

Guide to OECD's Trade in Value Added (TiVA) Indicators, 2018 edition

OECD, Directorate for Science, Technology and Innovation

Abstract

This guide presents the Trade in Value Added (TiVA) indicators published by OECD. The latest indicators were estimated based on the 2018 release of OECD's annual Inter-Country Input-Output (ICIO) tables which cover the period 2005 to 2015. The indicators are provided for 64 economies (including all OECD, European Union and G20 countries as well as most of East and Southeast Asia) and a selection of region aggregates and, for 36 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

This guide presents the Trade in Value Added (TiVA) indicators published by OECD¹. The latest indicators were estimated using the 2018 release of OECD's Inter-Country Input-Output (ICIO) tables covering the years 2005 to 2015². A range of indicators are provided for 64 economies (including all OECD, European Union and G20 countries as well as most of East and Southeast Asia) and a selection of region aggregates and, for 36 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.

While the 2016 editions of ICIO and TiVA were based on System of National Accounts, 1993 (1993 SNA) concepts and used an industry list based on the ISIC Rev.3 classification, the 2018 versions used 2008 SNA concepts and an industry list based on ISIC Rev.4. In addition, the 2018 edition of TiVA indicators edition includes Kazakhstan as a new economy. As well as the 64 target economies, an aggregate for the Rest of the World economies is included in ICIO tables and TiVA for completeness.

Based on OECD's ICIO, it was also released the Trade in Value Added (TiVA) database consisting of a set of measures that aim to provide better insights into global production networks and supply chains than is possible with conventional trade statistics.

2 OECD's ICIO Tables: basic definitions

This section presents the basic structure of the OECD's annual ICIO tables and the elements needed for the calculation of the TiVA indicators.³

The 2018 set of TiVA indicators cover 65 target economies (including an aggregate representing "the rest of the world"), 17 regions⁴, 36 industries and 19 industry aggregates⁵ (see Annex 1). Indicators are provided for all years from 2005 to 2015 with preliminary estimates for 2016 for a few selected indicators. Indicators may be expressed in USD million (current prices) or as percentages (shares or ratios).

¹ See <http://oe.cd/tiva>

² See <http://oe.cd/icio>

3. For readers new to input-output analysis, the book by Miller, R. and P. Blair (2009). *Input-Output Analysis: Foundations and Extensions*. Cambridge: Cambridge University Press, 2nd Edition is recommended.

4. Note that indicators are provided for regional aggregates. Once USD million measures have been calculated for the 65 economies, aggregation to various regional groupings is carried out before ratios and shares are derived.

5. Note that indicators are provided for aggregate sectors. Once USD million measures have been calculated for the 36 unique industries, summing to aggregate industry sectors is carried out 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) <u>plus taxes less subsidies on intermediate products</u> , 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 and 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”, $B = (I - A)^{-1}$, 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 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			...					
		Ind. 1	...	Ind. K	...			Ind. 1	...	Ind. K	...					
Country 1	Ind. 1	Z^{11}			...			Z^{1N}			Y^{11}			...	Y^{1N}	X^1
	Ind. K															
...	
Country N	Ind. 1	Z^{N1}			...			Z^{NN}			Y^{N1}			...	Y^{NN}	X^N
	Ind. K															
Value Added ¹		W^1			...			W^N			Taxes less subsidies on final products					
Gross Output		X^1			...			X^N								

