



# TRADE COMPETITIVENESS MAP

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Benchmarking national and sectoral trade performance

## TRADE PERFORMANCE INDEX

*Market Analysis and Research*

*Division of Market Development*

*International Trade Centre*

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## 1. **Summary**

The International Trade Centre (ITC) developed the Trade Performance Index (TPI) with the aim of assessing and monitoring the multi-faceted dimensions of export performance and competitiveness by sector and by country.

At present, the TPI covers around 180 countries and 14 different export sectors. The index calculates the level of competitiveness and diversification of a particular export sector using comparisons with other countries. In particular, it brings out gains and losses in world market shares and sheds light on the factors causing these changes. Moreover, it monitors the evolution of export diversification for products and markets. The TPI is limited by its purely quantitative approach, although it does provide a systematic overview of sectoral export performance and comparative and competitive advantages.

For each country and each sector, the TPI provides three types of indicators: a *general profile*, a country *position* for the latest available year and *changes* in export performance in recent years. Altogether, the TPI makes use of several quantitative performance indicators. For ease of reference, these indicators are presented in absolute terms and, in addition, ranked among the 180 countries covered by the TPI.

Moreover, one composite ranking referring to the overall *position* of a country and sector is calculated. This composite ranking is based on five criteria, namely the value of net exports, per capita exports, the world market share, the diversification of products, and the diversification of markets.

## 2. **Introduction**

The trade performance of individual countries tends to be a good indicator of economic performance since well performing countries tend to record higher rates of GDP growth. The majority of developing countries have joined the World Trade Organization (WTO) and have taken initiatives aimed at opening their economies.

Nevertheless, the outcome has not always been systematically positive with export performance sometimes remaining disappointing. It is difficult to establish an all embracing definition of successful trade performance.

Trade champions contrast with certain specialised exporters that suffer from deterioration in their terms of trade. For example, some developing countries record high growth rates by specialising in niche markets and concentrating their export markets, while other developing countries record more moderate rates of growth with a well diversified array of products and partner countries. In other cases, successful performance is the result of a favourable product or market penetration since the beginning. Successful performance can also be gauged in terms of a country's ability to adapt its export profile to changing patterns of world demand. The last approach is the most dynamic and demand-driven trade policy stance.

The Trade Performance Index (TPI thereafter) designed by ITC aims to tackle the complex and multidimensional nature of trade patterns. This index is computed using the world's largest trade database, COMTRADE (of the United Nations Statistics Division), covering around 180 countries<sup>1</sup>, where more than 95% of world trade in 5,000 products is reported at the 6-digit level of the Harmonized System (HS). Since COMTRADE captures around 95 % of world trade, the TPI is calculated not only for countries that report their own trade data, but also for over one hundred primarily low-income countries that do not report national trade statistics.

Given that such an amount of information would be overwhelming to the final user, products are grouped into 14 sectors (see appendix 2). Calculations are made at the product level and results are presented at the sectoral level and for the economy as a whole. For each country and each sector, the TPI provides a *general profile*, indicators on a country's *position* and indicators on *changes* in export performance in recent years.

The rest of the paper covers the objectives, methodology and results of the TPI framework.

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<sup>1</sup> In the case of non-reporting countries, the trade is reconstituted on the basis of partner country statistics (mirror statistics). This approach does not capture trade among non-reporting countries

### **3. Motivation for developing the Trade Performance Index**

Generally, trade performance is characterised by rough indicators, such as the level of openness (total trade in goods and services divided by GDP) or growth of exports over a given period (such as the World Bank's *World Development Indicators*).

Recent research on the relationship between trade and growth suggests that openness alone is not a sufficient criterion for determining high levels of growth. Other factors, such as the type of product available, the level of market and economic diversification, the positioning on quality ladders, are also significant in explaining growth. In addition, it is important to determine the reasons for country differences in export growth and to determine the redistributive process of market shares among competitors.

Departing from the rough indicators referred to above, microeconomic and generally qualitative indicators are used to characterise the competitiveness of nations. In this light, the "Microeconomic index of competitiveness" (Porter and Christensen, 1999), is based on the micro-foundations of a country's competitiveness. Launched in 1998 as part of the Global Competitiveness Report, this index is based on a survey of some 4,000 businessmen and government officials in 58 countries, including OECD countries<sup>2</sup>. Regressing income per capita on this index explains more than 80% of the variance of income in the sample. A quantitative method was developed in order to complement the qualitative approach, which may be criticised on the ground of being limited to a small number of developing countries.

It appears that the relative position of a country or product on the international market, and its development over time, is a good indicator of competitiveness. Trade statistics capture these changes. Trade statistics have the advantage of being available for a substantial number of countries. For those countries which do not report trade statistics, their trade profile can be (partially) completed by using

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<sup>2</sup> Indicators range from the overall infrastructure quality to administrative infrastructure, information infrastructure, capital availability, human resources etc.

mirror statistics. Lastly, trade data is broken down at the industry and product levels, which provides a disaggregated insight into trade performances.

On this basis, developing countries can be ranked according to their trade performance, based on various criteria. A ranking can be provided by country, sector, or a combination of different criteria.

It must be stressed that the performance of individual countries cannot be determined on the basis of a restricted sample of countries or products. The derivation of the relative export performance is achieved by including a significant number of countries, together with a detailed product breakdown.

#### **4. Content of the TPI**

For each country and each sector, the TPI provides indicators on a country's general profile, on a country's position and on the decomposition of the country's change in world market share. Altogether, the TPI consists of 22 quantitative indicators of trade performance. For ease of reference, these indicators are presented in absolute terms and, in addition, combined to form a ranking among the countries. All this information is grouped under three categories referring to "general profile", "current performance" and "decomposition of changes in trade performance", as illustrated in Table 1.

Table 1. Groups of indicators used

Current performance <sup>3</sup>	General profile	Decomposition of changes in world market share (last 5 years)
P1. Value of net exports	G1. Value of exports	C1. Relative change of world market share decomposed into:
P2. Per capita exports	G2. Trend growth of exports (last 5 years)	
P3. Share in world market	G3. Share in national exports	(C1a) Competitiveness effect
P4.a Product diversification	G4. Share in national imports	(C1b) Initial geographic specialisation
P4.b Product concentration		
P5.a Market diversification	G5. Growth in per capita exports (last 5 years)	(C1c) Initial product specialisation
P5.b Market concentration	G6. Level in relative unit values	(C1d) Adaptation effect
		C2. Matching with dynamics of world demand

## 5. Data used

The raw trade data used to calculate the indicators are defined at the 6-digit level of the Harmonized System, 1996 edition, which includes more than 5'000 product items. The data are extracted from COMTRADE (<http://comtrade.un.org>), the United Nations Commodity Trade Statistics Database, maintained by the Statistics Division of the U.N.

Around 100 countries have reported their trade data systematically over the last five years in the 1996 edition of the HS. For the other countries (around 90), we are using mirror estimates, which are derived from partner countries statistics. Since COMTRADE captures around 95 % of world trade, mirror estimates usually give fairly reliable results. See Box 1 for a description of problems encountered using trade data.

<sup>3</sup> Indicators used for the computation of the composite index.

In order to obtain more robust rankings of trade performance, for each sector we have only considered countries whose exports are superior to US\$ 1 million for each year of a five-year period under review, and whose total exports for the same period are superior to US\$ 25 million.

**Box 1: Foreign Trade Statistics: what users should take into consideration**

Foreign trade statistics provide a differentiated picture of trade flows among countries. They are comprehensive in terms of product coverage (more than 5,000 products under the Harmonized System), geographical coverage (over 100 countries covering 95 per cent of world trade) and time series (data under the Harmonized System are available for the last decade). Moreover, they are readily available at moderate costs. This makes them an attractive source for market research and the assessment of trade performance. Against this background, ITC has developed a number of tools for international marketing and trade promotion, based on trade statistics. The Trade Performance Index and Trade Maps are cases in point. All of these tools strive to present trade statistics in an analytical and user friendly format. Notwithstanding the attractiveness of this comprehensive source of information, users should factor in the following weak points of foreign trade statistics.

- i) Trade data are never complete. Smuggling and non-reporting represent a serious problem in a number of countries. In addition, trade statistics as any source of information are not free of mistakes and omissions.
- ii) Most countries include imports for re-exports and re-exports in their trade statistics. A low income country may be an exporter of airplanes simply because its national airline has sold second hand planes.
- iii) According to international conventions for reporting trade statistics, the export value refers to the total or contract value, which may, of course, be very different from local value added for many processing activities, for instance, the local value added remains below 20 per cent of the export value.



iv) Detailed trade statistics are available only for merchandise trade and not for services, although the latter may account for a sizeable share of national exports.

v) Even at the lowest level of disaggregation, product groups in the trade nomenclatures do not necessarily reflect trade names and often contain a wide spread of different products. Moreover, the product nomenclature is sometimes misleading. The labels of aggregated product groups are often very general and provide at times only limited guidance on the leading items within the group of products concerned.

vi) Exchange rates fluctuations are not always properly recorded in international trade statistics. Values are normally aggregated over the period of one year in local currency and converted into US dollars.

vii) For countries that do not report trade data to the United Nations, ITC uses partner country data, an approach referred to as mirror statistics. Mirror statistics are a second best solution (better than having no data at all). At the same time, they have a number of shortcomings when compared to the first best solution of nationally reported data. First and foremost, they do not cover trade with other non reporting countries. As a result, mirror statistics hardly cover South trade. For an assessment of intra African trade, for instance, mirror statistics are not a suitable source of information. Second, there is the problem of transshipments, which may hide the actual source of supply. Third, mirror statistics invert the reporting standards by valuing exports in if terms (i.e. including transport cost and insurance) and imports in fob terms (excluding these items).

In view of the above shortcomings, trade statistics should never be the sole source of insight but need to be complemented by other sources and in particular cross checked by product specialists and industry insiders. Overall, ITC's experience suggests that trade statistics represent a very useful source of information and a valid point of departure for strategic market research, if analysed with a healthy mix of scepticism and pragmatism vis-à-vis their strength and shortcomings.

## 6. **Description of indicators**

This section examines the rationale and the calculation of each indicator entering in the TPI. General profile indicators, position-related indicators (Current Performance) and change-related indicators are surveyed respectively. All indicators are calculated for each of the 14 sectors at the product level. Original data used in the computation is at the 6-digit level of the HS nomenclature (1996 edition), corresponding to more than 5,000 products as a whole.

The *composite index* (CI)<sup>4</sup> is based on a simple average of the five rankings of current performance indicators (P1 to P5). This index reflects the position of a country in a given sector for a given year, in terms of trade performance. Changes over time of this position reflect improvements or deterioration in trade performance of the country under analysis.

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<sup>4</sup> In the previous editions of the TPI, this index was referred as the "Current Index (P)".

## G1. - VALUE OF EXPORTS (in thousand US\$)

- **What does it tell us?**

This index shows the value of country's sector's total exports for the chosen year (in thousands of US\$), indicating the importance of the sector.

