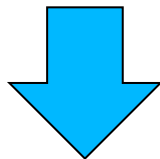


# Measurement of trade statistics

- Focus on trade in merchandise (not services)
- Trade statistics are collected by various international organizations from national sources (NSOs, customs, central banks)
- Basic principle: recorded when merchandise crosses the border
  - Disregards the origin of the intermediate products in the production of exports



- Double-counting

# Trade in Value Added (TiVA)

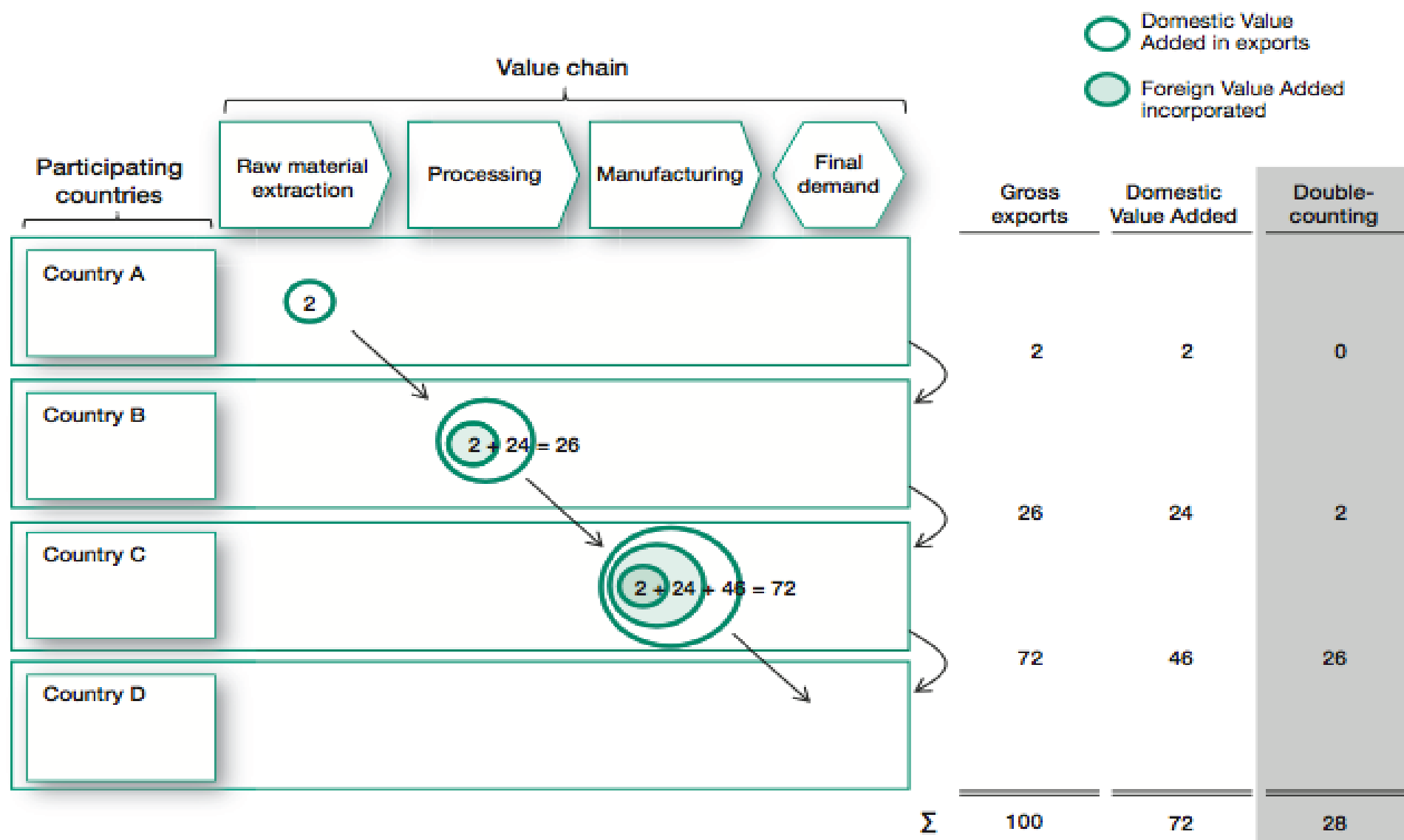
- Basic concept: measuring trade based on where value added (VA) is produced
  - Imported (foreign) VA will not be counted as exports
  - Addresses the problem with double-counting
- Overall trade balance with RoW will not change, but bilateral balances will change

Example: 2009 US trade balance in iPhones

	China	Japan	Korea, Rep. of	Germany	Rest of world	World
Traditional measure	-1,901.2	0	0	0	0	-1,901.2
Value added measure	-73.5	-684.8	-259.4	-340.7	-542.8	-1,901.2

Source: Maurer, 2011; Meng and Miroudot, 2011; and Xing and Detert, 2010.