1. includes taxes less subsidies on intermediate products

Figure 2.2 Obtaining the Leontief Inverse and the Value Added to Output Ratio

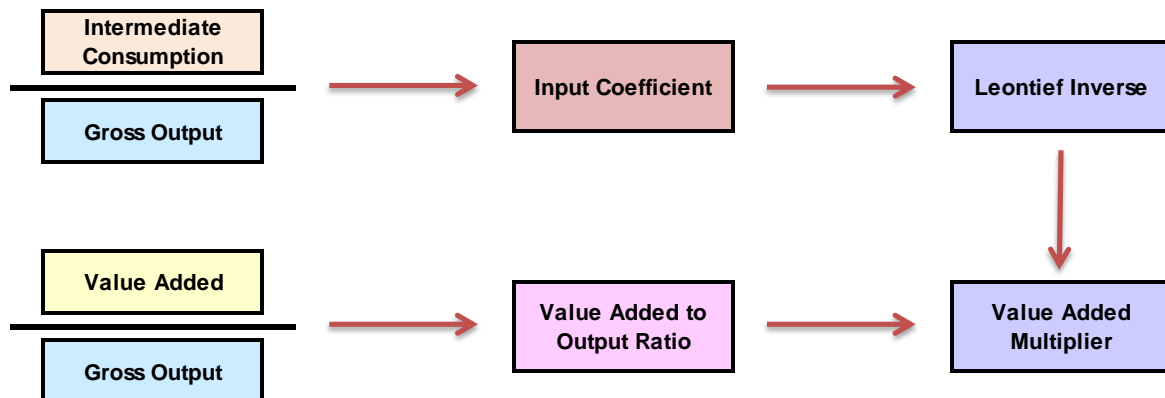
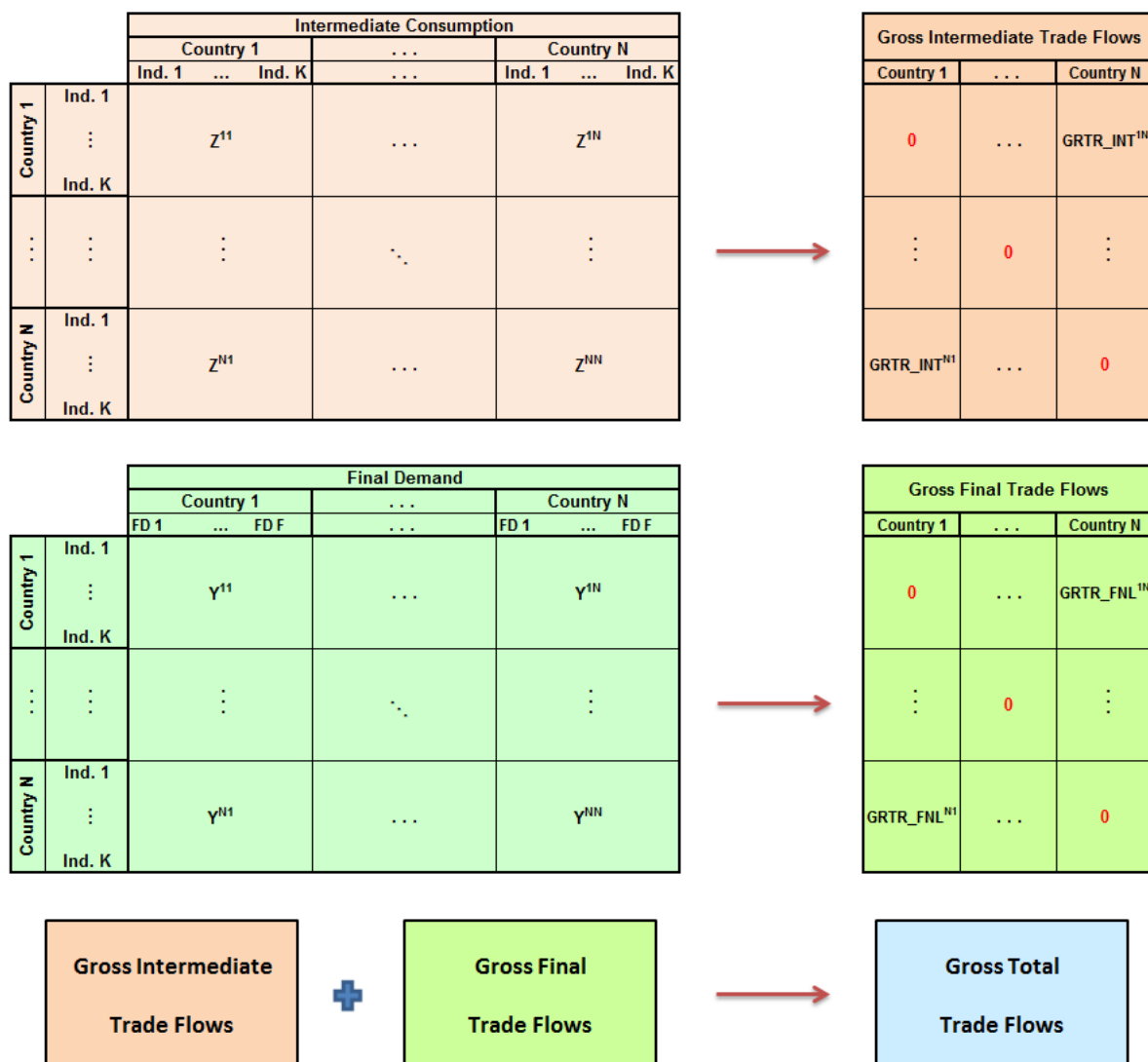


Figure 2.3 Obtaining the Bilateral Trade Flows



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 .

$V_c = [v_{c1} \cdots v_{cK}]$ 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 diagonalized matrix of vector V_c , i.e. a $K \times K$ matrix with elements $v_{c1} \cdots v_{cK}$ 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.

