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Guide to the OECD TiVA Indicators, 2021 edition

Joaquim J.M. Guilhoto, Colin Webb and Norihiko Yamano (OECD)

The goods and services we buy are composed of inputs from various countries around the world. However, the flows of goods and services within these global production chains are not always reflected in conventional measures of international trade.

The Trade in Value-Added (TiVA) indicators address this issue by considering the value added by each country in the production of goods and services that are consumed worldwide. TiVA indicators are designed to better inform policy makers by providing new insights into the commercial relations between nations.

This guide presents the TiVA indicators published by OECD. The latest indicators were generated using the 2021 release of the OECD Inter-Country Input-Output (ICIO) tables which cover the period 1995 to 2018. The indicators are provided for 66 economies and the rest of the world (including all OECD, European Union, ASEAN and G20 countries) and a selection of region aggregates and, for 45 unique industries and related aggregates (such as total manufactures and total services) based on the ISIC Rev. 4 classification.

This guide builds on previous versions and is intended for all users, from experienced Input-Output practitioners familiar with the matrix algebra for generating indicators, to relative novices who wish to use TiVA indicators in their analyses and just need guidance on their use and interpretation.

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1. Introduction

The goods and services we buy are composed of inputs from various countries around the world. However, the flows of goods and services within these global production chains are not always reflected in conventional measures of international trade.

The development of Trade in Value Added (TiVA) indicators addresses this issue by considering the value added by each country in the production of goods and services that are consumed worldwide. TiVA indicators are designed to better inform policy makers by providing new insights into the commercial relations between nations.

This guide presents the TiVA indicators published by OECD¹. The latest indicators were estimated using the 2021 release of OECD's Inter-Country Input-Output (ICIO) tables covering the years 1995 to 2018². A range of indicators are provided for 66 economies and the rest of the world (including all OECD, European Union, ASEAN and G20 countries) and a selection of region aggregates and, for 45 unique industries and related aggregates (such as total manufactures and total services).

This guide builds on previous versions and is intended for all users, from experienced Input-Output practitioners familiar with the matrix algebra for generating indicators, to relative novices who wish to use TiVA indicators in their analyses and just need guidance on their use and interpretation.

The 2021 ICIO and TiVA databases are primarily based on statistics compiled according to 2008 System of National Accounts (2008 SNA) concepts and, an industry list based on ISIC Revision 4. Compared to the 2018 edition, the 2021 edition of TiVA indicators includes two new countries, Lao PDR and Myanmar, to complete the coverage of ASEAN economies. As well as the 66 target economies, an aggregate for the “*Rest of the World*” is included in the ICIO tables and TiVA database for completeness. The number of unique industries has also increased to 45 compared to 36 in the 2018 edition.

TiVA indicators, by identifying where value is added is created along value chains, can provide better insights into global production networks and supply chains than is possible with conventional trade statistics.

As well as being the source of TiVA indicators, the underlying ICIO infrastructure can be used, when combined with other information, to develop other indicators related to global value chains (GVCs). For example, employment and GVCs and, emissions embodied in international trade. The OECD maintains the Trade in Employment (TiM)³ and the Trade in Embodied CO₂ (TECO2)⁴ databases to address these topics.

2. OECD's ICIO Tables: basic definitions

This section presents the basic structure of the OECD ICIO tables and the elements needed for the calculation of the TiVA indicators.⁵

The 2021 edition of TiVA indicators covers 66 target economies (plus an aggregate representing “Rest of the world”) and 17 regions and country groups (see Annex Table A.1 and Table A.2); and, 45 unique industries and 25 industry aggregates within a hierarchy (see Annex Table A.3, Table A.4 and Table A.5). Indicators are provided for all years from 1995 to 2018. Indicators may be expressed in USD million (current prices) or as percentages (shares or ratios).

Note that for regional aggregates, once USD million measures have been calculated for the 66 economies and “Rest of the World”, aggregation to various regional groupings is carried out before ratios and shares are derived. Similarly, for aggregate industry sectors. Once USD million measures have been calculated for the 45 unique industries, summing to aggregate industry sectors is carried before ratios and shares are derived.

2.1. The OECD's Inter-Country Input-Output (ICIO) system

The OECD's ICIO system consists of a set of annual symmetric industry-by-industry global input-output tables. For each year, several matrices can be generated from the ICIO tables to calculate TiVA indicators. Table 2.1, Figure 2-1, Figure 2-2 and Figure 2-3 present the basic structure of the ICIO database and the main matrices need for the estimation of the TiVA indicators.

Table 2.1. Basic Matrices in OECD's ICIO and TiVA Indicators

Matrix	Size of the matrix	Description
W	$1 \times (N * K)$	Value added , where w_i^r is the value added (at basic prices) by industry i (1 to K) in country r (1 to N) plus <i>taxes less subsidies</i> on intermediate products, so that total value added equals total final demand at basic prices.
X	$1 \times (N * K)$	Gross output (at basic prices) , where x_i^r is the gross output from industry i in country r
V	$1 \times (N * K)$	Value added to output ratio , where $v_i^r = w_i^r / x_i^r$ is the ratio of value added to gross output by industry i in country r .
Z	$(N * K) \times (N * K)$	Intermediate consumption (at basic prices) , where z_{ij}^{rs} is the flow of goods from producing industry i in country r to the purchasing industry j in country s .
Y	$(N * K) \times N$	Final demand , where the element y_i^{rs} represents final demand of country s for goods and services produced by industry i in country r . Final demand is separated into Household consumption, Consumption expenditure of non-profit institutions serving households (NPISH), Direct purchases by non-residents, Government Final Consumption, Gross Fixed Capital Formation (GFCF) and changes in inventories.
A	$(N * K) \times (N * K)$	Input coefficients , calculated as $a_{ij}^{rs} = z_{ij}^{rs} / x_j^s$
B	$(N * K) \times (N * K)$	Leontief inverse , or “output multipliers”, $\mathbf{B} = (\mathbf{I} - \mathbf{A})^{-1}$, where the element b_{ij}^{rs} shows the direct and indirect requirements of inputs from industry i in country r for the production of one unit of output for final demand by industry j in country s .
GRTR GRTR_INT GRTR_FNL	$(N * K) \times N$	Bilateral gross trade matrices by exporting industry/country and importing country of intermediate (INT) and final (FNL) goods GRTR = GRTR_INT + GRTR_FNL

Figure 2-1. OECD's ICIO Basic Structure

		Intermediate Consumption						Final Demand						G.O.
		Country 1		...		Country N		Country 1		...		Country N		
		Ind. 1	... Ind. K	...		Ind. 1	... Ind. K	FD'	... FD F	...		FD'	... FD F	
Country 1	Ind. 1	z^{11}		...		z^{1N}		y^{11}		...		y^{1N}		x^1
	
Country N	Ind. 1	z^{N1}		...		z^{NN}		y^{N1}		...		y^{NN}		x^N
	
Value Added	Value added at basic prices + taxes / less subsidies on intermediate products		w^1		...		w^N		Taxes less subsidies on final products					
Gross Output		x^1		...		x^N								

Figure 2-2. Obtaining the Leontief Inverse and the Value Added to Output Ratio

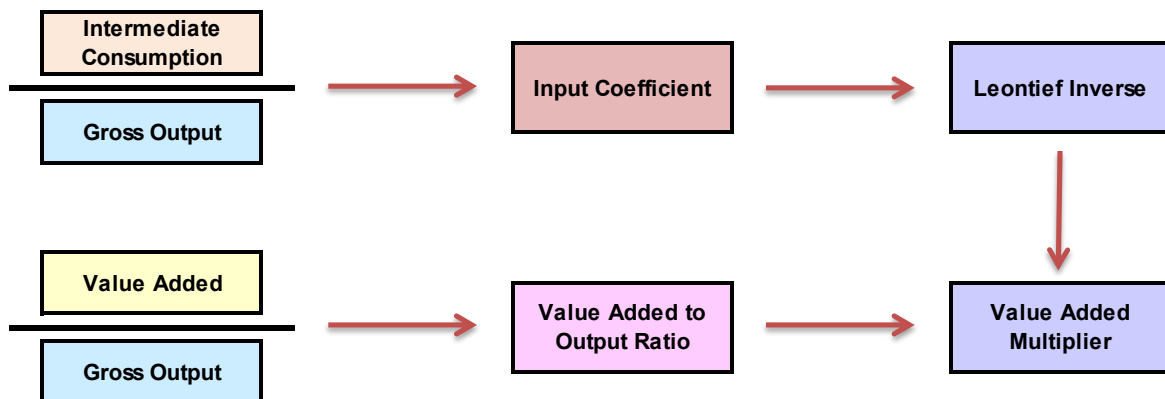
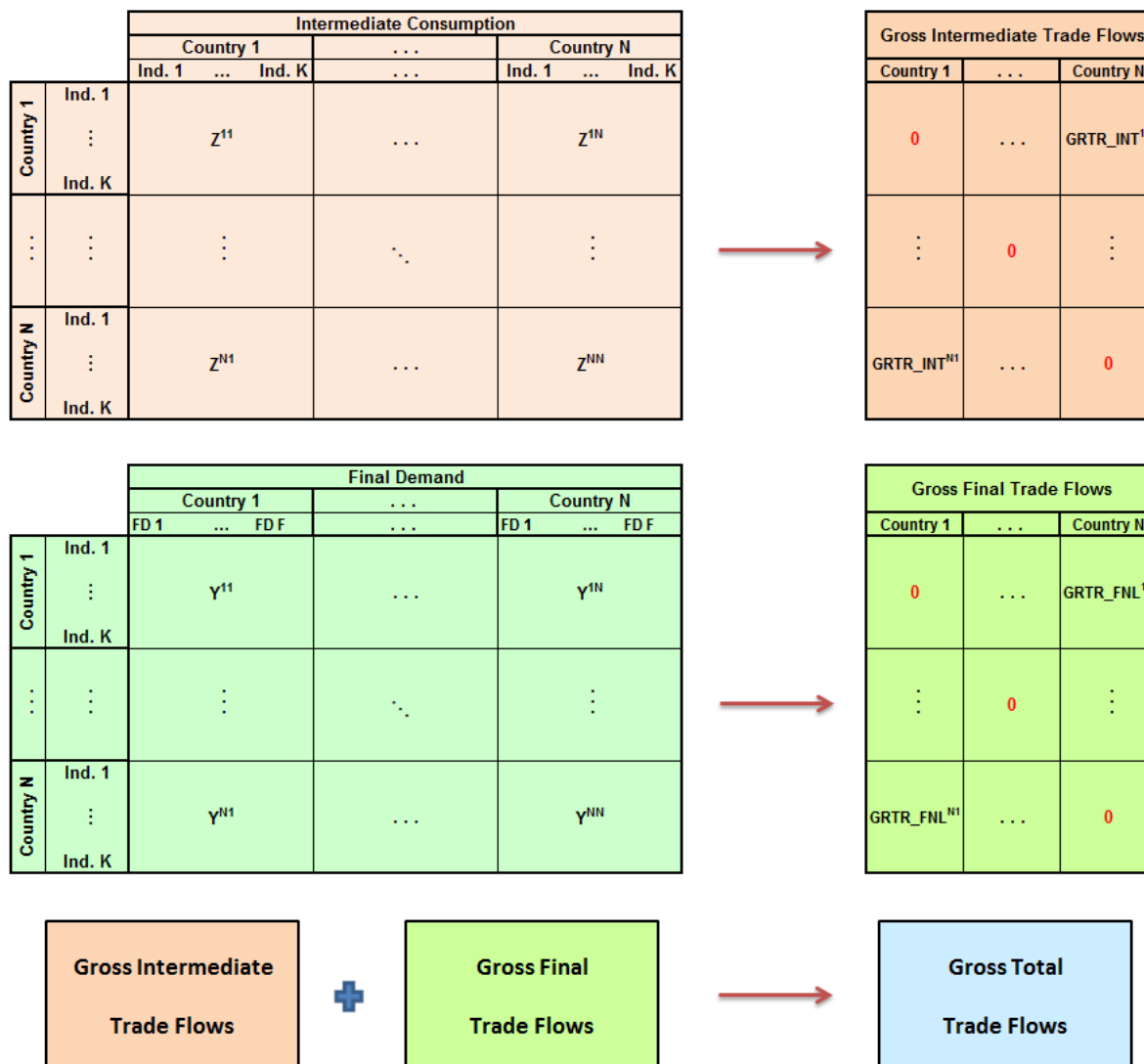


Figure 2-3. Obtaining the Bilateral Trade Flows



2.2. Definitions and notation used in this Guide

The TiVA indicators are shown in blue in the equations, while the variables derived from the ICIO system are shown in black. Visual representations of the indicators are also provided (see Box 1.)

$EXGR_{c,p}$ represents a $K \times 1$ vector of gross exports from country c to partner country p for all K industries, where $c \neq p$. $EXGR_c$ is a $K \times 1$ vector of total exports of country c .

$V_c = [v_{c1} \dots v_{cK}]$ is a $1 \times K$ row vector with domestic value added shares of output for each industry i in country c , while V_p generally represents value added shares of the partner country p . \hat{V}_c denotes the diagonalised matrix of vector V_c , i.e. a $K \times K$ matrix with elements $v_{c1} \dots v_{cK}$ on the diagonal and 0 elsewhere.