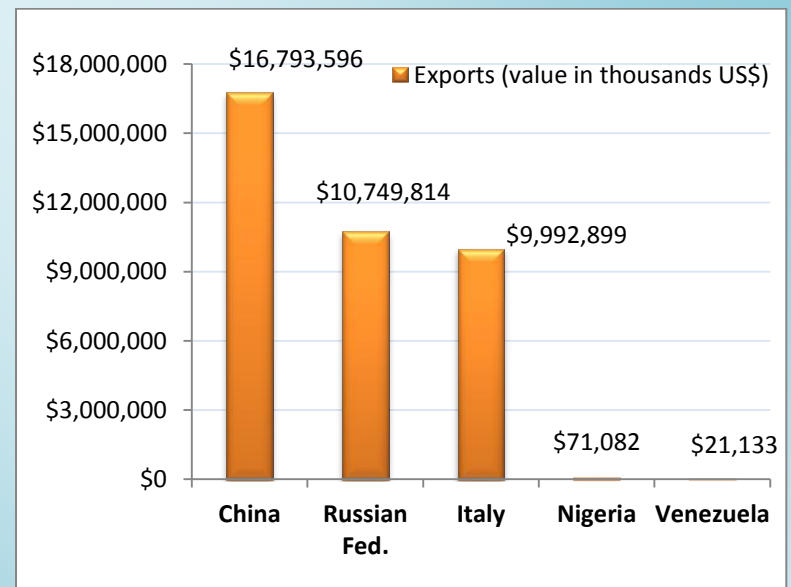
Exports are given in FOB terms (free on board) if the country is a direct reporter to the United Nations' COMTRADE database, otherwise in CIF terms (cost, insurance, freight), as mirror statistics (based on the partners' declarations of imports) are used.

- **Definition:**

Sum of selected sector's exports in the chosen year.

- **Range of values:**

Takes value between 0 and  $+\infty$ , with higher values indicating greater importance of the sector under review.



**Example:**

The above figure depicts the “Wood and articles of wood” sector's exports (value in thousand US\$) for selected economies in the chosen year (t).

## G1. – TECHNICAL NOTES

- **Mathematical definition:**

$$X_{ds}^t$$

where d is the country under study, s refers to a specific sector and X are the export values.

- **Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Exports (value in thousands US\$)
China	\$16,793,596
Russian Fed.	\$10,749,814
Italy	\$9,992,899
Nigeria	\$71,082
Venezuela	\$21,133

**Sample calculation:**

The table above presents total exports data for selected economies for the sector under review. The trade data is from ITC Trade Map. All of the data is in compatible units (current US dollars).

## G2. - EXPORT GROWTH IN VALUE, p.a. (%)

- **What does it tell us?**

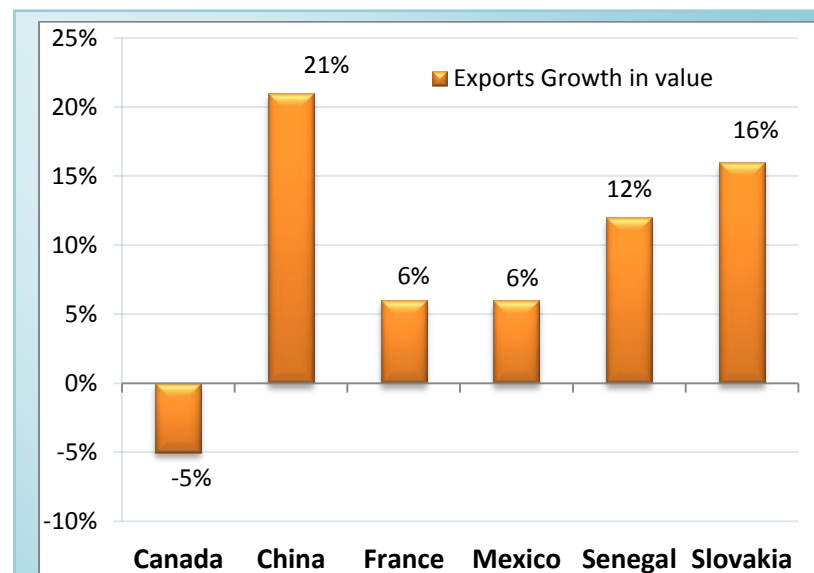
The export growth in value shows the development of a sector's exports from time  $t_0$  to time  $t$  (last five years). A positive value shows that the exports (in value) have increased.

- **Definition:**

The weighted trend (compound growth rates) measures, for each country and each sector, the annual percentage growth of exports over the most recent 5-year period.

- **Range of values:**

It takes values between  $-\infty$  and  $+\infty$  (per cent), with positive values indicating positive trend.



**Example:**

The above figure depicts the “Wood and articles of wood” sector’s export growth in value for selected economies in a given 5-year period ( $t_0$ ,  $t$ ).

## G2. – TECHNICAL NOTES

- **Mathematical definition:**

$$GVX_{ds}^t = 100 \times \left[ \left( \frac{X_{ds}^t}{X_{ds}^{t_0}} \right)^{1/(t-t_0)} - 1 \right]$$

where t and  $t_0$  are respectively the last and the first years considered, d is the country being studied, s is the selecting sector, and X are the exports.

- **Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Export Value t0	Export Value t	Exports Growth in value
Canada	\$29,854,934	\$28,362,187	-5%
China	\$13,879,005	\$16,793,596	21%
France	\$12,456,154	\$13,203,523	6%
Mexico	\$1,686,856	\$1,788,067	6%
Senegal	\$18,687	\$20,929	12%
Slovakia	\$2,237,659	\$2,595,684	16%

**Sample calculation:**

The table above presents a sector's exports in value data for selected economies in the period under review. The trade data is from ITC Trade Map. All of the data is in compatible units (current US dollars).

The value of the exports growth is the result of the ratio of the sector's exports in the last year of the period under review to the exports of the first year considered, normalised for a given factor, and multiplied by 100 to alter the expression in percentage terms.

## G3. - SHARE IN NATIONAL EXPORTS (%)

- **What does it tell us?**

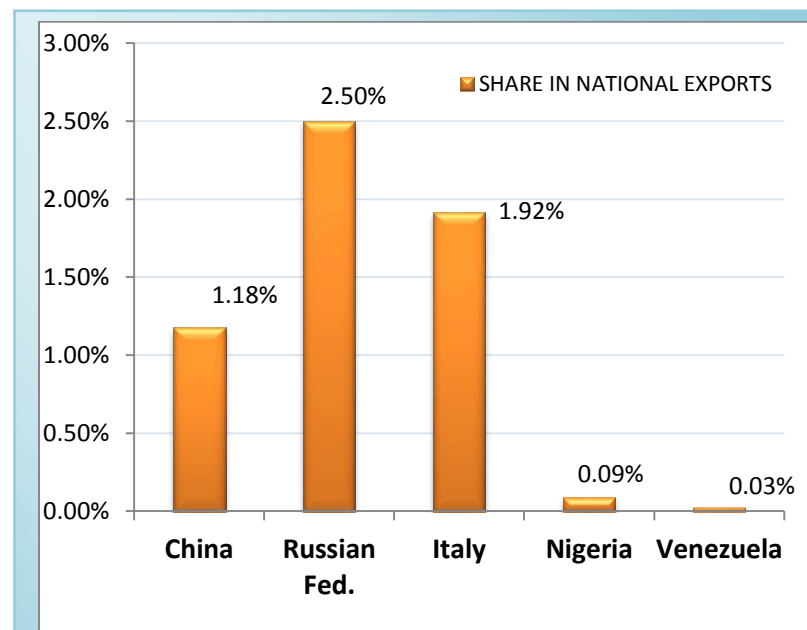
This indicator refers to the share of a sector's exports in relation to total country exports; hence it shows the importance of the sector under review in national exports.

- **Definition:**

The percentage ratio between total sector's exports to total country's exports.

- **Range of values:**

Takes value between 0 and 100 per cent, with higher values indicating greater importance of the sector under review in the selected country's export portfolio.



**Example:**

The above figure depicts the “Wood and articles of wood” sector's share in national exports for selected economies in the chosen year (t).

## G3. – TECHNICAL NOTES

- Mathematical definition:**

$$SHNX_{ds}^t = 100 \times \frac{X_{ds}^t}{X_d^t}$$

where d is the country under study, s is the selected sector, and X are the exports.

- Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Sector's Exports (\$US .000)	Total Exports (\$US .000)	Share in National Exports
China	\$16,793,596	\$1,426,967,065	1.18%
Russian Fed.	\$10,749,814	\$429,662,334	2.50%
Italy	\$9,992,899	\$520,679,246	1.92%
Nigeria	\$71,082	\$80,710,887	0.09%
Venezuela	\$21,133	\$83,191,474	0.03%

**Sample calculation:**

The table above presents a sector's exports and total country's exports data for selected economies. The trade data is from ITC Trade Map. All of the data is in compatible units (current US dollars).

The value of the share in national exports is the result of the ratio of a sector's exports to total exports, multiplied by 100 to alter the expression in percentage terms.



## G4. - SHARE IN NATIONAL IMPORTS (%)

- **What does it tell us?**

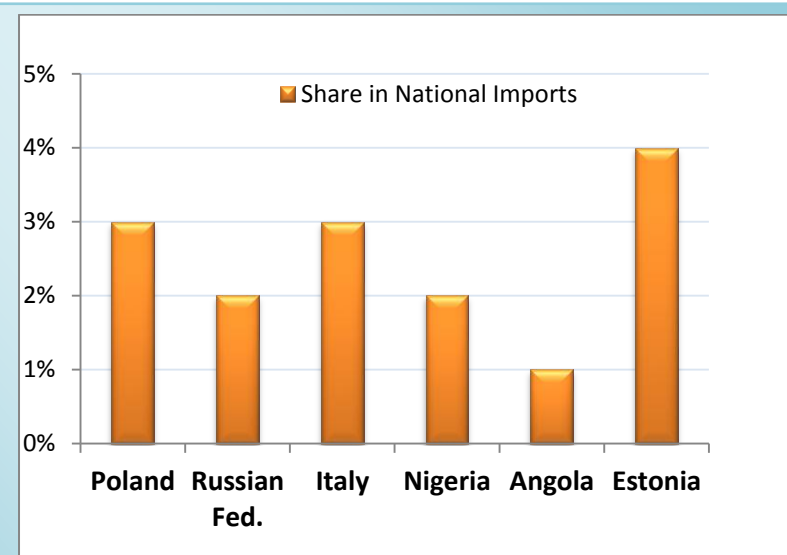
This index indicates the share of a sector's imports in relation to total country imports; hence it shows the importance of this sector in national imports.

- **Definition:**

The percentage ratio between total sector's imports to total country's imports.

- **Range of values:**

Takes value between 0 and 100 per cent, with higher values indicating greater importance of the sector under review on the selected country's trade balance.



**Example:**

The above figure depicts the “Wood and articles of wood” sector's share in national imports for selected economies in the chosen year (t).

## G4. – TECHNICAL NOTES

- **Mathematical definition:**

$$SHNM_{ds}^t = 100 \times \frac{M_{ds}^t}{M_{d.}^t}$$

where d is the country under study, s is the selected sector, and M are the imports.

- **Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Imports (\$US .000)	Total Imports (\$US .000)	Share in National Imports
Poland	\$6,314,355	\$210,478,512	3%
Russian Fed.	\$5,341,025	\$267,051,248	2%
Italy	\$16,618,865	\$553,962,176	3%
Nigeria	\$563,872	\$28,193,596	2%
Angola	\$202,969	\$20,296,878	1%
Estonia	\$693,324	\$17,333,096	4%

**Sample calculation:**

The table above presents sector's imports and total country's imports data for selected economies. The trade data is from ITC Trade Map. All of the data is in compatible units (current US dollars).

The value of the share in national imports is the result of the ratio of sector's imports to total imports, multiplied by 100 to alter the expression in percentage terms.

## G5. - RELATIVE TRADE BALANCE (%)

- **What does it tell us?**

A first advantage is that the indicator eliminates re-exports that can introduce a strong bias for some countries. A second advantage is that the indicator takes into account the globalisation of the production processes: since exported goods incorporate to a large extent imported intermediate products that are often from the same sector (e.g. electronic parts and assembled computers), net exports introduce a simple corrective measure for dealing with the specialisation of countries on various production stages.

