



Session 1

Levelling-up: statistics

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*Workshop on 'carbon content',
Hamburg, 21-23 February 2024
Session 1 'levelling up'*

Content

statistical basics related to ...

- economy (production and consumption patterns)
- greenhouse gas emissions
- environmental-economic modelling (Leontief-type)

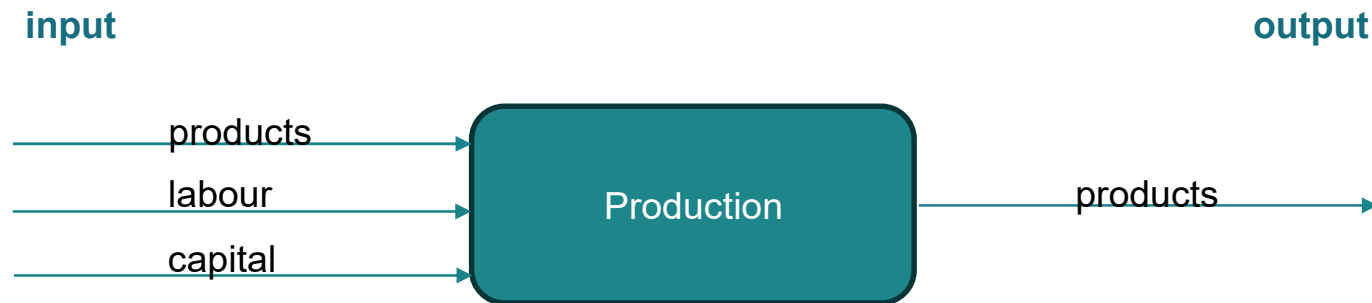
National accounts

National Accounts

- ... quantitative description of national economies
- ... to analyse economic structures and development
- ... complete, coherent, and comparable
- ... internationally harmonised guidelines ([ESA](#), SNA)
- ... wide range of indicators; e.g. gross domestic product (GDP)
- The input-output (I-O) framework portrays in detail the transactions of all goods and services between industries and final consumers.
- Eurostat compiles European accounts from EU members' data.

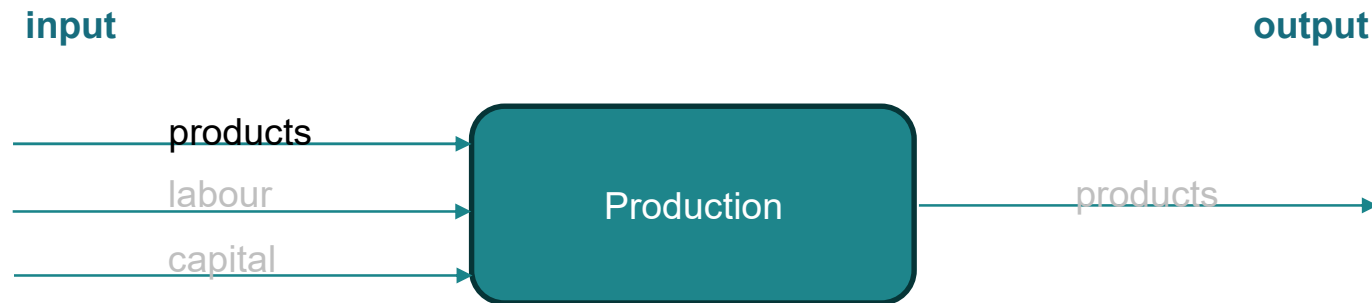
Production (1)

- Production = an activity carried out under the control, responsibility and management of an institutional unit that uses labour, capital and products to produce outputs of products.



Consumption (1) - types

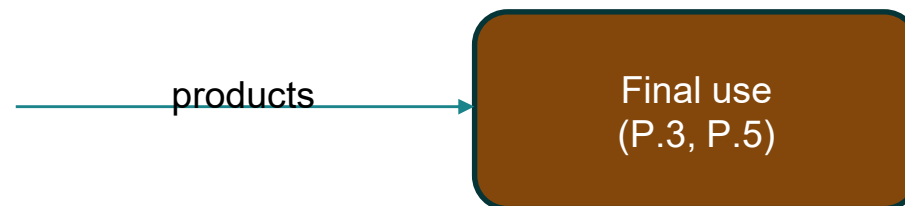
- Intermediate consumption, (P.2) consists of goods and services consumed as inputs to a production process, excl. the consumption of fixed assets.



Consumption (2)

Final uses:

- Final consumption expenditure (P.3) expenditure on goods and services used by households, NPISHs* and government to satisfy individual and collective needs.
- Gross capital formation (P.5) consists of gross fixed capital formation (P.51g), changes in inventories (P.52), and acquisitions less disposals of valuables (P.53).