$B = (I - A)^{-1}$, is the global Leontief inverse matrix with $NK \times NK$ dimensions, where A is the global I-O coefficient matrix. $B_{c,c}$ is a $K \times K$ diagonal block matrix of B representing total domestic gross output required for one unit increase of country c demand. $B_{p,c}$ is also

a $K \times K$ block matrix, and it represents the total gross output from country p required for a one unit increase in country c demand.

Total gross exports and imports in ICIO tables, and hence in TiVA indicators, differ from official National Accounts statistics due to removal of estimates of re-exports and re-imports, conversion to a Basic Price valuation and reconciliation of bilateral asymmetries via balancing under output constraints.

Changes in inventories, acquisitions less disposals of valuables, and expenditure approach statistical discrepancy for a given country are included in countries' total final demand. In other words, there is an implicit assumption that all products consumed within a year are produced in the same year, and vice versa.

Gross trade and output measures are in current prices, USD millions, with a basic price valuation. The conversion rates used to convert in national currency statistics to USD are available online in the collection of "ready-made files" provided with the TiVA database on OECD.STAT.

Dimensions for each indicator are provided with the following abbreviations:

Country / Region:

- Prod cou = Production country
- VA src cou = Value added source country
- Exp cou = Export country
- Imp cou = Import country
- FD cou = final demand / destination country
- World = all countries which are related to the indicator

Industry:

- Prod ind = Production source industry
- VA src ind = Value added source industry
- Exp ind = Export products producing industry
- FD ind = final demand products producing industry
- Tot ind = total industry

Supply and Demand Dimensions:

- Depending on the indicator, the supply and demand dimensions could refer to intermediate, final or total goods and services.

3. An overview of OECD's TIVA indicators

This section presents an overview of OECD's TiVA Indicators classified into four groups according to data requirements:

- Structural indicators, based on the values presented in ICIO;
- Indicators based on value added, gross exports and gross imports;
- Indicators based on value added and final demand;
- Detailed indicators, with four dimensions, revealing the origins of value added in gross exports, gross imports and final demand.

The complete set of indicators, with their respective dimensions, is presented in Table 3.1 and Table 3.2.

Table 3.1. Overview of OECD's TiVA Indicators and requirements for calculation

Number in doc.	Code	Label	Unit	ICIO Matrices or vectors used in the calculations
Structural indicators - based on the values in ICIO tables				
4.1	PROD	Production (gross output)	USD	X
4.2	VALU	Value added	USD	W
4.3	PROD_VASH	Value added as a % of production	PC	V
4.4	EXGR	Gross exports	USD	GRTR
4.4	EXGR_INT	Gross exports of intermediate products	USD	GRTR_INT
4.4	EXGR_FNL	Gross exports of final products	USD	GRTR_FNL
4.5	IMGR	Gross imports	USD	GRTR
4.5	IMGR_INT	Gross imports of intermediate products	USD	GRTR_INT
4.5	IMGR_FNL	Gross imports of final products	USD	GRTR_FNL
4.6	BALGR	Gross trade balance	USD	GRTR
4.7	EXGRpSH	Gross exports, partner shares	PC	GRTR
4.7	IMGRpSH	Gross imports, partner shares	PC	GRTR
Indicators based on value added in gross exports and imports				
Domestic value added content of gross exports				
5.1	EXGR_DVA	Domestic value added content of gross exports	USD	VB * GRTR
5.2	EXGR_DVASH	Domestic value added share of gross exports	PC	VB * GRTR
5.3	EXGR_TDVAIND	Industry domestic value added contribution to gross exports	PC	VB * GRTR
5.4	EXGR_DVApSH	Domestic value added in gross exports, partner shares	PC	VB * GRTR
Decomposition of domestic value added content of gross exports				
5.5	EXGR_DDC	Direct domestic value added content of gross exports	USD	VB * GRTR
5.6	EXGR_IDC	Indirect domestic value added content of gross exports	USD	VB * GRTR
5.7	EXGR_RIM	Re-imported domestic value added content of gross exports	USD	VB * GRTR
Foreign value added content of gross exports (backward participation in GVCs)				
5.8	EXGR_FVA	Foreign value added content of gross exports	USD	VB * GRTR
5.9	EXGR_FVASH	Foreign value added share of gross exports	PC	VB * GRTR
5.10	EXGR_TFVAIND	Industry foreign value added contribution to gross exports	PC	VB * GRTR
5.11	DEXFVApSH	Foreign value added share of gross exports, by value added origin country	PC	VB * GRTR
Domestic value added content of foreign gross exports (forward participation in GVCs)				
5.12	EXGR_DVAFXSH	Domestic value added embodied in foreign exports as share of gross exports	PC	VB * GRTR
5.13	FEXDVApSH	Domestic value added in foreign exports as a share of gross exports, by foreign exporting country	PC	VB * GRTR
Domestic value added content of intermediate and final gross exports				
5.14	EXGR_INTDVASH	Domestic value added in exports of intermediate products, as a share of total gross exports	PC	VB * GRTR_INT
5.15	EXGR_FNLDVASH	Domestic value added in exports of final products, as a share of total gross exports	PC	VB * GRTR_FNL
5.16	EXGR_INTDVApSH	Domestic value added in exports of intermediate products, partner shares	PC	VB * GRTR_INT
Services value added content of gross exports				
5.17	EXGR_SERV_DVASH	Domestic services value added share of gross exports	PC	VB * GRTR
5.18	EXGR_SERV_FVASH	Foreign services value added share of gross exports	PC	VB * GRTR
Domestic value added in imports				
5.19	IMGR_DVA	Domestic value added content of gross imports	USD	VB * GRTR
5.20	IMGR_DVASH	Domestic value added share of gross imports	PC	VB * GRTR
Re-exported intermediate imports				
5.21	REII	Re-exported intermediate imports	USD	A, B, GRTR
5.22	IMGRINT_REII	Re-exported intermediate imports as % of intermediate imports	PC	A, B, GRTR_INT
Indicators based on value added in final demand				
6.1	FFD_DVA	Domestic value added embodied in foreign final demand	USD	VB * FD
6.2	FFD_DVApSH	Domestic value added in foreign final demand, partner shares	PC	VB * FD
6.3	VALU_FFDDVA	Share of domestic value added embodied in foreign final demand	PC	VB * FD
6.4	DFD_FVA	Foreign value added embodied in domestic final demand	USD	VB * FD
6.5	DFD_FVApSH	Foreign value added in domestic final demand, partner shares	PC	VB * FD
6.6	BALVAFD	Value added embodied in final demand, balance	USD	VB * FD
Sources of value added in final demand				
6.7	FD_VA	Value added content of final demand, by source country and industry	USD	VB * FD
6.7	CONS_VA	Value added content of total consumption, by source country and industry	USD	VB * CONS
6.7	GFCF_VA	Value added content of gross fixed capital formation, by source country and industry	USD	VB * GFCF
6.8	FD_VASH	Value added share of total final demand, by source country and industry	PC	VB * FD
6.8	CONS_VASH	Value added share of total consumption, by source country and industry	PC	VB * CONS
6.8	GFCF_VASH	Value added share of gross fixed capital formation, by source country and industry	PC	VB * GFCF
Indicators with four dimensions				
Origins of value added By Source Country and Industry (BSCI)				
7.1	EXGR_BSCI	Origin of value added in gross exports	USD	VB * GRTR
7.2	IMGR_BSCI	Origin of value added in gross imports	USD	VB * GRTR
7.3	FDVA_BSCI	Origin of value added in final demand	USD	VB * FD
Gross exports with 3 country dimensions: exporter, value added origin and final destination				
7.4	FD_EXGRINT_VA	Gross exports of intermediate products by origin of value added and final destination	USD	V, A, B, FD
7.4	FD_EXGRFNL_VA	Gross exports of final products by origin of value added and final destination	USD	VB * GRTR_FNL
7.4	FD_EXGR_VA	Gross exports by origin of value added and final destination	USD	FD_EXGRINT_VA + FD_EXGRFNL_VA

Table 3.2. OECD TiVA Indicators and their dimensions

OECD, Trade in Value Added (TiVA) - List of Indicators				OECD.Stat	
Code	What is in the indicator Country Industry Country	Unit	Country	Partner Country	
BALGR	Exp cou Tot ind Imp cou	USD	Exp cou	Imp cou	
BALVAFD	VA src cou VA src ind FD cou	USD	VA src cou	FD cou	
CONS_VA	FD cou VA src ind VA src cou	USD	FD cou	VA src cou	
CONS_VASH	FD cou VA src ind VA src cou	PC	FD cou	VA src cou	
DEXFVApSH	Exp cou Tot ind VA src cou	PC	Exp cou	VA src Cou	
DFD_FVA	FD cou VA src ind VA src cou	USD	FD cou	VA src cou	
DFD_FVApSH	FD cou VA src ind VA src cou	PC	FD cou	VA src cou	
EXGR	Exp cou Exp ind Imp cou	USD	Exp cou	Imp cou	
EXGR_DDC	Exp cou Exp ind World	USD	Exp cou	World	
EXGR_DVA	Exp cou Exp ind Imp cou	USD	Exp cou	Imp cou	
EXGR_DVAFXSH	VA src cou Exp ind World	PC	VA src cou	World	
EXGR_DVApSH	Exp cou Exp ind Imp cou	PC	Exp cou	Imp cou	
EXGR_DVASH	Exp cou Exp ind World	PC	Exp cou	World	
EXGR_FNL	Exp cou Exp ind Imp cou	USD	Exp cou	Imp cou	
EXGR_FNLDVASH	Exp cou Exp ind World	PC	Exp cou	World	
EXGR_FVA	Exp cou Exp ind World	USD	Exp cou	World	
EXGR_FVASH	Exp cou Exp ind World	PC	Exp cou	World	
EXGR_IDC	Exp cou Exp ind World	USD	Exp cou	World	
EXGR_INT	Exp cou Exp ind Imp cou	USD	Exp cou	Imp cou	
EXGR_INTDVApSH	Exp cou Exp ind Imp cou	PC	Exp cou	Imp cou	
EXGR_INTDVASH	Exp cou Exp ind World	PC	Exp cou	World	
EXGR_RIM	Exp cou Exp ind World	USD	Exp cou	World	
EXGR_SERV_DVASH	Exp cou Exp ind World	PC	Exp cou	World	
EXGR_SERV_FVASH	Exp cou Exp ind World	PC	Exp cou	World	
EXGR_TDVAIND	Exp cou Exp ind World	PC	Exp cou	World	
EXGR_TFVAIND	Exp cou Exp ind World	PC	Exp cou	World	
EXGRpSH	Exp cou Exp ind Imp cou	PC	Exp cou	Imp cou	
FD_VA	FD cou VA src ind VA src cou	USD	FD cou	VA src cou	
FD_VASH	FD cou VA src ind VA src cou	PC	FD cou	VA src cou	
FEXDVApSH	VA src cou Tot ind Exp cou	PC	VA src cou	Exp Cou	
FFD_DVA	VA src cou VA src ind FD cou	USD	VA src cou	FD cou	
FFD_DVApSH	VA src cou VA src ind FD cou	PC	VA src cou	FD cou	
GFCF_VA	FD cou VA src ind VA src cou	USD	FD cou	VA src cou	
GFCF_VASH	FD cou VA src ind VA src cou	PC	FD cou	VA src cou	
IMGR	Imp cou Exp ind Exp cou	USD	Imp Cou	Exp Cou	
IMGR_DVA	Imp cou Exp ind Exp cou	USD	Imp Cou	Exp Cou	
IMGR_DVASH	Imp cou Exp ind Exp cou	PC	Imp Cou	Exp Cou	
IMGR_FNL	Imp cou Exp ind Exp cou	USD	Imp Cou	Exp Cou	
IMGR_INT	Imp cou Exp ind Exp cou	USD	Imp Cou	Exp Cou	
IMGRINT_REII	Exp cou Exp ind World	PC	Exp cou	World	
IMGRpSH	Imp cou Exp ind Exp cou	PC	Imp Cou	Exp Cou	
PROD	Prod cou Prod ind World	USD	Prod cou	World	
PROD_VASH	Prod cou VA src ind World	PC	Prod cou	World	
REII	Exp cou Exp ind World	USD	Exp cou	World	
VALU	VA src cou VA src ind World	USD	VA src cou	World	
VALU_FFDDVA	VA src cou VA src ind World	PC	VA src cou	World	

Code	What is in the indicator	Unit
EXGR_BSCI	VA src cou VA src ind Exp cou Exp ind	USD
IMGR_BSCI	Imp cou VA src cou Exp ind Exp cou	USD
FDVA_BSCI	VA src cou VA src ind FD cou FD ind	USD
FD_EXGR_VA	VA src cou Exp cou Exp ind FD cou	USD
FD_EXGRFNL_VA	VA src cou Exp cou Exp ind FD cou	USD
FD_EXGRINT_VA	VA src cou Exp cou Exp ind FD cou	USD

Notes:**Country / Region:**

Prod cou = Production country
VA src cou = VA source country
Exp cou = Export country
Imp cou = Import country
FD cou = final demand / destination country
World = all countries which are related to the indicator

Industry:

Prod ind = Production source industry
VA src ind = VA source industry
Exp ind = Export products producing industry
FD ind = final demand products producing industry
Tot ind = total industry

Supply and Demand Dimensions:

Depending on the indicator, the supply and demand dimensions could refer to intermediate, final or total goods.