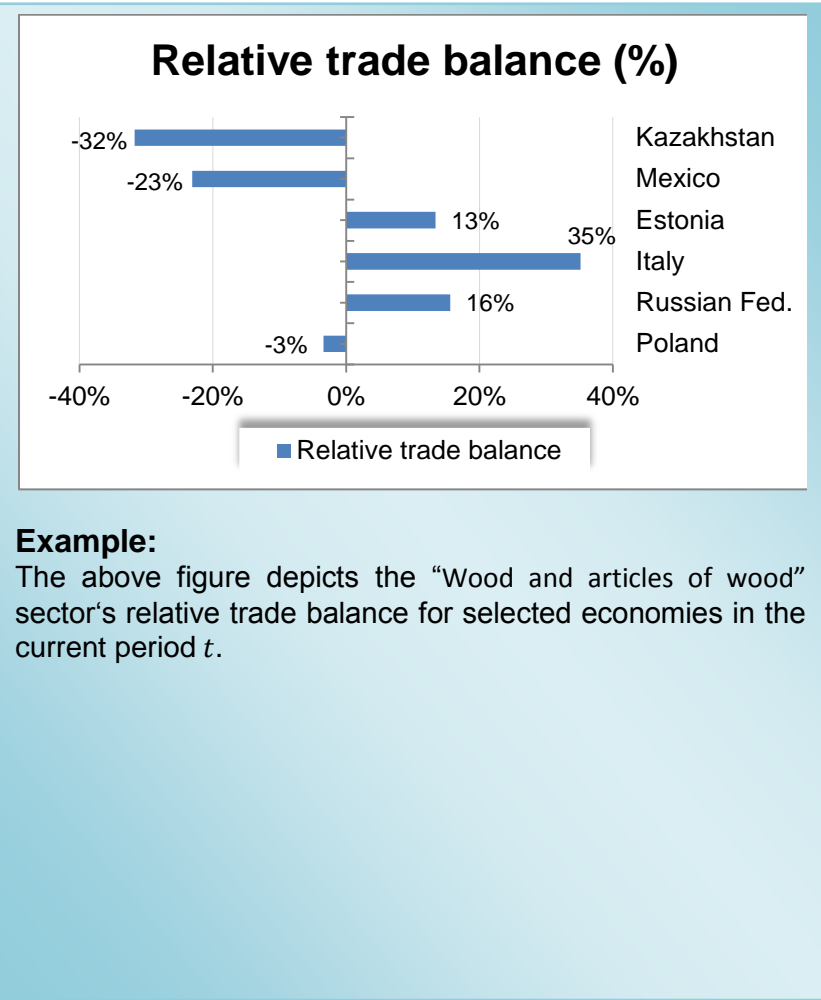
It shows whether a country is a net exporter (where national production outweighs national consumption) or a net importer (where consumption outweighs production).

- **Definition:**

It is the ratio between the trade balance (exports minus imports) and the total trade (exports plus imports). This reduces bias against large industries, which tend to have either high deficits or surpluses.

- **Range of values:**

It takes values between -100 and +100 (per cent), with positive values indicating that the country is a net exporter, whereas negative values indicate that the country is a net importer.



## G5. – TECHNICAL NOTES

- **Mathematical definition:**

$$RTB_{ds}^t = 100 \times \frac{X_{ds}^t - M_{ds}^t}{X_{ds}^t + M_{ds}^t}$$

where t is the current year, d is the country under study, s is the selected sector, X are the exports, and M are the imports.

- **Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Export value in period t	Import value in period t	Relative trade balance
Poland	\$1,722,868	\$1,843,469	-3%
Russian Fed.	\$6,794,671	\$4,959,614	16%
Italy	\$2,827,102	\$1,356,322	35%
Estonia	\$657,083	501,590\$	13%
Mexico	\$677,213	\$1,083,541	-23%
Kazakhstan	\$228,561	\$441,122	-32%

### Sample calculation:

The value of the relative trade balance is the result of the ratio of the difference of a sector's net exports between the years in exam, to the balance value of the first year considered, multiplying the whole by 100 to put the expression in percentage terms.

## G6. - RELATIVE UNIT VALUE (world average = 1)

- **What does it tell us?**

This index shows the standard of quality reached by country exports of the selected sector. Traditionally, the comparison of unit values for homogeneous products gives an indication of exporters' relative prices. However, products are differentiated by quality, which is often reflected by differences in price.

- **Definition:**

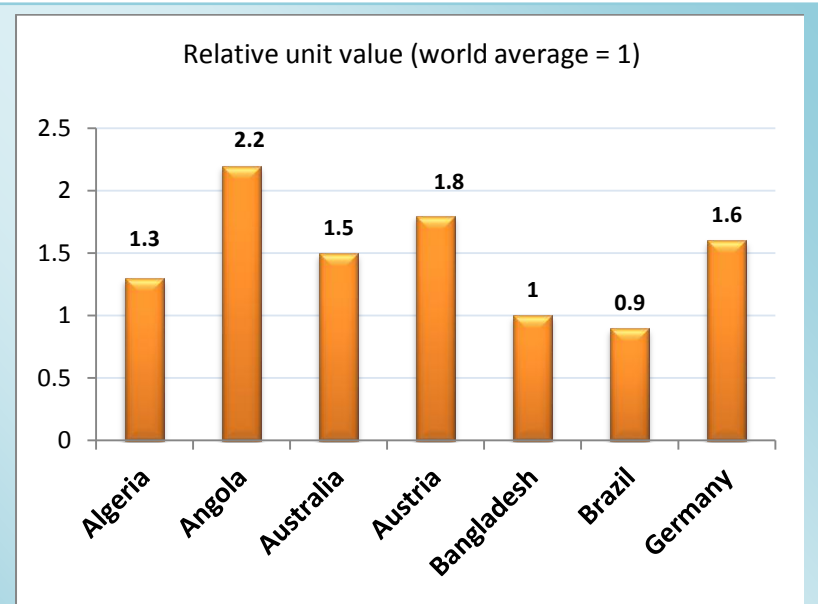
Unit value (value divided by quantity) of a country's exports relative to the world unit value in a selected sector.

- **Range of values:**

The reference point or average relative unit value is 1 (the unit value in the targeted country equals the unit value in the world market). If the RUV is below (above) 1, then the country's exports' quality is lower (higher) than the world average unit quality (the country exports its product at a lower –higher- price than the world average).

- **Strengths-limitations:**

Prices are considered as an indirect indicator of the quality of differentiated products. However, since prices are not available for individual products, or even for industries, unit values (values divided by quantities) are taken as proxies for prices. Higher unit values are considered as reflecting a higher quality, other things being equal, and not as an indication of poor price competitiveness.



**Example:**

The above figure depicts the “Fresh Food” sector's relative unit value for selected economies in the chosen year (*t*).

## G6. – TECHNICAL NOTES

- **Mathematical definition:**

$$\sum_{i(s)} \omega_{cs}^{i(s)} * \frac{UV_{cs}^{i(s)}}{UV_{ws}^{i(s)}}$$

Where  $\omega_{cs}^{i(s)} = X_{cs}/X_{ws}$  and  $i(s)$  is a sample of HS-6 positions related to the sector (s) after removing the outliers (HS-6 in terms of unit value, five-year trend).

- **Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Relative unit value (world average = 1)
Algeria	1.3
Angola	2.2
Australia	1.5
Austria	1.8
Bangladesh	1
Brazil	0.9
Germany	1.6

**Sample calculation:**

The table above presents relative unit value's data for selected economies in the chosen year ( $t$ ).

## P1. - VALUE OF NET EXPORTS

- **What does it tell us?**

The value of net export is the balance of trade for a specific sector. A country's net export is a reliable indicator of its position on the world market. A positive value shows that the country exports more than it imports (it has a surplus). Instead, a deficit occurs when a country imports more than it exports.

- **Definition:**

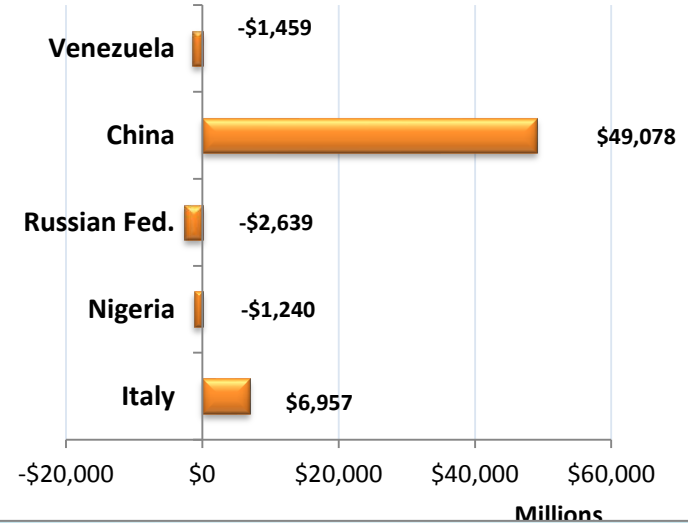
The algebraic sum of exports less imports.

- **Range of values:**

Takes values between  $-\infty$  and  $+\infty$ .

- **Strengths-limitations**

Net exports eliminate re-exports, which would otherwise introduce a bias into the raw data. Secondly, the index takes into account the international division of production processes, since a large part of imported intermediate products found within exports usually belong to the same sector (e.g. electronic parts and assembled computers). Hence, net exports provide a very simple but reliable correction for dealing with the globalisation of production processes and the induced vertical specialisation of countries at various stages of production.



**Example:**

The above figure depicts the value of net exports in the textile sector for selected economies for the chosen year (t). Substantial surplus is observed in China.

## P1. - VALUE OF NET EXPORTS – TECHNICAL NOTES

- Mathematical definition:**

$$TB_{ds}^t = X_{ds}^t - M_{ds}^t$$

where d is the country under study, s refers to a specific sector, X are the exports and M the imports.

- Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Exports (value, \$US)	Imports (value, \$US)	Net Exports (value, \$US)
Italy	\$16,091,507,199	\$9,134,819,234	\$6,956,687,965
Nigeria	\$45,059,781	\$1,285,346,206	-\$1,240,286,425
Russian Fed.	\$317,685,580	\$2,956,546,764	-\$2,638,861,184
China	\$65,366,583,459	\$16,288,626,716	\$49,077,956,743
Venezuela	\$11,218,703	\$1,470,439,298	-\$1,459,220,595

**Sample calculation:**

The table above presents the textile sector's exports and imports data for selected economies. The trade data is from ITC Trade Map. All of the data is in compatible units (current US dollars).

The value of the net exports is simply obtained subtracting imports from exports.



## P2. - PER CAPITA EXPORT

- **What does it tell us?**

The value of per capita exports indicates the level of outward looking of a country and the extent to which a country's population produces for the world market.

- **Definition:**

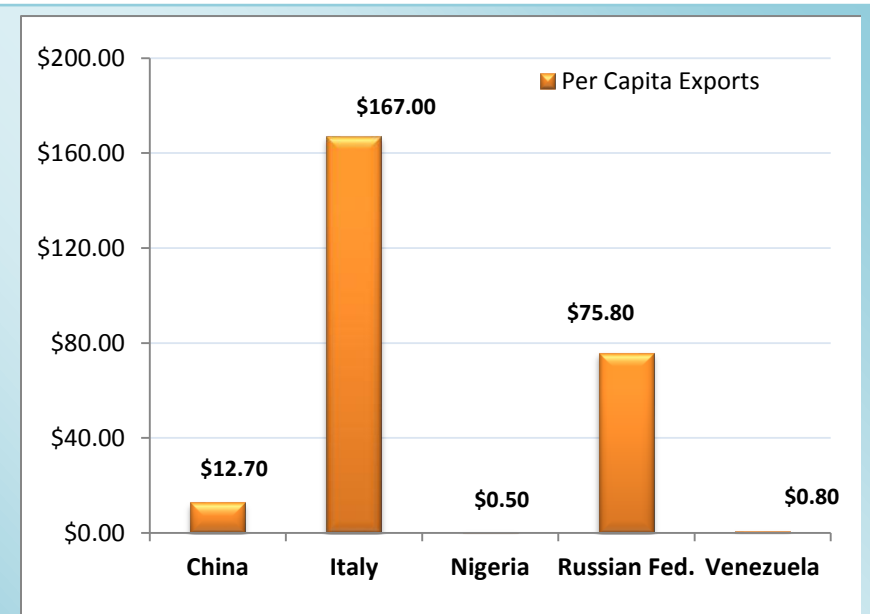
The ratio of exports to inhabitants.

