# ICIO-TIVA HIGHLIGHTS: GVC INDICATORS FOR
LITHUANIA

OECD's Inter-Country Input-Output (ICIO) tables have been supporting analysis of global and regional inter-dependencies for over 10 years. Notably, ICIO-based **Trade in Value Added** (TiVA) indicators offer new insights into the commercial relations among economies and provide a broad view of where value is created along **global value chains (GVCs)**. Compared to gross trade statistics, the TiVA approach better reflects the contribution to trade made by services, the role of imports in export performance, and the true nature of economic interdependencies through indicators based on the value-added origins (both country and industry) of exports, imports and final demand. ICIO tables are also used to generate indicators of **Trade in Employment** (TiM), revealing the impact of GVCs on jobs, and **Greenhouse Gas Footprints**, providing insights into how final demand in a country drives emissions abroad. A further extension of the ICIO tables, the **Analytical AMNE** database examines the role of multinational enterprises in global production networks. The 2023 versions of these databases cover up to 76 economies and 45 industrial sectors, for the years 1995 to 2020. A new dataset introduces two novel indicators to assess the importance of direct and indirect gross output linkages along GVCs. This note highlights a selection of GVC-related indicators for **Lithuania**, that can help inform analysis in a range of policy areas including environment, industry, innovation, investment and trade. A **glossary** is provided for further information on how these indicators can be harnessed for analysis.

Figure 1. Foreign value-added content of gross exports
*As a percentage of total gross exports, 1995 to 2020*
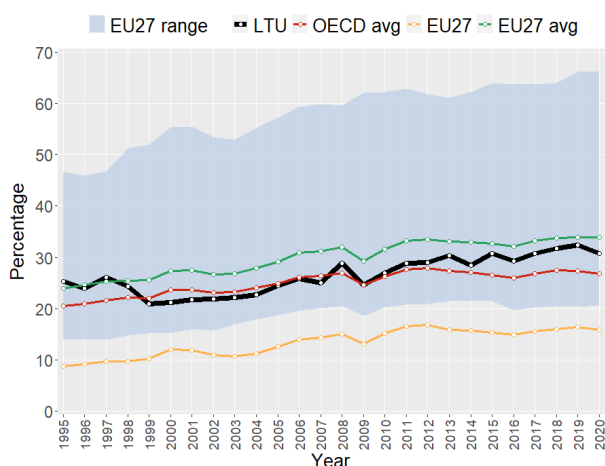
A standard way to evaluate globalisation through trade in intermediate inputs is to consider the foreign value-added content of gross exports. This reflects "backward participation" in GVCs. At the global level, the new TiVA indicators confirm that there has been a slowdown in GVC integration since the Financial Crisis in 2008-09 (Figure 1). In general, foreign value added in trade has remained relatively stable over the last decade.

Between 2008 and 2020, the foreign content of Lithuania's exports is estimated to have increased from 28.8% to 30.8% - above the OECD average of 26.7%.

The role of foreign final demand in domestic production

An alternative approach to evaluate participation in GVCs is to adopt a forward-looking perspective, such as the share of domestic value added driven by foreign demand (Figure 2). Overall, in 2020, 40.6% of Lithuania's domestic value added was driven by foreign final demand, up from 30.6% in 2008 and significantly above the OECD average of 29.8% in 2020. By industry, the shares ranged from *Transport and storage* (84.7%) and *Electrical equipment* (80.7%) at the higher end to *Accommodation and food services* (10.8%) at the lower end.