4. Structural Indicators - based on the values presented in ICIO

4.1. PROD: Production (gross output), USD million

Indicator dimensions: [Prod cou | Prod ind | World]

This indicator is extracted directly from ICIO and defined as the production (gross output) *at basic prices* by industry *i* in country *c*:

$$\text{PROD}_{c,i} = X_{c,i}$$

The estimates are compatible, to the greatest extent possible, with the latest available official System of National Accounts, 2008 (2008 SNA) annual statistics.

For most OECD countries, gross output by industry time series are drawn from the SNA08/ISIC Rev.4 version of the OECD STAN Database (<http://oe.cd/stan>), or OECD's annual National Accounts database, adapted to the industry classification of the ICIO system. For other countries, particularly non-OECD economies, sources include United Nations Statistics Division (UNSD) and Eurostat databases as well as National Accounts statistics published by national statistical institutes.

Where necessary, industry estimates of gross output are calculated by drawing on other sources such as national Supply and Use tables (SUTs), Input-Output tables and, structural business statistics (industry survey data) such as UNIDO's INDSTAT database.

4.2. VALU: Value added, USD million

Indicator dimensions: [VA src cou | VA src ind | World]

This indicator is extracted directly from ICIO and is defined here as production (gross output) *at basic prices* minus total intermediate inputs *at basic prices*. In other words, it represents value added *at basic prices* plus any *taxes less subsidies* on purchases of intermediate products by industries. Value added in the TiVA indicator system includes *taxes less subsidies* on intermediate products to maintain the condition of equity with final expenditures *at basic prices* (Total output *at basic prices* less intermediate consumption expenditures *at basic prices*).

Value added by industry *i* in country *c*:

$$\text{VALU}_{c,i} = W_{c,i}$$

Value added *at basic prices* reflects the value that is added by industry *i* in country *c* when producing goods and services. It follows the definition of value added used in the System of National Accounts, 2008 (2008 SNA) and is equivalent to the difference between the industry's Production (gross output) *at basic prices* and the sum of its intermediate inputs of goods and services *in purchasers' prices*.

Value added *at basic prices* consists of Compensation of employees, Consumption of fixed capital, and Net operating surplus and mixed income (i.e. profits and income of the self-employed and family members). It also includes 'Other taxes, less subsidies, on Production' (such as payroll taxes).

The sources for value added are the same as those used for gross output (see above).

4.3. PROD_VASH: Value added as a share of Gross Output, by industry, percentage

Indicator dimensions: [Prod cou | VA scr ind | World]

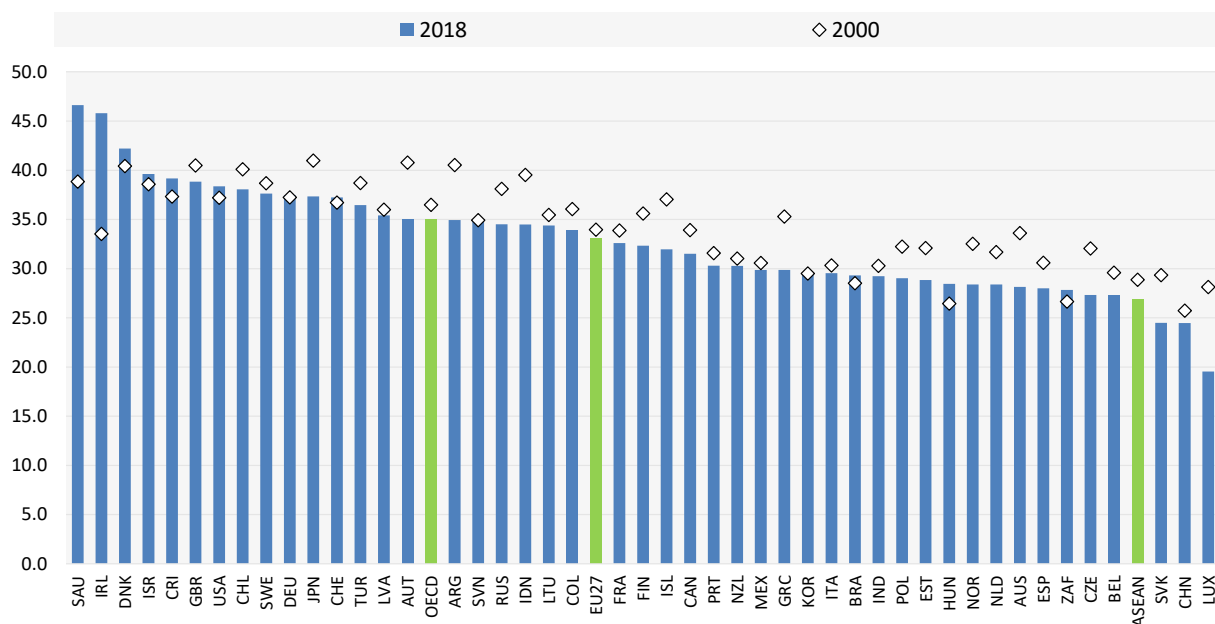
The value added share is given for each industry in each country, and represents value added generated by industry i in country c , $VALU_{c,i}$, as a percentage of gross output, $PROD_{c,i}$.

$$PROD_VASH_{c,i} = \frac{VALU_{c,i}}{PROD_{c,i}} = V_{c,i}$$

Industry value added / gross output ratios are a major determinant of a country's shares of value added embodied in trade and final demand.

For the OECD as a whole, in 2018, about 35% of gross output in the manufacturing sector consisted of value added generated in production. Countries such as Germany, the United Kingdom and the United States had shares between 37% and 39%. These shares were higher than those for the People's Republic of China (hereafter "China") and the aggregate of Southeast Asian (ASEAN) countries with 24% and 27% respectively. In many OECD countries, value added shares of gross output have fallen over the past two decades (Figure 4-1).

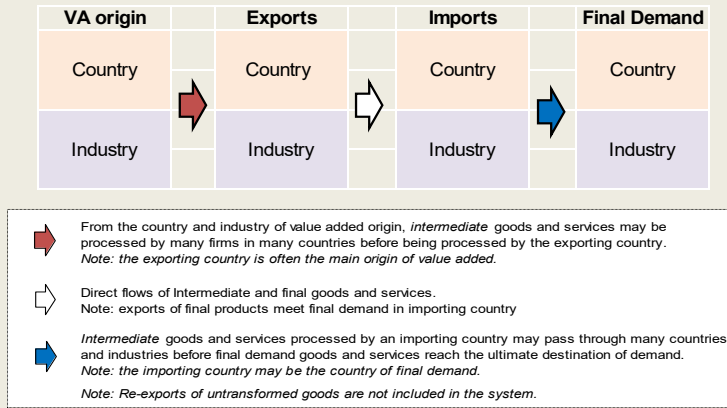
Figure 4-1. Value added as a share of Gross Output, Total Manufacturing



Source: OECD, Trade in Value Added (TiVA) database, <http://oe.cd/tiva>, 2021.

Box 1. The choice of TiVA indicators and their dimensions

Indicators of global flows of goods and services can be considered from four perspectives: the origin of value added, exporters, importers and final consumers. Each with a country and industry (or product group) dimension.

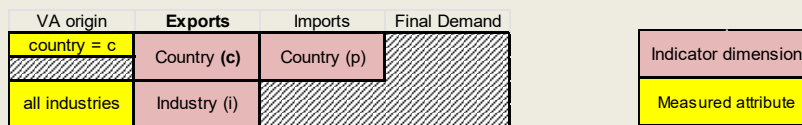


Thus, Indicators could be produced that reveal, for example: a) value added from the Chinese basic metals industry; b) embodied in Japanese exports of ICT components; c) imported by the Mexican machinery industry; and d) ultimately meeting US final demand for motor vehicles.

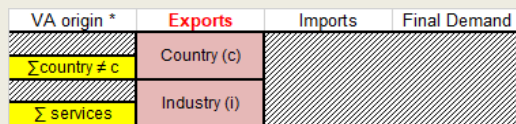
However, with 66 countries and 45 industries/product groups, there are potentially about $(66 \times 45)^4 \approx 78,000,000,000,000$ combinations.

Although many of the combinations have no meaning, this estimate does not consider regional groups, industry aggregates, splitting final demand into Gross fixed capital formation (GFCF) and Household consumption, splitting exports into intermediates and final goods and services and, the variety of ratios and shares that can be calculated. A very small fraction of the possibilities will meet the vast majority of analytical needs, and the challenge is to identify a set of easy-to-use TiVA indicators for policy analysts and researchers i.e. indicators with 2, 3 or 4 dimensions.

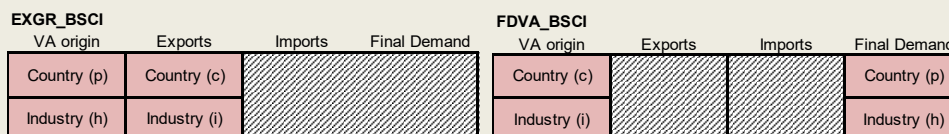
As an aid to understanding the dimensions of the indicators provided, simple illustrative diagrams are provided alongside the definitions. For example, in the Principle indicators (with 2 or 3 dimensions), *Domestic value added content of gross exports* (EXGR_DVA) can be represented as:



While the Foreign services value added share of gross exports is illustrated thus:



Similarly, for the indicators with 4 dimensions such as *Value added origin of gross exports* (EXGR_BSCI) and *Value added origin of final demand* (FDVA_BSCI) we have the following:



4.4. EXGR | EXGR_INT | EXGR_FNL: Gross exports, by industry and by partner country, USD million (f.o.b.)

Indicator dimensions:
[Exp cou | Exp ind | Imp cou]

VA origin	Exports	Imports	Final Demand
all countries	Country (c)	Country (p)	
all industries	Industry (i)		

Country c 's total gross exports for a given industry i can be directly calculated from the ICIO system by summing exports in intermediate goods and services and exports of final demand goods and services.

$$EXGR_{c,i} = \sum_p EXGR_{c,i,p} = \sum_p (EXGR_INT_{c,i,p} + EXGR_FNL_{c,i,p})$$

where $EXGR_INT_{c,i,p}$ represents gross exports of intermediate goods and services from domestic industry i in country c to partner country p , and $EXGR_FNL_{c,i,p}$ is gross exports of final demand goods and services, where c and $p \in [1, \dots, N]$ and $c \neq p$. They are calculated from the gross trade matrices as:

$$EXGR_INT_{c,i,p} = GRTR_INT_{(c-1)*N+i,p}$$

$$EXGR_FNL_{c,i,p} = GRTR_FNL_{(c-1)*N+i,p}$$

Note that the gross exports are consistent with official National Accounts estimates of total exports and imports of goods and services, adjusted for re-exports, as well as estimates for GDP. However, while National Accounts exports are valued *at purchaser's prices*, Gross exports for TiVA indicators are valued *at basic prices* in line with the valuation used throughout the ICIO tables. When transforming exports from *purchasers' prices* to *basic prices*, one of the main adjustments is the reallocation of the domestic distribution margins, (inherent in exports of goods *at purchasers' prices*) to exports of services (wholesale, retail and transportation). A consequence is that, for many countries, total exports of services in the TiVA database may be significantly higher than total exports of services reported in National Accounts (and Balance of Payments) statistics.

EXGR includes both cross-border flows and direct expenditure by non-residents on the domestic territory. Estimates of bilateral exports by industry are based on the balanced trade system drawn from the ICIO database. "Unspecified export destination" (i.e. any discrepancy between exports and imports) is allocated to the partner "Rest of the World".

For regions, EXGR excludes intra-regional trade (e.g. for EU27, exports to non-EU27 partners only)

4.5. IMGR | IMGR_INT | IMGR_FNL: Gross imports, by industry and by partner country, USD million (f.o.b.)

Indicator dimensions:
[Imp cou | Exp ind | Exp cou]

VA origin	Exports	Imports	Final Demand
all countries	Country (p)	Country (c)	
all industries	Industry (i)		

Total imports of country c are measured as:

$$IMGR_{c,i} = \sum_p IMGR_{c,i,p} = \sum_p (IMGR_INT_{c,i,p} + IMGR_FNL_{c,i,p})$$

where $IMGR_INT_{c,i,p}$ is gross imports of intermediates by country c from industry i in country p ; and $IMGR_FNL_{c,i,p}$ is gross imports of final demand goods and services.

They can be calculated from the gross trade matrices as:

$$IMGR_INT_{c,i,p} = GRTR_INT_{(p-1)*N+i,c}$$

$$IMGR_FNL_{c,i,p} = GRTR_FNL_{(p-1)*N+i,c}$$

See also the notes for the EXGR indicators, which also apply to the IMGR indicators.

4.6. BALGR: Gross trade balance, by partner country, USD million (f.o.b.)

Indicator dimensions:
[Exp cou | Tot ind | Imp cou]

VA origin	Exports	Imports	Final Demand
all countries	Country (c)	Country (p)	
	Σ all industries	Σ all industries	

The gross trade balance is the difference between Gross exports, $EXGR_{c,p}$, and Gross imports, $IMGR_{c,p}$ and is provided for country c and partner p for total industry.

$$BALGR_{c,p} = EXGR_{c,p} - IMGR_{c,p}$$

Total goods and services trade balances provided in the TiVA database are generally aligned with those reported by national statistical offices.

