# Chapter II
# World Openness Index: Methodology

The term *opening-up to the outside world* has rich connotations and extensions. The World Openness Index integrates a number of statistical indicators related to opening-up to the outside world, such as economy, society, and culture, and can measure the level of openness of an economy in a more comprehensive and systematic manner. The index system measuring the level of opening-up to the outside world is the core content of the world openness index. The statistically measurable quantitative indicators are created through quantifying economic, social, cultural and other related openness factors, which provides a new way to quantitatively analyze the openness and open-up trend of various economies.

Compared with other similar indexes on openness, this index has the following characteristics. First, it is positioned to measure economic openness and non-economic openness that is closely related to economic openness. Second, the results of openness and openness policies are equally emphasized, and inward and outward openness are equally emphasized. Third, the dimensionless methods of inward and outward opening indicators are rigorously based on the supply and demand theory.

In this chapter and subsequent chapters, unless specified, the word "country" can be used in common with the word "economy".

## I. Principles of Measuring Opening-up to the Outside World

### 1. Scientific natures

Scientific theory and method have been adopted in this study. The openness index focuses on *on-the-border* openness and does not measure phenomena

beyond the border. The setting of the indicator system and data conversion processing are strictly based on professional openness theory and the processing of basic data and the weighting of indicators have strictly followed statistical theories and methods.

The balance of two-way openness. Cross-border openness includes the entry of foreign factors and the exit of domestic factors and both are the measurement content of this indicator system. Under the premise of data availability, they will be treated equally, including the setting of weighting.

The objectivity of openness data. The index numbers must be in line with reality. It requires the selection of indicators to be able to reflect the main openness practices and the method for determining the weight of each indicator must be rational. Moreover, the assumptions made when supplementing some missing data must be consistent with the actual situation.

The heterogeneity of openness measures. Specifically, what indicators measure should not overlap each other. There should be no theoretical causal relationship among indicators, but the designing of this index needs to meet the following requirements. The openness policies as the cause should be measures and the openness performance based on the cause should also be measured. For this reason, in the designing of this indicator system, the overlapping caused by combining openness cause and openness performance must be minimized. Such overlapping basically does not affect the relative openness rankings of concerned economies, and, therefore, the design is acceptable. However, when the total openness of all economies aggregated or the openness of the world as a whole is assessed, such overlapping means that the openness of each economy and that of the world as a whole would be overestimated.

For that reason, such overlapping effect of the index has been reduced from the following two aspects. First, even if some indicators measure the same target, they should be measured from different angles. For example, indicators such as cross-border tourists, international students, and cross-border migrants measure the headcount-based scale of cross-border population movement in social openness, and the corresponding cross-border economic costs (such as transportation, education service and travel consumption costs) are measured using the cross-border economic openness. (cross-border trade in goods and services). Second, if, for various reasons, it is impossible to find suitable, different angles for separate measurement, which inevitably leads to

overlapping. Therefore, the overlapped parts will be deducted in this index when those indicators are aggregated to prevent the overall index from being higher than the actual level of openness. For example, cross-border intellectual property trade and cross-border cultural product trade measure the level of cross-border cultural openness, but they have actually included in the economic openness measurement. For this reason, such repetition needs to be deducted from the overall openness of the concerned country. Unless the original data cannot support it, the aforementioned principles have been observed to the greatest extent in the designing and calculation of this index.

### 2. Representativeness

The representativeness of this index is reflected in two aspects.

Representativeness of fields of openness. This report measures cross-border openness in the following three areas: economy, society, and culture. Economic openness has so far been the main area of global cross-border openness and has in turn promoted related social and cultural openness. Social and cultural openness, which is not so directly related to economic openness, and political openness (or international governance), which lag far behind economic openness, are not main areas of human openness so far, and, therefore, are not included in this index. The aforementioned fields that have been included are sufficient to represent the openness practices of mankind.