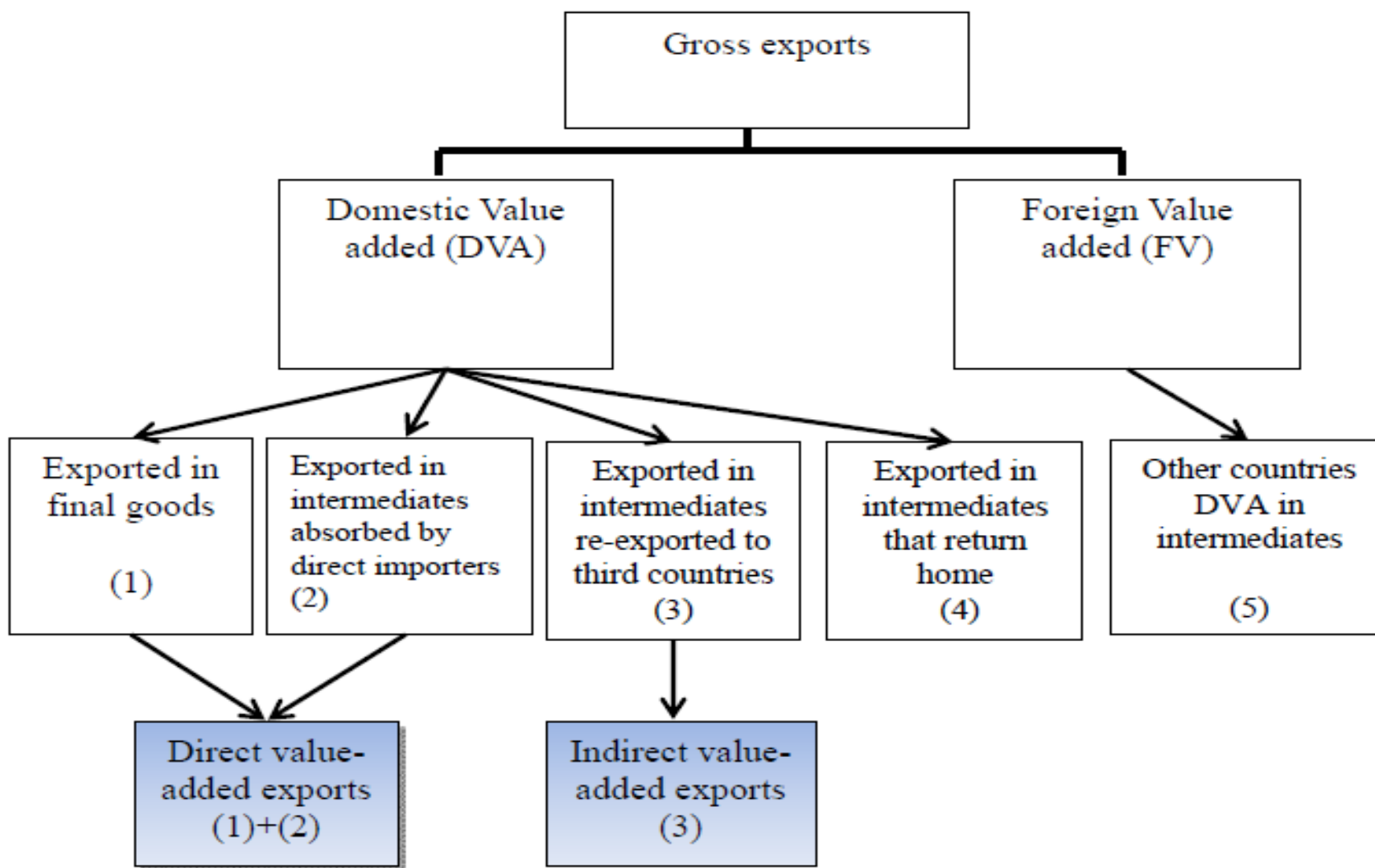
# Trade in value added, an illustration



# Benefits of TiVA

- Understand how and where domestic value added is created by exporters
- Understand how trade contributes to economic growth and competitiveness
- Understand how upstream domestic industries contribute to exports (e.g. services)
- Understand trade (im)balances in value added terms
- Understand the links between trade and employment, i.e. where jobs are created and which domestic industries are involved
- Provide policy makers a better understanding of potential impacts of macroeconomic shocks on trade (e.g. the 2008/09 financial crisis);
- Understand the environmental impact of trade, the potential impact of trade on climate change