- **Range of values:**

Takes values between 0 and  $+\infty$ .

- **Strengths-limitations:**

This indicator, being an average, does not consider the distribution effect on population.



**Example:**

The above figure depicts the value of per capita export in the textile sector for selected economies for the chosen year (t).

## P2. - PER CAPITA EXPORT – TECHNICAL NOTES

- **Mathematical definition:**

$$Xcap_{ds}^t = X_{ds}^t / Pop_d^t$$

where d is the country under study, s refers to a specific sector, X are the exports and  $Pop_d^t$  the total population for the period t.

- **Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE). Population data can be obtained from national statistical offices on population density and urbanization and from the United Nations Statistic Division, demographic and social section.

Country	Exports (value \$US)	Population	Per Capita Exports
China	\$16,793,596,000	1,322,330,394	\$12.70
Italy	\$9,992,899,000	59,837,719	\$167.00
Nigeria	\$71,082,000	142,164,000	\$0.50
Russian Fed.	\$10,749,814,000	141,818,127	\$75.80
Venezuela	\$21,133,000	26,416,250	\$0.80

**Sample calculation:**

The table above presents the sector's exports and country's population data for selected economies. The trade data is from ITC Trade Map, the population data is from the United Nations Statistic Division, demographic and social section. The value of per capita exports is the result of the ratio of the sector's exports to population.

## P3. - SHARE IN WORLD MARKET (% share of world exports)

- **What does it tell us?**

The world market share tells us how important a particular country is in terms of the global export profile for a specific sector.

- **Definition:**

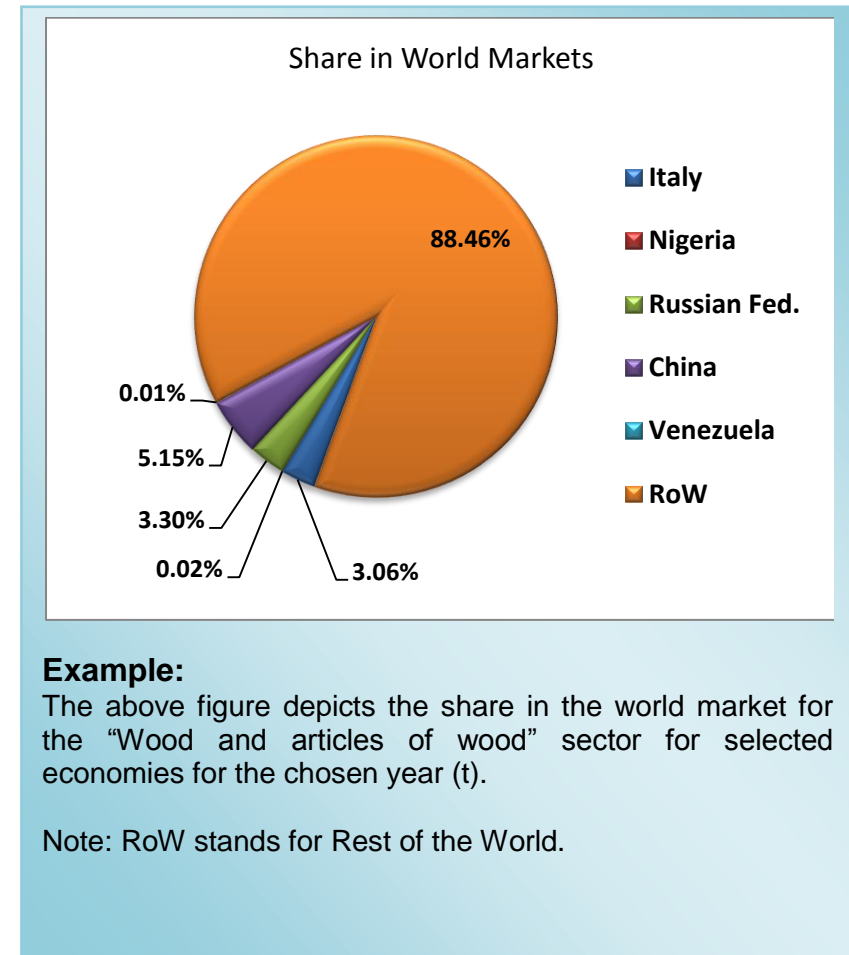
The ratio of the selected country's exports to total world's exports (expressed in percentage).

- **Range of values:**

It takes values between 0 and 100 per cent, with higher values indicating greater importance of selected country on the world market.

- **Strengths-limitations:**

This indicator, being a static measure, shows a picture of the situation but does not explain the source of any changes occurred on time.



## P3. - SHARE IN WORLD MARKET - TECHNICAL NOTES

- Mathematical definition:**

$$SHWX_{ds}^t = \frac{X_{ds}^t}{X_{ws}^t} \times 100$$

where d is the country under study, s is the sector under review, w is the set of all exporting countries and X are the exports.

- Source Data:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Exports (value \$US)	Share in World Market
Italy	\$9,992,899	3.06%
Nigeria	\$71,082	0.02%
Russian Fed.	\$10,749,814	3.30%
China	\$16,793,596	5.15%
Venezuela	\$21,133	0.01%
RoW	\$288,460,719	88.46%
World	\$326,089,243	1

**Sample calculation:**

The table above shows sector's exports data for selected economies and world's exports for the sector under review. The trade data is from ITC Trade Map.

The value of the share in world market is the result of the ratio of one country's sector exports to world exports.

## P4.a - PRODUCT DIVERSIFICATION (N° of equivalent products)

- **What does it tell us?**

The equivalent number (EN) is a theoretical value which represents the number of markets of identical size that would lead to the degree of export concentration exactly equal to the observed one. Calculating product differentiation by means of the EN distinguishes for each country the equivalent number of exported goods of equal importance (either within each sector or in the whole national economy) leading to the same concentration of exports.

- **Definition:**

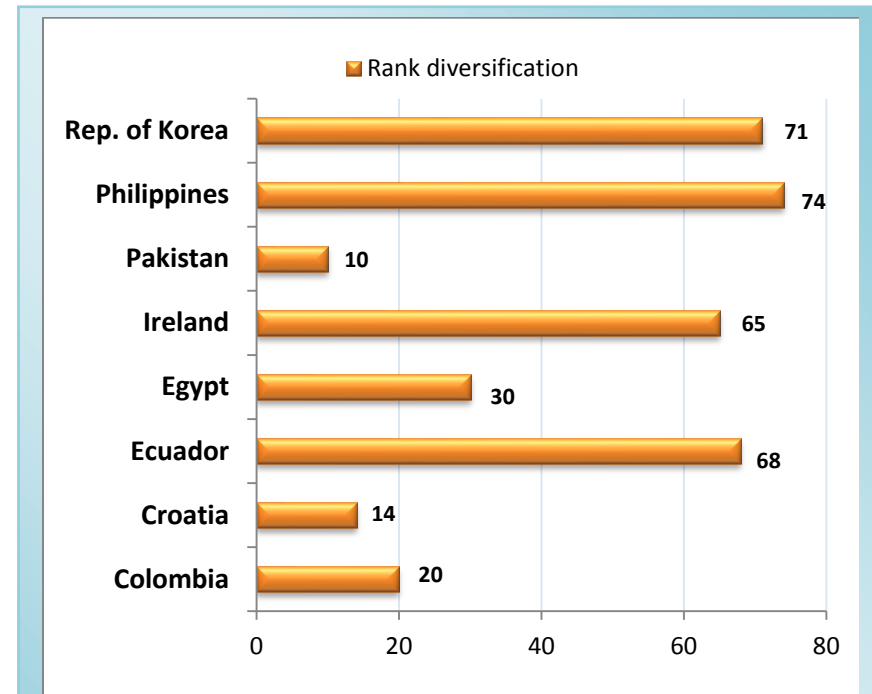
The inverse of the Herfindal Index.

- **Range of values:**

Takes values between 0 and  $+\infty$ . The larger the index value, the greater the diversification of exports, and consequently the better the ranking (the increase in rank is a function of the increase in the level of diversification).

- **Strengths-limitations:**

Product diversification is a good indicator of production structures and industry's development level. Diversification limits the dependence on a small number of products and hence reduces a country's vulnerability to industry-specific external shocks. Unfortunately, because this indicator is not highly sensitive to activities of relatively weak importance, it is a measurement that is suited to sectoral studies.



**Example:**

The above figure depicts product diversification's rank, combined with product concentration's rank for the "IT & Consumer electronics" sector for selected economies for the chosen year (t).

## P4.a - PRODUCT DIVERSIFICATION – TECHNICAL NOTES

- Mathematical definition:**

$$NDPX_{ds}^t = 1/HIP_{ds}^t$$

where HIP is the Herfindal Index that it is calculated as follows:

$$HIP_{ds}^t = \sum_{p=1}^{np_s} \left( \frac{X_{dp,s}^t}{X_{ds}^t} \right)^2$$

with

- $X_{dp,s}^t$  the export of product p by country d for a given year t;
- $X_{ds}^t$  country d exports of all products belonging to the sector s;
- $\frac{X_{dp}^t}{X_{ds}^t}$  the share of product p in total exports of country d in sector s.

- Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Product diversification (N.E.)	Rank diversification
Colombia	11	20
Croatia	11	14
Ecuador	5	68
Egypt	9	30
Ireland	5	65
Pakistan	2	10
Philippines	4	74
Rep. of Korea	5	71

**Sample calculation:**

The table above shows product's diversification and concentration data/rank for selected economies in the chosen year.

## P4.b - PRODUCT CONCENTRATION (Spread)

- **What does it tell us?**

The spread index complements the equivalent number. The spread index for products calculates for each country the distribution of export products and compares it to the average export value.

- **Definition:**

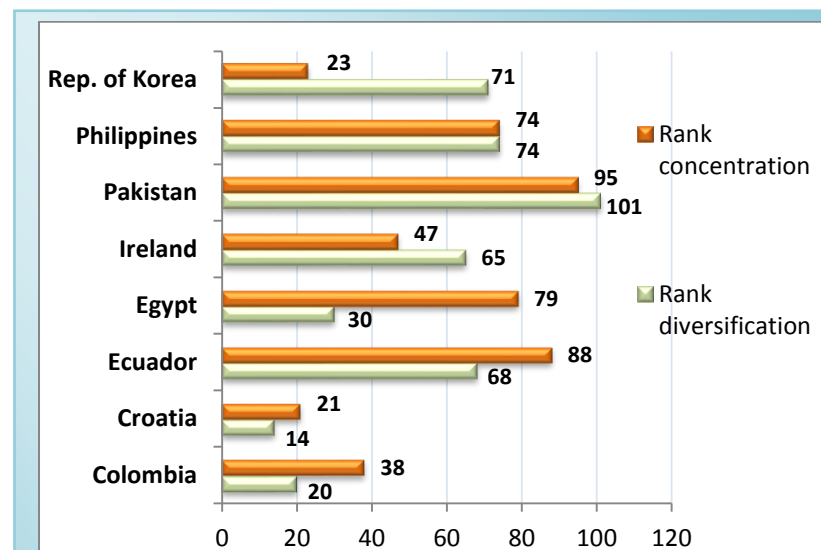
The inverse of the standard deviation of one country's product exports divided by the number of products, times the average value of exports for individual products

- **Range of values:**

Takes value between 0 and  $+\infty$ . The greater the distribution (i.e. spread) of exports from a country as compared to the average, the higher the value of the index.

