2. Non-tariff measures on "green" and "brown" energy products

2.1. Introduction

The global green energy transition from fossil fuels to renewable energy is important for many reasons. These include the recent increases in oil, gas and coal prices and the growing impact of climate change.

The renewable energy sector can create new employment opportunities while it also fosters innovation and research and development. Furthermore, some green technologies, such as off-grid solar energy and wind energy systems can provide affordable electricity in remote agricultural areas that are currently without access to electricity or with limited or unreliable electricity supply. It is also expected to expand small-scale industrial and entrepreneurial opportunities in these communities.

Sustainable Development Goal 7 calls for international cooperation on shifting from fossil fuel to renewable energy, including through increased trade for green energy technologies such as hydro, wind and solar power generation systems and their components. The transition aims to limit the future extent of climate change by substantially reducing energy-related carbon emissions to achieve net zero global carbon emissions towards the middle of this century.

Trade in energy efficient goods and technology are necessary to significantly reduce CO_2 emissions and depart from fossil fuel-based

systems. Availability of renewable energy technologies through trade is vital to achieve reliable, sustainable and resilient industrial infrastructure. Imports can be facilitated and made more affordable through trade that eliminates burdensome tariffs and non-tariff measures on renewable energy related goods and goods needed to enhance energy efficiency.

Data on non-tariff measures (NTMs) are a vital complement to tariff data as NTMs can be as important as tariffs in determining market

access. Internationally comparable data on NTMs is scarce, but useful information is made available through UNCTAD's Trade Analysis Information System (TRAINS – see Box 1).

Furthermore, inclusion in the database of NTMs derived from national requirements does not imply a judgement on the legitimacy or appropriateness of these requirements. NTMs are recorded in a neutral way with the purpose of fostering transparency for the policy tools that may affect international trade.

> ## Box 1: NTM data collection: Methodology and coverage
>
> UNCTAD, jointly with several other international organisations, such as the WTO, has developed a methodology to collect data on NTMs.[1] It uses the international classification of NTMs, approved by the United Nations statistics department.[2] A common taxonomy for NTMs allows for regular and consistent data collection.
>
> NTM data collection relies solely on official regulations issued by the country. UNCTAD performs a comprehensive review of the legislation in force in the country whenever data is collected. The legal requirements, from which the data stem, are established on a national basis, and can directly or indirectly affect international trade in goods. The data cover all requirements that can potentially affect international imports and exports of a specific product in a specific country and for a specific trading partner.
>
> UNCTAD has performed data collection in more than 100 countries, at least once. For several of those countries, data is updated yearly, or every two years. Since the process of data collection follows a standardised methodology, data is comparable across countries.
>
> 1. See: https://unctad.org/system/files/official-document/ditctab2019d8_en.pdf
> 2. See: https://unctad.org/system/files/official-document/ditctab2019d5_en.pdf

2.2. Use of NTMs in "green" and "brown" energy products

The TRAINS NTM database can be used to produce statistics for any region or for any product group. Three basic indicators – frequency index, coverage ratio, and prevalence score – reveal the use of NTMs as policy instruments (see Box 2). They provide information on how often a country uses NTMs, the most common NTM types, and the nature of the most regulated sectors.

Nevertheless, they do not reveal how much NTMs would cost to exporters and importers, nor if they restrict or enhance trade, and by how much. In some cases, NTMs could facilitate trade, especially when the requirement has been complied with already.

A joint UNCTAD and World Bank publication (UNCTAD, 2018) observed that developed countries tend to have deeper levels of regulation, covering more sectors and with a higher number of NTMs. The objective may be to ensure consumer safety or product quality. Sanitary and phytosanitary (SPS) and technical

barriers to trade (TBT) measures are used more frequently by developed countries. Less developed countries

may not have any regulations indicated in these areas as some sectors might not be well regulated.

Box 2: NTM indicators: "Frequency Index", "Coverage Ratio" and "Prevalence Score"

The Frequency Index and Coverage Ratio are indicators computed using traded products.

- The **Frequency Index is essentially the percentage of products affected** by one or more NTMs.[1] It takes into account the presence or absence of a measure on a certain product.
- The **Coverage Ratio is the share of trade subject to NTMs**. This index is also a ratio, but trade weighted.[2]
- **The Prevalence Score** (sometimes called the Intensity Index) **is an average of how many measures apply to a given product group**. It can be used, for example, to indicate which group of products is affected by the largest number of NTMs on average. For instance, it can reveal if agricultural products are affected more than industrial products, or to compare the average number of measures among various countries.