Figure 2. Lithuania - domestic value added in foreign final demand
As a percentage of value added, by industry, 2000, 2008 and 2020
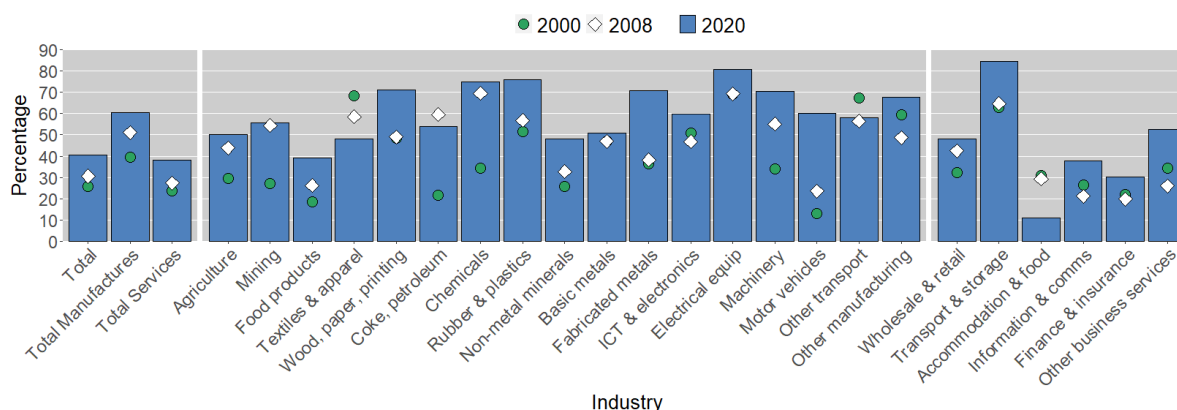
The importance of imports for exports

The industries with the most foreign value-added contents in their exports (Figure 3a) were *Coke and refined petroleum products* (64.2%), *Electrical equipment* (54.8%) and *Basic metals* (50.8%). *Transport and storage* generated the greatest source of domestic value-added content of total exports in 2020, accounting for 19.4% of total gross exports (Figure 3b), followed by *Wholesale and retail trade* (11.4%) and *Manufacturing nec* (4.8%). The most foreign content in total exports came from *Transport and storage* (9.2%).

Figure 3a. Lithuania - foreign value-added content of gross exports
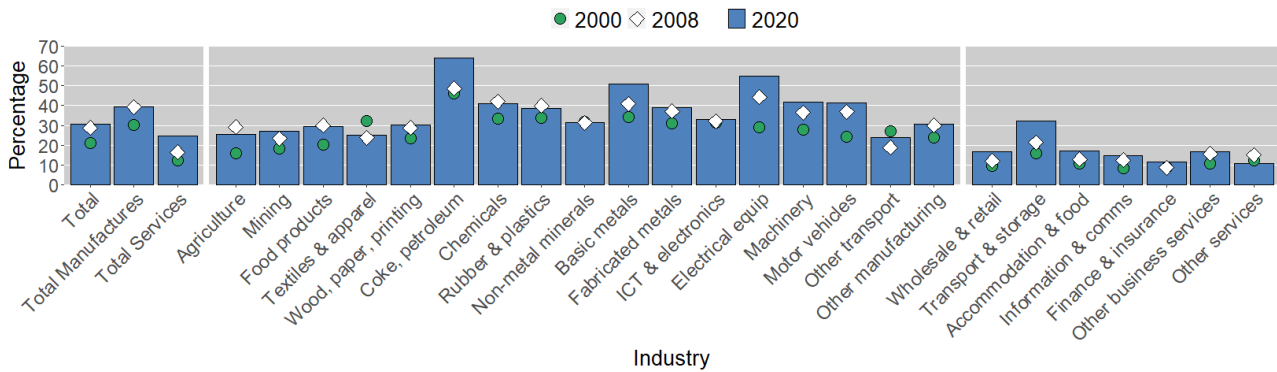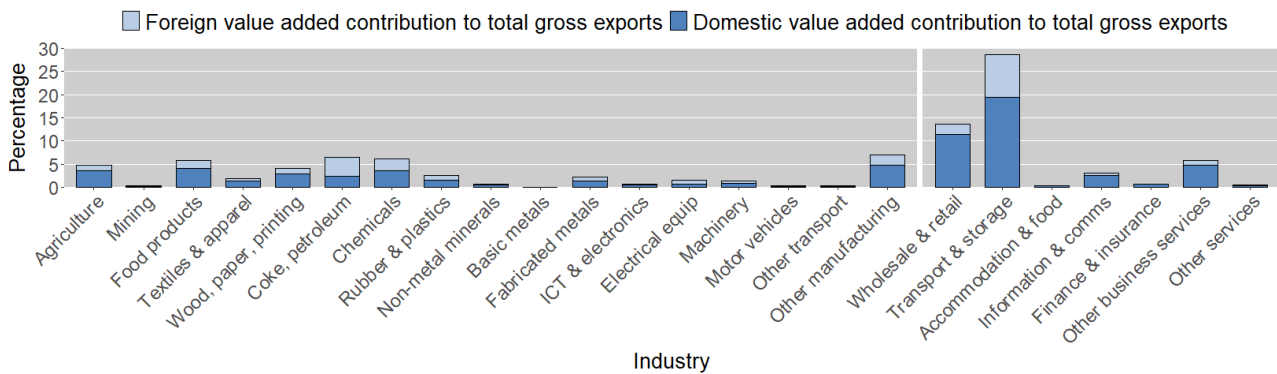*As a percentage of gross exports, by industry, 2000, 2008 and 2020*