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 the 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 the origins of 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 the origins of value added origin 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	FFD_FVA	Foreign value added embodied in domestic final demand	USD	VB * FD
6.5	FFD_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

Trade in Value Added (TiVA) - Principal indicators (2018 edition)					
indicator number	Code	Indicator dimensions in OECD.STAT			Unit
		number of dims	Country <i>c</i> Industry <i>i</i> 'Partner' <i>p</i>		
1	EXGR	3	Exp cou Exp ind Imp cou		USD
2	EXGR_FNL	3	Exp cou Exp ind Imp cou		USD
3	EXGR_INT	3	Exp cou Exp ind Imp cou		USD
4	EXGR_DVA	3	Exp cou Exp ind Imp cou		USD
5	EXGR_DDC	2	Exp cou Exp ind <i>World</i>		USD
6	EXGR_IDC	2	Exp cou Exp ind <i>World</i>		USD
7	EXGR_RIM	2	Exp cou Exp ind <i>World</i>		USD
8	EXGR_FVA	2	Exp cou Exp ind <i>World</i>		USD
9	IMGR	3	Imp cou Exp ind Exp cou		USD
10	IMGR_FNL	3	Imp cou Exp ind Exp cou		USD
11	IMGR_INT	3	Imp cou Exp ind Exp cou		USD
12	IMGR_DVA	3	Imp cou Exp ind Exp cou		USD
13	BALGR	2	Exp cou <i>Tot ind</i> Imp cou		USD
14	REII	2	Exp cou Prod ind <i>World</i>		USD
15	PROD	2	Prod cou Prod ind <i>World</i>		USD
16	VALU	2	Prod cou Prod ind <i>World</i>		USD
17	FFD_DVA	3	VA src cou VA src ind FD cou		USD
18	DFD_FVA	3	FD cou VA src ind VA src cou		USD
19	BALVAFD	3	VA src cou VA src ind FD cou		USD
20	FD_VA	3	FD cou VA src ind VA src cou		USD
21	CONS_VA	3	FD cou VA src ind VA src cou		USD
22	GFCF_VA	3	FD cou VA src ind VA src cou		USD
23	EXGR_DVASH	2	Exp cou Exp ind <i>World</i>		PC
24	EXGR_FVASH	2	Exp cou Exp ind <i>World</i>		PC
25	EXGR_DVAFXSH	2	VA src cou Exp ind <i>World</i>		PC
26	EXGR_FNLDVASH	2	Exp cou Exp ind <i>World</i>		PC
27	EXGR_INTDVASH	2	Exp cou Exp ind <i>World</i>		PC
28	EXGR_INTDVApSH	3	Exp cou Exp ind Imp cou		PC
29	EXGRpSH	3	Exp cou Exp ind Imp cou		PC
30	EXGR_DVApSH	3	Exp cou Exp ind Imp cou		PC
31	EXGR_TDVAIND	2	Exp cou Exp Ind <i>World</i>		PC
32	EXGR_TFVAIND	2	Exp cou Exp Ind <i>World</i>		PC
33	EXGR_SERV_DVASH	2	Exp cou Exp Ind <i>World</i>		PC
34	EXGR_SERV_FVASH	2	Exp cou Exp Ind <i>World</i>		PC
35	IMGRINT_REII	2	Exp cou Prod ind <i>World</i>		PC
36	IMGR_DVASH	3	Imp cou Exp ind Exp cou		PC
37	IMGRpSH	3	Imp cou Exp ind Exp cou		PC
38	FFD_DVApSH	3	VA src cou VA src ind FD cou		PC
39	DFD_FVApSH	3	FD cou VA src ind VA src cou		PC
40	VALU_FFDDVA	2	VA src cou VA src ind <i>World</i>		PC
41	PROD_VASH	2	Prod cou Prod ind <i>World</i>		PC
42	FD_VASH	3	FD cou VA src ind VA src cou		PC
43	CONS_VASH	3	FD cou VA src ind VA src cou		PC
44	GFCF_VASH	3	FD cou VA src ind VA src cou		PC
45	DEXFVApSH	2	Exp cou <i>Tot ind</i> VA src cou		PC
46	FEXDVApSH	2	VA src cou <i>Tot ind</i> Exp cou		PC
Trade in Value Added (TiVA) - Origins of value added cubes (2018 edition)					
cube number	Code	number of dims	Indicator dimensions in OECD.STAT		Unit
2	EXGR_BSCI	4	VA src cou VA src ind Exp cou Exp ind		USD
3	FDVA_BSCI	4	VA src cou VA src ind FD cou FD ind		USD
4	FD_EXGR_VA	4	VA src cou Exp cou Exp ind FD cou		USD
4	FD_EXGRFNL_VA	4	VA src cou Exp cou Exp ind FD cou		USD
4	FD_EXGRINT_VA	4	VA src cou Exp cou Exp ind FD cou		USD
5	IMGR_BSCI	4	Imp cou VA src cou Exp ind Exp cou		USD
Notes:					
Country / Region:			Industry:		
Prod cou = Production country			Prod ind = Production industry		
VA src cou = Value added source country			VA src ind = Value added source industry		
Exp cou = Export country			Exp ind = Export products producing industry		
Imp cou = Import country			FD ind = Final demand products producing industry		
FD cou = Final demand / destination country			Tot ind = Total industry		
World = total world i.e. indicator with no partner dimension					