1. The frequency index is computed using the products that are effectively traded within the country, i.e. FI is the share of those imported products that have to face at least one NTM.
2. Usually, the Coverage Ratio is computed using the average trade value for the last three years (bilateral and by HS6), so that there would be less zero values. This is relevant because this indicator uses traded products only.

2.3. Results and policy conclusions

Figure 1 presents the average results for all the countries in the data set for 2021, or the latest year available[1], for import NTMs and export NTMs. Thirty-one countries were added in 2020 and 2021 to the database.

The first two bars in the figure are import measures. Import NTMs are conditions or requirements for import into the country whereas export NTMs are regulations affecting the country's own exports, e.g. obtaining a permit before exporting a chemical product. The latter are shown in the last two bars in the figure.

Around 40 per cent of the imported products in the world need to comply with at least one NTM (first blue bar). This represents about 70 per cent of the value of these imported goods (first red bar). Every imported product needs to comply with about two NTMs,

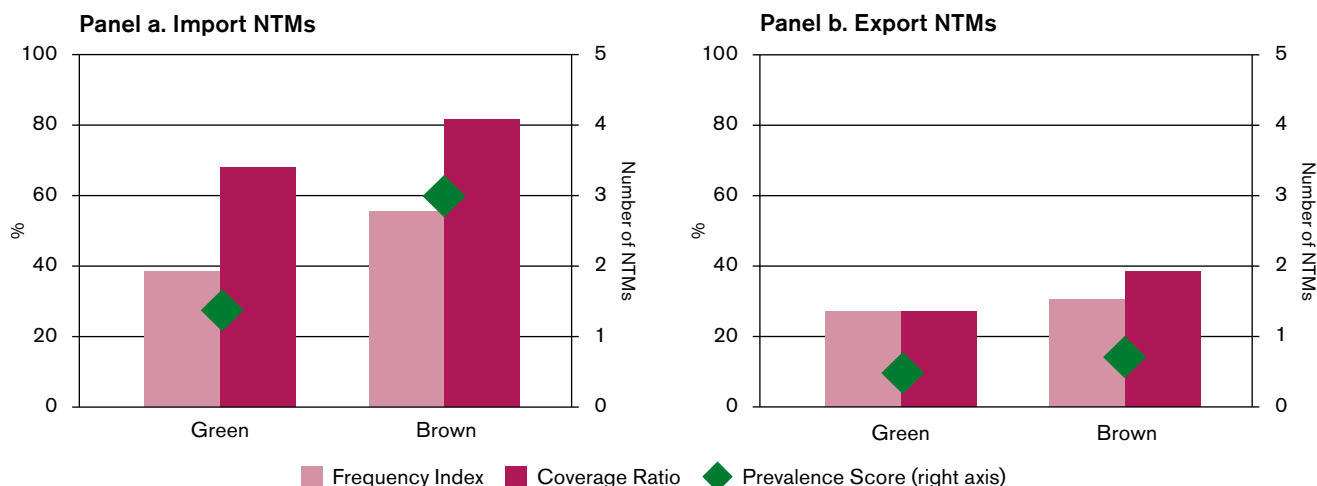## Figure 1. Global results for import/export NTMs
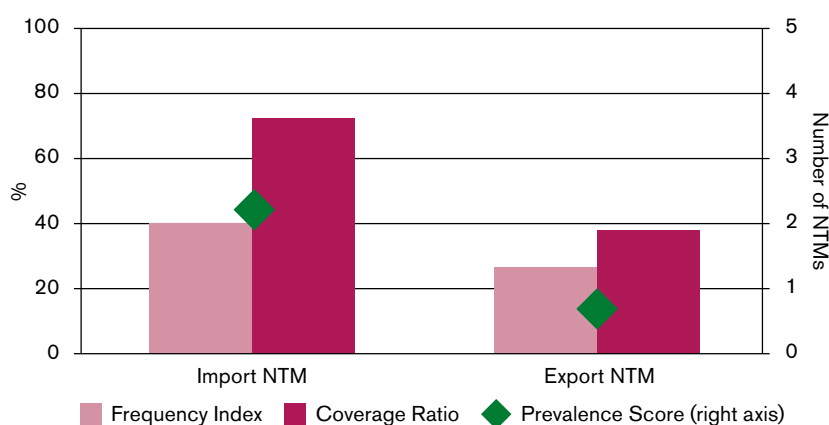
Source: Authors' illustration based on TRAINS.

on average (first green diamond). About 20 per cent of exported products need to comply with almost one NTM, on average.