Representativeness of openness entities. This index measures the cross-border openness of 129 economies, which not only accommodate the vast majority of the total population and economic output of the world, but are also the main entities of human cross-border openness activities. Human cross-border communication involves governments, for-profit market institutions and individuals, as well as non-profit institutions and individuals. They are added up according to their economies to form the basic unit of observation in this index —national economy (country or region). These economies are added up to constitute the vast majority of the human world, becoming largely representative of the world.

### 3. Sustainability

Data availability is high. Data in this indicator system come from public sources,

such as the International Monetary Fund's balance of payments statistics, the World Bank's World Development Indicators, the United Nations' social and cultural statistics, the World Trade Organization's cross-border trade opening-up policy data, and the UNCTAD's cross-border investment liberalization policy data, are publicly released on their respective official websites, and are free and available to readers around the world.

The source of data is stable. The data of the above indicators are all released by the aforementioned international organizations at a fixed frequency for a long period of time. These data are mainly provided by international inter-governmental organizations based on the official statistical authorities of countries, or compiled by those organizations based on the scattered official data of relevant economies.

The quality of data is high. The compilation of the above indicator data by the aforementioned international organizations or authorities of concerned economies is based on the statistical systems, methodologies and best practices established by authoritative international statistical manuals. The quality of the original data sources has generally been guaranteed by official authorities, and even if the statistical practices of some economies are different from those of others, the differences would be explained thoroughly so that readers can fully understand, evaluate and use the data.

Last but not least, this index would have a broad prospect of expansion and application. The reputation of an index comes in part from its ease of application. When this index releases the rankings of economies, it will also release the scores and original valuesof the secondary, tertiary, and basic-level indicators to facilitate users to understand, assess, and apply it.

## II. Indicators Measuring Opening-up to the Outside World

### 1. List of indicators measuring opening-up to the outside world

This indicator system has 21 measurement indicators for openness performance, which measure the performance of economic openness, social openness, and cultural openness.

**Table 2-1 List of Indicators Measuring Opening-up to the Outside World**

| Secondary | Tertiary | Basic-level |
|---|---|---|
| Openness policies | Economic openness policies | Weighted applied tariff rate |
| | | Non-tariff trade barriers |
| | | Inbound openness of concerned free trade agreement(s) |
| | | Outbound openness of concerned free trade agreement(s) |
| | | Inbound openness of concened international investment agreement(s) |
| | | Outbound openness of concerned international investment agreement(s) |
| | | Financial openness policy |
| | Social openness policies | Cross-border visa openness policy |
| Openness performance | Economic openness performance | Export of goods |
| | | Import of goods |
| | | Export of services |
| | | Import of services |
| | | Foreign direct investment |
| | | Outbound direct Investment |
| | | Portfolio investment inflows |
| | | Portfolio investment outflows |
| | Social openness performance | Inbound tourists |
| | | Outbound tourists |
| | | Inbound students |
| | | Outbound students |
| | | Immigrants |
| | | Emigrants |
| | Cultural openness performance | Intellectual property import |
| | | intellectual property export |
| | | Patent applications by non-residents |
| | | Patent applications abroad by residents |
| | | Internaional citations of science documents |
| | | Cultural goods import |
| | | Cultural goods export |

## 2. Brief introduction of openness policy indicators and openness performance indicators

Openness policy refers to authoritative, standardized regulations, which are directive contents on fields of cross-border openness made by economies out of their

self-interest and will. Openness policy is usually an important causal variable for openness performance, but it is not the only causal variable. In practice, an openness policy is often the focus of an economy in regulating its own fields of openness. It is a government's legitimate right to formulate and implement openness policy. Through openness policy, an economy can adjust the width and strength of fields of its cross-border openness, thereby forming its own pace of opening-up. Of course, the formulation and implementation of openness policies are often the result of the combined forces of relevant domestic and foreign factors.

The cross-border openness policies involved in this report are mainly economic and social openness policies. This indicator system is composed of eight openness policy indicators, of which three are designed to measure the strength and breadth of cross-border openness policies, while five are designed to measure the breadth of coverage of cross-border openness policies. Cultural openness policies will also be introduced when it becomes ripe in the future to fully match the areas covered by openness performance indicators.