# TiVA framework of indicators



# GVC participation

Need to distinguish between:

- Forward linkages (downstream participation) – measured by DVX
- Backward linkages (upstream participation) – measured by FVA
- GVC participation index:

$$GVC_{\text{Participation}} = \frac{DVX + FVA}{GE}$$

**ESTIMATING TIVA**

# 1. National IOTs

- Ideally adapted from national SUTs
  - Assumptions needed
- Simplified IOT:

		Producers as Consumers								Final Demand			
		Agriculture	Mining	Const.	Manuf.	Trade	Transp.	Services	Other	Personal Consumption Expenditures	Gross Private Domestic Investment	Govt. Purchases of Goods and Services	Net Exports of Goods and Services
Producers	Agriculture												
	Mining												
	Const.												
	Manuf.												
	Trade												
	Transp.												
	Services												
	Other												
Value Added	Employees	Employee compensation								Gross Domestic Product			
	Business Owners and Capital	Profit-type income and capital consumption allowance											
	Government	Indirect business taxes											

Source: Miller and Blair, 2009.



# 2. Build regional/international IOT

Requirements:

- National IOTs
- National accounts time series
- Bilateral trade data
- Assumptions

		Intermediate use		Final demand		Gross output
		Country A	Country B	Country A	Country B	
		Industry	Industry	Industry	Industry	
Contry A	Industry	Intermediate use of domestic output	Intermediate use of B of exports from A	Final use of domestic output	Final use by B of exports from A	Xa
Country B	Industry	Intermediate use of A of exports from B	Intermediate use of domestic output	Final use by A of exports from B	Final use of domestic output	Xb
Value added		Va	Vb			
Gross input		Xa	Xb			

Source: UNCTAD, 2013a.

# 3. Estimation of TiVA

- To estimate TiVA (T= VLE) we need:
  - V - Value added from international IOT
  - L - Leontief inverse based on technology assumptions between industries
  - E - Export data
- T is matrix and it gives us:
  - Diagonal elements – DVA
  - Off-diagonal column elements – FVA
  - Off-diagonal row elements – DVX

$$\begin{pmatrix} \hat{T}_{11} & \cdots & \hat{T}_{1N} \\ \vdots & \ddots & \vdots \\ \hat{T}_{N1} & \cdots & \hat{T}_{NN} \end{pmatrix} = \begin{pmatrix} v_1 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & v_N \end{pmatrix} \begin{pmatrix} L_{11} & \cdots & L_{1N} \\ \vdots & \ddots & \vdots \\ L_{N1} & \cdots & L_{NN} \end{pmatrix} \begin{pmatrix} e_{1*} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & e_{N*} \end{pmatrix}$$