- **Strengths-limitations:**

If all countries export all products, this indicator (or the equivalent number) would be sufficient. Since this is not the case, the combination of the two indicators is useful (see Appendix 1).



**Example:**

The above figure depicts product concentration's rank, combined with product diversification's rank for the "IT & Consumer electronics" sector for selected economies in the chosen year (t).

The discrepancy can be easily seen (sometimes very obviously) between these two measures. For this reason, it could be useful to calculate the combination of these indicators (see appendix 1).

## P4.b PRODUCT CONCENTRATION – TECHNICAL NOTES

- Mathematical definition:**

$$SDPX_{ds}^t = 1 / \left[ \frac{\sqrt{\sum_{p=1}^{Nps} \left( X_{dp,s}^t - \bar{X}_{ds}^t \right)^2}}{Nps \times \bar{X}_{ds}^t} \right]$$

With:

- $X_{dp,s}^t$  country d exports of product p to the markets in a given year;
- $\bar{X}_{ds}^t$  the average value of country d exports for the p products belonging to the sector s;
- $\left( X_{dp,s}^t - \bar{X}_{ds}^t \right)$  the deviation to the average of product p in the sector s for country d;
- $\sqrt{\sum_{p=1}^{Nps} \left( X_{dp,s}^t - \bar{X}_{ds}^t \right)^2}$  the standard deviation;
- $SDPX_{ds}^t$  the weighted spread and Nps the number of product lines within the sector s.

- Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Rank concentration	Rank diversification
Colombia	38	20
Croatia	21	14
Ecuador	88	68
Egypt	79	30
Ireland	47	65
Pakistan	95	10
Philippines	74	74
Rep. of Korea	23	71

**Sample calculation:**

The table above shows market's concentration and diversification ranks for the "IT & Consumer electronics" sector for selected economies in the chosen year (t).



## P5.a - MARKET DIVERSIFICATION (N° of equivalent markets)

- **What does it tell us?**

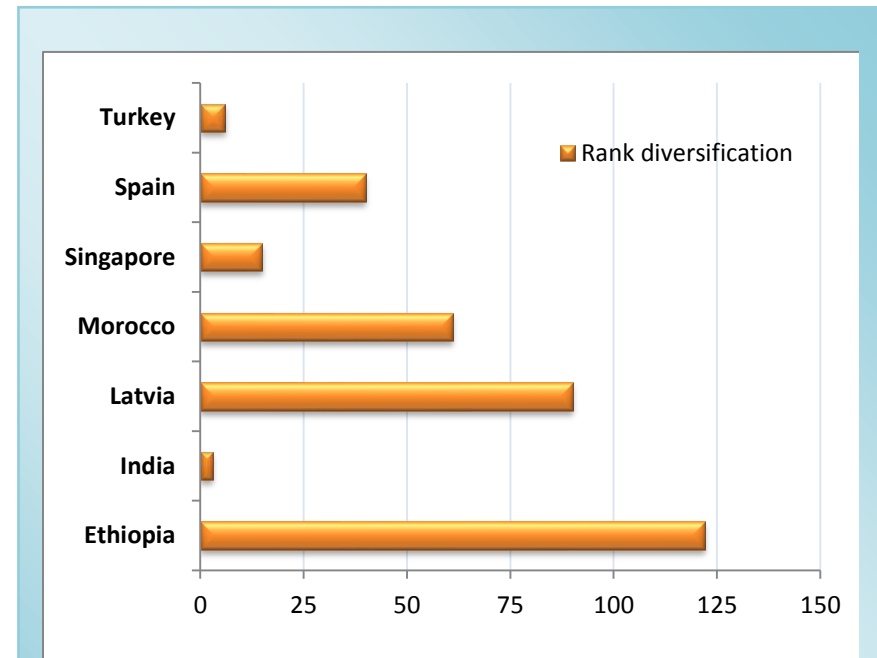
The equivalent number shows the degree of market diversification: diversifying partner countries reduces a country's dependence on a small number of export markets and hence the vulnerability to shocks within destination countries.

- **Definition:**

The inverse of the Herfindal Index.

- **Range of values:**

Takes values between 0 and  $+\infty$ . The bigger the index value, the greater the diversification of markets, and consequently, the better the ranking (the increase in rank is a function of the increase in the level of diversification of markets).



**Example:**

The above figure depicts market diversification's rank for the "Processed food" sector for selected economies in the chosen year (t).

## P5.a - MARKET DIVERSIFICATION – TECHNICAL NOTES

- Mathematical definition:**

$$NDMX_{ds}^t = 1/HIM_{ds}^t$$

where HIM is the Herfindal Index that it is calculated as follows:

$$HIM_{ds}^t = \sum_{m=1}^{nm_s} \left( \frac{X_{dm,s}^t}{X_{ds}^t} \right)^2$$

with

- $X_{dm,s}^t$  the export of all products belonging to the sector s by country d to the market m, for a given year t;
- $X_{ds}^t$  country d exports of all products belonging to the sector s;
- $\frac{X_{dm,s}^t}{X_{ds}^t}$  the share of market m in total exports of country d in sector s.

- Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Market diversification (N.E.)	Rank diversification
Ethiopia	3	122
India	24	3
Latvia	6	90
Morocco	8	61
Singapore	15	15
Spain	10	40
Turkey	18	6

**Sample calculation:**

The table above shows market's diversification data and rank for the "Processed food" sector for selected economies in the chosen year (t).

## P5.b - MARKET CONCENTRATION (Spread)

- **What does it tell us?**

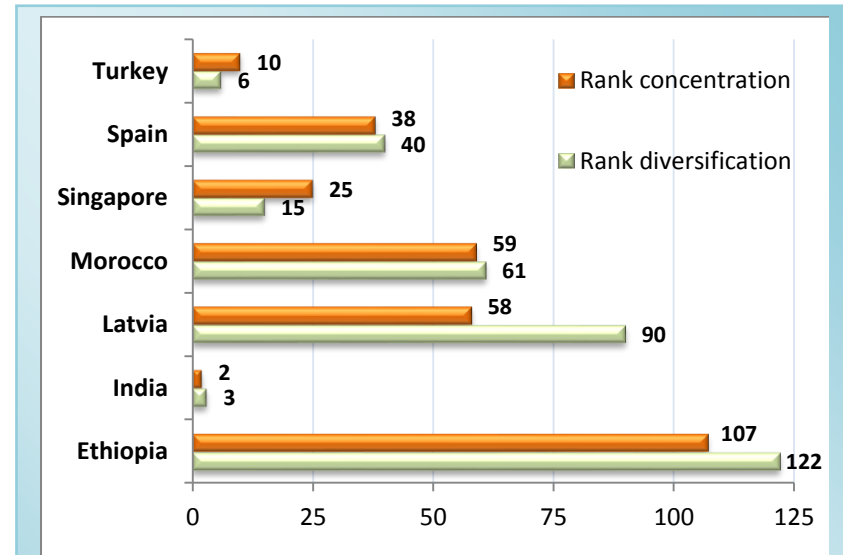
The spread index for markets compares for each country, the share of its exports directed to different partner countries with the average export value.

- **Definition:**

The inverse of the standard deviation of one country's market exports divided by the number of markets, times the average value of exports for individual markets.

- **Range of values:**

Takes value between 0 and  $+\infty$  and the greater the dispersion of exports from a country (i.e. the greater the spread) as compared to the average, the higher the value of the index. Concerning positions, the ranking of the 180 countries is a function of the degree of diffusion of exported products (of a country's exports to partner countries). The smaller the index, the more exported products are evenly distributed (amongst partner countries) and the better the ranking.



**Example:**

The above figure depicts market concentration's rank, combined with market diversification's rank for the "Processed Food" sector for selected economies in the chosen year (t).

The discrepancy can be easily seen (sometimes very obviously) between these two measures. For this reason, it could be useful to calculate the combination of these indicators (see appendix 1).

## P5.b - MARKET CONCENTRATION – TECHNICAL NOTES

- Mathematical definition:**

$$SDMX_{ds}^t = 1 / \left[ \frac{\sqrt{\sum_{m=1}^{nm_s} (X_{dm,s}^t - \bar{X}_{ds}^t)^2}}{nm_s \times \bar{X}_{ds}^t} \right]$$

With:

- $X_{dm,s}^t$  country d exports of all products belonging to the sector s to the market m in a given year;
- $\bar{X}_{ds}^t$  the average value of country d exports for the m markets belonging to the sector s;
- $(X_{mp,s}^t - \bar{X}_{ds}^t)$  the deviation to the average of market m in the sector s for country d;
- $\sqrt{\sum_{m=1}^{nm_s} (X_{dm,s}^t - \bar{X}_{ds}^t)^2}$  the standard deviation;
- $SDMX_{ds}^t$  the weighted spread and  $Nm_s$  the number of markets destinations within the sector s.

- Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Rank concentration	Rank diversification
Ethiopia	107	122
India	2	3
Latvia	58	90
Morocco	59	61
Singapore	25	15
Spain	38	40
Turkey	10	6

**Sample calculation:**

The table above shows market's concentration and diversification ranks for the "Processed food" sector for selected economies in the chosen year (t).

## C1. - RELATIVE CHANGE OF WORLD MARKET SHARE

- **What does it tell us?**

This index shows the percentage change of a country's exports in the world market for the selected sector between time 0 and time t. It is a reliable indicator of change in global performance for the sector under review. If it is positive, country i has increased its world market share.

- **Definition:**

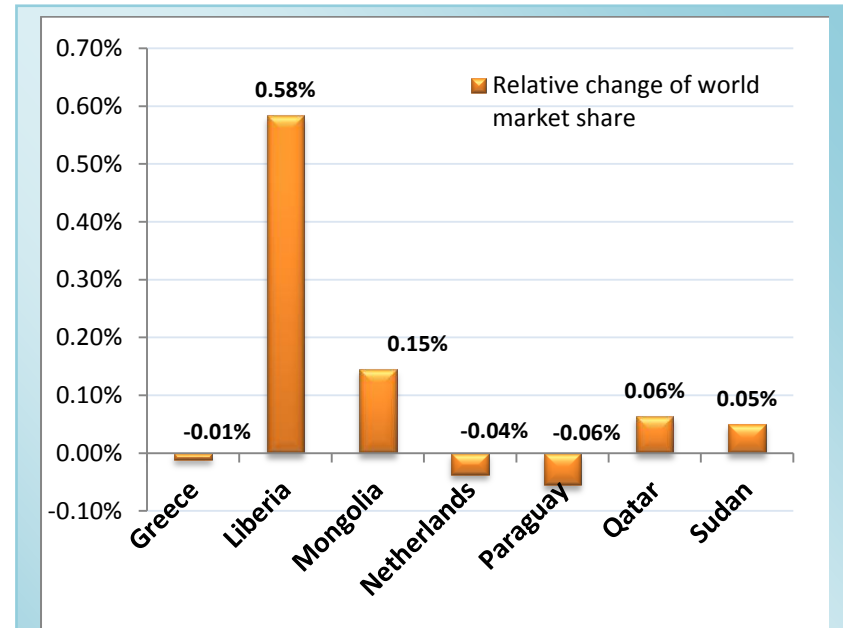
Percentage variation in the world market share for a specific sector's exports between time 0 and time t (in this case five years).

- **Range of values:**

It takes values between  $-\infty$  and  $+\infty$  (per cent), with positive values indicating increasing importance of the selected country sector on the world market.

