Socio-economic and environmental accounts in an input-output table

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SEVENTH FRAMEWORK PROGRAMME

Why SE and Env Accounts?

➢ Greatly enhances the type of questions that can asked from national or world input-output data

 ➢ Distributional issues: e.g. which production factors benefit from international trade: unskilled labour, skilled labour or capital?

 ➢ In which production factors does a country have a comparative advantage?

 ➢ Net emissions: how much CO_2 is produced *and* consumed in a country?

 ➢ How much water and land is embodied in international trade?

Content

➢ Based on experience within the World KLEMS (worldwide initiative to built comparable productivity accounts) and WIOD projects

➢ There is no universal method:

  ➢ much depends on local data situation,

  ➢ *and* the type of questions asked

➢ Will highlight some issues that appear to be challenging for

  ➢ Breakdown into compensation for labour and capital within framework of National Accounts

  ➢ Environmental accounts

Dataflows and construction steps in WIOT

Public statistics	National accounts (time-series)	Supply and use tables (infrequent)	International trade statistics (time-series)

For each country

> Total Final demand by type
> Total Export/Import
> Value added by industry
> Gross output by industry

> Supply (Basic price)
> Use (Purchasers' price)

> Imports and exports on bilateral basis
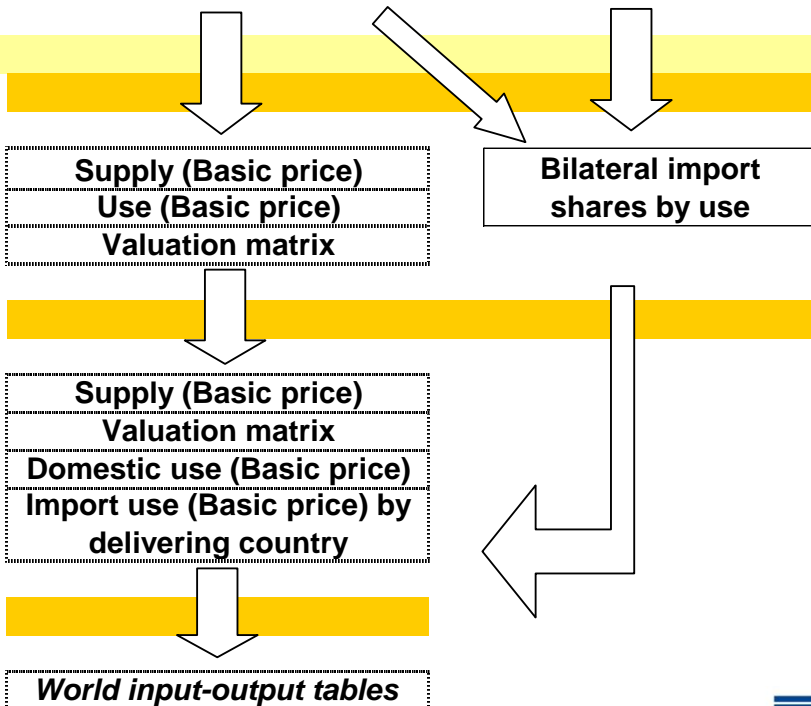> - of goods
> - of services

Harmonisation

Estimation

Time series for each country

> Supply (Basic price)
> Use (Basic price)
> Valuation matrix

> Bilateral import shares by use

Estimation

Time series for each country

> Supply (Basic price)
> Valuation matrix
> Domestic use (Basic price)
> Import use (Basic price) by delivering country

Estimation

Time series

> *World input-output tables*

Sources and construction

- **World Input-Output Table (WIOT)**
  - Harmonising national supply and use tables (SUTs)
  - Estimating time-series of SUTs consistent with industry gross output and value added, and final demand categories from the National Accounts (based on SUT-RAS method, Temurshoev and Timmer 2011)
  - Breakdown of imports by partner country using (extended) BEC, based on HS 6-digit bilateral trade data from UN COMTRADE
  - Transform international SUTs into WIOT using "fixed product-sales structure"
- **Factor inputs**: value added shares taken from EU KLEMS database plus additional specific country sources (labour force, household surveys etc)

Figure 3 Schematic outline of National Supply-Use table

	Supply *Product*	Intermediate use *Industry*	Final use		Total
Product		Intermediate use (I)	Domestic final use (F)	Exports (E)	Total use by product (U)
Industry	Domestic supply (S^D)				Total output by industry (GO)
Rest of World	Imports (M)				
		Value added (VA)			
	Total supply by product (S)	Total input by industry			

Figure 4 Schematic outline of International Supply-Use table

		Supply *Product*	Intermediate use *Industry*	Final use			Total
country A	*Product*		Intermediate use of domestic output	Domestic final use of domestic output	Exports		Total use of domestic output
Rest of World (RoW)	*Product*		Intermediate use of imports	Domestic final use of imports	Re-exports of imports		Total use of imports
country A	*Industry*	Domestic supply					
Rest of World (RoW)		Imports					
		Total supply					
			Value added				
			Output				