However, differences between TiVA estimates and official national statistics may be apparent, particularly for bilateral trade balances. There are well documented reasons for such differences. For example, there are numerous asymmetries in official national trade statistics (country A's reported exports from Country B can differ, sometimes significantly, from Country B's reported imports from Country A, even when allowing for differences in valuation). Reasons include: i) the treatment of re-exports and transit trade through major regional trading hubs such as Belgium, Netherlands, Hong Kong (China), Singapore and United States: exporters may report their exports by country of consignment while the importers report the imports by country of origin; and ii) coverage and quality issues (missing data etc.) that affect official bilateral data particularly for trade in services.

By necessity, to generate a balanced view of bilateral trade by industry (product group) in the ICIO system, missing data are estimated and exports and imports adjusted to eliminate asymmetries. The resulting exports matrix is thus a transpose of the imports matrix.

See also notes for EXGR and IMGR.

4.7. EXGRpSH: Gross exports, partner shares, by industry, percentage

Indicator dimensions:
[Exp cou | Exp ind | Imp cou]

VA origin	Exports	Imports	Final Demand
all countries	Country (c)	Country (p)	
all industries	Industry (i)		

The partner shares are calculated for each country, industry and partner country by dividing by total exports of the industry and country. The industry is the exporting industry.

$$\text{EXGRpSH}_{c,i,p} = \frac{\text{EXGR}_{c,i,p}}{\sum_p \text{EXGR}_{c,i,p}} \times 100$$

4.8. IMGRpSH: Gross imports, partner shares %, by industry, percentage

Indicator dimensions:
[Imp cou | Exp ind | Exp cou]

VA origin	Exports	Imports	Final Demand
all countries	Country (p)	Country (c)	
all industries	Industry (i)		

The partner shares are calculated for each country, industry and partner country by dividing by total imports of the industry and country. The industry refers to the exporting industry (i.e. from country c's perspective, the industry of origin of the imports).

$$\text{IMGRpSH}_{c,i,p} = \frac{\text{IMGR}_{c,i,p}}{\sum_p \text{IMGR}_{c,i,p}} \times 100$$

5. Indicators based on the Origins of Value Added in Gross Exports and Imports

5.a Domestic value added content of gross exports

5.1. EXGR_DVA: Domestic value added content of gross exports, USD million

Indicator dimensions:
[Exp cou | Exp ind | Imp cou]

VA origin	Exports	Imports	Final Demand
country = c	Country (c)	Country (p)	
all industries	Industry (i)		

$EXGR_DVA_{c,i,p}$, Domestic Value Added content of exports, by industry i in country/region c to partner country/region p , represents the exported value added that has been generated anywhere in the domestic economy (i.e. not just by the exporting industry).

$$EXGR_DVA_{c,i,p} = V_c B_{c,c} EXGR_{c,i,p}$$

Where $EXGR_{c,i,p}$ is a $K \times I$ vector with all entries equal to zero except those corresponding to industry i .

For regions c , $EXGR_DVA$ excludes intra-regional trade (e.g. for EU27, exports to non-EU27 partners only) and intra-regional value added flows (e.g. German value added in French exports) are treated as domestic value added. In other words, a region is treated as a single economy. Alternatively, region averages can be calculated, see Box 2.

The domestic value added content of gross exports can be split further into three components, direct domestic industry value added ($EXGR_DDC$, see 5.5), indirect domestic value added ($EXGR_IDC$, see 5.6) and re-imported domestic value added ($EXGR_RIM$, see 5.7).

5.2. EXGR_DVASH: Domestic value added share of gross exports, percentage

Indicator dimensions:
[Exp cou | Exp ind | World]

VA origin	Exports	Imports	Final Demand
country = c	Country (c)		
all industries	Industry (i)		

The share of domestic value added in gross exports is available by industry for partner world is defined as domestic value added in gross exports, $EXGR_DVA_{c,i}$, as a percentage of total gross exports, $EXGR_{c,i}$:

$$EXGR_DVASH_{c,i} = \frac{\sum_p EXGR_DVA_{c,i,p}}{\sum_p EXGR_{c,i,p}} \times 100$$

It is a 'DVA intensity measure' and reflects how much value added, generated anywhere in the domestic economy, is embodied per unit of total gross exports by industry, i .

For regions c , $EXGR$ and $EXGR_DVA$ exclude intra-regional trade (e.g. for EU27, exports to non-EU27 only) and for $EXGR_DVA$, intra-region value added flows are treated as domestic value added. Hence, for $EXGR_DVASH$, a region is treated as a single economy.

See also the notes for $EXGR_DVA$ and $EXGR_TDVAIND$

5.3. EXGR_TDVAIND: Industry domestic value added contribution to gross exports, as a percentage of total gross exports

Indicator dimensions:
[Exp cou | Exp ind | World]

VA origin	Exports	Imports	Final Demand
country = c	Country (c)		
all industries	Industry (i)		

This indicator reflects the share, in total gross exports, of domestic value added in an industry’s exports. The sum over all industries is the total domestic value added share of gross exports (EXGR_DVASH)

$$EXGR_TDVAIND_{c,i} = \frac{\sum_p EXGR_DVA_{c,i,p}}{\sum_{p,i} EXGR_{c,i}} \times 100$$

While EXGR_DVASH_{c,i} measures the intensity of Domestic value added in an industry's exports, EXGR_TDVAIND_{c,i} captures the magnitude compared to other industries. Note that the sum of EXGR_TDVAIND across industries equals EXGR_DVASH for total industry.

See also the notes for EXGR and EXGR_DVA

5.4. EXGR_DVApSH: Domestic value added in gross exports, partner shares, percentage

Indicator dimensions:
[Exp cou | Exp ind | Imp cou]

VA origin	Exports	Imports	Final Demand
country = c	Country (c)	Country (p)	
all industries	Industry (i)		

For each country and industry, this indicator shows the importing partner distribution of domestic value added in gross exports.

$$EXGR_DVApSH_{c,i,p} = \frac{EXGR_DVA_{c,i,p}}{\sum_p EXGR_DVA_{c,i,p}} \times 100$$

See also the notes for EXGR_DVA

5.b Decomposition of domestic value added content of gross exports

5.5. EXGR_DDC: Direct domestic industry value added content of gross exports, USD million

Indicator dimensions:
[Exp cou | Exp ind | World]

VA origin	Exports	Imports	Final Demand
country =c	Country (c)		
industry =i	Industry (i)		

Direct domestic value added content of exports, $EXGR_DDC_{c,i}$, measures the direct value added contribution made by industry i in country c to the production of goods and services exported by industry i to the world

$$EXGR_DDC_c = \widehat{V}_c \text{diag} B_c EXGR_c$$

where $EXGR_DDC_c$ is a $K \times I$ vector representing the industry dimension and A_c is a local I-O coefficient matrix from country c single Input-Output table and $B_c = (I - A_c)^{-1}$ is the local Leontief inverse. Matrix $\text{diag} B_c$ consists of the diagonal elements of the local Leontief inverse, i.e. those entries of the matrix displaying the direct requirements.

$EXGR_DDC_{c,i}$ is the i -th element of the $K \times I$ vector $EXGR_DDC_c$, and gives direct domestic value added content of gross export of a given industry i .

It does not include domestic value added that has returned, via imports, after previously being exported (embodied in intermediates) i.e. only the value added directly generated by domestic industries in producing goods and services prior to export is covered.

5.6. EXGR_IDC: Indirect domestic content of gross exports (originating from domestic intermediates), USD million

Indicator dimensions:
[Exp cou | Exp ind | World]

VA origin	Exports	Imports	Final Demand
country =c	Country (c)		
\sum industry $\neq i$	Industry (i)		

Indirect domestic value added content of exports, $EXGR_IDC_{c,i}$, corresponds to the value added originating from other, upstream, domestic industries (different from industry i) in country c that are incorporated in the exports of industry i .

$$EXGR_IDC_c = \widehat{V}_c \text{offdiag} B_c EXGR_c$$

where $EXGR_IDC_c$ is a $K \times I$ vector representing the industry dimension and A_c is a local I-O coefficient matrix from country c single Input-Output table and $B_c = (I - A_c)^{-1}$ is the local Leontief inverse. Matrix $\text{offdiag} B_c$ is the local Leontief inverse with all diagonal elements set to zero, thus representing the indirect requirements.

$EXGR_IDC_{c,i}$ is the i -th element of the $K \times I$ vector $EXGR_IDC_c$, and gives indirect domestic value added content of gross export of a given industry i .

It does not include domestic value added that has returned, via imports, after previously being exported (embodied in intermediates) i.e. only the value added directly generated by domestic industries in producing goods and services prior to export is covered.

5.7. EXGR_RIM: Re-imported domestic value added content of gross exports, USD million

*Indicator dimensions:
[Exp cou | Exp ind | World]*

VA origin	Exports	Imports	Final Demand
country =c	Country (c)		
all industries	Industry (i)		

Re-imported domestic value added content of exports, $EXGR_RIM_{c,i}$, measures the domestic value added content, from any industry in country c , which has been exported for the production of intermediate goods or services abroad and subsequently embodied in imports used in the production of exports by industry i in country c .

$$EXGR_RIM_c = EXGR_DVA_c - EXGR_DDC_c - EXGR_IDC_c$$

where $EXGR_RIM_c$ is a $K \times 1$ vector representing the industry dimension, and the other variables are as defined before.

$EXGR_RIM_{c,i}$ is the i -th element of the $K \times 1$ vector $EXGR_RIM_c$, and gives the re-imported domestic value added content of gross exports of a given industry i .

5.c Foreign value added content of gross exports (*backward participation in GVCs*)

5.8. EXGR_FVA: Foreign value added content of gross exports, by industry, USD million

Indicator dimensions:
[Exp cou | Exp ind | World]

VA origin	Exports	Imports	Final Demand
∑ country ≠ c	Country (c)		
all industries	Industry (i)		

Foreign value added content of gross exports captures the value of imported intermediate goods and services that are embodied in a domestic industry's exports. The value added can come from any foreign industry upstream in the production chain.

$$EXGR_FVA_{c,i} = \hat{V} B_{ci} EXGR_{c,i}$$

B_{ci} is the column of B corresponding to *inputs used by industry i* in country c , where the rows corresponding to inputs from origin industries in country c are set to zero.

Note that EXGR_FVA includes re-imported foreign value added that was previously exported by country c (c.f. EXGR_RIM)

For regions c , EXGR_FVA excludes intra-regional trade (e.g. for EU27, exports to non-EU27 only). Intra-region value added flows (e.g. German value added in French exports) are treated as domestic value added. In other words, a region is treated as a single economy. Alternatively, region averages can be calculated, (see Box 2).

5.9. EXGR_FVASH: Foreign value added share of gross exports, percentage

Indicator dimensions:
[Exp cou | Exp ind | World]

VA origin	Exports	Imports	Final Demand
∑ country ≠ c	Country (c)		
all industries	Industry (i)		

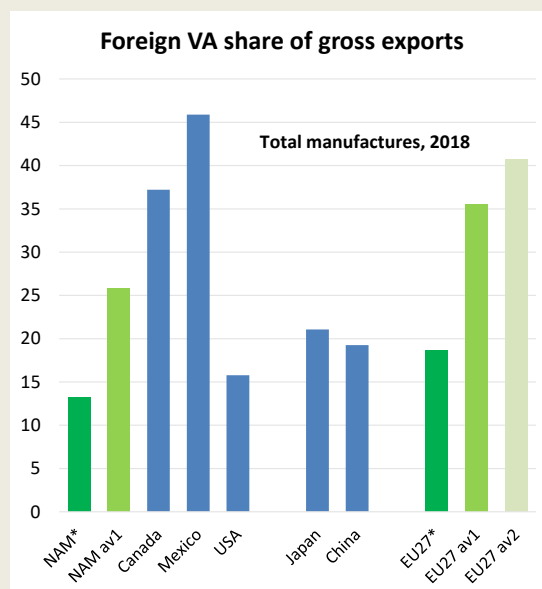
The share of foreign value added in gross exports is available by industry for partner world, and is defined as foreign value added embodied in gross exports $EXGR_FVA_{c,i,p}$ as a percentage of total gross exports, $EXGR_{c,i,p}$.

$$EXGR_FVASH_{c,i} = \frac{\sum_p EXGR_FVA_{c,i,p}}{\sum_p EXGR_{c,i,p}} \times 100$$

It is a 'FVA intensity measure' often referred to as 'import content of exports' and considered as a measure of 'backward linkages' in analyses of GVCs.

See also notes for EXGR_FVA and EXGR_TFVAIND.

Box 2. Indicators for region aggregates



Source: OECD, Trade in Value Added (TiVA) database, <http://oe.cd/tiva>, 2021.

When considering regions (e.g. the European Union, EU27 and North America, NAM) there are alternative approaches to calculating certain indicators: weighted or unweighted averages of the countries within the region or, treating the region as if it was a single economy. For example, for the measure Foreign Value Added share of gross exports:

1. As a single economy (EU27*): gross exports to non-EU27 only and intra-region flows of value added are considered as domestic flows: i.e. value added generated in non-EU27 countries embodied in EU27 exports to non-EU27 economies
2. Weighted average of region's countries' Foreign value added content of gross exports: $\frac{\sum(\text{EXGR_FVA})}{\sum(\text{EXGR})}$. Intra-regional VA flows are considered foreign. Intra-regional exports included (see EU27av1, NAMav1)
3. Unweighted average of region's countries' Foreign value added share of gross exports i.e. average $(\text{EXGR_FVA}/\text{EXGR})$. Intra-regional value added flows are considered foreign. Intra-regional exports included (see EU27av2)

Note that treating the European Union as a single economy yields foreign value added shares of gross exports closer to those of China, Japan and the United States.