# **TIVA ESTIMATES AND ANALYSIS**

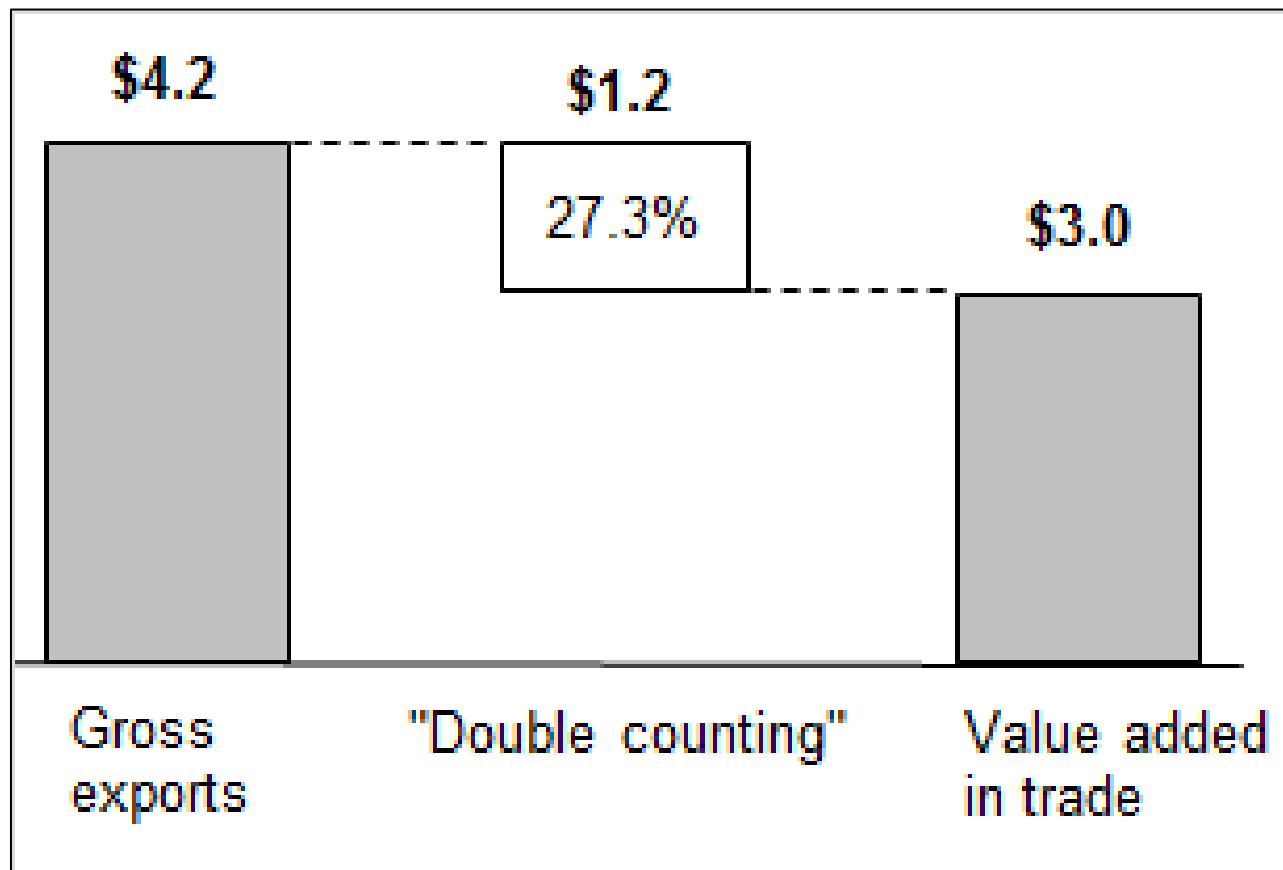
# Current initiatives

Project	Institution	Data years	Total number of economies included	Number of regional ESCAP Members and Associate Members included
UNCTAD-Eora GVC Database	UNCTAD and University of Sydney	1990-2011	187	44
OECD-WTO TiVA Database	OECD and WTO	1995, 2000, 2005, 2008, 2009, 2010, 2011	57	17