Figure 3b. Lithuania - industry share of domestic and foreign value-added content of gross exports
As a percentage of total gross exports, 2020

In 2020, 54.9% out of the total value of Lithuania's imports of intermediate goods and services was subsequently embodied in exports (Figure 4), significantly above the OECD average of 44.5%, and significantly above the share in 2008 (43.9%). The originating industries with the highest shares of intermediate imports used in Lithuania's exports were *Transport and storage* (67.3%), *Chemicals and pharmaceuticals* (65.4%) and *Motor vehicles* (64.3%).

Figure 4. Lithuania - imported intermediate inputs used for exports, by industry-origin of imports
*As a percentage of intermediate imports, 2000, 2008 and 2020*
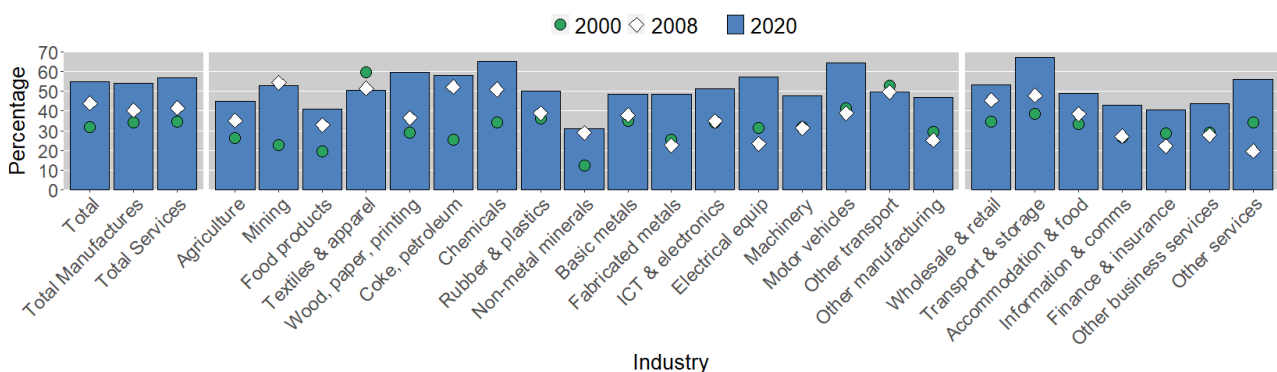
International flows of goods and services: main players

In gross terms, Germany (9.6%), Latvia (7.8%) and Denmark (6.6%) were the three most important Lithuanian export market destinations in 2020 (Figure 5). The top three final destinations for Lithuania's value added were Germany (9.4%), the United States (6.4%) and Latvia (5.5%).

For imports in gross terms, Lithuania's top three partners in 2020 were Poland (14.3%), the Russian Federation (13.1%) and Germany (8.9%). In value-added terms, the top three were also the Russian Federation (12.1%), Poland (11.2%) and Germany (10%).