NTMs such as product requirements to protect health and safety are more widely used for fossil fuel energy products than for renewable
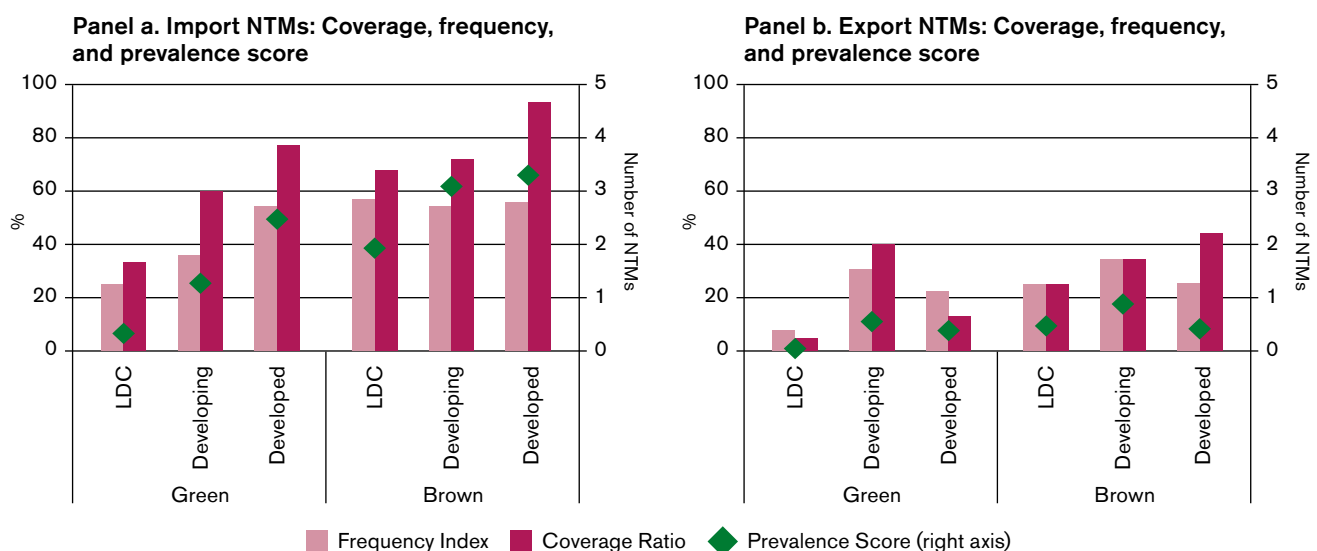
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1   Indicators for Grenada, Liberia and Tajikistan were not estimated as the corresponding trade information was not available.

Figure 2. NTM indicators, by energy product group

Panel a. Import NTMs

Panel b. Export NTMs

Legend: Frequency Index | Coverage Ratio | Prevalence Score (right axis)

Source: Authors' illustration based on TRAINS.

Figure 3. NTM indicators, by development status

Panel a. Import NTMs: Coverage, frequency, and prevalence score

Panel b. Export NTMs: Coverage, frequency, and prevalence score

Legend: Frequency Index | Coverage Ratio | Prevalence Score (right axis)

Source: Authors' illustration based on TRAINS.

energy products. This does not mean that NTMs are more trade restrictive for "brown products" (fossil fuel energy products).[2]

Figure 2 shows indicators concerning either the "green" or the "brown" energy product groups. Green energy products are products related to green

energy technologies such as hydro, wind and solar power generation systems and their components.[3]

About 40 per cent of green products imported in the world are affected by at least one NTM. This represents more than 60 per cent of its trade value. A larger share of the brown products

(almost 60 per cent) is affected by NTMs. Moreover, there are 1.5 NTMs on every green product imported in the world, on average, while there are three NTMs on each brown product.