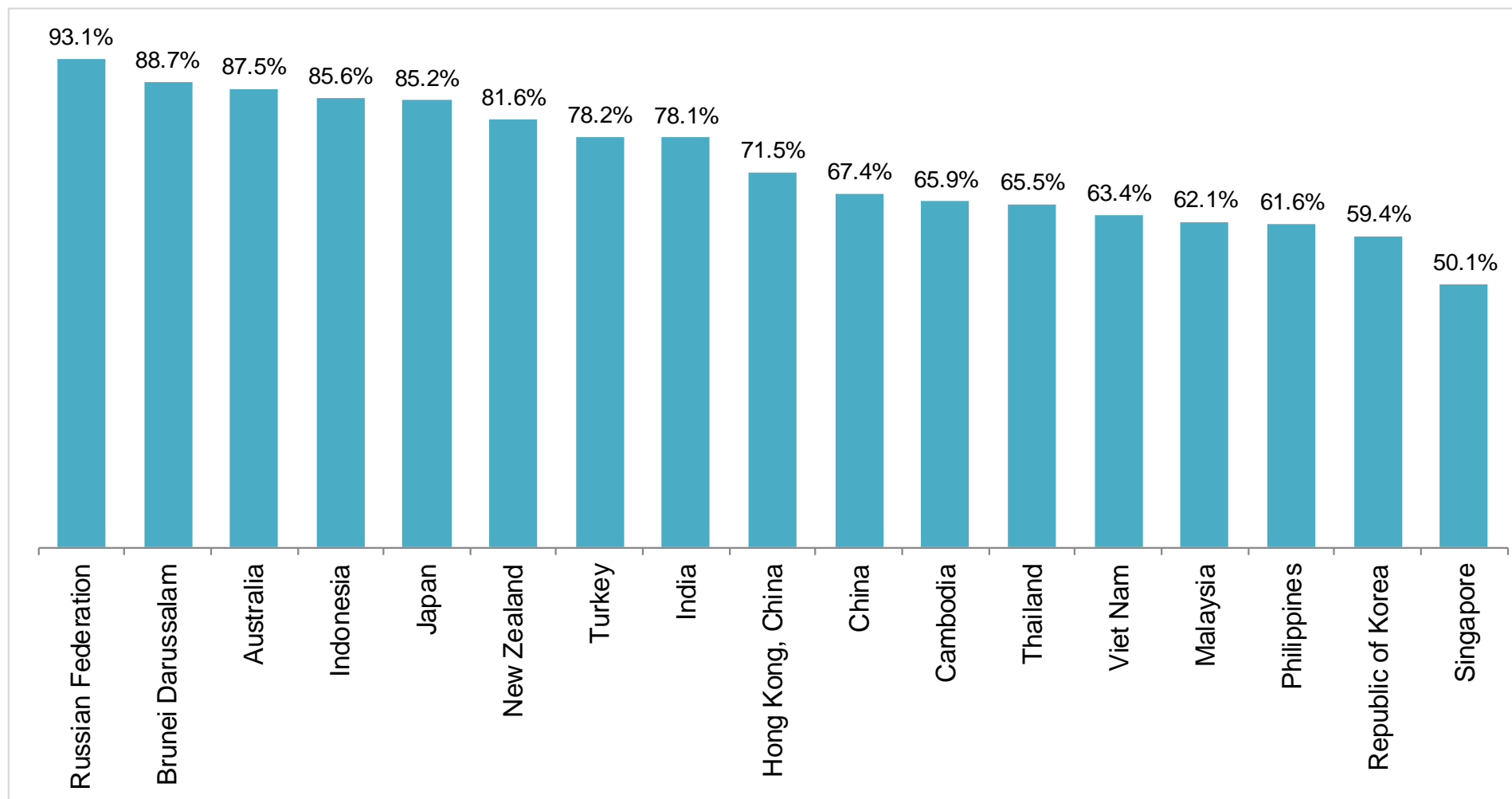
- ESCAP economies included in OECD-WTO database:
  - OECD members (5): Australia, Japan, New Zealand, Republic of Korea, and Turkey
  - Other (12): Brunei Darussalam, Cambodia, China, India, Indonesia, Malaysia, Philippines, Russian Federation, Singapore, Thailand, Viet Nam, and Hong Kong, China
- Represent approximately 95% of region's GDP and total exports of merchandise in 2009