Figure 5. Lithuania - main trade partners
As a percentage of total gross and value-added exports and imports, 2020
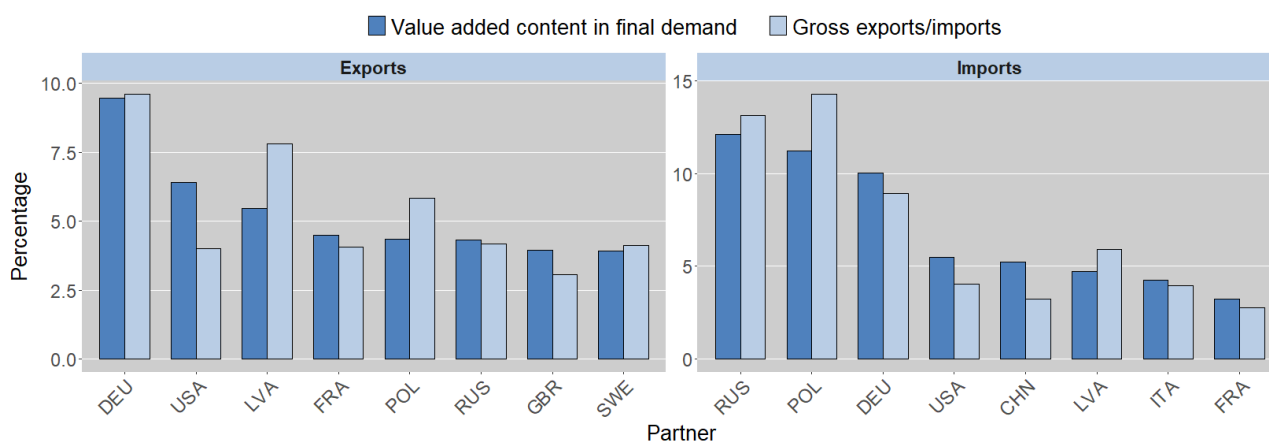
The importance of services in international trade

Services are a major contributor to the Lithuanian economy, accounting for 61.6% of Lithuania's gross exports in 2020 (Figure 6) - above the OECD average of 58.9%. Foreign services contributed 17.1% to the value of total gross exports. For manufactures, services value-added content was 32.9% of gross exports, with the highest shares in *Coke and refined petroleum products* (41.7%), *Electrical equipment* (38.4%) and *Food and beverages* (35.1%).

Figure 6. Lithuania - services content of gross exports
*As a percentage of gross exports by industry, 2020*
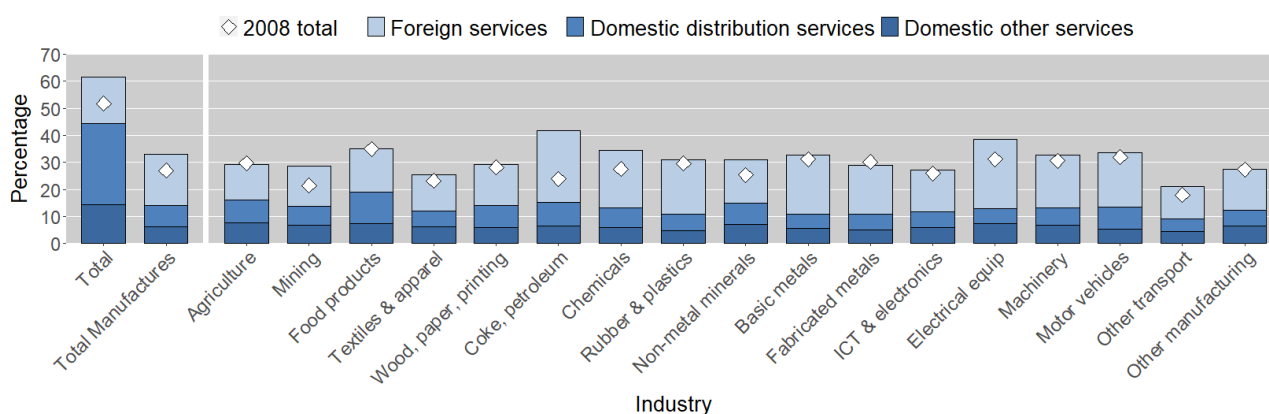
Foreign Input Reliance (FIR) and Foreign Market Reliance (FMR)

FIR and FMR indicators are based on gross output, rather than value added. They provide alternative perspectives of the importance of other countries and regions along value chains, and reveal the higher risk of disruption associated with longer foreign supply chains.

In 2020, the Manufacturing sector had the longest chain of foreign suppliers compared to other macroeconomic sectors: the foreign gross output used in Lithuania's production represented 90.2% of its domestic gross output (Figure 7, left panel, FIR). In the same period, the Mining sector had the longest chain of foreign clients: Lithuania's domestic output used in foreign production represented 103.6% of its total domestic output (Figure 7, right panel, FMR). Due to the gross trade approach and the resulting double counting, the indicators can take values above 100%. Decomposing the foreign reliance in geographical contributions for all industries shows that other OECD countries represent 62.7% of the gross output reliance of Lithuania with foreign suppliers, and 71.5% of the gross output reliance with foreign clients.