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: [Prod cou / Prod 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. 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 / Prod ind / World]

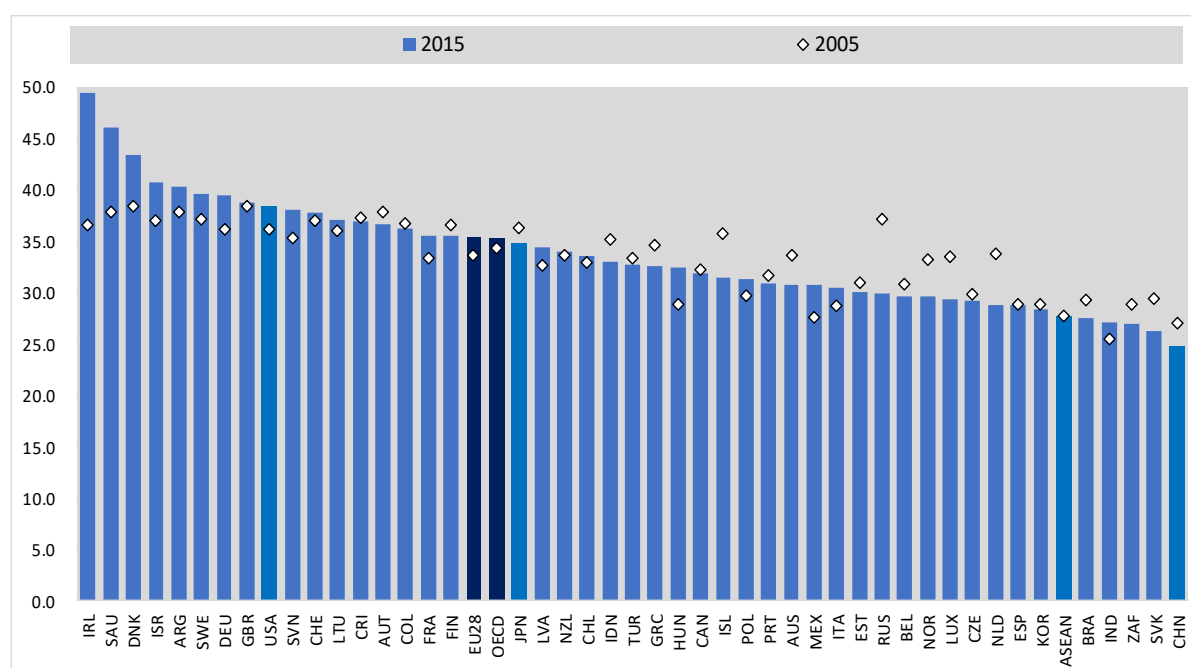
The value added share is given for each industry in each country, and represents value added generated by industry i in country c , $VALU_{c,i}$, as a percentage of gross output, $PROD_{c,i}$.

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

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

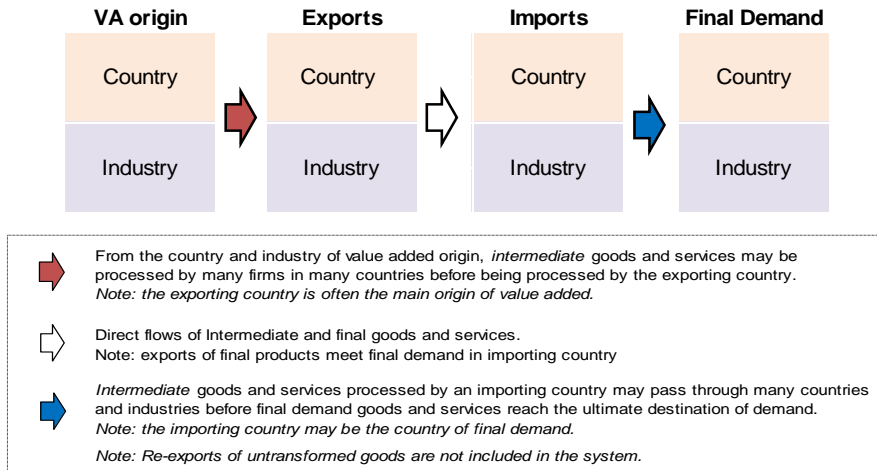
For the OECD as a whole, in 2015, about 35% of gross output in the manufacturing sector consisted of value added generated in production. Countries such as Germany, the United Kingdom and the United States had shares between 38% and 40%. These shares were higher than those for China and the aggregate of Southeast Asian (ASEAN) countries with 25% and 28% respectively (Figure 4-1)

Figure 4-1 ICIO 2018, Value added as a share of Gross Output, Total Manufacturing



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 64 countries and 36 industries/product groups, there are potentially about $(64 \times 36)^4 \approx 28,000,000,000,000$ combinations.