# Analysis of TiVA for ESCAP region

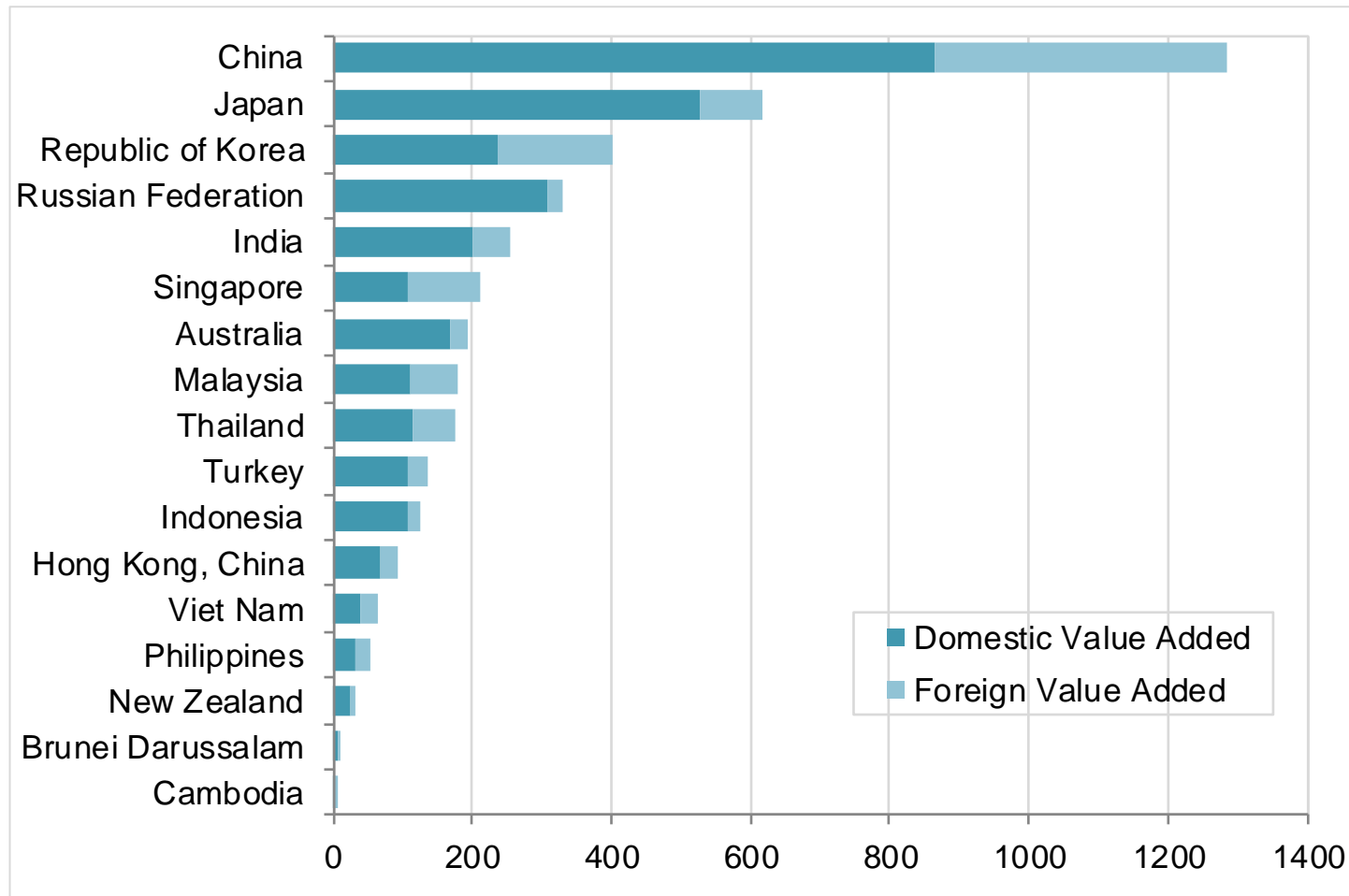
Disaggregation of gross exports for 17 ESCAP economies in Asia-Pacific, 2009 in trillion US\$



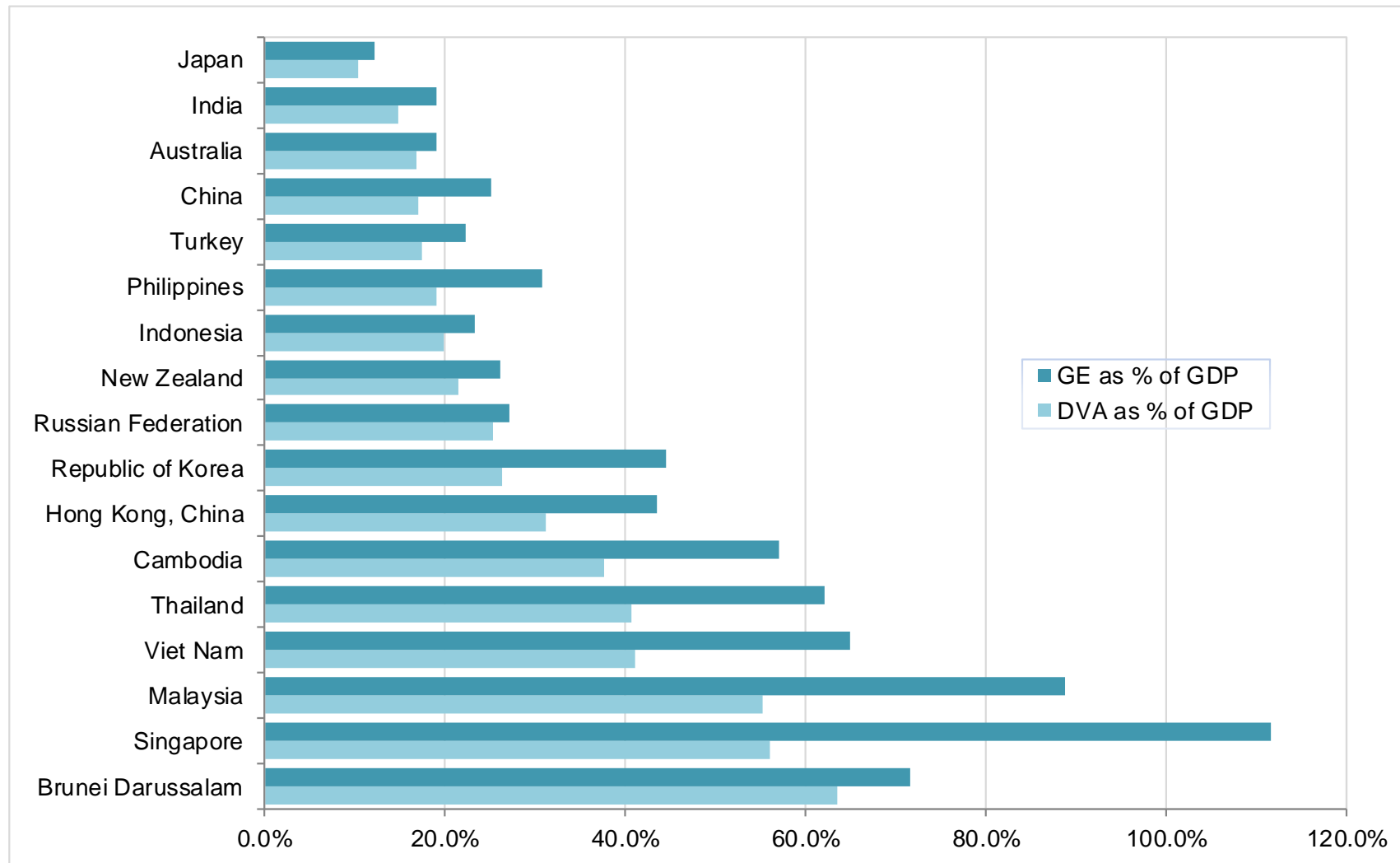
# Shares of domestic value added in gross exports