Figure 7. Lithuania - FIR and FMR, average by macroeconomic sector
As a percentage of gross output, 2020
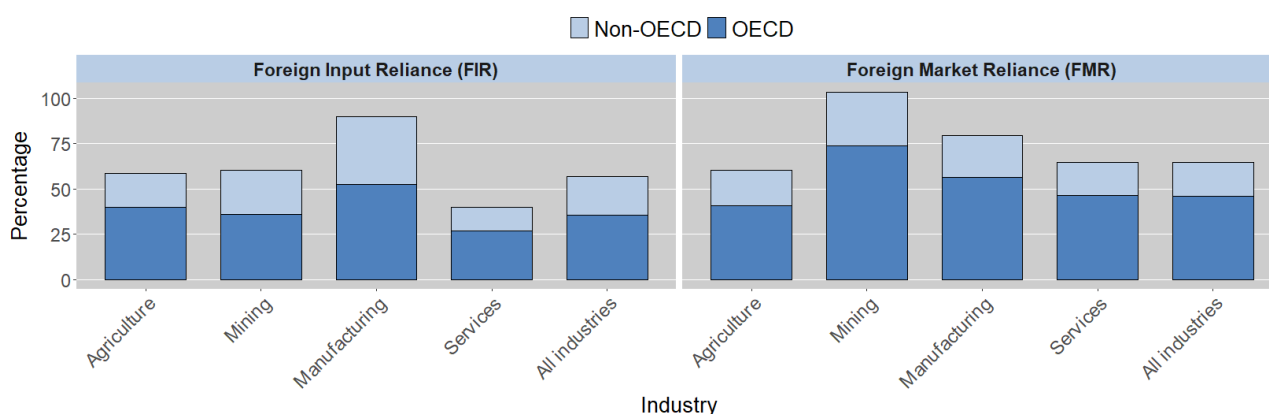
Environment and trade - embodied emissions

Figure 8. Lithuania - production-based and demand-based greenhouse gas (GHG) emissions
1995 to 2020, Million tonnes of CO2 equivalent (Mt CO2-eq)
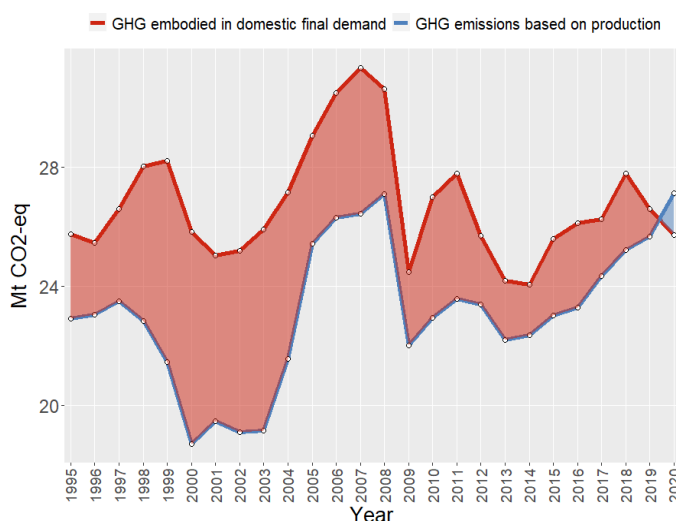
The underlying ICIO tables, used to generate TiVA indicators, also enable the estimation of other indicators related to globalisation. For example, estimates of GHG emissions embodied in final demand provide an alternative perspective to measures of emissions from domestic production. Figure 8 highlights the difference between production-based and demand-based carbon emissions.

Between 2000 and 2019, Lithuania's GHG emissions from domestic production rose by 37.3% (to 26 Mt). Over the same period, emissions embodied in Lithuania's final demand for goods and services also rose, by 3% (to 27 Mt). In 2019, Lithuania was a net importer of GHG emissions, with consumption being 1 Mt greater than production of emissions.

Employment and trade

ICIO tables can also be used to produce indicators related to employment and GVCs. The TiM database provides measures that can help address this topic, showing, for example, the extent to which exporting activities or foreign final demand sustain domestic employment used in production.