The fact that brown products are more regulated than green products does not mean that trade policies

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2   For example, the import restrictiveness of NTMs facing renewable energy products, measured as an equivalent to tariff rates (i.e. the ad valorem equivalent of NTMs), is higher for renewable energy products than for fossil fuels.
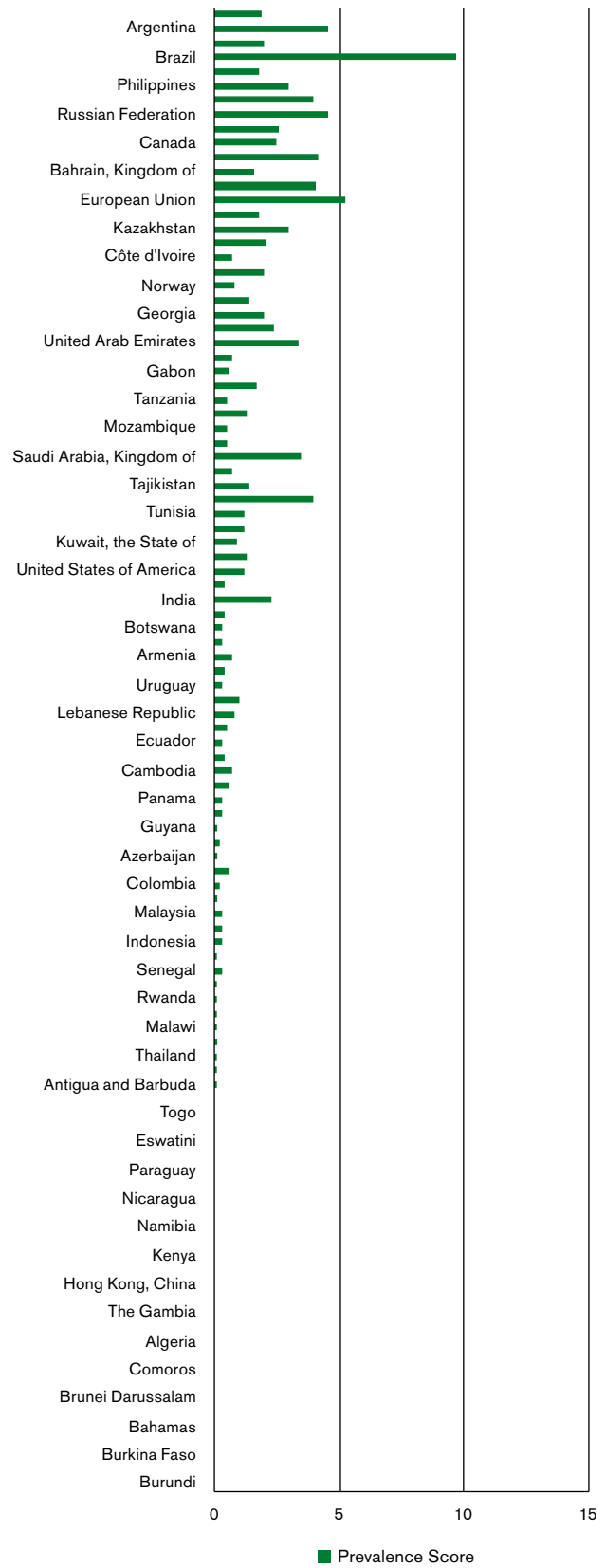3   Renewable energy systems and components as listed in: WTO, 2010, Renewable Energy 1st and 2nd submission of WTO member States, Committee on Trade and Environment, TN/TE/19 (32 products at HS 6-digit level mainly from chapters 84 and 85 for machinery and mechanical appliances, and electrical equipment)