Figure 6 World Supply-Use table for three regions

		Country A Supply *Product*	Country B Supply *Product*	Rest of World Supply *Product*	Country A Intermediate use *Industry*	Country B Intermediate use *Industry*	Rest of World Intermediate use *Industry*	Country A Final domestic use	Country B Final domestic use	Rest of World Final domestic use	Total
Country A	*Product*				Intermediate use of domestic output	Intermediate use by B of imports from A	Intermediate use by RoW of imports from A	Final use of domestic output	Final use by B of exports from A	Final use by RoW of exports from A	Output in A
Country B	*Product*				Intermediate use by A of imports from B	Intermediate use of domestic output	Intermediate use by RoW of imports from B	Final use by A of exports from B	Final use of domestic output	Final use by RoW of exports from B	Output in B
Rest of World (RoW)	*Product*				Intermediate use by A of imports from RoW	Intermediate use by B of imports from RoW	Intermediate use of domestic output	Final use by A of exports from RoW	Final use by B of exports from RoW	Final use of domestic output	Output in RoW
country A	*Industry*	Domestic supply									
Country B	*Industry*		Domestic supply								
Rest of World (RoW)	*Industry*			Domestic supply							
Country A			Imports	Imports							
Country B		Imports		Imports							
Rest of World		Imports	Imports								
Total		Total supply	Total supply	Total supply							

Value added	Value added	Value added
Output in A	Output in B	Output in RoW

World input-output table
(3 regions, industry-by-industry type)

		Country A Intermediate *Industry*	Country B Intermediate *Industry*	Rest of World Intermediate *Industry*	Country A Final domestic	Country B Final domestic	Rest of World Final domestic	Total
Country A	*Industry*	Intermediate use of domestic output	Intermediate use by B of exports from A	Intermediate use by RoW of exports from A	Final use of domestic output	Final use by B of exports from A	Final use by RoW of exports from A	Output in A
Country B	*Industry*	Intermediate use by A of exports from B	Intermediate use of domestic output	Intermediate use by RoW of exports from B	Final use by A of exports from B	Final use of domestic output	Final use by RoW of exports from B	Output in B
Rest of World (RoW)	*Industry*	Intermediate use by A of exports from RoW	Intermediate use by B of exports from RoW	Intermediate use of domestic output	Final use by A of exports from RoW	Final use by B of exports from RoW	Final use of domestic output	Output in RoW
		Value added	Value added	Value added				
		Output in A	Output in B	Output in RoW				

Figure 7 Schematic outline of extended National Supply-Use table

	Supply *Product*	Intermediate use *Industry*	Final use		Total
Product		Intermediate use	Domestic final use	Exports	Total use by product
Industry	Domestic supply				Total output by industry
	Imports				
		Labour by type			
		Capital by type			
		Profit			
	Total supply by product	Total input by industry			
		Energy use (by type)			
		Air emissions			
		Natural resources			

Breakdown of value added: labour

➢ Breakdown into compensation for labour and capital within framework of National Accounts

➢ Typically need additional data from labour force or household surveys

➢ Compensation for labour by skill type

  ➢ Breakdown by educational attainment (ISCED-classification), age, gender. Alternative: occupational data

  ➢ Cost of labour, incl. wages but also additional costs to employers

  ➢ Need for estimating compensation for self-employed

  ➢ Jobs vs. persons engaged vs hours

  ➢ NB Always ensure consistency: wage times quantity = value

  ➢ Skill distributions and premia move slowly, no need for annual data

Breakdown of value added: capital

➢ Capital compensation is calculated as residual: value added minus labour compensation

➢ It is the compensation for capital use (gross profits)

  ➢ Reproducible tangible assets (e.g. machinery, IT)

  ➢ Intangibles (e.g. software)

  ➢ Non-reproducible (e.g. land, natural resources)

➢ If there is interest in compensation for particular type of capital, one needs to derive quantities (stocks) as well

  ➢ Perpetual inventory method for building up capital stocks (asset by industry matrix needed, typically is scarce)

  ➢ plus calculation of rental prices which is the real rate of return plus depreciation

➢ A split of capital into foreign and domestically owned might be interesting as well

Current initiative

➢ LA KLEMS initiative: The LA-KLEMS project is the opening to Latin America WORLD-KLEMS project, which has created a new platform for information associated with economic growth, productivity, employment creation, capital formation and technological change"

➢ (website: *www.cepal.org/**la-klems**/*)