Although some 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 (which have 2 or 3 dimensions), *Domestic value added content of gross exports* (EXGR_DVA) can be represented as:

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

Indicator dimension

Measured attribute

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

VA origin *	Exports	Imports	Final Demand
$\sum \text{country} \neq c$	Country (c)		
$\sum \text{services}$	Industry (i)		

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:

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

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 EU28, exports to non-EU28 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 EU28, exports to non-EU28 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 EU28, exports to non-EU28 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)

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

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.

$$\text{EXGR_DVApSH}_{c,i,p} = \frac{\text{EXGR_DVA}_{c,i,p}}{\sum_p \text{EXGR_DVA}_{c,i,p}} \times 100$$

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

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

where $EXGR_DDC_c$ is a $K \times 1$ 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 $K \times 1$ 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)		
$\sum \text{industry} \neq i$	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 .

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

where $EXGR_IDC_c$ is a $K \times 1$ 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 $K \times 1$ 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
$\sum \text{country} \neq c$	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.

$$\text{EXGR_FVA}_{c,i} = V_c B_c \text{EXGR}_{c,i}$$

With B_c being the column block of B corresponding to country c , with the row block corresponding to c being 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 EU28, exports to non-EU28 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]

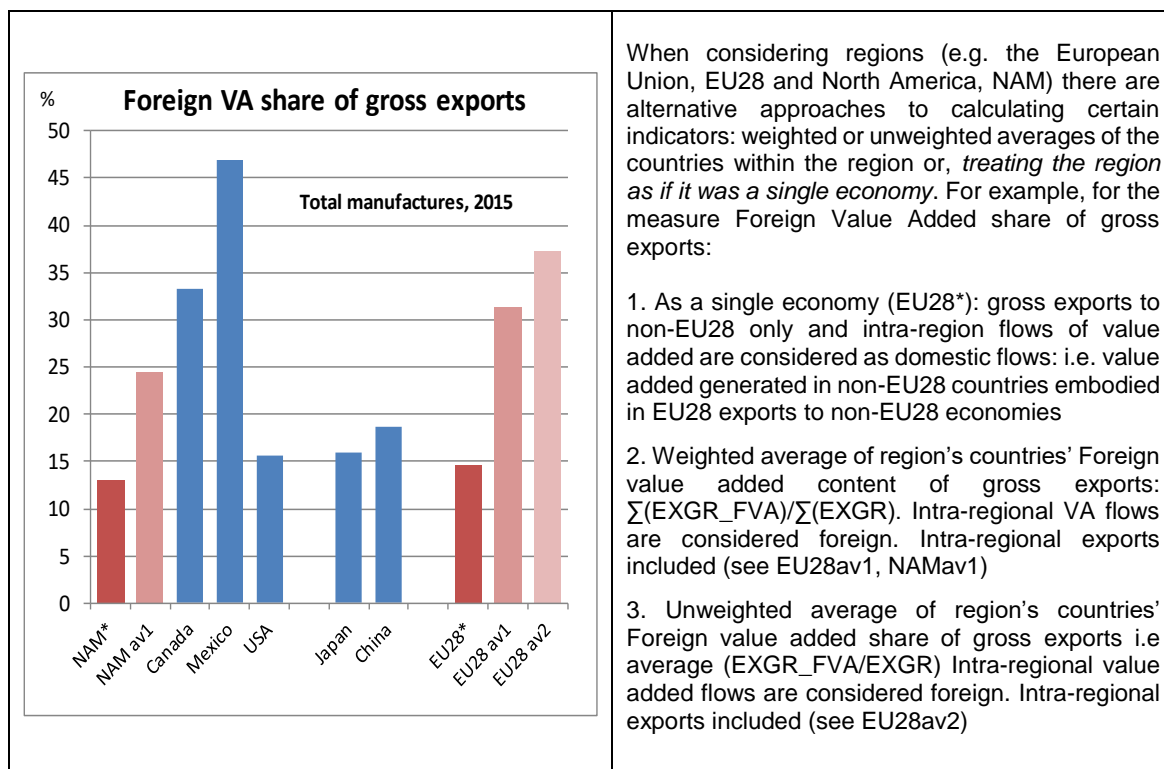
VA origin	Exports	Imports	Final Demand
$\sum \text{country} \neq c$	Country (c)		
all industries	Industry (i)		

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 $\text{EXGR_FVA}_{c,w,i}$, as a percentage of total gross exports, $\text{EXGR}_{c,w,i}$.

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

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.

