# Ongoing and future developments of OECD ICIO tables and GVC indicators

World KLEMS meeting 12-13 October

Colin Webb, OECD Directorate for Science, Technology and Innovation





- Introduction
  - OECD's Inter-Country Input-Output (ICIO) tables and indicator collections
  - Quick spotlight on TiVA
- Construction of ICIO tables
- Dependence on Russian oil and gas (USD v energy units)
- ICIO tables in previous year prices (PYPs)
- The 2022 edition 1995-2020, more countries
- Final Comments

### INTRODUCTION





### Launched 17 November 2021

- Long annual time-series of ICIO tables and TiVA indicators: **1995 to 2018**
- **66 countries** + RoW + 17 region groups
  - All 38 OECD countries, all G20, all European Union and now, all ASEAN countries (*new: Myanmar and Lao PDR*)
  - Colombia and Costa Rica now included in OECD
- 45 industries + 25 industry aggregates in a hierarchy (based on ISIC Rev.4) – compatible with previous list in 2018 edition (36 industries)



Number	Industry
1	Agriculture, hunting, forestry
2	Fishing
3	Mining and quarrying, energy producing products
4	Mining and quarrying, non-energy producing products
5	Services to mining and quarrying
6	Food products, beverages and tobacco
7	Textiles, textile products, leather and footwear
8	Wood and products of wood and cork
9	Paper products and printing
10	Coke and refined petroleum products
11	Chemical and chemical products
12	Pharmaceuticals, medicinal chemical and botanical products
13	Rubber and plastics products
14	Non-metallic mineral products
15	Basic metals
16	Fabricated metal products
17	Computer, electronic and optical products
18	Electrical machinery and apparatus, nec
19	Machinery and equipment, nec
20	Motor vehicles, trailers and semi-trailers
21	Manufacturing nec; repair of machinery and equipment
22	Other industry and repair
23	Electricity, gas, steam and air conditioning supply

Number	Industry
24	Water supply; sewerage, waste management and remediation activities
25	Construction
26	Wholesale and retail trade; repair of motor vehicles
27	Land transport and transport via pipelines
28	Water transport
29	Air transport
30	Warehousing and support activities for transportation
31	Postal and courier activities
32	Accommodation and food services
33	Publishing, audiovisual and broadcasting activities
34	Telecommunications
35	IT and other information services
36	Financial and insurance activities
37	Real estate activities
38	Professional, scientific and technical activities
39	Administrative and support services
40	Public administration and defence
41	Education
42	Healthcare and social work
43	Arts, entertainment and recreation
44	Other service activities
45	Activities of households as employers

## The goal – annual ICIO tables from 1995

Inter-country

ICIO at basic prices (industry-by-industry)		Intermediate demand					Final consumption (P3) and Gross capital formation (P5)			Direct purchases abroad by residents (P33)			Output	A globally balanced view	
		Со	u A	Со	u B		l C	Cou A	Cou B	CoulC	CoulA	Cou B	CoulC	at bp	of inter-country inter-
		Ind 1	Ind 2	Ind 1	Ind 2	Ind 1	Ind 2	courr	0000		courr	COUP	0000		industry flows of
Country A Ind	dustry 1														
Ind	dustry 2										E C	A-A-			intermediate and final
Country B Ind	dustry 1											PE			goods and services
Ind	dustry 2														Soods and services
Country C Ind	dustry 1														
Ind	dustry 2														A table for each year to
Net taxes Co	untry A														
on products Co	untry B				<b>V</b> A					NI-	TE				track evolution of global
paid by Co	untry C														production networks
														-	over time
Value added at	t bp (B1G)								Global (	GDP (B1	_GA & B	1_GI)	=VA +	NTZ + NTF	over time
Output at b	p (P1)			X					Global (	GDP (B1_	_GE)		= Y + DF	P +NTF	
-								·							To understand the
() SNA codes							s /								notions and immediate of
					_e	OGUN	5								nature, and impact, of
				e/;	ditu'	6 K	35/								regional and global
		/	, redit	other	1es	× QUI			3-	count	ry				value chains (CVCs) a g
KE	V	'n	err	<u>مَ</u> کر ه		e <sup>C1</sup> /			2-	indus	try				value chamis (GVCs) e.g.
Do	<u>'</u> mestic		Í		<u>/                                    </u>	Í			ex	ample	ڊ ٽ				TiVA indicators