T-account: ...representing production activity of

- enterprise
- grouping of enterprises (industries)
- total economy

	Use (Inputs)		Resources (Outputs)	
Interm. consumption =>	Product A	200	Product C	500
	Product B	50		
Value added =>	Labour	150		
	Capital	100		
	Sum of inputs	500	= output	500

Supply table: ...representing output-side of all production activities (industries)

	Industry A	Industry B	Industry C	Σ
Product A	250			250
Product B		250		250
Product C			500	600
Σ	250	250	500	1100

Use table: ...representing input-side of production activities (industries)

	Industry A	Industry B	Industry C
Product A	-	40	200
Product B	50	-	50
Product C	30	70	-
Labour	120	100	150
Capital	50	40	100
Σ	250	250	500

Use table: ...representing input-side of production activities (industries) & final use

	Industry A	Industry B	Industry C
Product A	-	40	200
Product B	50	-	50
Product C	30	70	-
Labour	120	100	150
Capital	50	40	100
Σ	250	250	500

Final use
10
150
400

Σ
250
250
500

--

1000

Symmetric input-output table (IOT)

- ...is derived from supply and use table (SUT),
- assumption: each industry produces one product
 - product by product ($p \times p$)
 - industry by industry ($i \times i$)

Symmetric input-output table (IOT)

	Product A	Product B	Product C
Product A	-	40	200
Product B	50	-	50
Product C	30	70	-
Labour	120	100	150
Capital	50	40	100
Σ	250	250	500

Final use
10
150
400
560

Σ
250
250
500
1000

Inter-country tables

- Integrate IOTs or SUTs of multiple countries
- connected through trade matrices
- representing global economy (production and consumption)
- => tracing the production chain of products going to final use

Inter-country IO table

FIGARO IC-IOI at basic prices		Intermediate use									Final use									Total Use (TU)
		Country A			Country B			Country C			Country A			Country B			Country C			
		Product 1	...	Product 64	Product 1	...	Product 64	Product 1	...	Product 64	Fd1	...	Fd5	Fd1	...	Fd5	Fd1	...	Fd5	
Country A	Product 1																			
	...																			
	Product 64																			
Country B	Product 1																			
	...																			
	Product 64																			
Country C	Product 1																			
	...																			
	Product 64																			
Value added (B1G)																				
Compensation of employees (D1)																				
Gross operating surplus (B2A3G)																				
Other net taxes on production (D29X39)																				
Output (P1)																				
Key:	Cross-border flows of intermediate goods and services									Cross-border flows of final goods and services										
	Domestic flows of intermediate goods and services									Domestic flows of final goods and services										

Measurement units

- all transactions can be considered kind of 'physical volumes'

Volume x Price

- comparability: expressed in monetary values, e.g. € or \$
- Note: basic prices vs. purchaser prices
- Deflated prices => chain linked volumes

National Accounts' concept of residence:

- An economic unit is said to be a **resident unit** of a country when it has a centre of economic interest in the economic territory of that country, that is, when it engages for an extended period (1 year or more) in economic activities in that territory.

Classifications:

- Production activities: ISIC, NACE
- Products: CPC, CPA
 - Eurostat: 64
 - OECD: 44
- Final use: 2-5 types

Data sources: SUT, IOT, inter-country tables

- [Eurostat](#)
- [OECD](#)

Emissions of greenhouse gases (GHG)

- emissions vs. concentration
- measurement unit
- substances
- scope (anthropogenic vs. natural)
- estimation vs. measuring => general emission model
- international data sources (at country level)

emissions vs. concentration

- emissions = flux (amount flowing from A to B in a given time period)
- measurement unit: e.g. tonnes per year

- concentration = (amount in a given volume)
- measurement unit: e.g. kg per cubic metre

Greenhouse gases

code	label	global warming potential (in CO ₂ equivalents)
CO ₂	Carbon dioxide	1
N ₂ O	Nitrous oxide	28
CH ₄	Methane	265
FGAS - HFC - PFC - SF ₆ - NF ₃	Fluorinated gases: - Hydrofluorocarbons - Perfluorocarbons - Sulphur hexafluoride - Nitrogen trifluoride	2 - 23 500

scope (anthropogenic vs. natural)

- only anthropogenic emission and removals
- emissions from natural sources (e.g. volcanos, forest fires etc.) are excluded in general
- emissions/removals from managed land are considered anthropogenic
- CO₂ emissions from biomass combustion are recorded separately (memo item)

estimation (calculation) vs. measuring (metering)

- GHG emissions at the level of national economies are not metered or measured – they **need to be estimated** (i.e. calculated)
- **General emission model:**

$$\text{Emissions (E)} = \text{Activity Data (AD)} \times \text{Emission Factor (EF)}$$