Out of all of Lithuania's employment in 2020, 35.9% was engaged in production to meet foreign final demand (about 490 thousand persons), above the OECD average of 27.4%, and above the share in 2008 of 27.4% (Figure 9). The Lithuanian industries with the highest shares of employment reliant on foreign final demand were *Transport and storage* (82.9%), *Electrical equipment* (80.7%) and *Wood and paper products* (75.9%).

Figure 9. Lithuania - domestic employment embodied in foreign final demand
*As a percentage of employment by industry, 2000, 2008 and 2020*
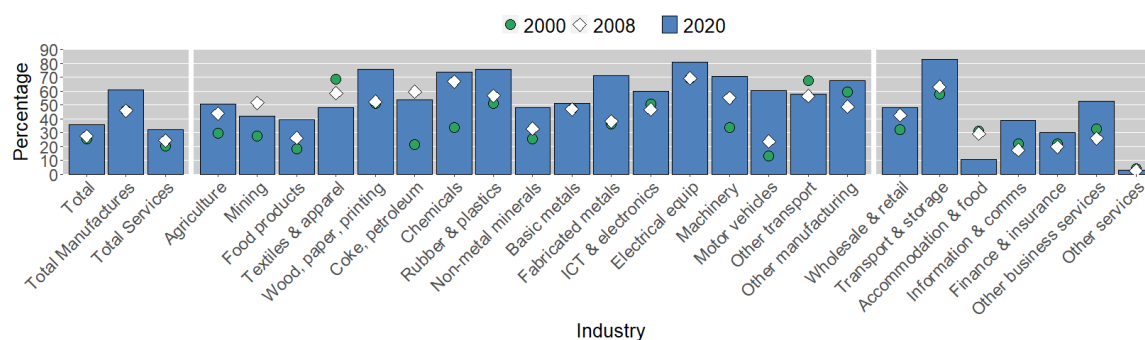
Activities of multinational enterprises

The Analytical Activities of Multinational Enterprises (AMNE) database documents the contribution of multinational enterprises (MNEs) and their foreign affiliates to global production. The database encompasses both inward activities, those of foreign multinationals with affiliates in the country, and outward activities, those of domestic multinationals with affiliates abroad.

In Lithuania, affiliates of foreign multinationals were responsible for 22.6% of the country's overall gross output in 2019. Conversely, the foreign affiliates of Lithuanian firms produced a volume of output equivalent to 4.7% of Lithuania's gross output (Figure 10).

Figure 10. Inward and outward MNE activity relative to the size of the domestic economy
As a share of the country's overall gross output, 2011 and 2019
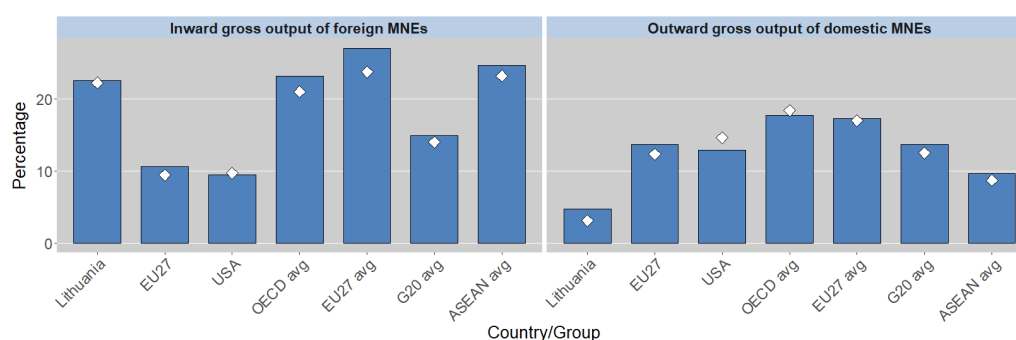
Further information is available to supplement this country note:

▶ Access the data at: http://oe.cd/tiva
▶ TiVA indicators are based on the 2023 version of ICIO tables: http://oe.cd/icio
▶ Related indicators of Trade in Employment (TiM): http://oe.cd/io-emp; and Greenhouse Gas Footprints: http://oe.cd/io-ghg
▶ Analytical AMNE database: http://oe.cd/gvc-mne/
▶ Trade policy implications of global value chains: https://www.oecd.org/trade/resilient-supply-chains/

Note: This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

COUNTRY NOTE GLOSSARY

1. Foreign value-added content of gross exports (TiVA: EXGR_FVASH)
Estimates the contribution to the total value of exports originating from foreign suppliers. It is often considered as a measure of 'backward linkages' in analyses of GVCs. Gross exports in TiVA exclude re-exported imports, i.e. imports that enter and exit a country without any further transformation.