## Multiple uses of IO-based analysis at OECD

- Analyses of GVCs (CIIE)
- Numerous Trade policy papers *(Trade Committee)*
- Trade in Employment (CIIE/Trade Committee)
- Embodied CO2 and material flows (Environment Committe UN region
- Role of MNEs (CIIE/Trade Committee)
- Agriculture and GVCs (*Agriculture Committee*)
- Steel and GVCs *(Steel Committee)*
- Shipbuilding (Shipbuilding Committee)
- Tourism (Tourism Committee)
- Digital economy (Committee for Digital Economy Policy)
- Responsible Business Conduct (Investment Committee)
- OECD Country Studies (*Economic Policy Committee*)
- OECD Skills outlook (*Education Committee*)
- Role of SMEs in GVCs (Committee for Statistics and Statistical Policy)

And many other organisations

WTO, IMF, WBG UN regional bodies (ECA, ECE, ECLAC) UNIDO, ADB

Government departments Research institutions Academia



- Trade in Value Added (TiVA) database: <u>http://oe.cd/tiva</u> (origins of VA in exports, origins of VA in final demand, etc.)
- Trade in Embodied CO2 (TECO2) database: <u>http://oe.cd/io-co2</u> (consumption of CO2, carbon footprints)
- Trade in Employment (TiM) database: <u>http://oe.cd/io-emp</u> (domestic employment used in production to meet foreign demand)
  - New Trade in Employment <u>by workforce characteristics (gender, age, skills)</u>:
     <u>DataSetCode=TIM\_BYC\_2021</u>
- Analytical AMNE database: <u>http://oe.cd/gvc-mne</u> (*splitting ICIO industries: domestic v. foreign ownership*)
- Also: Resident expenditure abroad (tourism) and GVCs





Note: this is a simplified version of ICIO and:

- Value added is *at basic prices* and includes taxes less subsidies on intermediate products;
- Final demand is *at basic prices* and includes direct purchases abroad by residents;

X = AX + Ywhere A is the input coefficient matrix:  $a_{ii}^{rs} = Z_{ii}^{rs} / x_i^s$ Output and Final Demand *Leontief inverse* X = BYB = (I - A) $b_{ii}^{rs}$  = direct and indirect inputs from industry i in country r for the production of one unit of output by industry j in country s. *Where* **Y** is final demand,  $\boldsymbol{e}$  are exports and  $\boldsymbol{v}$  is the VA/output ratios  $v_i^s = va_i^s / x_i^s$ 

Also, v = Co2 emissions/output  $\rightarrow$  Trade in embodied Co2

and,  $v = \text{employment/output} \rightarrow \text{Trade in employment}$ 

9

### The classic GVC indicator – backward linkages

#### Foreign value added share of gross exports, 1995-2018



Steady rise from 1995 to 2008.

Slight increase since dip in 2016, but in 2018, backward linkages, in general, lower than last peak of 2011-2012.

**China:** peak 2004-2007 (24%). Since 2011 (post crisis peak), decline from 22% to 18%

**EU27:** (as single economy) steady rise from 9% in mid-1990s to 16% in recent years. Fall from 2011-2012 peak of 17%.

**USA**: After pre- and post-crisis peaks of 12%-13%, by 2018, Foreign VA in exports, at 9%, back to shares of late 1990s.

**ASEAN:** (as single economy): Slight rise since 2010 30% to 32%



Ę

Share of domestic value added meeting foreign final demand, 1995-2018



**China:** peak 2006-2007 (25%). Now below 15%, the share in 1995. Increase in output meeting domestic demand.

**EU27:** (as single economy) steady rise from 10.5% in mid-1990s to 17% in recent years.

**USA**: Relatively stable in recent years: 9%-10%. Above lows of about 7% in 2002-03.

**ASEAN:** (as single economy): After peak of 39% in 1998 (Asian crisis) steady fall to about 30% in recent years.



### Many core TiVA indicators are variations of :

### – Value added origin of gross exports

• [VA src cou |VA src ind | Exp cou | Exp ind]

### – Value added origin of final demand

• [VA src cou | VA src ind | FD cou | FD ind]

# EXGR\_BSCI FD VA origin Exports Imports Final Demand Country (p) Country (c) (c) Industry (h) Industry (i) (c)





		Dom	estic	For		
Industry VA Origin		Motor vehicles	non-MV	Motor vehicles	non-MV	
Domestic	Motor Vehicles					Domes industr
	non-MV					Domes value a for Mot
Foreign	Motor Vehicles					Foreigr industr Domes
1 <sup>-</sup> 01 <del>0</del> 1911	non-MV					Foreigr value a deman