- Activity data (AD): **<= statistics**
 - ca. 80-90% = energy statistics
 - ca. 10-20% = non-energy statistics, e.g.: agriculture, production (cement, steel), etc.
- Emission Factor (EF): **<= scientific literature (IPCC)**
 - technology dependant

Data (GHG emissions at country level)

1. Greenhouse gas emission inventories



UN Framework Convention on Climate Change (UNFCCC)
Ministries => Environment Agencies

2. Air emissions accounts

3. => IO modelling 'emission footprints'



International Statistical System

Data (GHG emissions at country level)

1. Greenhouse gas emission inventories

2. Air emissions accounts

3. => modelling 'air emission footprints'

Commonalities:

- general emission model
- substances
- scope
- measurement units

Data (GHG emissions at country level)

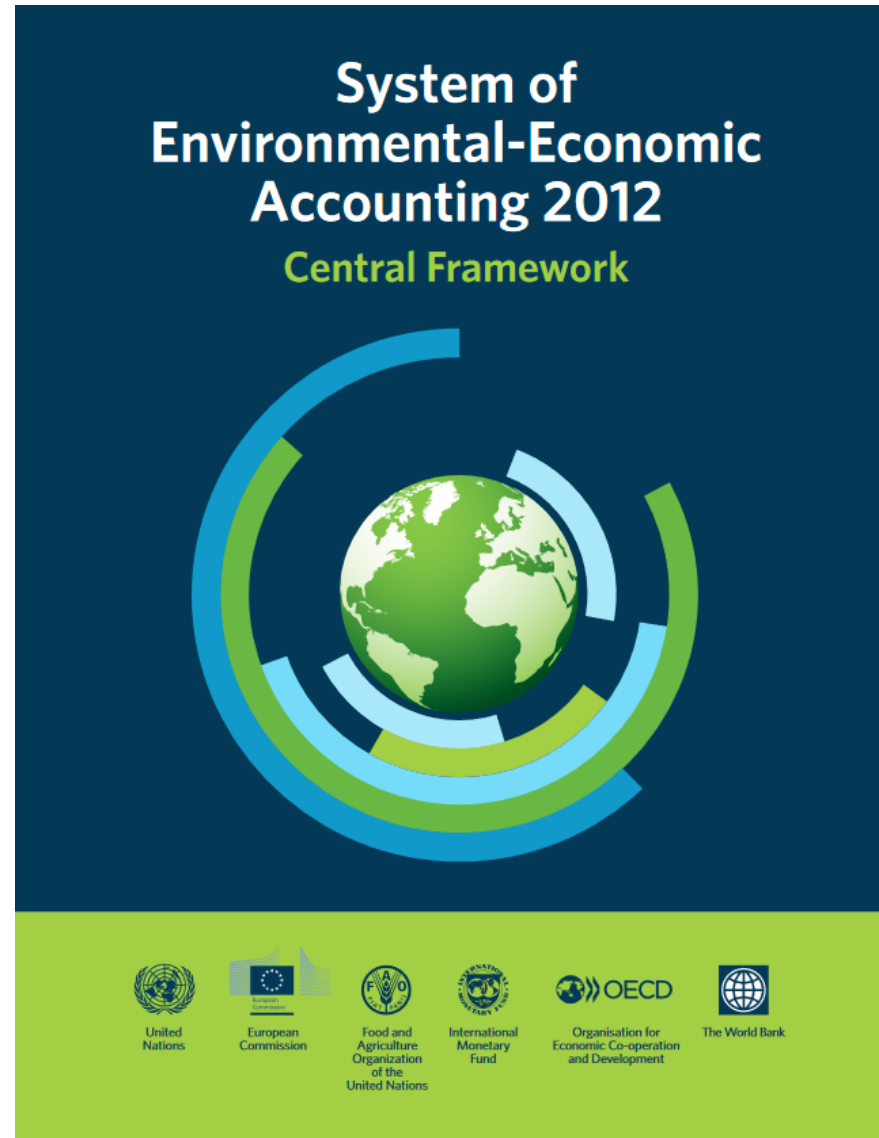
1. Greenhouse gas emission inventories
 - territorial perspective (fuel sales)
2. Air emissions accounts
 - production perspective
3. => modelling 'air emission footprints'
 - consumption perspective