The openness performance refers only to the direct performance achieved by the cross-border openness behavior itself, excluding the indirect performance of the openness behavior. The openness behavior has a far-reaching bearing on economy, society, and culture, and its cause and effect chain is very long. This report, however, only focuses on the direct performance of openness.

## 3. Introduction of basic openness indicators

**Table 2-2 Introduction of Basic Openness Indicators**

| Indicator code | Name of indicator | Source of data |
|---|---|---|
| 1.1.1 | Weighted applied tariff rate | WB |
| 1.1.2 | Non-tariff trade barriers | WTO |
| 1.1.31 | Outbound openness of concerned free trade agreement(s) | WTO |
| 1.1.32 | Inbound openness of concerned free trade agreement(s) | |
| 1.2.11 | Outbound openness of concerned international investment agreement(s) | UNCTAD |
| 1.2.12 | Inbound openness of concerned international investment agreement(s) | |
| 1.3.1 | Financial openness policy | Chinn-Ito Index |
| 1.4.1 | Cross-border visa openness policy | Henley & Partners |

(Continued)

| Indicator code | Name of indicator | Source of data |
|---|---|---|
| 2.1.11 | Export of goods | IMF/WB |
| 2.1.12 | Import of goods | |
| 2.1.21 | Export of services | |
| 2.1.22 | Import of services | |
| 2.2.11 | Foreign direct investment | |
| 2.2.12 | Outbound direct investment | |
| 2.2.21 | Portfolio investment inflows | |
| 2.2.22 | Portfolio investment outflows | |
| 2.3.11 | Inbound tourists | World Tourism Organization/WB |
| 2.3.12 | Outbound tourists | |
| 2.3.21 | Inbound students | UNESCO |
| 2.3.22 | Outbound students | |
| 2.3.31 | Immigrants | UNDESA |
| 2.3.32 | Emigrants | |
| 2.4.11 | Intellectual property export | IMF/WB |
| 2.4.12 | Intellectual property import | |
| 2.4.21 | Patent applications abroad by residents | WIPO |
| 2.4.22 | Patent applications by nonresidents | |
| 2.4.3 | International citations of science documents | SCImago |
| 2.4.41 | Cultural goods import | UNESCO |
| 2.4.42 | Cultural goods export | |

(1) Indicators on cross-border openness policies

Weighted applied tariff rate (tariff rate, applied, weighted mean, all products). It is the weighted rate of tax on imports from different partner economies imposed by the reporting economy, based on weighting of the reporting economy's import from each of those economies in its total imports. Among them, the import tax rate is based on HS product classification six-digit or eight-digit code (it needs to be converted to SITC classification three-digit code). This indicator comes from the World Bank estimates based on multiple databases[①].

① World Bank staff estimates using the World Integrated Trade Solution system, based on data from United Nations Conference on Trade and Development's Trade Analysis and Information System database, and the World Trade Organization's Integrated Data Base and Consolidated Tariff Schedules database.

Non-tariff measures (NTMs). It refers to the following measures under the monitoring announced by the GATT-WTO agreement: anti-dumping, anti-subsidy, quantitative restriction, safeguard measure, animal and plant quarantine, special safeguard measure, technical trade barrier, tariff quota, and export subsidy. This indicator measures the number of non-tariff trade measures, and does not involve the types of commodities or the value of cross-border trade involved in those measures. And, therefore, it is a breadth indicator of cross-border trade policy rather than an indicator of strength. The data come from WTO.