#### **Demand for final products**

Domestic Motor Vehicle ndustry value added

#### SNA Value added of ISIC Rev.4 (NACE Rev.1) Division 29

Domestic non-MV industry value added in global demand for Motor Vehicles

Foreign Motor Vehicle industry value added in Domestic final demand

Foreign non-MV industry value added in Domestic demand for Motor Vehicles

### Motor vehicles – meeting demand at home and abroad

Motor vehicle industry value added (blue) and other industries' value added meeting final demand for Motor vehicles (orange), as a % of total economy value added, 2018

Ę



#### Origin of value added in French demand for motor vehicles 1995-2018

Ę



### ICIO CONSTRUCTION



Characteristics of OECD ICIO tables

- Institutional, long-term project (the early 2010s )
- Underlying official National Accounts, Supply, Use and I-O tables
- Benchmarked to National Accounts (final expenditures, value-added, income)
- Coverage: Number of countries and timeseries
- Rest of the World (closed model)

- Non-resident direct purchases (tourism & education)
- Firm heterogeneity within manufacturing industries (China and Mexico)
- International distribution margins allocated to the country providing the trade and transport services
- Re-imports / Re-exports adjustment

#### Coverage:

• Country and industry (see appendix)

## ICIO Construction – Sources and methods

The document describes the sources and methods used to construct OECD's Inter-Country Input-Output (ICIO) tables. The aim is to produce tables that provide a globally balanced view of the inter-country inter-industry flows of goods and services used as intermediate inputs into production and, used to meet final demand

- Data requirements
- Main steps
- Challenges
- Dissemination



## • ICIO framework: 198 countries, 75 industries and products

– 66 countries and 45 industries published (2021 edition)

- **Ideal statistical requirements** for inclusion in published ICIO and TiVA databases (Appendix E)
  - Annual times series SUTs from 1995, detailed industries compatible with ISIC Rev.4, basic prices,
  - Bilateral trade in goods and services
- No country meets ideal requirements even in OECD some closer than others (e.g. USA, EU countries)
- Minimum requirements

The overall ICIO compilation procedure



\* optional

# Development flows of ICIO tables

SNA constraints

1. Collection of data sources

Ē

- 2. Estimation of harmonized constraints
- 3. Estimation of harmonised national SUTs
- 4. Bilateral trade data in goods and services
- 5. Inter-Country Input-Output model
- 8. Estimation of TiVA indicators
- 9. Dissemination material

flatfiles for Dotstat

Indicator result objects in Rdata format Country notes (docx, pdf, html)



Dissemination

(data / publication)

## ICIO doc – Data compilation and SNA constraints (§2)

- **Compilation of statistics** For each country, the following statistics from various national, regional and international statistical agencies are collected, validated and processed:
  - National Accounts (SNA): Main Aggregates and detailed tables: SUTs, IOTs, industry output and value added (STAN database), household consumption data (COICOP)
  - Balance of Payments (BoP)
  - Bilateral merchandise trade statistics (Comtrade, BTDIxE)
  - Bilateral Trade in Services (TIS)
  - Tourism Satellite Accounts (TSA)
- Harmonised SNA constraints. Tables of SNA constraints for the target years are generated for each country, with gaps filled with estimates using alternative sources

## ICIO doc – Balancing International trade (§3)

### **3 Stages**

### • Total world trade:

- *i*) cross border goods, *ii*) cross border services, *iii*) direct purchases of residents abroad (e.g. tourism).
- SNA, SUT definitions  $\rightarrow$  ICIO definition (Figure 3.1)
- **Sectoral trade flows** products and industries:

– Industry trade product assumptions (Table 3.2)

- *"Exploratory balancing"* many rounds e.g. to ensure consistency with output by product estimates
- **Bilateral trade flows** initial values from BTDIxE, BATIS and EBOPS databases,



Approx. 3,000 Supply, Use and Input-Output tables from national and regional sources, processed and harmonised for input into to ICIO

- Supply tables
- Use tables at purchasers' prices
- Domestic, Import Use and Margin tables
- Symmetric Input-Output tables

## ICIO doc – Balancing ICUTs and ICIO (§5)

- Generating Inter-Country Use Tables (ICUTs)
- Use tables at purchasers' prices
- Firm heterogeneity within manufacturing sectors: China and Mexico [a unique feature of OECD ICIO tables]





- **2008 SNA v**. **1993 SNA**. The latter is still used by some non-OECD countries and is the format of vintage National Accounts and earlier SUTs and IOTs for many others
- *SUTs are not revised.* Very few countries produce long time-series of SUTs based on the latest standards (2008 SNA). Earlier SUTs compiled according to 1993 SNA. Also, format of a country's SUTs may change over time
- Conversion from Fiscal Years to Gregorian Calendar years e.g. AUS, IND, NZL
- **Benchmark revisions**. SNA and IOTs (every 5 years or so)
- **Differences in reporting in terms of valuations:** basic prices v. purchasers' prices
- *National classifications*. mapping to ICIO standard industry list.
- Industry / product coverage in SUTs and IOTs. varies across countries.
- *Widespread asymmetries in reported bilateral trade statistics*, both goods and services
- Dealing with confidential data
- FILLING THE DATA GAPS