5.10. EXGR_TFVAIND Industry foreign value added contribution to gross exports, a as a percentage of total gross exports

Indicator dimensions:
[Exp cou | Exp ind | World]

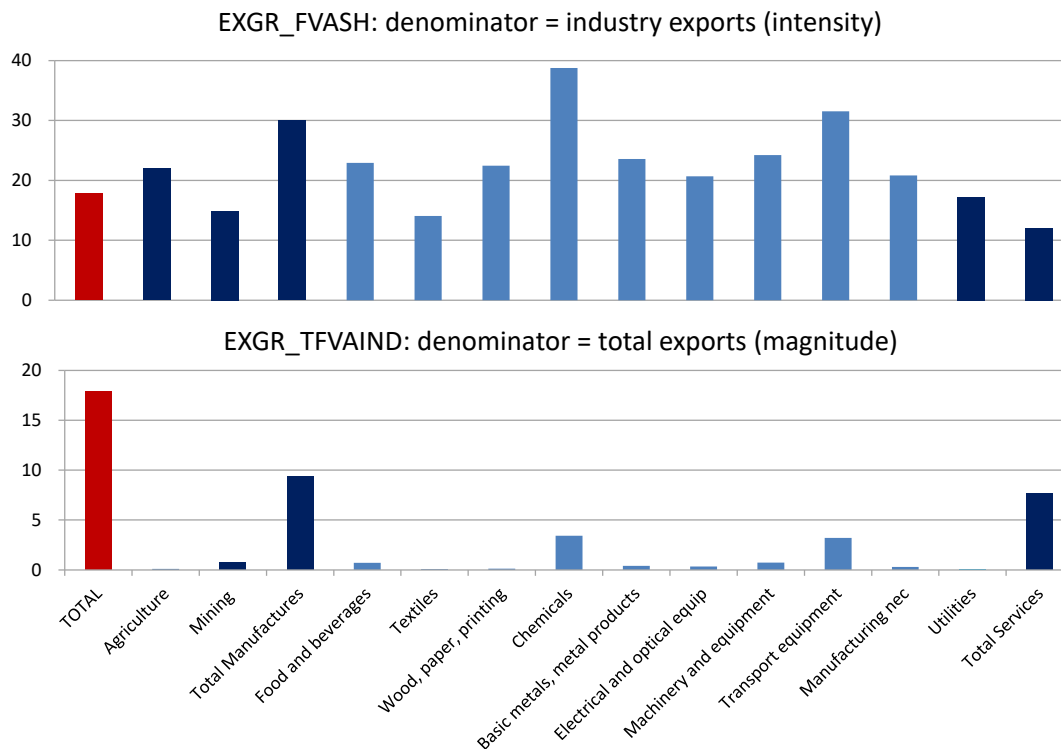
VA origin	Exports	Imports	Final Demand
∑ country ≠ c	Country (c)		
all industries	Industry (i)		

This indicator reflects the share, in total gross exports, of foreign value added in an industry's exports. The sum over all industries is the total foreign value added share of gross exports (EXGR_FVASH)

$$EXGR_TFVAIND_{c,i} = \frac{\sum_p EXGR_FVA_{c,i,p}}{\sum_{p,i} EXGR_{c,i,p}} \times 100$$

While $EXGR_FVASH_{c,i}$ measures the intensity of FVA in an industry's exports, $EXGR_TFVAIND_{c,i}$ captures the magnitude compared to other industries. Sum of $EXGR_TFVAIND$ across industries equals $EXGR_FVASH$ for total industry.

Figure 5-1: Example of EXGR_FVASH versus EXGR_TFVAIND, United Kingdom 2018



Source: OECD, Trade in Value Added (TiVA) database, <http://oe.cd/tiva>, 2021.

5.11. DEXFVApSH: Backward participation in GVCs, percentage

Indicator dimensions:
 [Exp cou | Tot ind | VA src cou]

VA origin	Exports	Imports	Final Demand
Country (p)	Country (c)		
country = p			
∑ all industries	∑ all industries		

Foreign VA embodied in exports, as % of total gross exports of the exporting country.

This indicator is calculated for the total value of source and exporting industries; it is estimated as the ratio between the VA contents of imports from the source country p and the gross exports of the exporting country c .

This indicator is estimated as:

$$DEXFVApSH_{c,p} = \frac{EXGR_BSCI_{c,p}}{EXGR_c} \times 100$$

Where $EXGR_BSCI_{c,p}$, see 7.1, is the total VA from country p embodied in the total exports of exporting country c , and $EXGR_c$ is the total gross exports of exporting country c .

5.d Domestic value added content of foreign gross exports (forward participation in GVCs)

5.12. EXGR_DVAFXSH: Domestic value added embodied in foreign exports as share of gross exports, percentage

Indicator dimensions:
[VA src cou | Exp ind | World]

VA origin	Exports	Imports	Final Demand
Country (c)	∑ country ≠ c		
	Industry (i)		

This indicator presents the country c domestic value added content embodied in the gross exports of industry i in foreign countries as a percentage of total gross exports of country c .

$$EXGR_DVAFXSH_{c,i} = \frac{\sum_p EXGR_BSCI_{c,i,p}}{EXGR_c} \times 100$$

Where $EXGR_BSCI_{c,p,i}$, see 7.1, is the total VA from country c embodied in the total gross exports of industry i in foreign country p , and $EXGR_c$ is the total gross exports of value added source country c .

It is often considered as a measure of 'forward linkages' in analyses of GVCs.

5.13. FEXDVApSH: Forward participation in GVCs, percentage

Indicator dimensions:
[VA src cou | Tot ind | Exp cou]

VA origin	Exports	Imports	Final Demand
Country (c)	Country (p)		
country = c			
∑ all industries	∑ all industries		

Domestic VA embodied in foreign exports, as a share (%) of total gross exports of the value added source country.

This indicator is calculated for the total value of source and exporting industries; it is estimated as being the VA contents of exports originated in the source country, and embodied in the exports of the exporting country, divided by the gross exports of the source country.

This indicator is estimated as:

$$FEXDVApSH_{c,p} = \frac{EXGR_BSCI_{c,p}}{EXGR_c} \times 100$$

Where $EXGR_BSCI_{c,p}$, see 7.1, is the total VA from country c embodied in the exports of country p , and $EXGR_c$ is the total gross exports of the value added source country c .

5.e Domestic value added content of intermediate and final gross exports

5.14. EXGR_INTDVASH: Domestic value added in exports of intermediate products, as a share of total gross exports, percentage

Indicator dimensions:
[Exp cou | Exp ind | World]

VA origin	Exports	Imports	Final Demand
country=c	Country (c)		
	Industry (i)		
all industries	Intermediates		

This indicator shows the share of domestic value added in exports of intermediate goods and services as a share of total gross exports. The indicator is available by country and industry.

$$EXGR_INTDVASH_{c,i} = \frac{\sum_p EXGR_INTDVA_{c,i,p}}{\sum_p EXGR_{c,i,p}} \times 100$$

EXGR_INTDVASH_{c,i} is defined as domestic value added in gross exports of intermediate products, by industry *i* in country *c*, as a percentage of total industry exports, EXGR_{c,i}. It reveals the share of industry exports that consists of domestic value added destined for further production within direct partners' economies - either to meet partners' final demand or to be embodied in exports by direct partners. It can be considered as a measure of forward linkages in global value chains (GVCs).

5.15. EXGR_FNLDVASH: Domestic value added in exports of final products, as a share of total gross exports, percentage

Indicator dimensions:
[Exp cou | Exp ind | World]

VA origin	Exports	Imports	Final Demand
country=c	Country (c)		
	Industry (i)		
all industries	Final products		

This indicator shows the share of domestic value added in exports of final goods and services as a share of total gross exports. The indicator is available by country and industry.

$$EXGR_FNLDVASH_{c,i} = \frac{\sum_p EXGR_FNLDVA_{c,i,p}}{\sum_p EXGR_{c,i,p}} \times 100$$

EXGR_FNLDVASH_{c,i} is defined as domestic value added in gross exports of final demand products, by industry *i* in country *c*, as a percentage of total industry exports, EXGR_{c,i}.

Note: EXGR_INTDVASH + EXGR_FNLDVASH = EXGR_DVASH.

5.16. EXGR_INTDVApSH: Domestic value added in exports of intermediate products, partner shares, percentage

Indicator dimensions:
[Exp cou | Exp ind | Imp cou]

VA origin	Exports	Imports	Final Demand
country = c	Country (c)	Country (p)	
	Industry (i)		
all industries	Intermediates		

This indicator presents, for a given industry i in country c , the domestic value added content of gross exports of intermediate goods and services (including the direct and upstream domestic value-added content) to immediate partner country, p , as a percent of total domestic value added content of gross exports of intermediates i .

$$EXGR_INTDVApSH_{c,i,p} = \frac{EXGR_INTDVA_{c,i,p}}{\sum_p EXGR_INTDVA_{c,i,p}} \times 100$$

5.f Services value added content of gross exports

The indicators dealing with service value added content consider only the service industries as a source of value added in the exports by all industries. Service industries include *Construction, Wholesale and retail, Accommodation and food services, Transportation services, Information and communications, Financial and insurance, Real estate, Professional, scientific and technical services, Administrative and support services, Public Administration, Health, Education and Personal services* i.e. defined a ISIC Rev.4 Divisions 41 to 98

5.17. EXGR_SERV_DVASH: Domestic services value added share in gross exports, percentage

Indicator dimensions:
[Exp cou | Exp ind | World]

VA origin	Exports	Imports	Final Demand
country = c	Country (c)		
	Industry (i)		
∑ services			

$EXGR_SERV_DVASH_{c,i}$ is the share of value added originating from all domestic service industries in total gross exports by industry i in country c and defined as :

$$EXGR_SERV_DVASH_{c,i} = \frac{EXGR_SERV_DVA_{c,i}}{EXGR_{c,i}} \times 100$$

where:

$$EXGR_SERV_DVA_{c,i} = \sum_{j \in S} \widehat{V}_{c,j} (B_{c,c})_{ji} EXGR_{c,i}$$

$\widehat{V}_{c,j}$ is the diagonal matrix \widehat{V}_c , with all entries corresponding to industry $i \neq j$ equal to zero and the element corresponding to $j \in S$ to the value added share of service industry j in country c . S is the set of service industry indices. $(B_{c,c})_{ji}$ is ji -th element of $B_{c,c}$.

5.18. EXGR_SERV_FVASH: Foreign services value added share in gross exports, percentage

Indicator dimensions:
 [Exp cou | Exp ind | World]

VA origin	Exports	Imports	Final Demand
∑ country ≠ c	Country (c)		
∑ services	Industry (i)		

EXGR_SERV_FVASH_{c,i} is the share of value added originating from all foreign service industries in total gross exports by industry *i* in country *c* and defined as:

$$EXGR_SERV_FVASH_{c,i} = \frac{EXGR_SERV_FVA_{c,i}}{EXGR_{c,i}} \times 100$$

where:

$$EXGR_SERV_FVA_{c,i} = \sum_p \sum_{j \in S} \widehat{V}_{p,j} (B_{p,c})_{ji} EXGR_{c,p,i}$$

$\widehat{V}_{c,j}$ is the diagonal matrix \widehat{V}_c , with all entries corresponding to industry $i \neq j$ equal to zero and the element corresponding to $j \in S$ to the value added share of service industry j in country c . S is the set of service industry indices. $(B_{p,c})_{ji}$ is the ji -th element of $B_{p,c}$.

5.g Domestic value added in imports

5.19. IMGR_DVA: Domestic value added embodied in gross imports, USD million

Indicator dimensions:
[Imp cou | Exp ind | Exp cou]

VA origin	Exports	Imports	Final Demand
country = c	Country (p)	Country (c)	
	Industry (i)		

Domestic value added content of gross imports reveals the value added generated in country c that returns to country c embodied in gross imports from industry i in partner country p .

$$IMGR_DVA_{c,i,p} = \hat{V}_c B_{c,i,p} IMGR_{c,i,p}$$

Where $IMGR_{c,i,p}$ is a $K \times K$ diagonal matrix with the imports of country c from the exporting industries of partner country p .

5.20. IMGR_DVASH: Domestic value added share of gross imports, percentage

Indicator dimensions:
[Imp cou | Exp ind | Exp cou]

VA origin	Exports	Imports	Final Demand
country = c	Country (p)	Country (c)	
	Industry (i)		

Domestic value added share of gross imports (IMGR_DVASH) is defined as the domestic value added embodied in gross imports (IMGR_DVA) by exporting industry i of exporting country p divided by total gross imports of exporting industry i of exporting country p , in %. It is a 'DVA intensity measure' and reflects how much domestic value-added is embodied per unit of total gross imports from exporting industry i of exporting country p :

$$IMGR_DVASH_{c,i,p} = \frac{IMGR_DVA_{c,i,p}}{\sum_p IMGR_{c,i,p}} \times 100$$

It can reveal the extent to which previously exported domestic value added returns to the domestic economy, via imports of both final and intermediate goods and services, after passing through regional or global production chains.