Trade openness policy measures the number of economies covered by trade agreements and is an indicator measuring breadth of cross-border openness. The Regional Trade Agreement (RTA) of the WTO refers to any reciprocal trade agreement between two or more partners, which aims to eliminate various trade barriers between them and regulate their trade cooperation relationship. Regarding the effect of RTA on global trade liberalization, there are different opinions. RTA is designed to benefit the signatory countries, but if distortions in resource allocation and trade and investment transfers are not minimized, the expected benefits could be reduced. In addition, the increase in RTAs has also caused the problem of overlapping membership. If traders cannot meet the requirements of multiple sets of trade rules, trade flows would be jeopardized. Moreover, as the scope of RTAs expands to include policy areas that are not subject to multilateral regulation, the risk of inconsistent agreements may increase. Most of the earlier signed RTAs only involve such rules as tariff liberalization, trade defense, standards, and rule of origin. The coverage of the newly signed RTAs has gradually been expanded to include service liberalization and commitments to service rules, investment, competition, intellectual property rights, e-commerce, environment, and labor, which may lead to regulatory confusion and enforcement issues. As of June 2016, all WTO member countries had participated in at least one regional trade agreement in force. As of January 17, 2020, there had been 30 RTAs in force around the world[①]. Relevant data come from WTO.

International investment policy, which, in this report, is measured by the number of international investment agreements signed. This indicator measures the breadth of international investment policies, that is, the number of partners that have

① RTA website of WTO: https://www.wto.org/english/tratop_e/region_e/region_e.htm.

signed international investment agreements, rather than the strength of international investment policies①. The International Investment Agreements (IIAs) are mainly divided into the following two categories. First, the Bilateral Investment Treaties (BITs) are agreements reached between two economies to promote and protect the investment of their respective investors in the other's territory. Most IIAs belong to BITs. Second, the Treaties with Investment Provisions (TIPs) refer to various treaties with cross-border investment provisions other than BITs, which can be subdivided into the following three categories. (1) Broad economic treaties, including common obligations in BITs, such as free trade agreements with special investment chapters. (2) Treaties with limited investment-related provisions. For example, the investment provisions of certain treaties are limited to free transfer of money for the establishment of investment or investment-related funds. (3) Treaties that only contain investment *framework* provisions. For example, those provisions are only about negotiation tasks of investment cooperation and/or future investment issues②. The data come from the UNCTAD.

Financial openness policy reflects tolerance of authorities of an economy towards cross-border financial flows, especially transaction management policies. This report uses the Chin-Ito Index for measure. The index is based on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER), and includes the degree and intensity of *capital control*. The data are publicized by Chinn & Ito③.

The cross-border visa policy for an economy's ordinary citizens reflects the tolerance of that economy's authorities towards cross-border visa policy for those holding an ordinary passport at home and abroad. This report uses the Henley & Partners Passport Index to measure the breadth of the cross-border liberalization policy for ordinary citizens. For a particular economy, when its ordinary citizens holds a passport issued by authorities of that economy to enter other economies, how many

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① Official UNCTAD website: https://investmentpolicy.unctad.org/international-investment-agreements

② Apart from those two types of IIAs, there is also an openness category of investment-related instruments (IRIs), including various binding and non-binding documents, such as sample agreements and document drafts, multilateral conventions on dispute settlement and arbitration rules, documents adopted by international organizations, and other documents. As a measurement indicator for cross-border direct investment policy, the international investment agreements in this report are not included in IRI.

③ Website where the index is released: http://web.pdx.edu/~ito/Chinn-Ito_website.htm.

economies would grant them the visa exemption or visa-on-arrival treatment, or how many other economies whose ordinary citizensare granted the visa exemption or visa-on-arrival treatment when they enter the territory of the economy, would reflect that economy's ease of cross-border personal mobility policies. The data come from the official website of Henley & Partners[①].

(2) Indicators on economic openness performance

This indicator system contains eight indicators on economic openness performance, all of which are compiled in accordance with the Balance of Payments Manual (BPM6) and come from the Balance of Payments and International Investment Position (BOP/IIP), published by the IMF.