- http://oe.cd/icio
- R Objects
- CSV files
- Harmonised national IOTs: <u>http://oe.cd/i-o</u>

+ Team can provide detailed training on ICIO Construction - materials available in English and French

... and use and interpretation of indicators (TiVA, Trade in Employment, Trade in Embodied CO<sub>2</sub>)

## Comments on draft ICIO documentation

- What is missing?
- What is not clear?
- What other information should be provided? (either in the document itself or in other materials e.g. online)

### RUSSIA – OIL AND GAS





Origin of value added in Russian final demand, by industry, 2018





#### Russian % share of Energy Mining\* VA in total Final Demand, 2018



In 2018, 18.5 % of Energy Mining Value Added embodied in EU27 Total Final Demand originated from Russia.

OECD countries with over one third of Energy Mining VA in total Final demand coming from Russia:

SVK (54%), LVA (52%), LTU (47%), HUN (44%), FIN (42%) and CZE (37%) i.e. neighbouring countries.

\*Coal (ISIC Division 05), Crude oil and gas (ISIC Division 06)

Includes indirect effects e.g. Russian energy VA embodied in manufactured goods imported from other countries

## ICIO/TiVA and the Russian invasion (III) Oil and gas

Russian/Belarus % share of total primary energy (Do5to6) VA in total Final Demand, 2020



Ongoing research and analysis **Challenges:** 

#### Data

- Under-reporting or confidential bilateral trade in oil and gas e.g. Russian exports, Germany imports from Russia.
- Separating oil (061) and gas (062) in ISIC Division 06 (SNA and SUTs)
- No Mining (Do5to9) split in many EU countries' SNA and SUTs

#### **Prices and quantities**

- Price effects (ICIO in current USD)
- Quantity units:
  - Natural gas: m<sup>3</sup>
     LNG = 700 Pipeline gas
  - Coal: tonnes
  - Crude oil: barrels



### Dependency on Russian primary energy products

Russian coal, oil and gas as % of total primary energy (D05t06) embodied in domestic final demand, in monetary and energy terms (2020) 100.0% \$ gas 90.0% 80.0% \$ oil e.g. Germany 70.0% 20% in USD terms \$ coal 40% in energy units 60.0% Energy gas 50.0% 40.0% Energy oil 30.0% Energy coal 20.0% 10.0% 0.0% BIP WARE SW IN WIN EN EST OF 20' WUNPP OF GRO FLAR SW WI TATUR HEY BE

Quantities to Energy units:

- Natural gas statistics are available in Terajoules
- 1 tonne of oil equivalent (TOE)
   = 41.868
   Gigajoules
- 1 tonne of hard coal = 29.308
   Gigajoules

Source: Energy sector split global IO model based on preliminary OECD ICIO 2022 edition

### PYP ICIO TABLES



## New: construction of ICIO tables in previous year's prices

Data Sources

#### Sébastien Miroudot et al

- Based on 2021 edition of OECD ICIO tables
- 65 economies, 45 industries, 1995-2018
- Same approach as in the WIOD project to convert tables into previous year's prices (see Los et al., 2014)
- Deflators for value added and gross output from KLEMS (35%), UN National Accounts (30%), STAN (25%), WIOD socio-economic accounts (10%)
- Final demand deflators from UN national accounts
- Balancing (RAS algorithm) after application of deflators. Some adjustment needed to avoid discrepancies between value added and gross output values (that impact intermediate consumption)
- Tables in previous year's prices allow chain-linking of TiVA indicators (i.e constant price structure with no base year)

## Import intensity of production 1995-2018

Cumulative trade in intermediate inputs as a share of gross final output



- Decrease in the fragmentation of production between 2011 and 2016 is more pronounced in current prices
- Remained at a high level, especially when taking a longer time perspective
- Significant divergence between the data in current and constant prices after 2011

Based on OECD ICIO tables and long-run WIOD tables in current and previous year's prices.