- **Strengths-limitations:**

The change in a country's world market share can be decomposed and expressed as the sum of the following effects: (a) competitiveness effect; structural effect, which in turn can be decomposed into (b) initial geographic specialisation and (c) initial product specialisation; and (d) adaptation effect.



**Example:**

The above figure depicts relative change of world market share for the "Mineral" sector for selected economies in the chosen year (t).

## C1. - TECHNICAL NOTES

- **Mathematical definition:**

$$\left( \frac{X_{ds}^t}{X_{ws}^t} \right) - \left( \frac{X_{ds}^{t_0}}{X_{ws}^{t_0}} \right) = \sum_j \left[ \left( \frac{X_{ds}^t}{X_{js}^t} \right) \times \left( \frac{X_{js}^t}{X_{ws}^t} \right) - \left( \frac{X_{ds}^{t_0}}{X_{js}^{t_0}} \right) \times \left( \frac{X_{js}^{t_0}}{X_{ws}^{t_0}} \right) \right]$$

where t is the current year, t<sub>0</sub> is the first year considered, d is the country under study, s is the selected sector, j is the set of import markets and X are the exports (  $X_{ws}^t$  are world exports for sector s).

- $\left( \frac{X_{ds}^t}{X_{js}^t} \right)$  is the country's market share on import markets for t;
- $\left( \frac{X_{js}^t}{X_{ws}^t} \right)$  is the share of import markets in world imports in t;
- $\left( \frac{X_{ds}^{t_0}}{X_{js}^{t_0}} \right)$  is the country's initial market share in import markets;
- $\left( \frac{X_{js}^{t_0}}{X_{ws}^{t_0}} \right)$  is the initial share of import markets in world imports.

- **Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Relative change of world market share
Greece	-0.01%
Liberia	0.58%
Mongolia	0.15%
Netherlands	-0.04%
Paraguay	-0.06%
Qatar	0.06%
Sudan	0.05%

**Sample calculation:**

The table above shows relative change of world market share's data for the "Mineral" sector for selected economies in the chosen year (t).

## C1.a - COMPETITIVENESS EFFECT, p.a. (%)

### • What does it tell us?

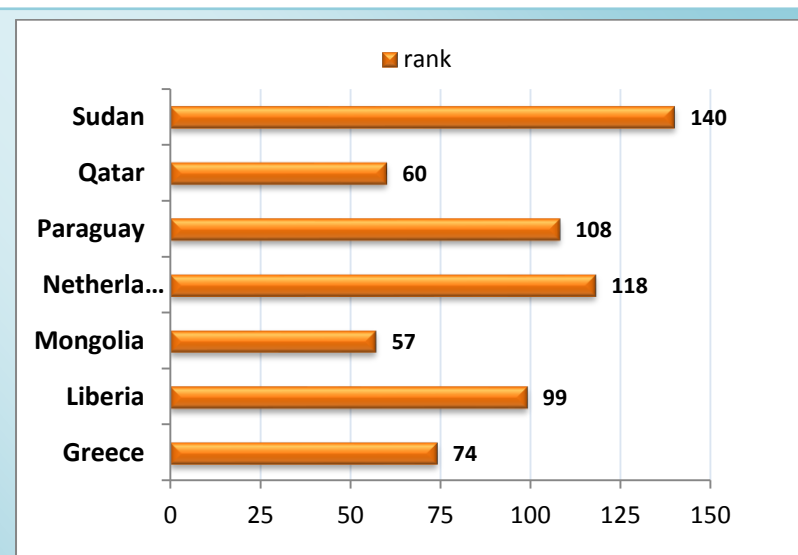
This index represents a quota of the “relative change of world market share”. The competitiveness effect in fact shows the percentage change in competitiveness of a country's exports in the world market for the selected sector in the period under review. It corresponds to hypothetical gains or losses of a country's aggregate market share that would occur if changes were only due to variations in the country's market share in import markets, regardless of the structure of the country's exports.

### • Definition:

Change in the exporting country's share in destination markets' imports times the initial share of partner countries' imports in world trade (weighted average of the variation in the country's position on elementary markets<sup>5</sup>)

### Range of values:

It takes values between  $-\infty$  and  $+\infty$  (per cent), with positive values indicating a gain in market due to increased competitiveness of a selected country sector on the world market.



### Example:

The above figure depicts competitiveness effect (by ranking) for the “Mineral” sector for selected economies in the chosen year (t).

<sup>5</sup> An elementary or import market is defined as the destination country  $j$  for a specific sector  $s$ .

## C1.a - TECHNICAL NOTES

### • Mathematical definition:

$$\sum_j \left( \frac{X_{djs}^t}{X_{js}^t} - \frac{X_{djs}^{t_0}}{X_{js}^{t_0}} \right) \times \frac{X_{js}^{t_0}}{X_{ws}^{t_0}}$$

where t is the current year, t<sub>0</sub> is the first year considered, d is the country under study, j is the partner country, s is the selected sector, and X are the exports, (X<sub>s</sub> are world exports for sector s).

- $\frac{X_{djs}^t}{X_{js}^t} - \frac{X_{djs}^{t_0}}{X_{js}^{t_0}}$  is the variation in the country's market share in import markets;
- $\frac{X_{js}^{t_0}}{X_{ws}^{t_0}}$  is the initial share of world markets in world imports

### • Data sources:

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Competitiveness effect	Rank
Greece	0.00%	74
Liberia	-0.02%	99
Mongolia	0.02%	57
Netherlands	-0.04%	118
Paraguay	-0.02%	108
Qatar	0.02%	60
Sudan	-0.08%	140

### Sample calculation:

The table above presents competitiveness effect's data and rank for the "Mineral" sector for selected economies in the chosen year (t).



## C1.b - INITIAL GEOGRAPHIC SPECIALISATION, p.a. (%)

### • What does it tell us?

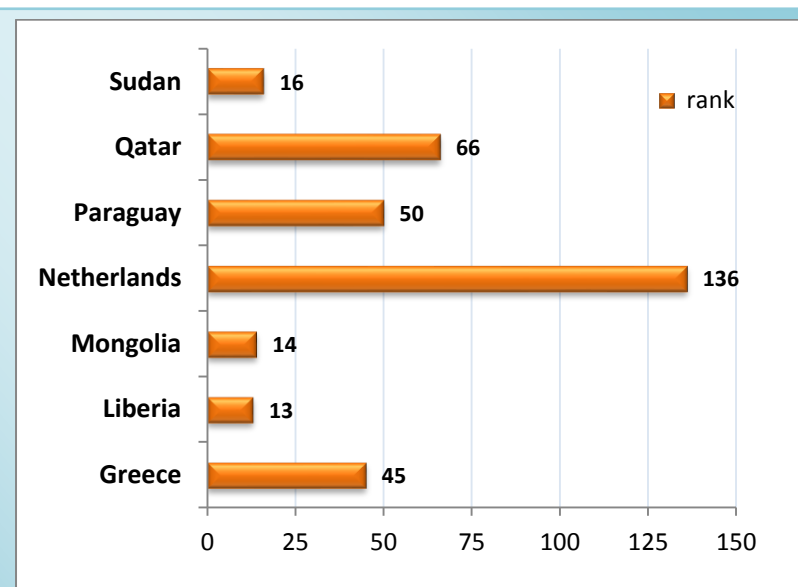
The initial geographic specialisation index represents a quota of the “relative change of world market share”. This index shows the benefits associated with the initial specialisation of domestic exporters on dynamic markets. It corresponds to hypothetical gains or losses in a country's aggregate market share that would occur if changes were only due to the dynamism of its partner countries, regardless of any variations in the country's market shares in these markets.

### • Definition:

Initial market share of the exporting country in partner countries times the change in the share of partner countries in world trade (weighted average of variations in the relative importance of export markets).

### • Range of values:

Takes values between  $-\infty$  and  $+\infty$ . The overall effect (the weighted average of the variation in the share of partner countries in world imports) is positive if the country is well positioned on dynamic destination markets in the beginning of the time period.



### Example:

The above figure depicts initial geographic specialisation (by ranking) for the “Mineral” sector for selected economies in the chosen year (t).

## C1.b - TECHNICAL NOTES

### • Mathematical definition:

$$\sum_j \frac{X_{djs}^{t_0}}{X_{js}^{t_0}} \times \left( \frac{X_{js}^t}{X_{ws}^t} - \frac{X_{js}^{t_0}}{X_{ws}^{t_0}} \right)$$

where t is the current year, t0 is the first year considered, d is the country under study, j is the partner country, s is the selected sector, and X are the exports ( $X_s$  are world exports for sector s).

- $\frac{X_{djs}^{t_0}}{X_{js}^{t_0}}$  is the country's initial share in the partner country's imports.
- $\left( \frac{X_{js}^t}{X_{ws}^t} - \frac{X_{js}^{t_0}}{X_{ws}^{t_0}} \right)$  is the variation in the share of the partner's country imports in world imports.

### • Data sources:

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Initial geographic specialisation	Rank
Greece	0.06%	45
Liberia	0.15%	13
Mongolia	0.14%	14
Netherlands	-0.02%	136
Paraguay	0.05%	50
Qatar	0.04%	66
Sudan	0.14%	16

### Sample calculation:

The table above presents initial geographic specialisation's data and rank for the "Mineral" sector for selected economies in the chosen year (t).

## C1.c - INITIAL PRODUCT SPECIALISATION, p.a. (%)

### • What does it tell us?

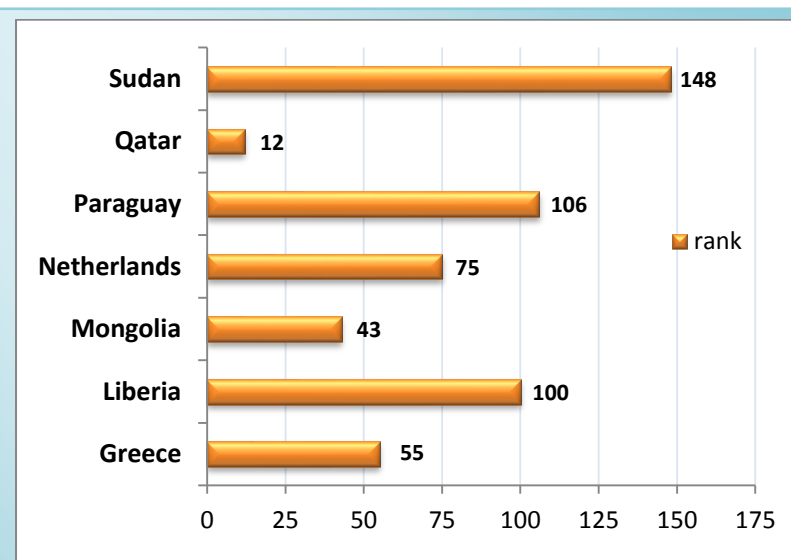
The initial product specialisation index represents a quota of the “relative change of world market share”. This index shows the gains or losses associated with the initial sectoral specialisation of domestic supply on products characterised by dynamic demand.

### • Definition:

Change in the share of elementary markets in world trade times the difference between the initial share of the exporting country in elementary markets and the initial market share of the exporting country in destination markets (initial product orientation weighted average of changes in destination market's share in world imports).

### • Range of values:

Takes values between  $-\infty$  and  $+\infty$ . The effect is positive if both factors go in the same direction, i.e. if the share of an import market in world imports increases (declines) and the sector is over (under)-represented in the country's exports to its partner and vice-versa. The overall effect is positive if the country is well positioned on dynamic products in the beginning of the time period.



### Example:

The above figure depicts initial product specialisation (by ranking) for “Mineral” sector for selected economies in the chosen year (t).