2. Domestic value added in foreign final demand, by industry (TiVA: VALU_FFDDVA)
Presents, for a given country, the value added originating from that country's manufacturing and service industries that is embodied (via exporting activities) in foreign final demand - as a share of the total domestic value added generated by that industry. It can be considered as a measure of industry 'export orientation', as it shows the share of an industry's value added that ultimately meets foreign final demand (whether as a direct export or as an indirect export i.e. embodied in exports by other, downstream industries and countries).

3. Foreign value-added content of gross exports by industry (3a), and industry share of domestic and foreign value content of gross exports (3b) (TiVA: EXGR_FVASH, EXGR_TDVAIND, EXGR_TFVAIND)
Shows the foreign content share of gross exports by industries (3a) and a decomposition of total gross exports into the domestic and foreign value-added content exported by each industry (3b).

4. Imported intermediate inputs used for exports, by industry-origin of imports (TiVA: IMGRINT_REII)
Presents, for a given country, the share of intermediate imports from partners' industries that are used domestically in producing goods and services for export, as a percentage of total intermediate imports from partners' industries. The indicator provides a measure of the importance of intermediate imports to produce goods and services for export and their role as a source of international competitiveness.

5. Exports to and imports from main partner countries (TiVA: EXGRPSH, IMGRPSH, FFD_DVAPSH, DFD_FVAPSH)
Presents, for a given country, the share of total exports to, or total imports from, main partners as a percent of total export or imports in value-added and gross terms. Export figures do not include re-exports.

6. Services content of gross exports (TiVA: EXGR_SERV_DVASH, EXGR_SERV_FVASH)
Presents, for a given country, the contribution made by domestic and foreign services to exporting activities, at the total economy level and for specific goods-producing industries. It reveals the extent to which manufacturing industries, for example, rely on services as intermediate inputs into the production and export of goods.

7. Foreign Input Reliance (FIR) and Foreign Market Reliance (FMR)
The indicators account for both direct and indirect input trade flows between partner countries. The exact calculation relies on a gross trade approach: All industry-level direct and indirect gross trade flows between the destination country and its partners are normalized by the country's gross output, and then summed over all partners. The FIR is calculated by summing the foreign elements along each column of the Leontief matrix. Conversely, the FMR is computed by summing the foreign components along each row of the Ghosh matrix. Due to the gross trade approach and the resulting double counting, both indicators can take values above 100%. These indicators reflect that supply chain disruptions, such as natural disasters or geopolitical events, typically disrupt the entire shipment of a good rather than only the value added originating from a specific partner. In essence, FIR and FMR indicators measure the importance of trade partners in the value chain while implicitly accounting for the higher risk of disruption associated with longer supply chains.

8. Emissions embodied in domestic and foreign final demand (FD_CO2E, PROD_CO2E)
Production-based Greenhouse Gas (GHG) emissions are estimated by allocating the emissions, measured in carbon dioxide equivalent (referred as CO_2-eq and sometimes as CDE), to the 45 target resident industries in OECD ICIO and to household final consumption of fuels. Demand-based GHG emissions are calculated by multiplying the intensities of the production-based emissions with the global Leontief inverse and domestic final demand matrices from OECD ICIO. Thus, net emissions are defined as the difference between production-based emissions and domestic and foreign emissions embodied in domestic final demand.

9. Share of domestic employment embodied in foreign final demand (TiM: EMPN_FFDDEM)
Presents, for a given country and industry, the domestic employment embodied in foreign final demand as a share of total employment in the industry. It is an indicator of the intensity of trade reliance of a specific sector's employment.

10. Inward and outward MNE activities
Expresses the overall gross output of the affiliates of foreign multinationals in the country and that of the affiliates of domestic multinationals abroad, respectively. A foreign affiliate is an enterprise in which more than half of the shares are controlled, directly or indirectly (e.g. through another affiliate), by an entity residing in another country. These indicators are expressed as a share of the gross output of the domestic economy.