### Assumptions and additional treatment for deflators

#### Methodology based on pyp WIOT tables of WIOD team (Los et al, 2014)

- Missing value added and output deflators approximated by closest available aggregate
- Missing output deflators approximated by value added deflators
- Sectoral value added deflators weighted average constrained to GDP deflator
- Output deflators constrained to -10% to +10% of value added deflators
- Net taxes deflators approximated by value added deflators
- Deflators for taxes, subsidies, international transport margins etc. related to final demand approximated by GDP deflators
- Non-resident expenditure deflators approximated by household expenditure deflators
- NPISH and change in inventory deflators derived from output deflators



- No deflators available for bilateral transactions (blue area)
- Use RAS method to estimate unobserved volumes
- Constraints:  $z_{ii}^* + z_{ji}^* = q_i^* rz_i^* v_i^*$   $c_{ii}^* + c_{ji}^* = c_i^* rc_i^*$  $z_{ii}^* + z_{ij}^* + c_{ii}^* + n_{ii}^* + g_{ii}^* + f_{ii}^* + i_{ii}^* + c_{ij}^* + n_{ij}^* + g_{ij}^* + f_{ij}^* + i_{ij}^* = q_i^*$

				Final demand in Country 1						Final demand in Country 2					
	Using Countries / Industries		Households	Non-residents	NPISH	Government	GFCF	Changes in Inventories	Households	Non-residents	NPISH	Government	GFCF	Changes in Inventories	GO
Supplying	z <sup>*</sup> <sub>11</sub> = <b>z<sub>11</sub>/p</b> <sub>11z</sub>	z <sup>*</sup> <sub>12</sub> = <b>z<sub>12</sub>/p</b> <sub>12z</sub>	c <sup>*</sup> <sub>11</sub> = c <sub>11</sub> /p <sub>11c</sub>	nr <sup>*</sup> <sub>11</sub> = nr <sub>11</sub> /p <sub>11nr</sub>	n <sup>*</sup> <sub>11</sub> = n <sub>11</sub> /p <sub>11n</sub>	$g_{11}^* = g_{11}/p_{11g}$	<i>f</i> <sup>*</sup> <sub>11</sub> = <i>f</i> <sub>11</sub> /p <sub>11f</sub>	<i>i</i> <sup>*</sup> <sub>11</sub> = <i>i</i> <sub>11</sub> /p <sub>11i</sub>	c <sup>*</sup> <sub>12</sub> = c <sub>12</sub> /p <sub>12c</sub>	nr <sup>*</sup> <sub>12</sub> = nr <sub>12</sub> /p <sub>12nr</sub>	n <sup>*</sup> <sub>12</sub> = n <sub>12</sub> /p <sub>12n</sub>	$g_{12}^* = g_{12}/p_{12g}$	$f_{12}^* = f_{12}/p_{12f}$	$i_{21}^* = i_{12}/p_{12i}$	q <sup>*</sup> <sub>1</sub> = q <sub>1</sub> /p <sub>1</sub>
Industries	z <sup>*</sup> <sub>21</sub> = z <sub>21</sub> /p <sub>21z</sub>	z <sup>*</sup> <sub>22</sub> = z <sub>22</sub> /p <sub>22z</sub>	c <sup>*</sup> <sub>21</sub> = c <sub>21</sub> /p <sub>21c</sub>	nr <sup>*</sup> <sub>21</sub> = nr <sub>21</sub> /p <sub>21nr</sub>	$n_{21}^* = n_{21}/p_{21n}$	g <sup>*</sup> <sub>21</sub> = g <sub>21</sub> /p <sub>21g</sub>	$f_{21}^* = f_{21}/p_{21f}$	<i>i</i> <sup>*</sup> <sub>21</sub> = i <sub>21</sub> /p <sub>21i</sub>	c <sup>*</sup> <sub>22</sub> = c <sub>22</sub> /p <sub>22c</sub>	nr <sup>*</sup> <sub>22</sub> = nr <sub>22</sub> /p <sub>22nr</sub>	n <sup>*</sup> <sub>22</sub> = n <sub>22</sub> /p <sub>22n</sub>	g <sup>*</sup> <sub>22</sub> = <mark>g<sub>22</sub>/p<sub>22g</sub></mark>	$f_{22}^* = f_{22}/p_{22f}$	<i>i</i> <sup>*</sup> <sub>22</sub> = <b>i<sub>22</sub>/p</b> <sub>22i</sub>	q <sup>*</sup> <sub>2</sub> = q <sub>2</sub> /p <sub>2</sub>
Net Taxes	$rz_{1}^{*} = rz_{1}/p_{1rz}$	$rz_2^* = rz_2/p_{2rz}$	<i>rc</i> <sup>*</sup> <sub>1</sub> = <b>rc</b> <sub>1</sub> /p <sub>1rc</sub>	<i>rnr</i> <sup>*</sup> <sub>1</sub> = <b>rnr</b> <sub>1</sub> /p <sub>1rnr</sub>	$rn_1^* = rn_1/p_{1rn}$	$rg_1^* = rg_1/p_{1rg}$	$rf_1^* = rf_1/p_{1rf}$	ri <sup>*</sup> 1= ri1/p1ri	$rc_2^* = rc_2/p_{2rc}$	$rnr_2^* = rnr_2/p_{2rnr}$	$rn_2^* = rn_2/p_{2rn}$	$rg_{2}^{*} = rg_{2}/p_{2rg}$	$rf_2^* = rf_2/p_{2rf}$	<i>ri</i> <sup>*</sup> <sub>2</sub> = <b>ri</b> <sub>2</sub> /p <sub>12ri</sub>	
Value Added	v <sup>*</sup> <sub>1</sub> = v <sub>1</sub> /p <sub>1v</sub>	$v_{2}^{*} = v_{2}/p_{2v}$	0	0	0	0	0	0	0	0	0	0	0	0	
Gross Output	$q_{1}^{*} = q_{1}/p_{1}$	$q_{2}^{*} = q_{2}/p_{2}$	$c_{1}^{*} = c_{1}/p_{1c}$	$nr_{1}^{*} = nr_{1}/p_{1nr}$	$n_{1}^{*} = n_{1}/p_{1n}$	$g_{1}^{*} = n_{1}/p_{1g}$	$f_1^* = f_1/p_{1f}$	<i>i</i> <sup>*</sup> <sub>1</sub> = <b>i</b> <sub>1</sub> / <b>p</b> <sub>1i</sub>	$c_{2}^{*} = c_{2}/p_{2c}$	$nr_2^* = nr_2/p_{2nr}$	$n^{*2} = n_2/p_{2n}$	$g_{2}^{*} = n_{2}/p_{2g}$	$f_2^* = f_2/p_{2f}$	$i_{2}^{*} = i_{2}/p_{2i}$	
10/24/2022															