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

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

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

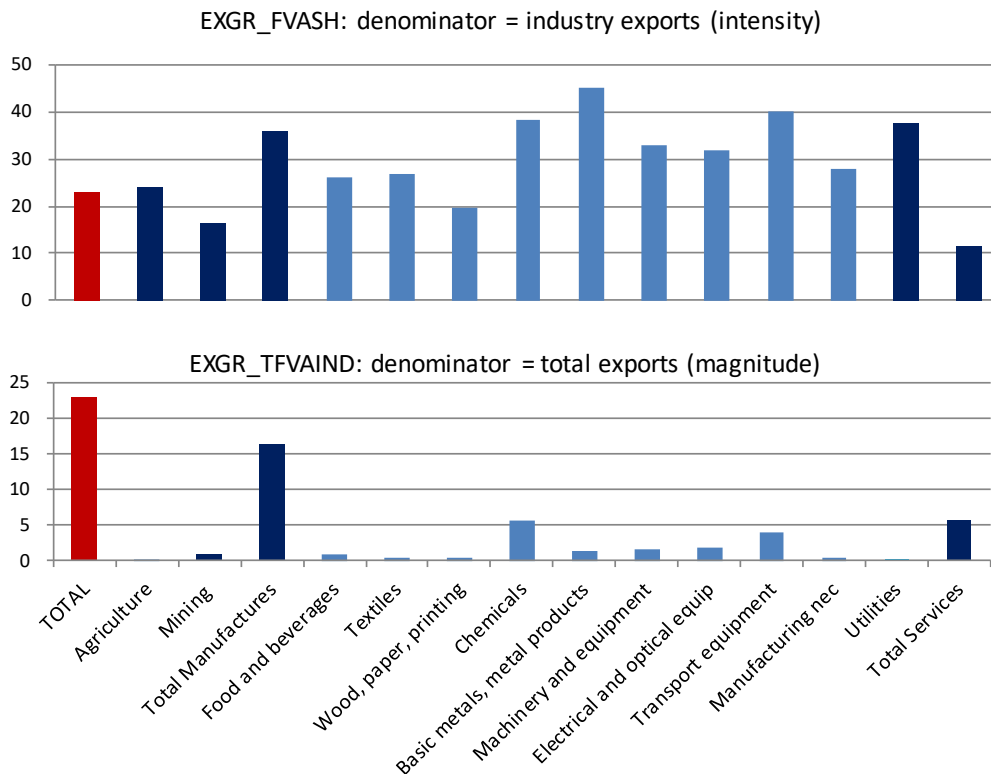
VA origin	Exports	Imports	Final Demand
$\sum_{\text{country} \neq c}$	Country (c)		
all industries	Industry (i)		

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)

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

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

Figure: Example of EXGR_FVASH versus EXGR_TFVAIND



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			
Σ all industries	Σ 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:

$$\text{DEXFVApSH}_{c,p} = \frac{\text{EXGR_BSCI}_{c,p}}{\text{EXGR}_c} \times 100$$

where $\text{EXGR_BSCI}_{c,p}$, 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)	$\sum \text{country} \neq c$		
	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 .

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

Where $\text{EXGR_BSCI}_{c,p,i}$, 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			
$\sum \text{all industries}$	$\sum \text{all industries}$		

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:

$$\text{FEXDVApSH}_{c,p} = \frac{\text{EXGR_BSCI}_{c,p}}{\text{EXGR}_c} \times 100$$

where $\text{EXGR_BSCI}_{c,p}$, 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)	
all industries	Industry (i)		
	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 as 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)		
Σ services			

$EXGR_SERV_DVA_{c,i}$ 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
$\sum \text{country} \neq c$	Country (c)		
$\sum \text{services}$	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:

$$\text{EXGR_SERV_FVASH}_{c,i} = \frac{\text{EXGR_SERV_FVA}_{c,i}}{\text{EXGR}_{c,i}} \times 100$$

where:

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

$\widehat{V}_{c,j}$ 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 .

$$\text{IMGR_DVA}_{c,i,p} = \hat{V}_c B_{c,i,p} \text{IMGR}_{c,i,p}$$

Where $\text{IMGR}_{c,i,p}$ 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 :

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

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 | Prod ind | World]

imports	Exports	Imports	Final Demand
	Country (c)		
	Industry (i)		
Σintermediates			

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 $K \times 1$ 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 $K \times 1$ 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 | Prod ind | World]

imports	Exports	Imports	Final Demand
	Country (c)		
	Industry (i)		
Σintermediates			

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 diagonalized 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.

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

$\text{FFD_DVA}_{c,p,i}$ 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 EU28, final demand in non-EU28 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:

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

$\text{DFD_FVA}_{p,c}$ 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 $p \neq c$.