# Values of the domestic and foreign value added embodied in gross exports



# Domestic value added (DVA) and Gross Exports (GE) as a percentage of GDP





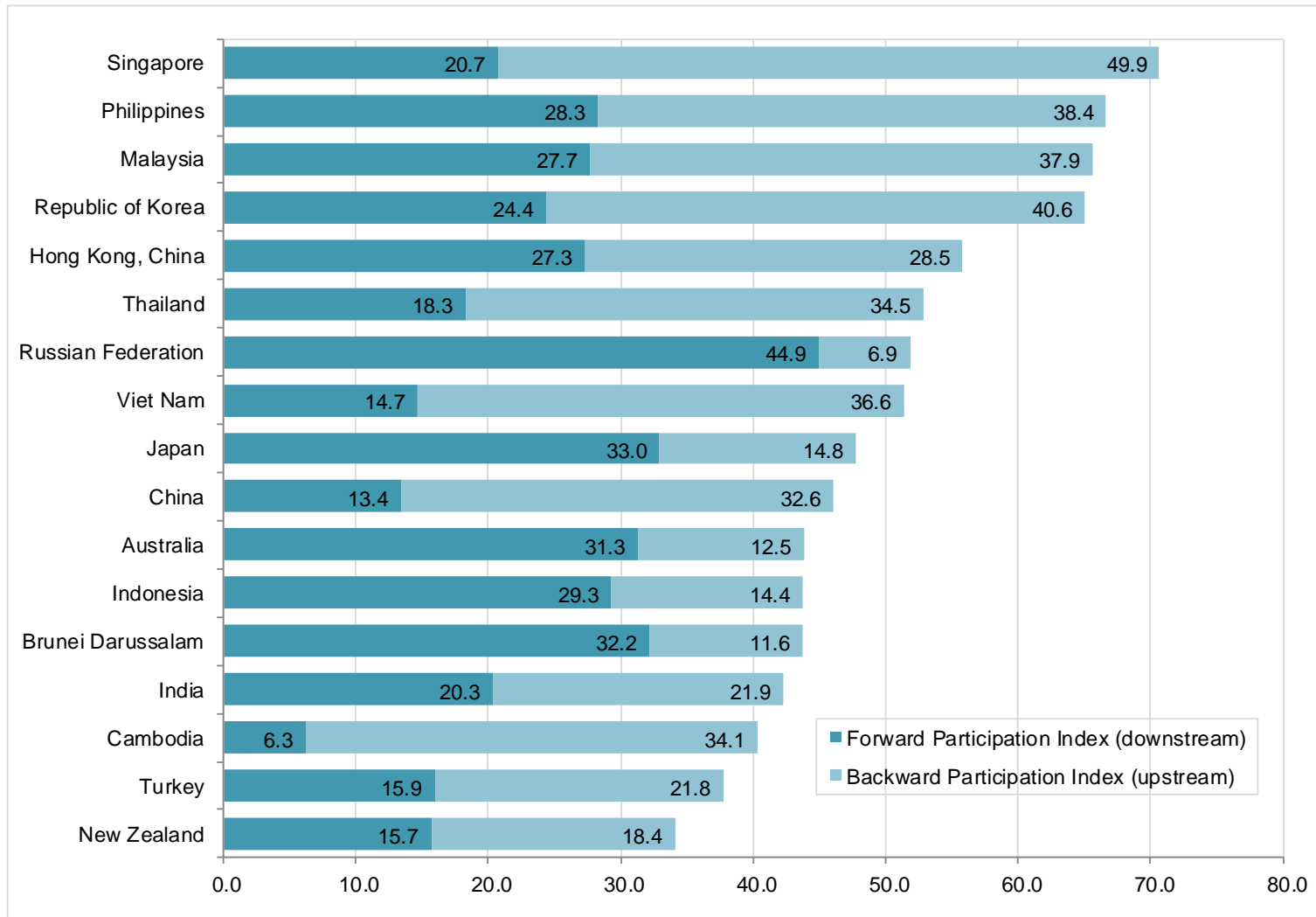
# Domestic value added in gross exports ratios by industry