### ICIO/TIVA 2022 EDITION





- 1995 to **2020**
- 10 new countries:
  - Cameroon, Côte d'Ivoire, Egypt, Nigeria, Senegal: Africa-TiVA project with WTO and UNECA
  - Jordan: project with UNIDO
  - Ukraine and Belarus: reaction to Russian invasion
  - Bangladesh and Pakistan:  $5^{th}$  and  $8^{th}$  most populated countries (embodied CO<sub>2</sub>)
- Anomalies in 2021 edition, identified by users, have been addressed
- Preliminary ICIO tables and TiVA indicators
  - 1. Internal quality review at OECD
  - 2. Distribution to delegates and other key stakeholders for review
- Release imminent zipped R and CSV files (publication of TiVA on OECD.STAT will take longer)



#### Foreign value added share of gross exports, 1995-2020



**China**: peak 2004-2005 (24%). Since 2011 (post crisis peak), decline from 21% to 16.5%

**EU27**: (as single economy) steady rise from 9.5% in mid-1990s to 16%-17% in recent years.

**USA:** After pre- and post-crisis peaks of 12%-13%, FVA in EXGR in recent years about 9% similar to shares of late 1990s.

**ASEAN:** (as single economy): steady rise over from mid-1990s from 26% to 32%

**World average** of about 26% in recent years, lower than pre- and post-crisis peaks of 27%-28%..



Ē

#### Share of domestic value added meeting foreign final demand, 1995-2020



**China:** peak 2006-2007 (25%). Now below 15%, the share in 1995. Increase in output meeting domestic demand.

**EU27:** (as single economy) steady rise from 10.5% in mid-1990s to 17% in recent years.

**USA**: Relatively stable in recent years: 9%-10%. Above lows of about 7% in 2002-03.

**ASEAN:** (as single economy): After peak of 39% in 1998 (Asian crisis) steady fall to about 30% in recent years.

![](_page_42_Picture_0.jpeg)

- More detailed industry breakdown?
  - We have to compromise in ICIO construction based on industry coverage and availability and quality of statistics (SUTs, SNA, BoP etc.) across countries
- More timely estimates?
  - National Accounts constraints (many countries not able to publish full set in 2008 SNA format)
  - National Accounts (t+15 months), SUTs (t+36 months)
- More countries?
  - Working on this e.g. more African/Asian/European countries. Minimum data requirements for inclusion in ICIO tables. Stats capacity building exercises often required.