Linking economic & environmental accounts

Linking economic & environmental accounts

System of Environmental-Economic Accounting – Central Framework

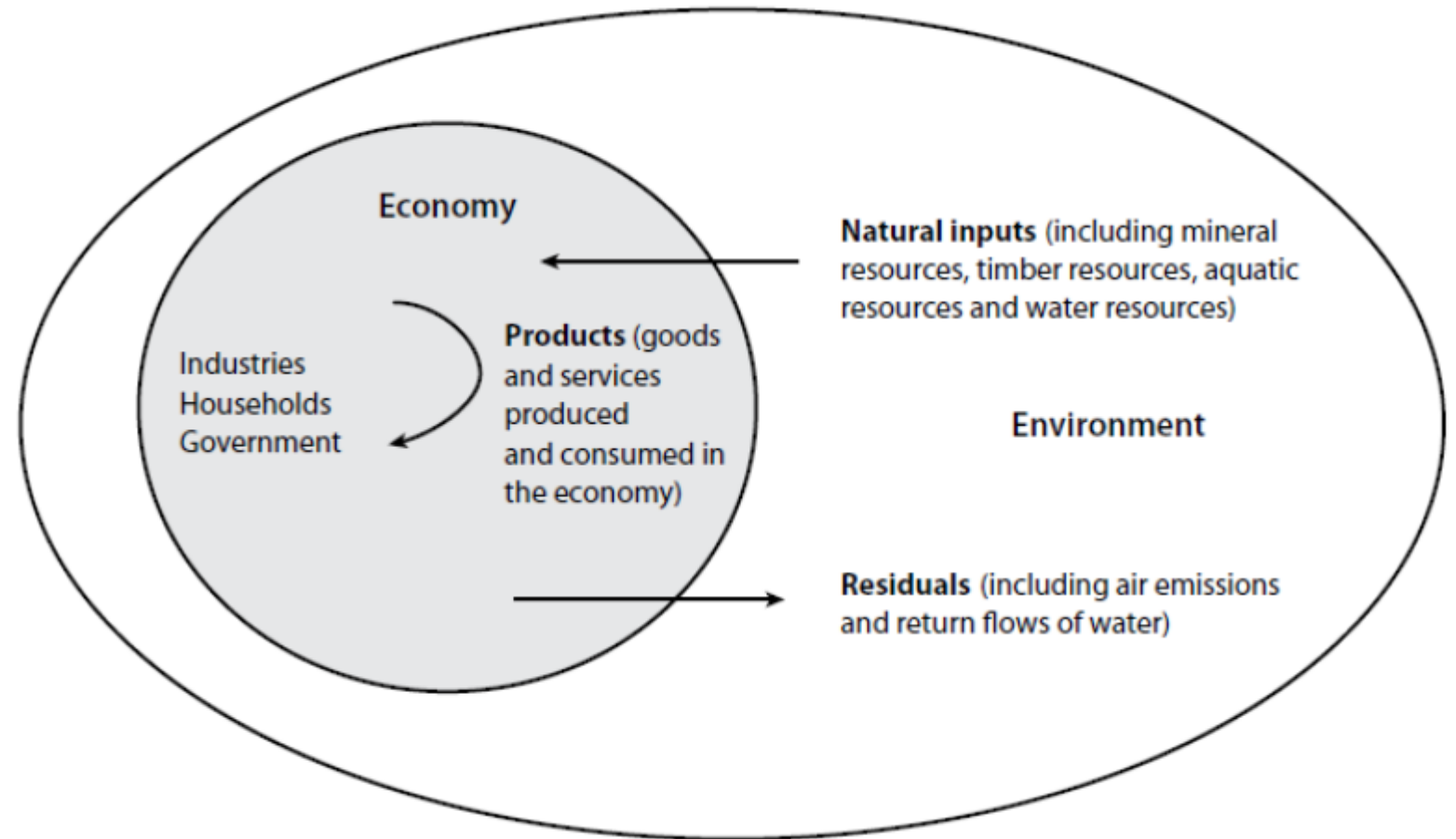
Important:
organise environmental data
compatible to national accounts



Linking economic & environmental accounts

Physical flows:

- Products
- Natural inputs
- Residuals



Environmental-economic modelling

- Leontief type Input-Output model
- Final use =
 - ultimate economic driver
 - determining level of production activity in all industries

Input-output modelling

	Product A	Product B	Product C
Product A	-	40	200
Product B	50	-	50
Product C	30	70	-
Labour	120	100	150
Capital	50	40	100
Σ	250	250	500

↑ ? ↑ ? ↑ ?

Final use	Σ
10	250 ↑ ?
150	250 ↑ ?
400	500 ↑ ?
560	1000

+10%
=> other products?

Input-output modelling

	Product A	Product B	Product C
Product A	-	40	200
Product B	50	-	50
Product C	30	70	-
Labour	120	100	150
Capital	50	40	100
Σ	250	250	500

Final use	Σ
10	250
150	250
400	500
560	1000

1 unit
=> other products?

Environmentally extended IO modelling

	Product A	Product B	Product C
Product A	-	40	200
Product B	50	-	50
Product C	30	70	-
Labour	120	100	150
Capital	50	40	100
Σ	250	250	500

CO2	50	40	10
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Final use	Σ
10	250
150	250
400	500

1 unit
=> CO2?

560	1000
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20	70
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Thank you



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