Figure 4: NTM indicators, by economy and sector group

**Panel a. Import NTMs, Coverage, frequency of green energy products**
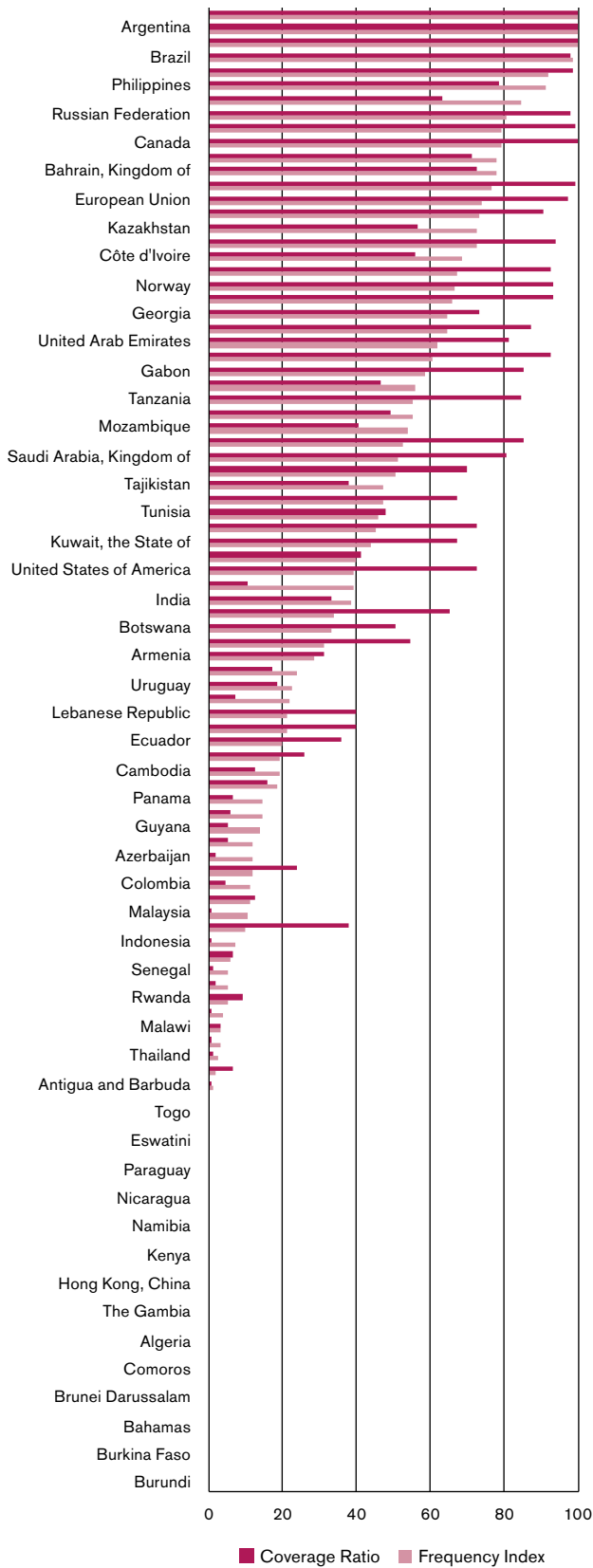
**Panel b. Prevalence score of green energy products**

Legend: ■ Coverage Ratio ■ Frequency Index ■ Prevalence Score

Source: Authors' illustration based on TRAINS.

Download the data:
www.wto.org/statistics

Figure 4: NTM indicators, by economy and sector group

Panel c. Import NTMs, Coverage, frequency of brown energy products

Coverage Ratio   Frequency Index
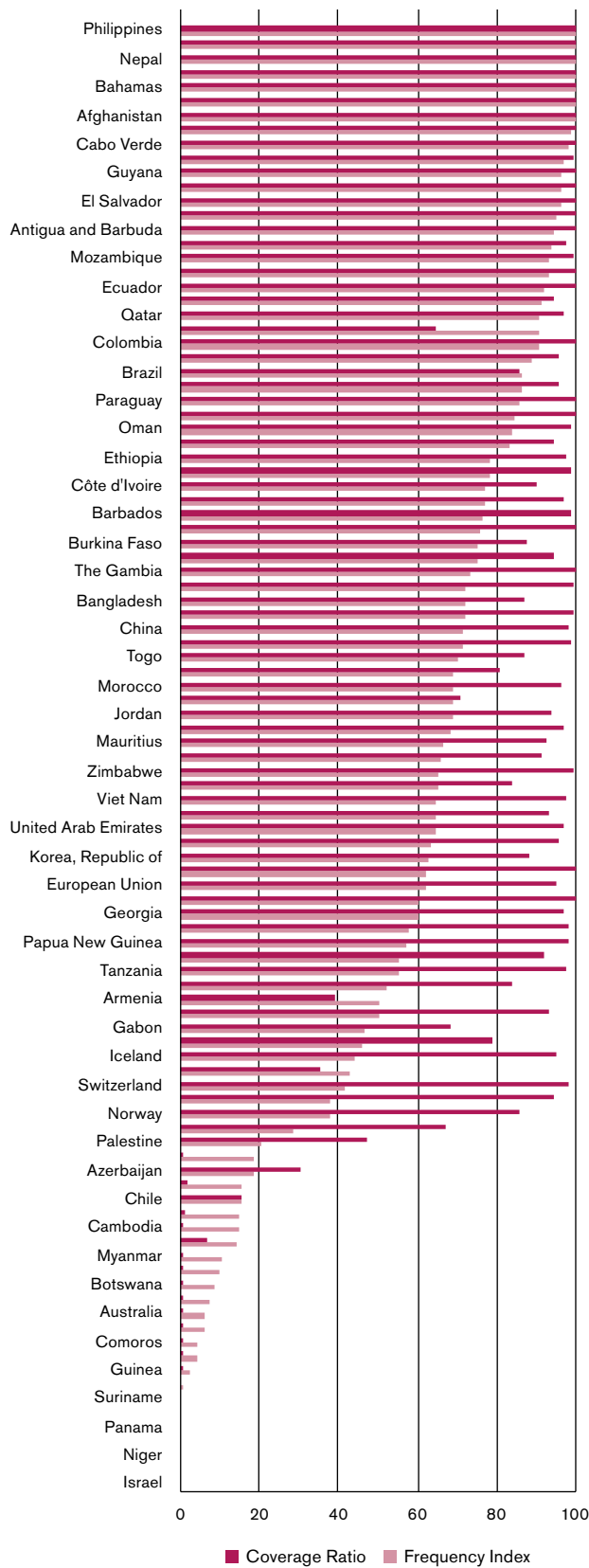
Panel d. Prevalence score of brown energy products