5.h Re-exported intermediate imports

5.21. REII: Re-exported intermediate imports, USD million

Indicator dimensions:
[Exp cou | Exp ind | World]

imports	Exports	Imports	Final Demand
	Country (c)		
	Industry (i)		
∑intermediates			

Imported products which are used as inputs into production processes and then exported again are referred to as re-exported intermediate products. This indicator is available by country and exporting industry.

$$REII_{c,i} = \sum_p A_{p,c} B_{c,c} EXGR_{c,i}$$

$A_{p,c}$ is a $K \times K$ off-diagonal block matrix of A giving country c imported intermediate products sourced from country p required to produce one unit of output.

$EXGR_{c,i}$ is a $K \times I$ vector, representing total exports of each industry i of country c to all other countries.

$A_{p,c} B_{c,c} EXGR_{c,i}$ is also a $K \times I$ vector and refers to intermediate goods and services absorbed in country c that originated from country p for total exports by country c .

$REII_{c,i}$ gives total intermediate goods and services absorbed by country c that originated from all foreign countries in industry i . It reveals the importance of intermediate imports in the production of goods and services for export and their role as a source for international competitiveness.

5.22. IMGRINT_REII: Re-exported intermediate imports as a % of total intermediate imports, percentage

Indicator dimensions:
[Exp cou | Exp ind | World]

imports	Exports	Imports	Final Demand
	Country (c)		
	Industry (i)		
∑intermediates			

Re-exported intermediate imports by exporting industry as a share of intermediate imports shows how much of the imports are exported.

$$IMGRINT_REII_{c,i} = \frac{REII_{c,i}}{\sum_p IMGR_INT_{c,i,p}}$$

Where $\sum_p IMGR_INT_{c,i,p}$ is total intermediate imports by country c from industry i in partner p .

This indicator reflects the share of intermediate imports from all partners' industry i that are used domestically by country c (both indirectly and directly) in producing goods and services for export, as a percentage of total intermediate imports (from industry i).

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

6. Indicators based on the origins of Value Added in Final Demand

6.1. FFD_DVA: Domestic value added embodied in foreign final demand, USD million

Indicator dimensions:
[VA src cou | VA src ind | FD cou]

VA origin	Exports	Imports	Final Demand
Country (c)			Country (p) ≠ c
Industry (i)			

Domestic value added embodied in foreign final demand captures the value added that industries export both directly, through exports of final goods or services and, indirectly via exports of intermediates that reach foreign final consumers (households, government, business investment) through other countries. The measure reflects how domestic industries (upstream in a value-chain) are connected to consumers in other countries, even when no direct trade relationship exists. The indicator illustrates therefore the full impact of final demand in foreign markets on domestic output. It can be interpreted as 'exports of value added', and is defined as:

$$\text{FFD_DVA}_{c,p} = (\hat{\mathbf{V}} \mathbf{B} \mathbf{FD})_{c,p}$$

Where $\text{FFD_DVA}_{c,p}$ is a $K \times 1$ vector. Matrix $\hat{\mathbf{V}} \mathbf{B} \mathbf{FD}$ is of size $(KN \times K)$ and calculated from multiplying the three global matrices, $\hat{\mathbf{V}}$, the diagonalised value added share of production PROD_VASH , \mathbf{B} the global Leontief inverse and \mathbf{FD} the global final demand matrix showing the demand of country p (in columns) for goods and services from industry i in country c (rows), and $(\hat{\mathbf{V}} \mathbf{B} \mathbf{FD})_{c,p}$ is the part of the matrix with K rows (one for each industry) corresponding to country c and column corresponding to country p . This is only available for $p \neq c$. FFD_DVA is available by value added country, value added industry, and partner country.

$\text{FFD_DVA}_{c,i,p}$ is the i -th element of the $K \times 1$ vector $\text{FFD_DVA}_{c,p}$

$\text{FFD_DVA}_{c,i,p}$ shows the value added originating from industry i in country/region c embodied in the final demand of country/region p .

For regions c , FFD_DVA excludes within-region final demand (e.g. for EU27, final demand in non-EU27 economies only).

6.2. FFD_DVApSH: Domestic value added embodied in foreign final demand, partner shares, percentage

Indicator dimensions:
[VA src cou | VA src ind | FD cou]

VA origin	Exports	Imports	Final Demand
Country (c)			Country (p) ≠ c
Industry (i)			

This indicator shows domestic value added generated by industry i in country c embodied in final demand of country p as a percentage of total domestic value added from industry i in foreign final demand:

$$\text{FFD_DVApSH}_{c,i,p} = \frac{\text{FFD_DVA}_{c,i,p}}{\sum_p \text{FFD_DVA}_{c,i,p}} \times 100$$

FFD_DVApSH is available by country and industry origin of value added and final demand partner country.

It provides a value added perspective of domestic industries' relative connectedness with other countries and regions - independent of whether or not domestic (upstream) industries are direct exporters. Compare with EXGRpSH and EXGR_DVApSH

6.3. VALU_FFDDVA: Domestic value added embodied in foreign final demand as a % of total value added, percentage

Indicator dimensions:
[VA src cou | VA src ind | World]

VA origin	Exports	Imports	Final Demand
Country (c)			
Industry (i)			

VALU_FFDDVA_{c,i} for industry i in country c is defined as domestic value added, from industry i , meeting foreign final demand, FFD_DVA_{c,i}, as a percentage of industry i value added:

$$\text{VALU_FFDDVA}_{c,i} = \frac{\sum_p \text{FFD_DVA}_{c,i,p}}{\text{VALU}_{c,i}} \times 100$$

This is available by country and industry origin of value added. It can be considered as a measure of an industry's reliance on foreign final demand

6.4. DFD_FVA: Foreign value added embodied in domestic final demand, USD million

Indicator dimensions:
[FD cou | VA src ind | VA src cou]

VA origin	Exports	Imports	Final Demand
Country (p) ≠ c			Country (c)
Industry (i)			

Foreign value added embodied in domestic final demand reveals the amount of foreign value added present in final goods or services purchased by households, government, non-profit institutions serving households or, as investments. It is the 'import' equivalent of FFD_DVA and can show how industries abroad (upstream in a value-chain) are connected to consumers at home, even where no direct trade relationship exists. It can be interpreted as 'imports of value-added', in such a way:

$$DFD_FVA_{p,c} = (\hat{V} B FD)_{p,c}$$

$DFD_FVA_{p,c}$ is the part of matrix $\hat{V} B FD$ with rows corresponding to country p industries and column c of domestic consumption. This is only available for $p \neq c$.

$DFD_FVA_{p,i,c}$ is the i -th element of the $K \times I$ vector $DFD_FVA_{p,c}$

$DFD_FVA_{p,i,c}$ shows the value added originating from industry i in country/region p embodied in the final demand of country/region c .

For regions c , DFD_FVA excludes within-region origin of value added (e.g. for EU27, foreign value added is non-EU27 origin only).

6.5. DFD_FVApSH: Foreign value added embodied in domestic final demand, partner shares, percentage

Indicator dimensions:
[FD cou | VA src ind | VA src cou]

VA origin	Exports	Imports	Final Demand
Country (p) ≠ c			Country (c)
Industry (i)			

This indicator shows foreign value added generated by industry i in country p embodied in domestic final demand of country c as a percentage of total foreign value added from industry i in domestic final demand

$$DFD_FVApSH_{c,i,p} = \frac{DFD_FVA_{c,i,p}}{\sum_p DFD_FVA_{c,i,p}} \times 100$$

DFD_FVApSH is available by country and, partner country and industry origin of value added.

It provides a value added perspective of a domestic economy's relative connectedness to production in other countries and regions - independent of whether or not there are direct imports from foreign (upstream) industries. Compare with IMGRpSH

6.6. BALVAFD: Value added embodied in final demand, balance, USD million

Indicator dimensions:
[VA src cou | VA src ind | FD cou]

VA origin	Exports	Imports	Final Demand
Country (c)			Country (p) ≠ c
Industry (i)			

The balance is calculated as the difference between domestic value added embodied in foreign final demand and foreign value added in domestic final demand by value added origin industry.

$$BALVAFD_{c,i,p} = FFD_DVA_{c,i,p} - DFD_FVA_{c,i,p}$$

For each country c the total value added trade balance, summed over all industries and for partner World is equal to the equivalent total gross trade balance (BALGR). However, at the partner and industry level, BALVAFD can reveal trading relationships not evident when looking at the trade balances in gross terms.

$BALVAFD_{c,i,p}$ shows country c value added trade balance with country p for industry (or product group) i .

6.7. FD_VA | CONS_VA | GFCF_VA: Value added embodied in final demand, consumption and GFCF, USD million

Indicators dimensions:
[FD cou | VA src ind | VA src cou]

VA origin	Exports	Imports	Final Demand
Country (p)			Country (c)
Industry (i)			Consumption

Value added (from industry i in country p) in final demand (FD), consumption (CONS) and gross fixed capital formation (GFCF) of country c are defined as the $K \times I$ vectors (representing the K industries)

$$FD_VA_{p,c} = (\hat{V} B FD)_{p,c}$$

$$CONS_VA_{p,c} = (\hat{V} B CONS)_{p,c}$$

$$GFCF_VA_{p,c} = (\hat{V} B GFCF)_{p,c}$$

Here, the indicator includes domestic value added embodied in domestic demand, i.e. $c = p$ is possible.

Total consumption, CONS, covers household consumption, government expenditure and NPISHs. It excludes direct purchases abroad by residents and non-residents direct purchases on domestic territory (*non-res*). It is a subset of FD_VA.

Gross fixed capital formation (GFCF), covers the demand for investment goods and services, by businesses and government in country c . It does not include change in inventories (*invnt*). It is also a subset of FD_VA.

In such a way: $FD_VA = (CONS_VA + GFCF_VA) + (non-res + invnt)$

6.8. FD_VASH | CONS_VASH | GFCF_VASH: Value added shares in final demand, consumption and GFCF, percentage

Indicators dimensions:
[FD cou | VA src ind | VA src cou]

VA origin	Exports	Imports	Final Demand
Country (p)			Country (c)
Industry (i)			Consumption

These indicators look on the demand side of the countries, i.e., for the total domestic demand (final demand, consumption or GFCF) of a country c they show what is the share of the value added from source country p industry i in country c total value added consumed and which has its origin in industry i . They are defined as follows:

$$FD_VASH_{p,c,i} = \frac{FD_VA_{p,c,i}}{\sum_p FD_VA_{p,c,i}} \times 100$$

$$CONS_VASH_{p,c,i} = \frac{CONS_VA_{p,c,i}}{\sum_p CONS_VA_{p,c,i}} \times 100$$

$$GFCF_VASH_{p,c,i} = \frac{GFCF_VA_{p,c,i}}{\sum_p GFCF_VA_{p,c,i}} \times 100$$

Total consumption, CONS, covers household consumption, government expenditure and NPISHs. It excludes direct purchases abroad by residents. It is a subset of FD_VA.

Gross fixed capital formation (GFCF), covers the demand for investment goods and services, by businesses and government in country c . It is also a subset of FD_VA.

7. Detailed Indicators for Gross Exports, Gross Imports and Final Demand

7.1. EXGR_BSCI: Origin of value added in gross exports, USD million

Indicators dimensions:
[VA src cou | VA src ind | Exp cou | Exp ind]

VA origin	Exports	Imports	Final Demand
Country (p)	Country (c)		
Industry (h)	Industry (i)		

Origin of value added in gross exports provides estimates of total gross exports by exporting industry i in country c broken down by the value added generated by source industry h in country p :

$$EXGR_BSCI_{p,h,c,i} = (\hat{V}B EXGR_{c,i})_{p,h}$$

Where $EXGR_{c,i}$ is a vector of size $KN \times I$, with all entries being zero except the entry corresponding to exports by country c industry i . $\hat{V}B EXGR_{c,i}$ is a vector of size $KN \times I$ as well and $(\hat{V}B EXGR_{c,i})_{p,h}$ is the vector element corresponding to value adding in country p industry h .

This indicator reveals how the value of a country's gross exports of intermediate and final products is an accumulation of value generated by many industries in many countries.

Domestic value added origin is shown where source country $p=c$ and, for convenience, also represented by *source country* = "DXD: Domestic".

From this indicator a range of gross exports-based measures can be derived including those in the main TiVA indicators database such as:

Total gross exports by industry, $EXGR_{c,i}$: set VA source country, $p = World$, source industry, $h = DTOTAL$;

Total domestic and foreign value added content of gross exports by industry, $EXGR_DVA_{c,i}$ and $EXGR_FVA_{c,i}$. For $EXGR_DVA$, set source country $p = DXD$ "Domestic", VA source industry, $h = DTOTAL$;

Shares of $EXGR_DVA$ and $EXGR_FVA$ in relation to $EXGR$ such as $EXGR_DVASH_{c,i}$, $EXGR_TDVAIND_{c,i}$, and the "GVC backward linkage" indicators $EXGR_FVASH_{c,i}$ and $EXGR_TFVAIND_{c,i}$;

"GVC forward linkage" indicators such as $EXGR_DVAFXSH$;

Service value added contents of gross exports $EXGR_SERV_DVASH_{c,i}$ and $EXGR_SERV_FVASH_{c,i}$. Set source industry, $h = D4IT98$ (Total Services including Construction activities);

For regions, exports exclude intra-regional trade and, intra-regional value added flows are considered as domestic value added. For example, for exporting region EU27, exports are to non-EU27 economies and, source country "DXD: domestic" includes value added originating from Member States.