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

$\text{DFD_FVA}_{p,c,i}$ 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 EU28, foreign value added is non-EU28 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

$$\text{DFD_FVApSH}_{c,i,p} = \frac{\text{DFD_FVA}_{c,i,p}}{\sum_p \text{DFD_FVA}_{c,i,p}} \times 100$$

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.

$$\text{BALVAFD}_{c,i,p} = \text{FFD_DVA}_{c,i,p} - \text{DFD_FVA}_{c,i,p}$$

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.

$\text{BALVAFD}_{c,i,p}$ 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)

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

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

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

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: $\text{FD_VA} = (\text{CONS_VA} + \text{GFCF_VA}) + (\text{non-res} + \text{invnt})$

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:

$$\text{FD_VASH}_{p,c,i} = \frac{\text{FD_VA}_{p,c,i}}{\sum_p \text{FD_VA}_{p,c,i}} \times 100$$

$$\text{CONS_VASH}_{p,c,i} = \frac{\text{CONS_VA}_{p,c,i}}{\sum_p \text{CONS_VA}_{p,c,i}} \times 100$$

$$\text{GFCF_VASH}_{p,c,i} = \frac{\text{GFCF_VA}_{p,c,i}}{\sum_p \text{GFCF_VA}_{p,c,i}} \times 100$$

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 :

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

Where $EXGR_{c,i}$ is a vector of size $KN \times 1$, with all entries being zero except the entry corresponding to exports by country c industry i . $\hat{VB} EXGR_{c,i}$ is a vector of size $KN \times 1$ as well and $(\hat{VB} EXGR_{c,i})_{p,h}$ 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, $h = D41T98$ (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 EU28, exports are to non-EU28 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, $IMGR_DVA_{c,p,i}$: set source country $s =$ importing country c .

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

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 .

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

Where $FD_{p,h}$ is a vector of size $KN \times 1$, with all entries being zero except the entry corresponding to final demand for goods and services of industry h in country p . $\hat{VB} FD_{p,h}$ is a vector of size $KN \times 1$ as well and $(\hat{VB} FD_{p,h})_{c,i}$ is the vector element corresponding to value added generated 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;

Foreign value added embodied in domestic final demand, DFD_FVA and related partner shares DFD_FVApSH.

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 .

$$\text{FD_EXGRINT_VA}_{s,c,i,p} = V_{s,j} * B_{s,j,c,i} * F_{c,i,p}$$

Where:

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

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 .

$$\text{FD_EXGRFNL_VA}_{s,c,i,p} = V_{s,j} * B_{s,j,c,i} * \text{EXGR_FNL}_{c,i,p}$$

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 .

$$\text{FD_EXGR_VA}_{s,c,i,p} = \text{FD_EXGRINT_VA}_{s,c,i,p} + \text{FD_EXGRFNL_VA}_{s,c,i,p}$$

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 .

Annex A. OECD ICIO 2018 Database

The TiVA indicators are estimated for 65 economies (Table A.1), 17 regions (Table A.2), 36 industries (Table A.3), and 19 industries aggregates (Table A.4), covering the years from 2005 to 2015, and for some indicators up to 2016.

Table A.1 Countries in OECD's ICIO and TiVA Indicators

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

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 in OECD's TiVA Indicators

N.	Region	Heading	Country											
1	OECD	OECD member countries	Countries 01 to 36											
2	NONOECD	Non-OECD economies and aggregates	Countries 37 to 65											
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 ²	BRN	IDN	KHM	MYS	PHL	SGP	THA	VNM				
5	EASIA	Eastern Asia	JPN	KOR	CHN	HKG	TWN							
6	EU28	European Union (28 countries)	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				
7	EU15	European Union (15 countries)	AUT	BEL	DNK	FIN	FRA	DEU	GRC	IRL	ITA	LUX		
			NLD	PRT	ESP	SWE	GBR							
8	EU13	EU28 excluding EU15	CZE	EST	HUN	LVA	LTU	POL	SVK	SVN	BGR	CYP		
			HRV	MLT	ROU									
9	EA19	Euro area (19 countries)	AUT	BEL	EST	FIN	FRA	DEU	GRC	IRL	ITA	LVA		
			LTU	LUX	NLD	PRT	SVK	SVN	ESP	CYP	MLT			
10	EA12	Euro area (12 countries)	AUT	BEL	FIN	FRA	DEU	GRC	IRL	ITA	LUX	NLD		
			PRT	ESP										
11	G20	Group of Twenty	AUS	CAN	JPN	KOR	MEX	TUR	USA	ARG	BRA	CHN		
			IND	IDN	RUS	SAU	ZAF	EU28						
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 South East Asia	JPN	KOR	BRN	CHN	HKG	IDN	KHM	MYS	PHL	SGP		
			THA	TWN	VNM									
14	ZNAM	North American Free Trade Association	CAN	MEX	USA									
15	ZOTH	Other regions	AUS	ISR	NZL	TUR	IND	KAZ	MAR	SAU	TUN	ZAF		
			ROW											
16	ZSCA	South and Central America	CHL	ARG	BRA	COL	CRI	PER						
17	WLD	World												
18	DXD	Domestic	Dummy partner used in the diagonal for some indicators.											
OECD countries														