Export and import of goods. The balance of payments statistics cover cross-border transactions of goods that *cause ownership change between residents and non-residents*. The main data come from the International Merchandise Trade Statistics, the customs system, or the International Transactions Reporting System (ITRS), although it needs to be adjusted based on the sources of the data. It is because the International Merchandise Trade Statistics counts goods that *enter its economic territory (import) or leave its economic territory (export), which increases or decreases the stock of material resources of the economy*. The customs system does not cover certain goods or travel items that have gone through cross-border ownership transfers, and the ITRS does not cover certain goods that have undergone cross-border ownership changes without making relevant payments[②]. Moreover, when international merchandise trade statistics, customs statistics, and international transaction reporting system data are converted into goods statistics under BOP, the freights and insurance costs that occur from the border of the exporting country to the border of the importing country should be deducted as the import price is converted from CIF to FOB. This is because

① https://www.henleypassportindex.com/passport.

② Since no change in ownership occurs between residents and non-residents, or the goods have no value, they are not included in the general goods category under certain circumstances, such as re-export trade, personal belongings of international migrants, goods acquired by the lessor under financial leases, and returned goods.

the International Merchandise Trade Statistics system uses FOB① for collecting export statistics and CIF for collecting import statistics. The BPM6 summarizes the specific items that are frequently adjusted based on the merchandise trade statistics in accordance with source data, including seven added items, six deducted items, and three added or deducted items. The seven added items are as follows: goods purchased by the carrier at the port, fishing, seabed minerals and rescued property after resident-operated ships are sold, goods with change in ownership after illegally entering/leaving the territory, goods acquired from other economies (only applicable to import) due to processing in other countries, goods sold abroad after processing in other economies (only applicable to export), net export as a result of reselling of goods (only applicable to export), non-monetary gold. The six deducted items are as follows: personal belongings of immigrants, goods imported by non-resident enterprises for construction projects, goods used for maintenance or storage without change of ownership, goods sent abroad after processing or returned without change of ownership, with returned goods subject to CIF/FOB price adjustment (only applicable to import). The three added or deducted items are as follows: goods lost or damaged in transit, goods in customs warehouses or other areas, with ownership changed, and high-value capital goods, whose delivery (time) is different from the ownership (time)②.

Service export and import. The Manual on Statistics of International Trade in Services (MSITS) is the main source of information for cross-border services trade data. The conceptual framework of MSITS is the same as that of the BPM6 and the System of National Accounts 2008. The classification of services is mainly based on products, and, secondly, traders. It has also been adjusted in accordance with Central Product Classification (CPC).

Cross-border direct investment includes foreign direct investment and outbound direct investment. This report measures the flow of direct investment, that is, the flow

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① There are three types of FOB calculations, which are as follows. (a) Free-on-board price for delivery at the border port of the exporting country (FOB, applicable to goods shipped by sea or inland water); (b) The free-carrier price for delivery at the border terminal of the exporting country (FCA, applicable when the shipping method used is not suitable for FOB); (c) Delivered-at-frontier, or delivery in the exporting country (DAF, applicable to shipping methods that are not suitable for FOB and FCA; for example, export of goods by rail or pipeline).

② BPM6, Chinese version, Table 10.2, p140.

generated among parties with direct investment relationships. Direct investment occurs when the investment of a resident investor in a certain economy constitutes the control of, or has a significant bearing on, a resident enterprise of another economy. Apart from equity that generates control or influence, direct investment also includes related debt and other debts and equities between companies that share the same direct investor. If the direct investor has more than 50% of the voting rights in the invested enterprise, then it is clear there is a controlling relationship and the invested enterprise is the subsidiary. If the direct investor has 10% to 50% of the voting rights in the invested enterprise, then it is clear there is a significant influence, and the invested enterprise is a joint enterprise. Control or influence can be direct (through ownership of voting rights) or indirect (through ownership of companies that have voting rights).

Cross-border portfolio investment flows includes portfolio investment inflows and portfolio investment outflows. This report measures the flow of portfolio investment, which refers to the flow of cross-border transactions of debts or equity securities that are not included in direct investment or reserve assets.