Prevalence Score
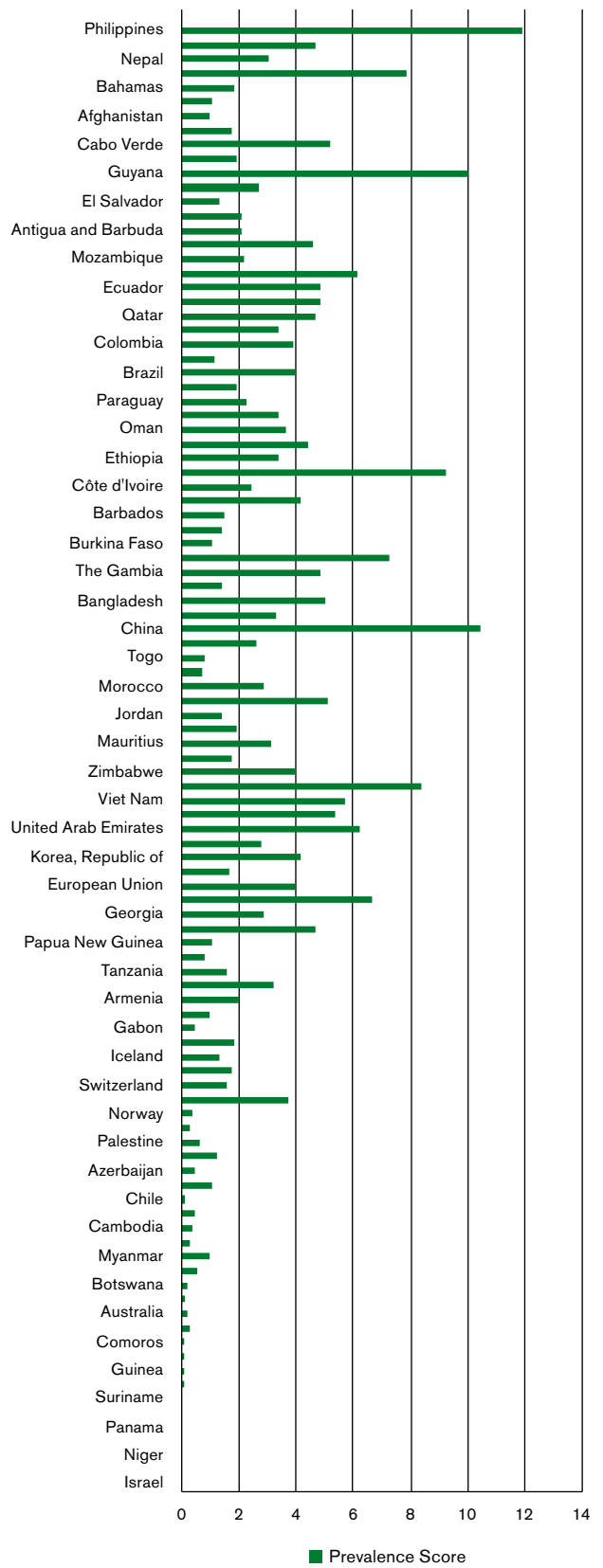
Source: Authors' illustration based on TRAINS.

