance. | The Worldwide Governance Indicators |
| Starting a business | Distance to frontier (0-100 scale). Simple average of scores in four indicators: (1) procedures to legally start and formally operate a company (number); (2) time required to complete each procedure (calendar days); (3) cost required to complete each procedure (percentage of per capita income); (4) paid-in minimum capital (percentage of per capita income). | World Bank, Doing Business. |

| | | |
|---|---|---|
| Flexibility of wage determination | Variable generated from answers to the question: In your country, how are wages generally set? [1 = by a centralized bargaining process; 7 = by each individual company]. | The Global Competitiveness Report, World Economic Forum. [World Economic Forum, Executive Opinion Survey. |
| Hiring and firing practices | Variable generated from answers to the question: In your country, to what extent do regulations allow flexible hiring and firing of workers? [1 = not at all; 7 = to a great extent]. | The Global Competitiveness Report, World Economic Forum. [World Economic Forum, Executive Opinion Survey. |
| **Education** | | |
| Educational attainment | | |
| Gross enrolment ratio in secondary education | Number of students enrolled in secondary level, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education. | UNESCO Institute for Statistics. Education. |
| Gross enrolment ratio in tertiary education | Number of students enrolled in tertiary level, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education. | UNESCO Institute for Statistics. Education. |
| Percentage of adults who have attained at least upper secondary education | Percentage of adults aged between 25 and 34 who have attained at least upper secondary education. | Education at a Glance: OECD Indicators - © OECD. |
| Percentage of adults who have attained at least upper secondary education | Percentage of adults aged between 25 and 34 who have attained tertiary education. | Education at a Glance: OECD Indicators - © OECD. |
| Educational assessment | | |
| Performance in mathematics | Average scores in math tests, 15-year-old students. | PISA OECD. |
| Performance in reading | Average scores in reading tests, 15-year-old students. | PISA OECD. |
| Performance in science | Average scores in science tests, 15-year-old students. | PISA OECD. |
| Expenditure on education | | |
| Total public expenditure on education | Percentage of GDP. | IMD World Competitiveness Yearbook. |
| Total public expenditure on education per capita | US$ per capita. | IMD World Competitiveness Yearbook. |

| Technology and innovation | | |
|---|---|---|
| Government support | | |
| Gross domestic expenditure on R&D | Percentage of GDP. | UNESCO Institute for Statistics. Science, technology and innovation. |
| Government procurement of advanced tech products | Variable generated from answers to the question: In your country, to what extent do government purchasing decisions foster innovation? [1 = not at all; 7 = to a great extent]. | The Global Competitiveness Report, World Economic Forum. [World Economic Forum, Executive Opinion Survey. |
| R&D and innovation in companies | | |
| Gross expenditure on R&D performed by business enterprise | Percentage of GDP. | UNESCO Institute for Statistics. Science, technology and innovation. |
| Capacity for innovation | Variable generated from answers to the question: In your country, to what extent do companies have the capacity to innovate? [1 = not at all; 7 = to a great extent]. | The Global Competitiveness Report, World Economic Forum. [World Economic Forum, Executive Opinion Survey. |

**CNI**