Notes:

1. APEC country not included in 2018 TiVA database: Papua New Guinea

2. ASEAN countries not included in 2018 TiVA database: Lao PDR and Myanmar

Table A.3 Industries in OECD's ICIO and TiVA Indicators

N.	Code	Industry	ISIC Rev.4
1	D01T03	Agriculture, hunting, forestry and fishing	01, 02, 03
2	D05T06	Mining and extraction of energy producing products	05, 06
3	D07T08	Mining and quarrying of non-energy producing products	07, 08
4	D09	Services to mining and quarrying	09
5	D10T12	Food products, beverages and tobacco	10, 11, 12
6	D13T15	Textiles, textile products, leather and footwear	13, 14, 15
7	D16	Wood and products of wood and cork	16
8	D17T18	Paper products and printing	17, 18
9	D19	Coke and refined petroleum products	19
10	D20T21	Chemicals and chemical products	20, 21
11	D22	Rubber and plastics products	22
12	D23	Other non-metallic mineral products	23
13	D24	Basic metals	24
14	D25	Fabricated metal products	25
15	D26	Computer, electronic and optical equipment	26
16	D27	Electrical machinery and apparatus, nec	27
17	D28	Machinery and equipment, nec	28
18	D29	Motor vehicles, trailers and semi-trailers	29
19	D30	Other transport equipment	30
20	D31T33	Manufacturing nec; repair of machinery and equipment	31, 32, 33
21	D35T39	Electricity, gas, water supply, sewerage, waste and remediation services	35,36, 37, 38, 39
22	D41T43	Construction	41, 42, 43
23	D45T47	Wholesale and retail trade; repair of motor vehicles	45, 46, 47
24	D49T53	Transportation and storage	49, 50, 51, 52, 53
25	D55T56	Accommodation and food services	55, 56
26	D58T60	Publishing, audiovisual and broadcasting activities	58, 59, 60
27	D61	Telecommunications	61
28	D62T63	IT and other information services	62, 63
29	D64T66	Financial and insurance activities	64, 65, 66
30	D68	Real estate activities	68
31	D69T82	Other business sector services	69, 70, 71, 72, 73, 74, 75, 77, 78, 79, 80, 81, 82
32	D84	Public admin. and defence; compulsory social security	84
33	D85	Education	85
34	D86T88	Health and social work	86, 87, 88
35	D90T96	Other community, social and personal services	90, 91, 92, 93,94,95, 96
36	D97T98	Private households with employed persons	97, 98

Table A.4 Industries Aggregates in OECD's TiVA Indicators

N.	Code	Industry Aggregate	Industry
1	D05T09	Mining and quarrying	D05T06, D07T08, D09
2	D10T33	Total Manufacturing	D10T12, D13T15, D16, D17T18, D19, D20T21, D22, D23, D24, D25, D26, D27, D28, D29, D30, D31T33
3	D16T18	Wood and paper products and printing	D16, D17T18
4	D19T23	Chemicals and non-metallic mineral products	D19, D20T21, D22, D23
5	D24T25	Basic metals and fabricated metal products	D24, D25
6	D26T27	Computer, electronic and electrical equipment	D26, D27
7	D29T30	Transport equipment	D29, D30
8	D45T82	Total Business Sector Services	D45T47, D49T53, D55T56, D58T60, D61, D62T63, D64T66, D68, D69T82
9	D45T56	Distributive trade, transport, accommodation and food services	D45T47, D49T53, D55T56
10	D58T63	Information services	D58T60, D61, D62T63
11	D84T98	Public admin, education, health and other personal services	D84, D85, D86T88, D90T96, D97T98
12	D84T88	Public admin, defence; education and health	D84, D85, D86T88
13	D90T98	Other social and personal services	D90T96, D97T98
14	D05T39	Industry (Mining, Manufactures and Utilities)	D05T06, D07T08, D09, D10T12, D13T15, D16, D17T18, D19, D20T21, D22, D23, D24, D25, D26, D27, D28, D29, D30, D31T33, D35T39
15	D45T98	Total Services	D45T47, D49T53, D55T56, D58T60, D61, D62T63, D64T66, D68, D69T82, D84, D85, D86T88, D90T96, D97T98
16	D58T82	Information, Finance, Real Estate and other business services	D58T60, D61, D62T63, D64T66, D68, D69T82
17	D41T98	Total Services (incl. construction)	D41T43, D45T47, D49T53, D55T56, D58T60, D61, D62T63, D64T66, D68, D69T82, D84, D85, D86T88, D90T96, D97T98
18	DINFO	Information industries	D26, D58T60, D61, D62T63
19	DTOTAL	TOTAL	All industries