(3) Indicators on social openness performance

The number of cross-border tourists includes the number of inbound tourists and that of outbound tourists. Tourists enter other economies from their permanent-residence economy for traveling that lasts not more than 12 months and that does not aim to obtain labor compensation from the visited economy. When the number of tourists is not available, the number of visitors would be used instead, namely, tourists, visitors on that specific day, cruise ship passengers, and crew members. Economies differ in terms of sources and collection methods of entrants to their territory. In some cases, the data come from border statistics and surveys. In other cases, the data come from tourist accommodation agencies. In some economies, the arrivals only refer to those arriving by air, while in other economies they only refer to those who settle down in a hotel; some economies take into account the entry of nationals residing abroad, while other countries do not consider such situation. Therefore, one should be cautious when comparing the number of arrivals from various economies. The data on inbound tourists refer to the number of arrivals, not the number of tourists. Therefore, people who travel to the same economy multiple times over a period of time are counted as newcomers each time. Outbound tourism refers to the number of times people travel from the economy where they usually live to any other economy, aiming not to engage

in remunerative activities in the visited economy. The data of outbound tourists refer to the number of outbound travelers, not that of tourists. Therefore, a person who has left a country many times over a period of time is counted as a new outbound traveler each time. The data are directly quoted from the World Bank's World Development Indicators, which is from the World Tourism Organization (WTO) Yearbook of Tourism Statistics.

The number of cross-border international mobile students includes the number of inbound students and that of outbound students. International mobile students here refer to those studying in higher-educational institutions. According to the UNESCO Institute for Statistics (2012), higher education is composed of the following two stages. The first stage is Level 5 of the International Standard Classification of Education (ISCED), including Level 5A, which is mainly a theory-based courses designed to provide sufficient qualifications for entering advanced research courses and majors with high-skill requirements; and level 5B, courses are usually more practical, i.e. technically and/or professionally specific. The second stage, ISCED level 6, includes courses dedicated to advanced research and original study and ultimately, advanced research qualifications will be granted. Data come from the *UNESCO Statistical Yearbook*①.

The number of cross-border migrants, including the number of inbound migrants and that of outbound migrants. What is measured here is the stock of migrants. International migration is the most difficult component of demographic change to measure and estimate. Therefore, the quality and quantity of data used to estimate and predict net migration varies from country to country. In addition, the movement of people across international borders is often a response to changing social, economic, political, and environmental forces, and fluctuates dramatically. For example, refugee flows may involve large numbers of people crossing borders during a short period of time. Data are available only for 1990, 1995, 2000, 2005, 2010, 2015 and 2019, estimated by the Population Division of the United Nations Department of Economic and Social Affairs②.

The cross-border social openness, represented by cross-border tourists,

① For online version of the database: UIS: http://data.uis.unesco.org/Index.aspx?DataSetCode=EDULIT_DS&popupcustomise=true&lang=en.

② https://www.un.org/en/development/desa/population/migration/data/estimates2/estimates19.asp.

international students and migrants, reflects the general picture of cross-borderpersonal communication and information, knowledge, technology, emotion and labor integration that it carries. It is very important for the economic development of concerned open economies.

(4) Indicators on cross-border cultural openness performance

There are seven indicators on cross-border cultural openness performance covering the fields of intellectual property, patents applications, international citations of science documents and trade in cultural goods.

Cross-border intellectual property flows include intellectual property export and import. The costs of using intellectual property rights refer to license fees involved in authorization of the use of exclusive rights (such as patent rights, trademark rights, copyrights, industrial processes and designs that include trade secrets, and franchise rights), as well as reproduction or dissemination (or both) of intellectual property rights in the original or prototype works (such as copyright of books and manuscripts, computer software, movies, and audio recordings) and related rights (such as the rights of live broadcasting and television relaying, cable transmission or satellite broadcasting). The data come from the IMF's BOP/IIP database or the World Bank's World Development Indicators.