![](_page_43_Picture_0.jpeg)

## **Potential data tools for revisiting Gross Output-based KLEMS productivity measurement ?**

### Also, not just EMS breakdown but also imported v. domestically-produced intermediate inputs?

- Quality of indicators depends on quality of ICIO which, in turn, depends on quality and availability of underlying national stats and, the balancing and estimation techniques used
- Thanks to the help from experts from national statistical institutes, international and regional organisations and academia and, of course, many colleagues at OECD
- We strongly encourage feedback from users (especially apparent anomalies). Contact: <u>ICIO-TiVA.Contact@oecd.org</u>

### THANK YOU

### http://oe.cd/tiva-viz

![](_page_44_Picture_2.jpeg)

### ANNEX SLIDES

![](_page_45_Picture_1.jpeg)

![](_page_46_Picture_0.jpeg)

Ē

### New industries published in TiVA database

TiVA 2021				TiVA 2018		
	ISIC4 Code	Section	ISIC4 Code	Description		
Agriculture, hunting, forestry	D01T02			Agriculture bunting forestry and fishing	e.g. STI Ocean satellite	
Fishing	D03	A	DUTIU3	Agriculture, nunting, lorestry and listing	account project	
Chemical and chemical products	D20	CE		Chemicals and pharmasoutiast products	Monitor international flows	
Pharmaceuticals	D21	CF	D20121		of pharmaceuticals in GVCs	
Electricity, gas, steam and air conditioning supply	D35	D		Electricity, and water cumply converges wests and	Split energy supply from	
Water supply; sewerage, waste management and remediation activities	D36T39	E	D35T39	remediation services	other utilities: improved indicators related to embodied GHG emissions	
Land transport and transport via pipelines	D49					
Water transport	D50	н	D49T53		Better links to information on transport margins Also	
Air transport	D51			Transportation and storage	COVID impact analysis	
Warehousing and support activities for transportation	D52					
Postal and courier activities	D53				"Other business services"	
Professional, scientific and technical activities	D69T75	М		Other husiness sector services	covers many activities. Split	
Administrative and support services	D77T82	N	D09102	Other business sector services	to ISIC sections M and N.	
Arts, entertainment and recreation	D90T93	R		Arts, entertainment, recreation and other service	Split ISIC sections R and S.	
Other service activities	D94T96	S	D90190	activities	COVID impact analysis	

TiVA 2018 industry aggregates maintained in published database for continuity

![](_page_47_Figure_0.jpeg)

CB: Cross border; DP: Direct purchases; SNA:National Accounts; BOP: Balance of Payments; IO; Input-Output; SUT supply and use; TSA: Tourism Satellite Account; HC: Household consumption

### Geographical coverage – expansion plan (2021 to 2022 edition)

Africa	Morocco, South Africa, Tunisia + 5
Americas	Northern America (2), Latin America and Caribbean(7)
Asia	Eastern (5), South-Eastern (10), Southern (1+2) Kazakhstan, Western Asia (4+1)
Europe	Eastern (7 <mark>+ 2</mark> ), Northern (10), Southern (7), Western (7)
Oceania	Australia, New Zealand
Region groups	OECD38, Non-OECD, APEC, ASEAN, Eastern Asia, EU15, EU27, Euro Area19, North America(3), G20 etc.

Africa (5) Cameroon, Côte d'Ivoire Egypt, Nigeria, Senegal Asia (3) Bangladesh, Jordan, Pakistan Europe (2) Belarus, Ukraine

![](_page_48_Figure_3.jpeg)

![](_page_49_Picture_0.jpeg)

![](_page_49_Figure_1.jpeg)

### TRADE IN EMBODIED CO2

![](_page_50_Picture_1.jpeg)

OECD Trade in embodied CO<sub>2</sub> (TECO2) Database

2021 edition, <u>http://oe.cd/io-co2</u>:

- Long annual time-series of TECO2 indicators:
   1995 to 2018
- **66 countries** + "Rest of World" + region groups
  - All 38 OECD countries, all G20, all European Union and now, all ASEAN countries
- **45 industries** + industry aggregates
- Underlying format
  - 2008 SNA
  - ISIC Rev.4 based industry breakdown

## CO<sub>2</sub> emissions from fossil fuel combustion, demand-based and production-based, OECD v. non-OECD

Ę

![](_page_52_Figure_1.jpeg)

*Source*: Estimation based on OECD's Inter-Country Input-Output (ICIO) Database (2021) and IEA (2021): <u>http://oe.cd/io-co2</u>

## Per capita CO<sub>2</sub> emissions from fuel combustion

#### Emissions per capita, 2018, tonnes

![](_page_53_Figure_2.jpeg)

In 2018, average consumption per capita in OECD 3.2 times greater than in non-OECD.