Note that the same value added originating from industry j in country p can be present in the gross exports of more than one country c (as embodied value added, from upstream production, may cross national borders many times). In general, therefore, these estimates should be viewed from the perspective of the exporting country c and exporting industry i .

However, for indicators of “GVC forward linkages” a source country p , source industry j perspective is required.

7.2. IMGR_BSCI: Origin of value added in gross imports, USD million

Indicators dimensions:
 [Imp cou | VA src cou | Exp ind | Exp cou]

VA origin	Exports	Imports	Final Demand
Country (s)	Country (p)	Country (c)	
	Industry (i)		

Origin of value added in gross imports provides estimates of the value added in gross imports by country c of goods and services from industry i originating from partner country/region p broken down by value added originating from country/region s .

$$IMGR_BSCI_{p,c,i,s} = \hat{V}B IMGR_{p,c}$$

Where $IMGR_{p,c}$ is a diagonal matrix of size $KN \times KN$, with the gross imports of country c from the exporting industries of the partners' countries p .

In other words, the four dimensions link the imports of country c to the value added from source country s embodied in the exports of industry i in the exporting country p - thus revealing how the value of a country's gross imports of intermediate and final products from a particular partner is an accumulation of value generated by many countries.

From this indicator a range of gross imports-based measures can be derived including the following found in the main TiVA indicators database:

Total gross imports by industry, $IMGR_{c,i}$: set exporting country, $p = World$ and source country, $s = World$.

Domestic value added content of gross imports by partner and industry, $IMGR_DVA_{c,i,p}$: set source country $s =$ importing country c .

Share of $IMGR_DVA$ in relation to $IMGR$: $IMGR_DVASH_{c,i,p}$

Note that the same value added originating from source country s can be present in the gross imports of more than one importing country c (as embodied value added, from upstream production, may cross national borders many times). In general, therefore, these estimates should be viewed from the perspective of an importing country c .

7.3. FDVA_BSCI: Origin of value added in final demand, USD million

Indicators dimensions:
[VA src cou | VA src ind | FD cou | FD ind]

VA origin	Exports	Imports	Final Demand
Country (c)			Country (p)
Industry (i)			Industry (h)

Origin of value added in final demand provides estimates of value added for final demand in country p for industry h final goods and services broken down by the value added generated by source industry i in VA source country c .

$$FDVA_BSCI_{c,i,p,h} = (\hat{V}B FD_{p,h})_{c,i}$$

Where $FD_{p,h}$ is a vector of size $KN \times I$, with all entries being zero except the entry corresponding to final demand for goods and services of industry h in country p . $\hat{V}B FD_{p,h}$ is a vector of size $KN \times I$ as well and $(\hat{V}B FD_{p,h})_{c,i}$ is the vector element corresponding to value added generate by industry i in country c .

In other words, it reveals how the value of final demand goods and services consumed within a country is an accumulation of value generated by many industries in many countries.

Domestic value added origin is shown where source country $p = c$ and, for convenience, also represented by source country = “*DXD: Domestic*”.

From this indicator a range of final demand-based measures can be derived including those in the main TiVA indicators database such as Domestic value added embodied in foreign final demand, FFD_DVA and related partner shares FFD_DVApSH; and, Foreign value added embodied in domestic final demand, DFD_FVA and related partner shares DFD_FVApSH.

Figure 7-1 illustrates, with a two-industry example - Motor vehicles (D29) and “Other industries” - how the data can provide new perspectives on the output of certain industries and related demand. The value added generated by a country’s domestic motor vehicle (“MV”) industry is present in final demand for both MV products and, products from other industries (“non-MV”), both at home and abroad. Similarly, domestic final demand for MV products includes value added generated by domestic and foreign MV and “non-MV” industries. Figure 7-2 presents the motor vehicles industry contribution to selected economies value added.

Figure 7-1. How the motor vehicles industry can contribute to the economy value added

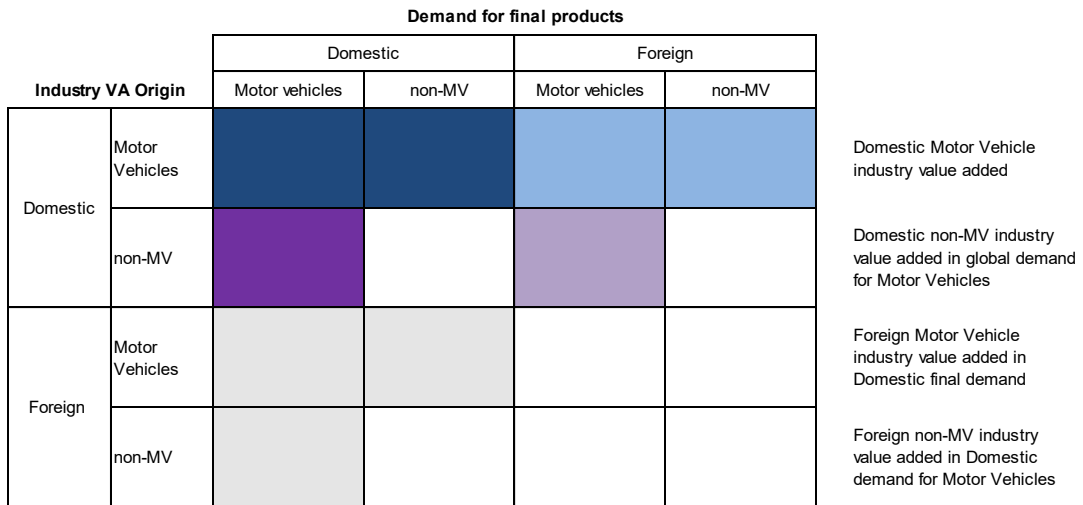
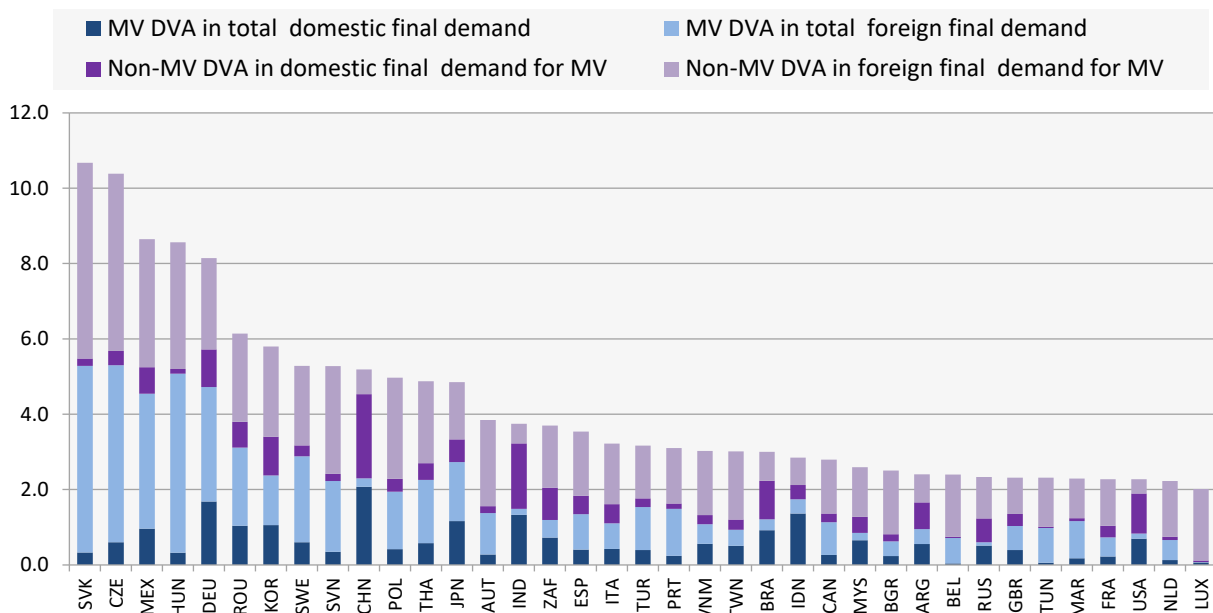


Figure 7-2. Motor vehicles industry contribution to selected economies value added



Source: OECD, Trade in Value Added (TiVA) database, <http://oe.cd/tiva>, 2021.

7.4. FD_EXGRINT_VA: Gross exports of intermediate products by origin of value added and final destination, USD million

Indicators dimensions:
 [VA src cou | Exp cou | Exp ind | FD cou]

VA origin	Exports	Imports	Final Demand
Country (s)	Country (c)		Country (p)
	Industry (i)		
	Intermediates		

This indicator (FD_EXGRINT_VA) presents gross exports of intermediate products by industry *i* in country *c*, broken down by both the source country/region *s* origin of value added, and according to final demand destination country/region *p*.

$$FD_EXGRINT_VA_{s,c,i,p} = V_{s,j} * B_{s,j,c,i} * F_{c,i,p}$$

Where:

$$F = diag\{\gamma \circ A * diag(B * FD)\} * i\}$$

γ is a matrix with ones in the off main block diagonals and zeros in the main block diagonals, i.e., zeros for the block diagonal of the same country of origin and destination

\circ is the symbol for the Hadamard product, i.e., the element-wise multiplication

i is a vector of ones

This indicator is from the exporting countries point of view, i.e., it shows the value added from source country *s* embodied in the exports of intermediates by exporting country *c* which ends up in the final destination country *p*.

7.5. FD_EXGRFNL_VA: Gross exports of final products by origin of value added and final destination, USD million

Indicators dimensions:
 [VA src cou | Exp cou | Exp ind | FD cou]

VA origin	Exports	Imports	Final Demand
Country (s)	Country (c)		Country (p)
	Industry (i)		
	Final goods		

This indicator (FD_EXGRFNL_VA) presents gross exports of final products by industry *i* in country *c*, broken down by both the source country/region *s* origin of value added and, according to final demand destination country/region *p*.

$$FD_EXGRFNL_VA_{s,c,i,p} = V_{s,j} * B_{s,j,c,i} * EXGR_FNL_{c,i,p}$$

This indicator is from the exporting countries point of view, i.e., it shows the value added from source country *s* embodied in the exports of final goods by exporting country *c* which ends up in the final destination *p*.

7.6. FD_EXGR_VA: Gross exports by origin of value added and final destination, USD million

Indicators dimensions:
 [VA src cou | Exp cou | Exp ind | FD cou]

VA origin	Exports	Imports	Final Demand
Country (s)	Country (c)		Country (p)
	Industry (i)		

This indicator (FD_EXGR_VA) presents gross exports of final and intermediate products by industry i in country c , broken down by both the source country/region s origin of value added and, according to final demand destination country/region p .

$$FD_EXGR_VA_{s,c,i,p} = FD_EXGRINT_VA_{s,c,i,p} + FD_EXGRFNL_VA_{s,c,i,p}$$

This indicator is from the exporting countries point of view, i.e., it shows the value added from source country s embodied in the exports of exporting country c which ends up in the final destination p .

Endnotes

¹ See <http://oe.cd/tiva>

² See <http://oe.cd/icio>

³ See <http://oe.cd/io-emp>

⁴ See <http://oe.cd/io-co2>

5. For readers new to input-output analysis see Miller, R. and P. Blair (2022).

Further reading

- Guilhoto, J.J.M., G.J.D. Hewings, H. Johnstone, C. Webb and N. Yamano (2019) "Exploring changes in world production and trade: Insights from the 2018 update of OECD's ICIO/TIVA database", *OECD Science, Technology and Industry Working Papers*, No. 2019/04, OECD Publishing, Paris, <https://doi.org/10.1787/6f9a10dc-en>.
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- Johnson, R.C. and G. Noguera (2012) "Accounting for Intermediates: Production Sharing and Trade in Value Added". *Journal of International Economics*, 86, 224–236. doi:10.1016/j.jinteco.2011.10.003.
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- Miroudot, S. and M. Ye (2020) "Decomposing value added in gross exports", *Economic Systems Research*, DOI: 10.1080/09535314.2020.1730308
- OECD (2013) *Interconnected Economies: Benefiting from Global Value Chains*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264189560-en>.

Annex A. Dimensions of OECD TiVA database – 2021 edition

The TiVA indicators are estimated for 66 economies plus “*Rest of the World*” (Table A.1); 17 regions and country groups (Table A.2); 45 unique industries (Table A.3) and 25 industry aggregates (Table A.4) within a hierarchy (Table A.5); and, covering the years from 1995 to 2018.