Download the data:
www.wto.org/statistics

restrict these types of products. It may only relate to the fact that green products are normally innovation products, and countries have not yet developed regulations for those products. Another possible reason is market size. Analysis of the information on the NTM database shows that countries normally regulate more of those products that are highly traded.

If trade is expected to increase for green products, then NTMs are expected to also multiply for these products. Policy-makers across the world are responsible for designing those regulations to assure safety and efficiency in a way that does not create trade burdens or unnecessary trade costs.

Some 20 to 40 per cent of the products in these sectors are subject to NTMs by requirement of the own exporting country. There is normally only one NTM enforced on average on these products when they are exported. This is similar for both product groups studied here.

Figure 3 disaggregates the information by region or economy group. In all three regions, the brown products are more highly regulated than the green energy products. The indicators are

lower for exports (the last panel). It seems that least-developed countries (LDCs) may be lacking necessary regulation for green products.

Figure 4 provides information by economy and sector group. Out of 104 economies covered, only 76 implement NTMs on green products. On the other hand, only a handful are not using NTMs on brown energy products. In line with the results in the previous figures, some countries may not yet be ready to regulate these products effectively. It could also be the case that they are not importing green products, and this is the reason why they do not appear in the statistical indicators.

The bars for panels c and d correspond to brown energy products. The bars are in general larger for these products than for the green products. The large majority of the economies regulate almost all imports of these products, as observed by the coverage ratio value being close to 1.

The indicators are calculated as a share of imported products in each of the groups. The frequency index and coverage ratio can be easily compared because both use the same set of products for each country.

For some countries, the frequency index is low, meaning that only a few of the imported products are affected by NTMs. For those countries, the prevalence score may also be low. This means that there are very few measures imposed on few products.

Figure 5 shows use of NTMs by type of measure. About 30 per cent of the imported green energy products in the world have to comply with at least one TBT measure. This value rises to almost half of imports for brown energy products. More than 60 per cent of the value of imports of green energy products have to contend with at least one TBT measure. Again, values are higher for brown energy products. Three out of four dollars of imports in this sector are affected by TBT measures.

The next two most common types of NTMs are measures restricting the quantity imported. The quantity control measures for imports are larger for brown products than for green products. In fact, the red line in Figure 5 (which represents indicators for brown energy products) is always beyond the green line marking the value of indicators for green energy products. This is true not only for the frequency index but also for the coverage ratio.

Figure 5: NTM indicators, by type of measure

Panel a: Import NTMs: frequency index

— Green frequency index — Brown frequency index
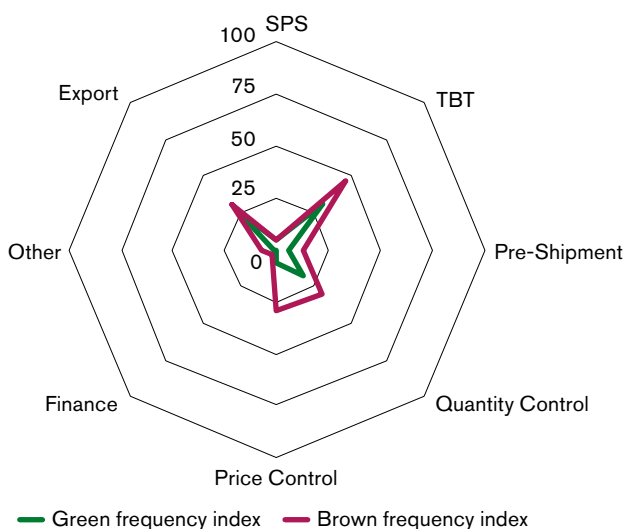
Panel b: Import NTMs: trade coverage


— Green coverage ratio — Brown coverage ratio
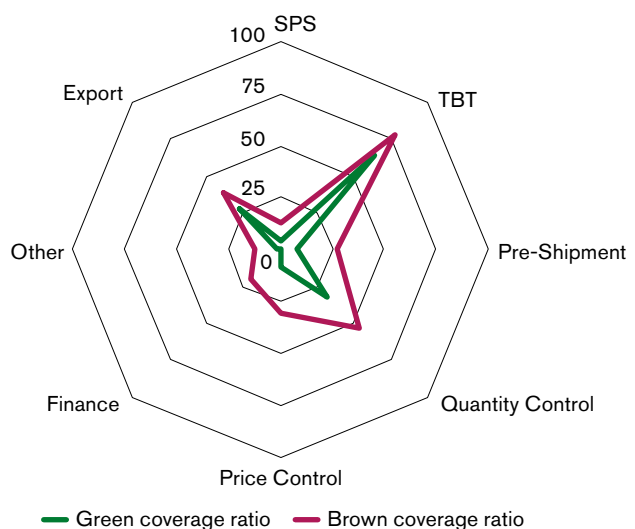
Source: Authors' illustration based on TRAINS.