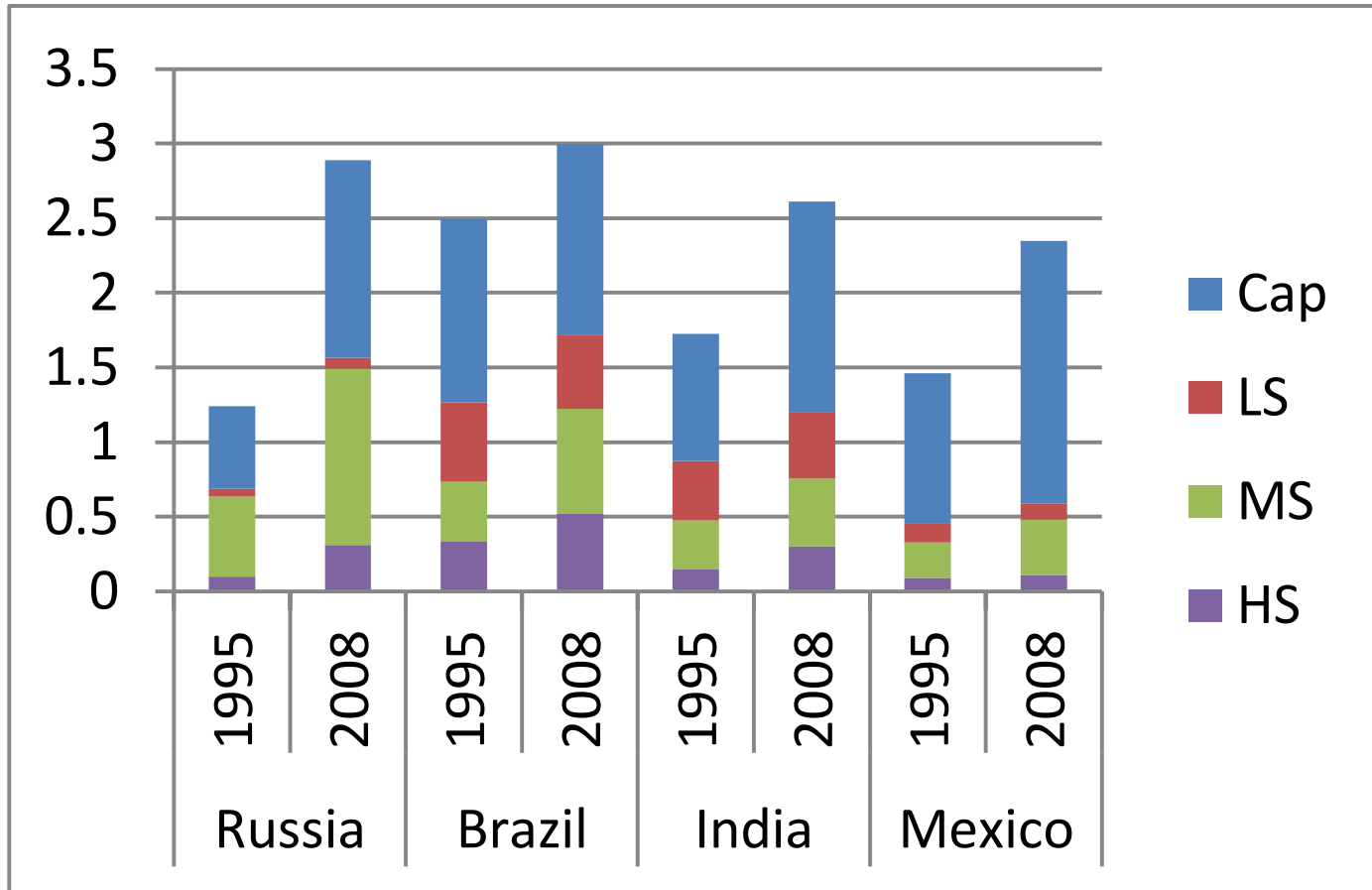**Income earned in global manufacturing by production factor and country (% shares in world income), 1995 and 2008.**

Table 3 Number of workers related to global production of manufacturing products (thousands), 1995-2009.

	1995	2002	2008
Agricultural workers			
Advanced	7,222	6,134	5,663
Emerging	685,498	708,273	681,409
Non-agricultural workers			
Advanced	79,342	76,803	74,025
Emerging	285,472	326,051	383,103

Environmental accounts

➢ Royal road is through data from the System of Environmental-Economic Accounts (SEEA). The SEEA framework follows a similar accounting structure as the System of National Accounts (SNA) and uses concepts, definitions and classifications consistent with the SNA in order to facilitate the integration of environmental and economic statistics. But only few countries have this at the moment

➢ In WIOD three types of environmental data data

  ➢ Energy use (by type of energy carrier)

  ➢ Air emissions

  ➢ Resource use (land, material water)

➢ More info at www.wiod.org

Air emissions

➢ The substances included in the WIODatabase comprise the air emissions linked directly to the three environmental impact categories covered, namely:

➢ •Greenhouse gas emissions to air (CO_2, N_2O, CH_4, HFCs, PFCs, SF_6), needed to derive Global Warming Potentials

➢ •Emissions of CFCs, Halons, Methyl Bromide CH_3Br, and HCFCs , needed to derive Ozone Depletion Potentials, and

➢ •Emissions of acidifying substances to air (NOx, SOx, NH_3), needed to derive Acidification Potentials

➢ Energy-related air emissions can be estimated using energy accounts and technology-specific emission factors as they are mainly related to gasses emitted in energy-use process. These emissions are complemented with non-energy related (process) emissions where appropriate, using inventory data from reports to the United Nations Framework Convention on Climate Change UNFCCC and CLRTAP (Convention on Long Range Transboundary Air Pollution).

Figure 17 Emissions embodied in net exports (China, Germany, US and Japan, 1995 and 2006)
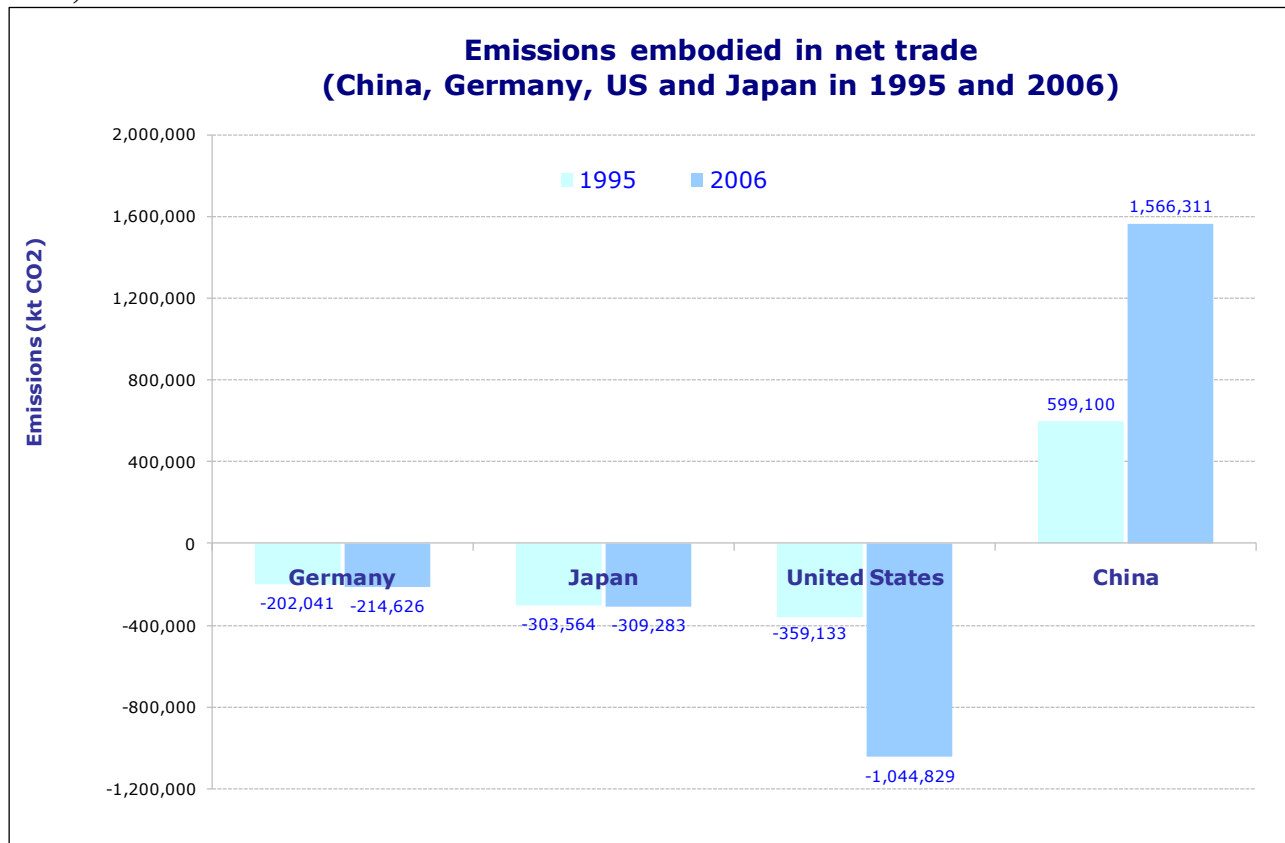
Note: based on WIOD, results are preliminary

Concluding remarks

➢ Adding socio-economic and environmental accounts to a (world) input-output table will greatly increase the number of issues that can be analysed

➢ Consistency of the various accounts is key

➢ As is international comparability

➢ On-going international initiatives provide good starting points for new initiatives