## C1.c - TECHNICAL NOTES

### • Mathematical definition:

$$\sum_j \left( \frac{X_{djs}^{t_0}}{X_{js}^{t_0}} - \frac{X_{dj}^{t_0}}{X_j^{t_0}} \right) \times \left( \frac{X_{js}^t}{X_w^t} - \frac{X_{js}^{t_0}}{X_w^{t_0}} \right)$$

where  $t$  is the current year,  $0$  is the first year considered,  $d$  is the country under study,  $j$  is the partner country,  $s$  is the selected sector, and  $X$  are the exports ( $X_s$  are world exports for sector  $s$ ).

- $\left( \frac{X_{djs}^{t_0}}{X_{js}^{t_0}} - \frac{X_{dj}^{t_0}}{X_j^{t_0}} \right)$  is the difference between the country's initial market share in import markets and the country's initial market share in the partner country's total imports.
- $\left( \frac{X_{js}^t}{X_w^t} - \frac{X_{js}^{t_0}}{X_w^{t_0}} \right)$  is the variation in the share of import markets in world imports.

### • Data sources:

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Initial product specialisation	Rank
Greece	0.01%	55
Liberia	-0.02%	100
Mongolia	0.02%	43
Netherlands	0.00%	75
Paraguay	-0.03%	106
Qatar	0.08%	12
Sudan	-0.11%	148

### Sample calculation:

The table above presents initial product specialisation's data and rank for the "Mineral" sector for selected economies in the chosen year ( $t$ ).

## C1.d - ADAPTATION EFFECT, p.a. (%)

### • What does it tell us?

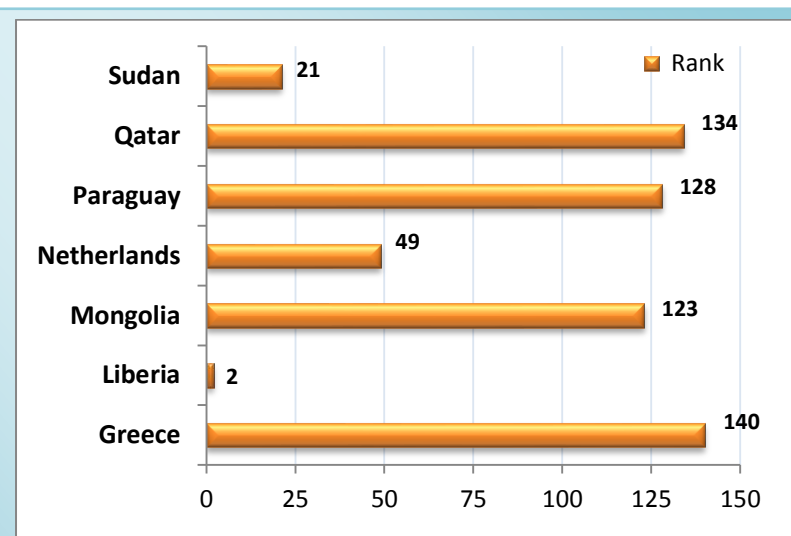
The adaptation effect index represents a quota of the “relative change of world market share”. This index shows the ability to adjust export supply to changes in world demand of a specific country's sector.

### • Definition:

Change in the share of the elementary markets in world trade times the change in the exporting country's market share in these elementary markets.

### • Range of values:

Takes values between  $-\infty$  and  $+\infty$ . The effect is positive if the country's market share increases in a growing import market (+,+) or declines in a declining market (-,-). The effect is negative if the country's market share increases in a declining import market (+,-) or declines in a growing market (-,+).



### Example:

The above figure depicts adaptation effect (by ranking) for the “Mineral” sector for selected economies in the chosen year (t).

## C1.d - TECHNICAL NOTES

### • Mathematical definition:

$$\sum_j \left( \frac{X_{djs}^t}{X_{js}^t} - \frac{X_{djs}^{t_0}}{X_{js}^{t_0}} \right) \times \left( \frac{X_{js}^t}{X_w^t} - \frac{X_{js}^{t_0}}{X_w^{t_0}} \right)$$

where  $t$  is the current year,  $0$  is the first year considered,  $d$  is the country under study,  $j$  is the partner country,  $s$  is the selected sector,  $w$  is the set of all exporting countries and  $X$  are the exports.

- $\left( \frac{X_{djs}^t}{X_{js}^t} - \frac{X_{djs}^{t_0}}{X_{js}^{t_0}} \right)$  is the variation in the country's market share in import markets.
- $\left( \frac{X_{js}^t}{X_w^t} - \frac{X_{js}^{t_0}}{X_w^{t_0}} \right)$  is the variation in the share of import market in world imports.

### • Data sources:

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Adaptation effect	Rank
Greece	-0.08%	140
Liberia	0.48%	2
Mongolia	-0.04%	123
Netherlands	0.02%	49
Paraguay	-0.05%	128
Qatar	-0.07%	134
Sudan	0.10%	21

### Sample calculation:

The table above presents adaptation effect's data and rank for the "Mineral" sector for selected economies in the chosen year ( $t$ ).

## C2. - MATCHING WITH DYNAMICS OF WORLD DEMAND

### • What does it tell us?

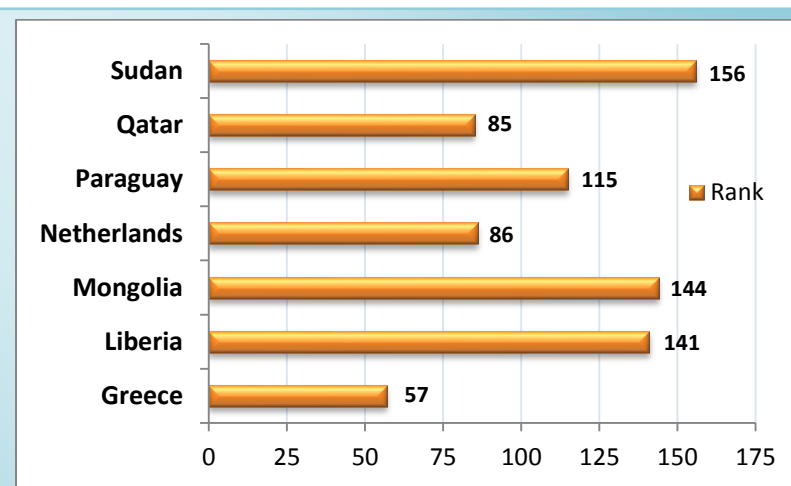
This index is calculated with a view to ranking countries according to their ability to adapt to the dynamics of world demand. It is a focus of the national export portfolio on the world's most dynamic products.

### • Definition:

Spearman's rank correlation between the ranking share of the exporting countries' export products in its total exports, and the rank of growth trends in worldwide exports of those products.

### • Range of values:

Each country is given a correlation index that takes a value between 1 and -1. A value of 1 (-1) indicates that the relative importance of a country's exported goods is in full accordance (discordance) with the ranking of world export growth rates for the same goods. The country ranking is dependent on the rank correlation index. The closer the index is to 1, the better the country ranking under analysis



### Example:

The above figure depicts the matching with dynamics of world demand index (by ranking) for the "Mineral" sector for selected economies in the chosen year (t).

## C2. - TECHNICAL NOTES

- **Mathematical definition:**

It is based on Spearman's rank correlation between the ranking in share of the exporting countries' export products in its total exports, and the rank of growth trends in worldwide exports of those products, belonging to the sector *s*.

- **Data sources:**

Trade data can be obtained from the ITC Trade Map and the United Nations Commodity Trade database (COMTRADE).

Country	Matching with dynamics of world demand (rank)
Greece	57
Liberia	141
Mongolia	144
Netherlands	86
Paraguay	115
Qatar	85
Sudan	156

**Sample calculation:**

The table above presents ranking of the “matching with dynamics of world demand index” for selected economies for the “Mineral” sector in the chosen year (*t*).



## **7. Appendixes**

### **7.1. Appendix 1: More on the use of different dispersion indicators**

This appendix illustrates the need of using two different measures of diversification with an example. Let us consider the data on 4 countries and 10 industries displayed in Table 2.

Country A exhibits uniformity in the level of specialisation in its sectors, thereby achieving the highest level of diversification. Country B is specialised with equal intensity in 5 out of the 10 sectors. Country C exports products in 8 sectors and is highly specialised in sector 7, which accounts for 35% of its exports. Lastly, country D exhibits the same specialisation patterns but tenfold. The choice between the two indicators is not the same for country A and B on the one hand, and B and C on the other hand. Neither indicator discriminates simultaneously between countries belonging to each of these pairs.

Consider the country pair A and B: the spread is zero in both cases (indicating uniformity in the specialisation in industries) whereas the equivalent number is twice as large for country A (indicating that country A is diversified twice as much as B). The spread does not take into account the number of sectors in which a country is active, but only the share of each sector in total exports. The equivalent number, on the other hand, ignores the differences in each sector's share to total exports and only focuses on the number of sectors a country is active in. Hence, the spread indicator does not distinguish any differences between country A and country B, whereas the equivalent number finds differences between them.

In the case of countries B and C, the opposite result is obtained. The equivalent number of markets of equal size is 5 in both cases. However, since the dispersion is much larger in country C, the spread can rank these two countries. In sum, country A is the most diversified country, followed by B. Countries C and D are the least diversified.

Lastly, the comparison of results for countries C and D highlights the advantage of using the weighted spread instead of the standard deviation. Using the standard

deviation, the dispersion in country D is ten times larger than in country C, even though only their size differs.

Table 2. Data and calculations of the measures of diversification

	Country A	Country B	Country C	Country D
Sector 1	20	0	20	200
Sector 2	20	0	15	150
Sector 3	20	0	26	260
Sector 4	20	0	20	200
Sector 5	20	0	20	200
Sector 6	20	40	0	0
Sector 7	20	40	74	740
Sector 8	20	40	5	50
Sector 9	20	40	20	200
Sector 10	20	40	0	0
Total Exports	200	200	200	2000
<b>Equivalent number</b>	<b>10.00</b>	<b>5.00</b>	<b>5.00</b>	<b>5.00</b>
Standard deviation	0.00	0.00	20.71	207.10
<b>Weighted spread</b>	<b>0.00</b>	<b>0.00</b>	<b>0.104</b>	<b>0.104</b>
Rank - equivalent number	1	2	2	2
Rank - weighted spread	1	1	3	3
<b>Ranking</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>3</b>

## 7.2. Appendix 2: Definition of sectors

Sectors	
SITC Rev.3	Products
<b>1 - Fresh food and raw agro-based products</b>	
001	LIVE ANIMALS
011	BOVINE MEAT
012	OTHER MEAT, MEAT OFFAL
034	FISH,FRESH,CHILLED,FROZN
036	CRUSTACEANS,MOLLUSCS ETC
041	WHEAT, MESLIN, UNMILLED
0421	RICE
043	BARLEY, UNMILLED
044	MAIZE UNMILLED
045	OTHER CEREALS, UNMILLED
054	VEGETABLES
057	FRUIT,NUTS EXCL.OIL NUTS
071	COFFEE,COFFEE SUBSTITUTE
072	COCOA
074	TEA AND MATE
075	SPICES
121	TOBACCO, UNMANUFACTURED
211	HIDES,SKINS(EX.FURS),RAW
212	FURSKINS, RAW
222	OILSEED(SFT.FIX VEG.OIL)
223	OILSEED(OTH.FIX.VEG.OIL)
231	NATURAL RUBBER, ETC.
261	SILK
263	COTTON
264	JUTE,OTH.TEXTL.BAST FIBR
265	VEGETABLE TEXTILE FIBRES
268	WOOL, OTHER ANIMAL HAIR
291	CRUDE ANIMAL MATERLS.NES
292	CRUDE VEG.MATERIALS, NES