The difference is clear for price control measures. While less than 10 per cent of green products need to comply with price control measures, it is about 30 per cent for brown energy products.

SPS, TBT and pre-shipment inspection constitute "technical measures" while the other NTMs are considered to be non-technical. Figure 6 shows that the use of NTMs is more

widespread for brown products, for both technical and non-technical measures, and for all three indicators.

Figure 6: NTM indicators, by sector groups and type of NTM

Panel a. Green energy products

Panel b. Brown energy products

Frequency Index   Coverage Ratio   ◆ Prevalence Score (right axis)
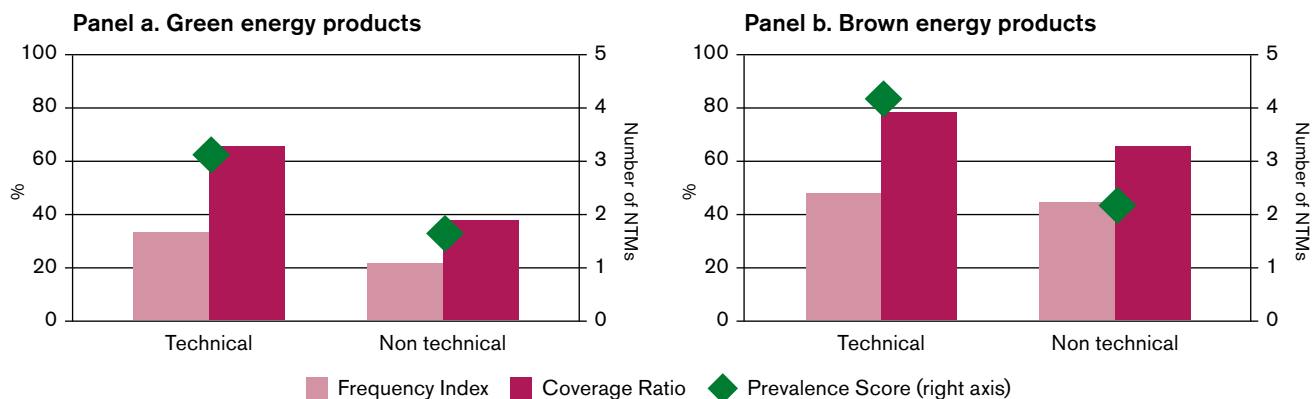
Source: Authors' illustration based on TRAINS.

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Annex

Frequency Index

The **Frequency Index (FI) is essentially the percentage of products affected** by one or more NTMs. More formally,

$$F_i = \frac{\sum D_s\, M_s}{\sum M_s} \cdot 100$$

The Frequency Index is a ratio calculated using two dummy variables in the numerator: D_s, the presence (or absence) of an NTM on the product, and the M_s, which equals to 1 for every (traded) product. The sum in the numerator is the total "affected" products, and the denominator is the sum of all products; the Frequency Index is simply the ratio between them.[4]

Coverage Ratio

The trade **Coverage Ratio (CR) is the share of trade subject to NTMs**. It can also be computed for a country, or for a region, or a group of products. This Index is also a ratio, but trade weighted. Trade value is represented by V_s. The numerator captures the sum of the import (export) value of those traded products that are affected by an import (export) NTM. It is then divided by the total value of imports (exports).

$$C_i = \frac{\sum D_s\, V_s}{\sum V_s} \cdot 100$$

Usually, Coverage Ratio is computed using the average trade value for the last three years (bilateral and by HS6), so that there would be less zero values. This is relevant because this indicator uses traded products only.

Prevalence Score

The **Prevalence Score (PS) is an average of how many measures apply to a given product group**. It can be used, for example, to tell what group of products is affected by the largest number of NTMs on average. For instance, it can be computed to see if agricultural products are affected by more measures, compared with industrial products, or to compare the average number of measures among different countries.

The formula is similar to the previous cases; D_s is defined above, N_s is the number of NTMs on product s, and M_s is the total number of products (those with and without NTMs).[5]

$$P_i = \frac{\sum D_s\, N_s}{\sum M_s}$$