![](_page_53_Figure_4.jpeg)

Between 2005 and 2018: Global emissions per capita + 6.5% World population + 16.2% Global emissions + 24.2%

### Emissions embodied in final products (1995–2018)

Total CO2 emissions embodied in domestically produced (blue) and imported (orange) final goods and services

![](_page_54_Figure_2.jpeg)

Emerging economies use more emissions for capital formation (e.g. infrastructure)

## Emissions embodied in final products (1995 – 2018)

Total CO2 emissions embodied in domestically produced (blue) and imported (orange) final goods and services

![](_page_55_Figure_2.jpeg)

### Emissions embodied in imports of manufactured goods, 2018

![](_page_56_Figure_1.jpeg)

From over 600 tonnes per USD million for Indonesia, India, Japan and Korea to 350-450 for European countries.

Depends on mix of imported intermediate inputs such as basic metals chemicals and minerals. Also transportation.

![](_page_57_Picture_0.jpeg)

- Yamano, N. and J. Guilhoto (2020), "CO2 emissions embodied in international trade and domestic final demand: Methodology and results using the OECD Inter-Country Input-Output Database", OECD Science, Technology and Industry Working Papers, No. 2020/11, OECD Publishing, Paris, https://doi.org/10.1787/8f2963b8-en
- Access to database: <u>http://oe.cd/io-co2</u>

### TRADE IN EMPLOYMENT

![](_page_58_Picture_1.jpeg)

![](_page_59_Picture_0.jpeg)

OECD Employment sustained by foreign final demand, by region, as a % of total employment, 2018

![](_page_59_Figure_2.jpeg)

Core indicators on OECD.STAT <u>http://oe.cd/io-emp</u>

51 countries for Employmentbased indicators
66 for Labour compensation 45 industries
Core years: 1995 to 2018
Final demand and export related indicators

![](_page_60_Picture_0.jpeg)

- Sources and methods: Horvát, P., C. Webb and N. Yamano (2020), "*Measuring employment in global value chains*", OECD Science, Technology and Industry Working Papers, No. 2020/01, OECD Publishing, Paris, <u>https://doi.org/10.1787/00f7d7db-en</u>
- Access to database: <u>http://oe.cd/io-emp</u>

### ANALYTICAL AMNE

![](_page_61_Picture_1.jpeg)

![](_page_62_Picture_0.jpeg)

#### Decomposition of value added content of exports, 2016

![](_page_62_Figure_2.jpeg)

Released July 2019 http://oe.cd/gvc-mne

> For each target country and industry: Domestic v. foreign ownership (also domestic MNEs v. non-MNEs)

- ) Fill gaps in official AMNE statistics
- 2) Reconcile AMNE figures with ICIO tables
- 3) Split and balance ICIO tables according to ownership

The methodology is described in: "*Multinational enterprises and global value chains: the OECD analytical AMNE database*", OECD Trade Policy Paper No. 211, 2018

#### Database update, 1995-2018, coming soon Analytical AMNE database Foreign affiliates' reliance on domestic sourcing

#### Sourcing structure of foreign affiliates, 2016

International sourcing more orientated towards manufactured goods

Ē

Domestic sourcing more orientated towards commercial services

Source:

http://oe.cd/gvc-mne

![](_page_63_Figure_4.jpeg)

![](_page_64_Picture_0.jpeg)

- Sources and methods: Cadestin, C., et al. (2018), "Multinational enterprises and global value chains: the OECD analytical AMNE database", OECD Trade Policy Papers, No. 211, OECD Publishing, Paris, <u>https://doi.org/10.1787/d9de288d-en</u>
- Alsamawi, A., et al. (2020), "Returns to intangible capital in global value chains: New evidence on trends and policy determinants", OECD Trade Policy Papers, No. 240, OECD Publishing, Paris, <u>https://doi.org/10.1787/4cd06f19-en</u>.

### **OTHER INDICATORS**

![](_page_65_Picture_1.jpeg)

Non-resident household expenditure and tourism

## In OECD ICIO tables: cross-border trade and non-resident household expenditure are separated → insights into international tourism and GVCs

Contribution of non-resident household expenditure to total exports, 2015, %

![](_page_66_Figure_3.jpeg)

OECD Tourism working paper: "Providing new OECD evidence on tourism trade in value added" (2019)

## Other ICIO-based contributions to discussions on meeting the SDGs ...

![](_page_67_Picture_1.jpeg)

### Joint work: ILO, IOM, OECD and UNICEF under "Alliance 8.7"

Launched at Paris Peace Forum 12 November 2019 by OECD Secretary General

**Preliminary estimates**. A key impact was <u>advocacy of the *potential* of using I-O analyses to inform policy makers on issues related to Child Labour and GVCs e.g. Child labour "hidden" in upstream in domestic supply chains.</u>