Cross-border patent applications includes residents applying for patents abroad and non-residents applying for patents within the concerned country. Patent application refers to a worldwide patent application filed with the national patent authorities through the Patent Cooperation Treaty procedures to obtain the exclusive rights of an invention, which means a product or process that provides a new way of doing things or solving technical problems. The patent right, which provides invention protection for the patentee, is within a certain period of time, generally 20 years. Unless otherwise stated, the number of resident and non-resident patent applications include patent applications submitted through the PCT system as PCT national/regional phase entries. Non-resident patent applications are filed by applicants outside the concerned country or region. Resident patent applications refer to patent applications in which the first applicant or assignee is a resident of the concerned country or region. Patent data are important resource for studying technological changes in a country or region. They provide a unique source of detailed information about multiple facets of invention activities and processes (such as geographic location, technical and institutional

origin, individual and network), which can be used for analyzing a wide range of topics related to technological change and patent activity, including industry-science links, corporate patent strategy, and study of internationalization and patent value indicators. Patent-based statistics reflect the invention performance of countries, regions, and companies, as well as other aspects of the dynamics of the innovation process, such as cooperation on innovation or technological paths. The data come from World Intellectual Property Organization (WIPO) or the World Bank's World Development Indicators.

International citations of science documents. The data come from the SCImago journals and country rankings. The country rankings are scientific indicators developed based on the information contained in the Scopus database (Elsevier B.V.). Citation data come from more than 34,100 articles and country performance indicators from more than 5,000 international publishers in 239 countries around the world.

Cross-border trade in cultural goods includes export and import of cultural goods. According to the definition of the 2009 UNESCO Framework for Cultural Statistics, cultural products refer to consumer products that convey ideas, symbols and lifestyles, namely, books, magazines, multimedia products, software, sound recordings, movies, videos, audiovisual programs, handicrafts and fashion. Data are from the *UNESCO Statistical Yearbook*①.

## III. Basic Indicator Data Processing and Weight Setting

Statistical methods are adopted to process the missing valuesof basic indicators, and the basic indicator data have been nondimensionalized in accordance with the supply and demand principle of economics (see Appendix for details).

The weighting of the indicator system is based on expert survey method. On the basis of a questionnaire survey of 41 experts on international economics, the arithmetic average of the results obtained through the questionnaire was taken as the weight of each indicator. The results are as follows.

① http://data.uis.unesco.org/Index.aspx?DataSetCode=EDULIT_DS&popupcustomise=true&lang=en.

**Table 2-3 Weights of Indicators**

| Secondary indicator | Tertiary indicator | Basic indicator |
|---|---|---|
| Openness policy (0.518) | Economic openness policy (0.9), and Social openness policy (0.1) | Weighted applied tariff rate (0.339) |
| | | Non-tariff trade barrier (0.259) |
| | | Inbound openness of concerned free trade agreement(s) (0.051) |
| | | Outbound openness of concerned free trade agreement(s) (0.051) |
| | | Inbound openness of concerned international investment agreement(s) (0.05) |
| | | Outbound openness of concerned international investment agreement(s) (0.05) |
| | | Financial openness policy (0.1) |
| | | Cross-border visa openness policy (0.1) |
| Openness performance (0.482) | Economic openness performance (0.69) | Export of goods (0.169) |
| | | Import of goods (0.169) |
| | | Exports of services (0.161) |
| | | Import of services (0.161) |
| | | Foreign direct investment (0.141) |
| | | Outbound direct investment (0.141) |
| | | Porfolio investment inflows (0.029) |
| | | Porfolio investment outflows (0.029) |
| | Social openness performance (0.17) | Inbound tourists (0.169) |
| | | Outbound tourists (0.169) |
| | | Inbound students (0.17) |
| | | Outbound students (0.17) |
| | | Immigrants (0.091) |
| | | Emigrants (0.091) |
| | Cultural openness performance (0.14) | Intellectual property export (0.183) |
| | | Intellectual property import (0.183) |
| | | Patent application by non-residents (0.171) |
| | | Patent application abroad by residents (0.171) |
| | | International citations of science documents (0.11) |
| | | Cultural goods import(0.091) |
| | | Cultural goods export(0.091) |