<b>2 - Processed food and agro-based products</b>			
016	MEAT,ED.OFFL,DRY,SLT,SMK	059	FRUIT, VEGETABLE JUICES
017	MEAT,OFFL.PRPD,PRSVD,NES	061	SUGARS,MOLASSES,HONEY
022	MILK AND CREAM	062	SUGAR CONFECTIONERY
023	BUTTER,OTHER FAT OF MILK	073	CHOCOLATE,OTH.COCOA PREP
024	CHEESE AND CURD	081	ANIMAL FEED STUFF
025	EGGS,BIRDS,YOLKS,ALBUMIN	091	MARGARINE AND SHORTENING
035	FISH,DRIED,SALTED,SMOKED	098	EDIBLE PROD.PREPRNTNS,NES
037	FISH ETC.PREPD,PRSVD.NES	111	NON-ALCOHOL.BEVERAGE,NES
0422	RICE	112	ALCOHOLIC BEVERAGES
0423	RICE	122	TOBACCO, MANUFACTURED
046	MEAL,FLOUR OF WHEAT,MSLN	411	ANIMAL OILS AND FATS
047	OTHER CEREAL MEAL,FLOURS	421	FIXED VEG.FAT,OILS, SOFT
048	CEREAL PREPARATIONS	422	FIXED VEG.FAT,OILS,OTHER
056	VEGETABLES,PRPD,PRSVD,NES	431	ANIMAL,VEG.FATS,OILS,NES
058	FRUIT,PRESERVED,PREPARED	551	ESSNTL.OIL,PERFUME,FLAVR
<b>3 - Wood, wood products and paper</b>			
244	CORK,NATURAL,RAW;WASTE	633	CORK MANUFACTURES
245	FUEL WOOD, WOOD CHARCOAL	634	VENEERS, PLYWOOD, ETC.
246	WOOD IN CHIPS, PARTICLES	635	WOOD MANUFACTURES, NES
247	WOOD ROUGH,ROUGH SQUARED	641	PAPER AND PAPERBOARD
248	WOOD, SIMPLY WORKED	642	PAPER,PAPERBOARD,CUT ETC
251	PULP AND WASTE PAPER e	8215	Wooden furniture
<b>4 - Yarn, fabrics and textiles</b>			
651	TEXTILE YARN	656	TULLE,LACE,EMBROIDRY.ETC
652	COTTON FABRICS, WOVEN	657	SPECIAL YARN,TXTL.FABRIC
653	FABRICS,MAN-MADE FIBRES	658	TEXTILE ARTICLES NES
654	OTH.TEXTILE FABRIC,WOVEN	659	FLOOR COVERINGS, ETC.
655	KNIT.CROCHET.FABRIC NES		
<b>5 - Chemicals</b>			
232	SYNTHETIC RUBBER, ETC.	554	SOAP,CLEANERS,POLISH,ETC
266	SYNTHETIC FIBRES	562	FERTILIZER,EXCEPT GRP272
267	OTHER MAN-MADE FIBRES	571	POLYMERS OF ETHYLENE
511	HYDROCARBONS,NES,DERIVTS	572	POLYMERS OF STYRENE
512	ALCOHOL,PHENOL,ETC.DERIV	573	POLYMERS,VINYL CHLORIDE
513	CARBOXYLIC ACIDS,DERIVTS	574	POLYACETAL,POLYCARBONATE
514	NITROGEN-FUNCT.COMPOUNDS	575	OTH.PLASTIC,PRIMARY FORM
515	ORGANO-INORGANIC COMPNDS	579	PLASTIC WASTE, SCRAP ETC
516	OTHER ORGANIC CHEMICALS	581	PLASTIC TUBE,PIPE,HOSE
522	INORGANIC CHEM.ELEMENTS	582	PLASTIC PLATE,SHEETS,ETC
523	METAL.SALTS,INORGAN.ACID	583	MONOFILAMENT OF PLASTICS
524	OTHER CHEMICAL COMPOUNDS	591	INSECTICIDES, ETC.
525	RADIO-ACTIVE MATERIALS	592	STARCHES,INULIN,ETC.
531	SYNTH.COLOURS,LAKES,ETC.	593	EXPLOSIVES,PYROTECHNICS
532	DYEING,TANNING MATERIALS	597	PREPRD ADDITIVES,LIQUIDS

533	PIGMENTS, PAINTS, ETC.	598	MISC.CHEMICAL PRODTS.NES
541	MEDICINES,ETC.EXC.GRP542	621	MATERIALS OF RUBBER
542	MEDICAMENTS	625	RUBBER TYRES,TUBES,ETC.
553	PERFUMERY,COSMETICS,ETC.	629	ARTICLES OF RUBBER, NES
<b>6 - Leather and leather products</b>			
611	LEATHER	831	TRUNK,SUIT-CASES,BAG,ETC
612	MANUFACT.LEATHER ETC.NES	851	FOOTWEAR
613	FURSKINS,TANNED,DRESSED		
<b>7 - Metal and other basic manufacturing</b>			
661	LIME,CEMENT,CONSTR.MATRL	681	SILVER,PLATINUM,ETC.
662	CLAY,REFRCT.CONSTR.MATRL	682	COPPER
663	MINERAL MANUFACTURES,NES	683	NICKEL
664	GLASS	684	ALUMINIUM
665	GLASSWARE	685	LEAD
666	POTTERY	686	ZINC
670	REST OF 67 NOT DEFINED	687	TIN
671	PIG IRON,SPIEGELEISN,ETC	689	MISC.NON-FERR.BASE METAL
672	INGOTS ETC.IRON OR STEEL	691	METALLIC STRUCTURES NES
673	FLAT-ROLLED IRON ETC.	692	CONTAINERS,STORAGE,TRNSP
674	FLAT-ROLLED PLATED IRON	693	WIRE PRODUCTS EXCL.ELECT
675	FLAT-ROLLED, ALLOY STEEL	694	NAILS,SCREWS,NUTS,ETC.
676	IRON,STL.BAR,SHAPES ETC.	695	TOOLS
677	RAILWAY TRACK IRON,STEEL	696	CUTLERY
678	WIRE OF IRON OR STEEL	697	HOUSEHOLD EQUIPMENT,NES
679	TUBES,PIPES,ETC.IRON,STL	699	MANUFACTS.BASE METAL,NES
<b>8 - Non-electric machinery</b>			
711	STEAM GENER.BOILERS,ETC.	731	METAL REMOVAL WORK TOOLS
712	STEAM TURBINES	733	MACH-TOOLS,METAL-WORKING
713	INTRNL COMBUS PSTN ENGIN	735	PARTS,NES,FOR MACH-TOOLS
714	ENGINES,MOTORS NON-ELECT	737	METALWORKING MACHNRY NES
716	ROTATING ELECTRIC PLANT	741	HEATNG,COOLNG EQUIP,PART
718	OTH.POWR.GENRTNG.MACHNRY	742	PUMPS FOR LIQUIDS,PARTS
721	AGRIC.MACHINES,EX.TRACTR	743	PUMPS NES,CENTRIFUGS ETC
722	TRACTORS	744	MECHANICAL HANDLNG EQUIP
723	CIVIL ENGINEERING EQUIPT	745	OTH.NONELEC MCH,TOOL,NES
724	TEXTILE,LEATHER MACHINES	746	BALL OR ROLLER BEARINGS
725	PAPER,PULP MILL MACHINES	747	TAPS,COCKS,VALVES,ETC.
726	PRINTNG,BOOKBINDNG MACHS	748	TRANSMISSIONS SHAFTS ETC
727	FOOD-PROCESS.MCH.NON DOM	749	NON-ELECT MACH.PARTS,ETC
728	OTH.MACH,PTS,SPCL INDUST		
<b>9 - Computers, telecomm; cons. Electronics</b>			
751	OFFICE MACHINES	762	RADIO-BROADCAST RECEIVER
752	AUTOMATC.DATA PROC.EQUIP	763	SOUND RECORDER,PHONOGRPH
759	PARTS,FOR OFFICE MACHINS	764	TELECOMM.EQUIP.PARTS NES
761	TELEVISION RECEIVERS ETC		

<b>10 - Electronic components</b>			
771	ELECT POWER MACHNY.PARTS	775	DOM.ELEC,NON-ELEC.EQUIPT
772	ELEC.SWITCH.RELAY.CIRCUT	776	TRANSISTORS,VALVES,ETC.
773	ELECTR DISTRIBT.EQPT NES	778	ELECTRIC.MACH.APPART.NES
774	ELECTRO-MEDCL,XRAY EQUIP		
<b>11 - Transport equipment</b>			
781	PASS.MOTOR VEHCLS.EX.BUS	786	TRAILERS,SEMI-TRAILR,ETC
782	GOODS,SPCL TRANSPORT VEH	791	RAILWAY VEHICLES.EQUIPNT
783	ROAD MOTOR VEHICLES NES	792	AIRCRAFT,ASSOCTD.EQUIPNT
784	PARTS,TRACTORS,MOTOR VEH	793	SHIP,BOAT,FLOAT.STRUCTRS
785	CYCLES,MOTORCYCLES ETC.		
<b>12 Clothing</b>			
841	MENS,BOYS CLOTHNG,X-KNIT		
842	WOMEN,GIRL CLOTHNG,XKNIT	845	OTHR.TEXTILE APPAREL,NES
843	MENS,BOYS CLOTHING,KNIT	846	CLOTHING ACCESSRS,FABRIC
844	WOMEN,GIRLS CLOTHNG.KNIT	848	CLOTHNG,NONTXTL;HEADGEAR
<b>13 Misc. manufacturing</b>			
811	PREFABRICATED BUILDINGS	885	WATCHES AND CLOCKS
812	PLUMBNG,SANITRY,EQPT.ETC	891	ARMS AND AMMUNITION
813	LIGHTNG FIXTURES ETC.NES	892	PRINTED MATTER
871	OPTICAL INSTRUMENTS,NES	893	ARTICLES,NES,OF PLASTICS
872	MEDICAL INSTRUMENTS NES	894	BABY CARRIAGE,TOYS,GAMES
873	METERS,COUNTERS,NES	895	OFFICE,STATIONERY SUPPLS
874	MEASURE,CONTROL INSTRMNT	896	WORKS OF ART,ANTIQUE ETC
881	PHOTOGRAPH APPAR.ETC.NES	897	GOLD,SILVERWARE,JEWEL NES
882	PHOTO.CINEMATOGRPH.SUPPL	898	MUSICAL INSTRUMENTS,ETC.
883	CINE.FILM EXPOSD.DEVELPD	899	MISC MANUFCTRD GOODS NES
884	OPTICAL GOODS NES		
<b>14 - Minerals</b>			
272	FERTILIZERS, CRUDE	289	PREC.METAL ORES,CONCTRSTS
273	STONE, SAND AND GRAVEL	321	COAL,NOT AGGLOMERATED
274	SULPHUR,UNRSTD.IRON PYRS	322	BRIQUETTES,LIGNITE,PEAT
277	NATURAL ABRASIVES, NES	325	COKE,SEMI-COKE,RET.CARBN
278	OTHER CRUDE MINERALS	333	PETROLEUM OILS, CRUDE
281	IRON ORE, CONCENTRATES	334	PETROLEUM PRODUCTS
282	FERROUS WASTE AND SCRAP	335	RESIDUAL PETROL.PRODUCTS
283	COPPER ORES,CONCENTRATES	342	LIQUEFIED PROPANE,BUTANE
284	NICKEL ORES,CONCTR,MATTE	343	NATURAL GAS
285	ALUMINIUM ORE,CONCTR.ETC	344	PETROLEUM GASES, NES
286	URANIUM,THORIUM ORES,ETC.	345	COAL GAS,WATER GAS, ETC.
287	ORE,CONCENTR.BASE METALS	351	ELECTRIC CURRENT
288	NON-FERROUS WASTE,SCRAP	667	PEARLS,PRECIOUS STONES