Industry	Domestic value added in gross exports ratio (%)
Agriculture, hunting, forestry and fishing	87.1
Mining and quarrying	91.2
Food products, beverages and tobacco	81.4
Textiles, textile products, leather and footwear	76.5
Wood, paper, paper products, printing and publishing	75.5
Chemicals and non-metallic mineral products	65.3
Basic metals and fabricated metal products	72.3
Machinery and equipment, nec	71.4
Electrical and optical equipment	59.4
Transport equipment	74.6
Manufacturing nec; recycling	69.8
Electricity, gas and water supply	86.0
Construction	77.1
Wholesale and retail trade; Hotels and restaurants	86.4
Transport and storage, post and telecommunication	77.0
Financial intermediation	85.8
Business services	83.8
Other services	88.6
Total	72.8

# Each industry as a percentage of gross exports (GE) and their domestic value added (DVA) to gross exports (GE) ratios for Australia and China

Industry	Australia		China	
	Percentage in GE	DVA to GE ratio	Percentage in GE	DVA to GE ratio
<b>Agriculture, hunting, forestry and fishing</b>	4.3	96.1	6.4	86.1
<b>Mining and quarrying</b>	33.4	90.9	8.0	34.8
<b>Food products, beverages and tobacco</b>	3.2	97.7	1.8	87.9
<b>Textiles, textile products, leather and footwear</b>	0.5	82.3	6.9	92.6
<b>Wood, paper, paper products, printing and publishing</b>	1.4	81.5	2.7	70.8
<b>Chemicals and non-metallic mineral products</b>	3.8	67.3	10.6	67.1
<b>Basic metals and fabricated metal products</b>	7.5	80.9	7.3	71.4
<b>Machinery and equipment, nec</b>	1.5	73.0	4.0	73.8
<b>Electrical and optical equipment</b>	1.6	57.1	15.1	65.1
<b>Transport equipment</b>	1.3	79.5	2.1	74.0
<b>Manufacturing nec; recycling</b>	0.4	80.7	3.3	83.1
<b>Electricity, gas and water supply</b>	1.5	85.2	2.3	73.3
<b>Construction</b>	1.5	94.7	0.3	29.9
<b>Wholesale and retail trade; Hotels and restaurants</b>	7.4	82.8	10.3	73.9
<b>Transport and storage, post and telecommunication</b>	10.9	89.1	4.7	53.6
<b>Financial intermediation</b>	4.3	88.3	4.4	73.7
<b>Business services</b>	12.5	90.0	7.8	41.1
<b>Other services</b>	3.2	91.6	2.0	70.4
<b>Total</b>	100.0	87.5	100.0	67.4

# Forward and backward GVC participation indices



# Challenges with TiVA

- Absence of adequate SUTs and/or IOTs severely limits the availability and accuracy of value added estimates.
- Lack of statistical capacity, particularly to construct and update SUTs/IOTs
- Many economies in Asia-Pacific are not included in the current regional/international IOTs
- SUTs/IOTs might not be updated very regularly
- Violation of assumptions might cause under/over estimation of TiVA
- Methodology development for estimating TiVA