Table A.1. Country coverage

N.	Code	Country	N.	Code	Country
1	AUS	Australia	39	ARG	Argentina
2	AUT	Austria	40	BRA	Brazil
3	BEL	Belgium	41	BRN	Brunei Darussalam
4	CAN	Canada	42	BGR	Bulgaria
5	CHL	Chile	43	KHM	Cambodia
6	COL	Colombia	44	CHN	China (People's Republic of)
7	CRI	Costa Rica	45	HRV	Croatia
8	CZE	Czech Republic	46	CYP	Cyprus ²
9	DNK	Denmark	47	IND	India
10	EST	Estonia	48	IDN	Indonesia
11	FIN	Finland	49	HKG	Hong Kong, China
12	FRA	France	50	KAZ	Kazakhstan
13	DEU	Germany	51	LAO	Lao People's Democratic Rep.
14	GRC	Greece	52	MYS	Malaysia
15	HUN	Hungary	53	MLT	Malta
16	ISL	Iceland	54	MAR	Morocco
17	IRL	Ireland	55	MMR	Myanmar
18	ISR	Israel ¹	56	PER	Peru
19	ITA	Italy	57	PHL	Philippines
20	JPN	Japan	58	ROU	Romania
21	KOR	Korea	59	RUS	Russian Federation
22	LVA	Latvia	60	SAU	Saudi Arabia
23	LTU	Lithuania	61	SGP	Singapore
24	LUX	Luxembourg	62	ZAF	South Africa
25	MEX	Mexico	63	TWN	Chinese Taipei
26	NLD	Netherlands	64	THA	Thailand
27	NZL	New Zealand	65	TUN	Tunisia
28	NOR	Norway	66	VNM	Viet Nam
29	POL	Poland	67	ROW	Rest of the World
30	PRT	Portugal			
31	SVK	Slovak Republic			
32	SVN	Slovenia			
33	ESP	Spain			
34	SWE	Sweden			
35	CHE	Switzerland			
36	TUR	Turkey			
37	GBR	United Kingdom			
38	USA	United States			

OECD countries (as of 25 May 2021)

Notes:

1. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities or third party. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

2. **Footnote by Turkey:** The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue". **Footnote by all the European Union**

Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Table A.2. Regions and country groups

N.	Group	Heading	Country
1	OECD	OECD member countries	Countries 01 to 38
2	NONOECD	Non-OECD economies and aggregates	Countries 39 to 67
3	APEC	Asia-Pacific Economic Cooperation ¹	AUS CAN CHL JPN KOR MEX NZL USA BRN CHN HKG IDN MYS PER PHL RUS SGP THA TWN VNM
4	ASEAN	Association of South East Asian Nations	BRN IDN KHM LAO MYS MMR PHL SGP THA VNM
5	EASIA	Eastern Asia	JPN KOR CHN HKG TWN
6	EU27_2020	European Union (27 countries) ²	AUT BEL CZE DNK EST FIN FRA DEU GRC HUN IRL ITA LVA LTU LUX NLD POL PRT SVK SVN ESP SWE BGR CYP HRV MLT ROU
7	EU28	European Union (28 countries) ²	AUT BEL CZE DNK EST FIN FRA DEU GRC HUN IRL ITA LVA LTU LUX NLD POL PRT SVK SVN ESP SWE GBR BGR CYP HRV MLT ROU
8	EU15	European Union (15 countries) ²	AUT BEL DNK FIN FRA DEU GRC IRL ITA LUX NLD PRT ESP SWE GBR
9	EU13	EU28 excluding EU15 ²	CZE EST HUN LVA LTU POL SVK SVN BGR CYP HRV MLT ROU
10	EA19	Euro area (19 countries)	AUT BEL EST FIN FRA DEU GRC IRL ITA LVA LTU LUX NLD PRT SVK SVN ESP CYP MLT
11	G20	Group of Twenty	AUS CAN FRA DEU ITA JPN KOR MEX TUR GBR USA ARG BRA CHN IND IDN RUS SAU ZAF EU27 ³
World divided into regions			
12	ZEUR	Europe	AUT BEL CZE DNK EST FIN FRA DEU GRC HUN ISL IRL ITA LVA LTU LUX NLD NOR POL PRT SVK SVN ESP SWE CHE GBR BGR CYP HRV MLT ROU RUS
13	ZASI	East and Southeastern Asia	JPN KOR BRN CHN HKG IDN KHM LAO MYS MMR PHL SGP THA TWN VNM
14	ZNAM	North America	CAN MEX USA
15	ZSCA	South and Central America	CHL ARG BRA COL CRI PER
16	ZOTH	Other regions	AUS ISR NZL TUR IND KAZ MAR SAU TUN ZAF ROW
17	WLD	World	
18	DXD	Domestic	Dummy partner used in the diagonal for some indicators.

OECD countries (as of 25 May 2021)

Notes:

1. APEC excludes Papua New Guinea, a country not included in the 2021 TiVA database.
2. From 1 February 2020, after the departure of the United Kingdom, the European Union consists of 27 countries. The aggregates EU28 and EU15, which include the United Kingdom, are retained for any analyses that may require this perspective. See: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:EU_enlargements.
3. Excludes FRA, DEU and ITA which are shown separately.

Table A.3. Industry coverage

Code	Industry	ISIC Rev.4 Divisions	ISIC Rev.4 Sections
1 D01T02	Agriculture, hunting, forestry	01, 02	A
2 D03	Fishing and aquaculture	03	
3 D05T06	Mining and quarrying, energy producing products	05, 06	B
4 D07T08	Mining and quarrying, non-energy producing products	07, 08	
5 D09	Mining support service activities	09	
6 D10T12	Food products, beverages and tobacco	10, 11, 12	
7 D13T15	Textiles, textile products, leather and footwear	13, 14, 15	C
8 D16	Wood and products of wood and cork	16	
9 D17T18	Paper products and printing	17, 18	
10 D19	Coke and refined petroleum products	19	
11 D20	Chemical and chemical products	20	
12 D21	Pharmaceuticals, medicinal chemical and botanical products	21	
13 D22	Rubber and plastics products	22	
14 D23	Other non-metallic mineral products	23	
15 D24	Basic metals	24	
16 D25	Fabricated metal products	25	
17 D26	Computer, electronic and optical equipment	26	D
18 D27	Electrical equipment	27	
19 D28	Machinery and equipment, nec	28	
20 D29	Motor vehicles, trailers and semi-trailers	29	
21 D30	Other transport equipment	30	
22 D31T33	Manufacturing nec; repair and installation of machinery and equipment	31, 32, 33	
23 D35	Electricity, gas, steam and air conditioning supply	35	
24 D36T39	Water supply; sewerage, waste management and remediation activities	36, 37, 38, 39	
25 D41T43	Construction	41, 42, 43	
26 D45T47	Wholesale and retail trade; repair of motor vehicles	45, 46, 47	
27 D49	Land transport and transport via pipelines	49	E
28 D50	Water transport	50	
29 D51	Air transport	51	
30 D52	Warehousing and support activities for transportation	52	
31 D53	Postal and courier activities	53	F
32 D55T56	Accommodation and food service activities	55, 56	
33 D58T60	Publishing, audiovisual and broadcasting activities	58, 59, 60	G
34 D61	Telecommunications	61	
35 D62T63	IT and other information services	62, 63	H
36 D64T66	Financial and insurance activities	64, 65, 66	
37 D68	Real estate activities	68	I
38 D69T75	Professional, scientific and technical activities	69 to 75	
39 D77T82	Administrative and support services	77 to 82	J
40 D84	Public administration and defence; compulsory social security	84	
41 D85	Education	85	K
42 D86T88	Human health and social work activities	86, 87, 88	
43 D90T93	Arts, entertainment and recreation	90, 91, 92, 93	L
44 D94T96	Other service activities	94, 95, 96	
45 D97T98	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	97, 98	M

Table A.4. Industry aggregates

	Code	Industry Aggregate	ISIC Rev. 4 Divisions
1	D01T03	Agriculture, hunting, forestry and fishing	01, 02, 03
2	D05T09	Mining and quarrying	05 to 09
3	D10T33	Total Manufacturing	10 to 33
4	D16T18	Wood and paper products and printing	16 to 18
5	D19T23	Chemicals and non-metallic mineral products	19 to 23
6	D20T21	Chemicals and pharmaceutical products	20, 21
7	D24T25	Basic metals and fabricated metal products	24, 25
8	D26T27	Computer, electronic and electrical equipment	26, 27
9	D29T30	Transport equipment	29, 30
10	D35T39	Electricity, gas, water supply, sewerage, waste and remediation services	35 to 39
11	D45T82	Total Business Sector Services	45 to 82
12	D45T56	Distributive trade, transport, accommodation and food services	45 to 56
13	D49T53	Transportation and storage	49 to 53
14	D58T63	Information and communication	58 to 63
15	D69T82	Other business sector services	69 to 82
16	D84T98	Public admin, education, health and other personal services	84 to 98
17	D84T88	Public admin, defence; education and health	84 to 88
18	D90T98	Other social and personal services	90 to 98
19	D90T96	Other community, social and personal services	90 to 96
20	D05T39	Industry (Mining, Manufactures and Utilities)	05 to 39
21	D45T98	Total Services (excl. construction)	45 to 98
22	D58T82	Information, Finance, Real Estate and other business services	58 to 82
23	D41T98	Total Services (incl. construction)	41 to 98
24	DINFO	Information industries	26, 58 to 63
25	DTOTAL	TOTAL	All industries

Table A.5. Industry Hierarchy

Hierarchy Level	Parent Code	TIVA code	Industry	3-char code ¹
0		DTOTAL	TOTAL	TOT
1	DTOTAL	D01T03	Agriculture, hunting, forestry and fishing	AGR
2	D01T03	D01T02	Agriculture, hunting, forestry	AHF
2	D01T03	D03	Fishing and aquaculture	FSH
1	DTOTAL	D05T09	Mining and quarrying	MIN
2	D05T09	D05T06	Mining and quarrying, energy producing products	MNE
2	D05T09	D07T08	Mining and quarrying, non-energy producing products	MNN
2	D05T09	D09	Mining support service activities	MNS
1	DTOTAL	D10T33	Total Manufacturing	MAN
2	D10T33	D10T12	Food products, beverages and tobacco	FOD
2	D10T33	D13T15	Textiles, textile products, leather and footwear	TEX
2	D10T33	D16T18	Wood and paper products and printing	WPP
3	D16T18	D16	Wood and products of wood and cork	WOD
3	D16T18	D17T18	Paper products and printing	PAP
2	D10T33	D19T23	Chemicals and non-metallic mineral products	CNM
3	D19T23	D19	Coke and refined petroleum products	PET
3	D19T23	D20T21	Chemicals and pharmaceutical products	CPP
4	D20T21	D20	Chemical and chemical products	CHM
4	D20T21	D21	Pharmaceuticals, medicinal chemical and botanical products	PHM
3	D19T23	D22	Rubber and plastics products	RBP
3	D19T23	D23	Other non-metallic mineral products	NMM
2	D10T33	D24T25	Basic metals and fabricated metal products	BMF
3	D24T25	D24	Basic metals	MET
3	D24T25	D25	Fabricated metal products	FBM
2	D10T33	D26T27	Computer, electronic and electrical equipment	EEQ
3	D26T27	D26	Computer, electronic and optical equipment	CEQ
3	D26T27	D27	Electrical equipment	ELQ
2	D10T33	D28	Machinery and equipment, nec	MEQ
2	D10T33	D29T30	Transport equipment	TEQ
3	D29T30	D29	Motor vehicles, trailers and semi-trailers	MTR
3	D29T30	D30	Other transport equipment	TRQ
2	D10T33	D31T33	Manufacturing nec; repair and installation of machinery and equipment	OTM
1	DTOTAL	D35T39	Electricity, gas, water supply, sewerage, waste and remediation services	EGW
2	D35T39	D35	Electricity, gas, steam and air conditioning supply	ELG
2	D35T39	D36T39	Water supply; sewerage, waste management and remediation activities	WSW
1	DTOTAL	D41T43	Construction	CON
1	DTOTAL	D45T82	Total Business Sector Services	BSR
2	D45T82	D45T56	Distributive trade, transport, accommodation and food services	WTH
3	D45T56	D45T47	Wholesale and retail trade; repair of motor vehicles	WRT
3	D45T56	D49T53	Transportation and storage	TSP
4	D49T53	D49	Land transport and transport via pipelines	LTR
4	D49T53	D50	Water transport	WTR
4	D49T53	D51	Air transport	ATR
4	D49T53	D52	Warehousing and support activities for transportation	WSA
4	D49T53	D53	Postal and courier activities	PST
3	D45T56	D55T56	Accommodation and food service activities	HTR
2	D45T82	D58T63	Information and communication	INF
3	D58T63	D58T60	Publishing, audiovisual and broadcasting activities	PVB
3	D58T63	D61	Telecommunications	TEL
3	D58T63	D62T63	IT and other information services	ITS
2	D45T82	D64T66	Financial and insurance activities	FIN
2	D45T82	D68	Real estate activities	REA
2	D45T82	D69T82	Other business sector services	OBZ
3	D69T82	D69T75	Professional, scientific and technical activities	PRF
3	D69T82	D77T82	Administrative and support services	ADM
1	DTOTAL	D84T98	Public admin, education, health and other personal services	PUB
2	D84T98	D84T88	Public admin, defence; education and health	PEH
3	D84T88	D84	Public administration and defence; compulsory social security	GOV
3	D84T88	D85	Education	EDU
3	D84T88	D86T88	Human health and social work activities	HTH
2	D84T98	D90T98	Other social and personal services	OSP
3	D90T98	D90T96	Other community, social and personal services	OTS
4	D90T98	D90T93	Arts, entertainment and recreation	AER
4	D90T98	D94T96	Other service activities	OSA
3	D90T98	D97T98	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	PVH
memo	DTOTAL	D05T39	Industry (mining, manufactures and utilities)	MMU
memo	DTOTAL	D41T98	Total services (incl. construction)	TSC
memo	DTOTAL	D45T98	Total services	SER
memo	DTOTAL	D58T82	Information, finance, real estate and other business services	IFB
memo	DTOTAL	DINFO	Information industries	IFI

New industries introduced in the 2021 edition of TIVA indicators (the 2018 edition has 36 unique industries)

1. Suggested 3-character codes for use in tables and charts