From supply/use tables to input-output tables

Presentation for Statistics Jordan
January 2015
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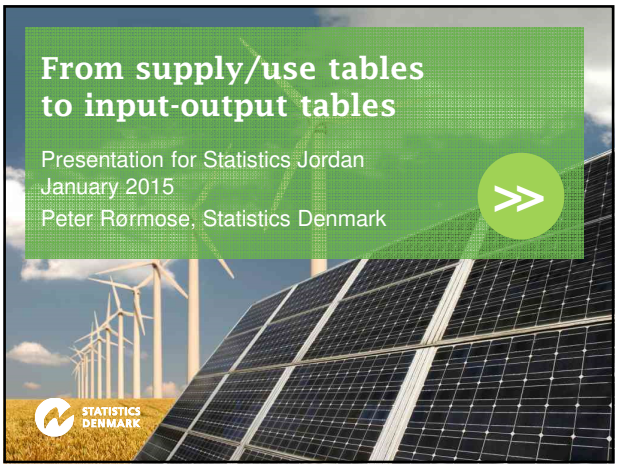

Why do we need input-output tables 1?

- *Input-output tables contains valuable detailed information about the structure of the economy that are not shown in any other statistics.*
  - E.g. what is the composition of the input of some important industries in terms of deliveries from other industries and imports?
  - How dependent is agriculture on deliveries from the chemical industry
  - How large is the share of energy inputs in various industries?
  - How large a share of total exports is actually imported?

Why do we need input-output tables? What answers will it give?

- What is the share of transport services in the construction industry?
- How much imports does the construction industry need in order to produce?
- How large a share of the production of repair and maintenance is input and how much is investment?

Why do we need input-output tables 2?

- *Input-output tables are used as the core of many macro-economic models*
- *Input-output tables is the basis of the **input-output model** that can give valuable information about the **direct as well as indirect effects** on production, employment, imports, air emissions etc., of changes in final demand.*

Why do we need input-output tables? Questions to be answered

- What is the direct and indirect share of agricultural production in total exports?
- What are the total direct and indirect effects on employment of increasing investment in construction by 10 pct?
- What are the total direct and indirect effects on energy production of increasing private consumption of meat by 1 million JOD?

What is an input-output table?

	Intermediate consumption								Final demand					Total
DKK billions, current prices	1.Agriculture, fishing and quarrying	2.Manufacturing	3. Electricity, heat, gas and water supply	4. Construction	5. Trade, hotels and restaurants	6.Transport, post og telecommunication	7. Financial intermediation, business act.	8. Public and personal services	Private consumption	Public consumption	Gross fixed capital formation	Changes in stocks	Export	
1. Agriculture, fishing and quarrying	8	50	9	2	0	0	0	2	3	1	0	1	45	121
2. Manufacturing	13	96	1	37	17	7	14	10	49	1	29	7	292	573
3. Electricity, heat, gas and water supply	1	7	3	0	4	1	2	4	21	0	0	0	9	51
4. Construction	1	3	3	2	2	6	26	7	4	7	125	0	1	187
5. Trade, hotels and restaurants	5	30	0	21	15	8	6	10	148	3	22	1	75	343
6. Transport, post og telecommunications	1	14	0	2	33	35	17	18	36	1	2	0	163	323
7. Financial intermediation, business act.	8	35	3	27	50	18	96	42	193	5	29	0	30	535
8. Public and personal services	1	5	1	1	5	3	12	29	81	379	4	0	2	524
Import incl. costum duties	11	144	4	23	37	127	29	26	77	4	53	8	141	684
Taxes on products, net	3	3	0	2	5	6	17	24	132	2	40	0	-2	233
Use at market prices	**52**	**388**	**25**	**116**	**168**	**211**	**220**	**171**	**745**	**403**	**304**	**18**	**757**	**3576**
Other taxes on production, net	-5	-1	0	0	0	0	7	-4						
Compensation of employees	10	131	5	54	130	56	138	301						
Gross operating surplus and mixed income	65	56	22	17	46	57	170	56						
Gross output at basic prices	**121**	**573**	**51**	**187**	**343**	**323**	**535**	**524**						

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What is an input-output table?

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How to get from SUT to IOT

V160400 Fish prepared or conserved

Supply / use	Industry	Basic price mio. DKK
Danish production	Preparation of fish fish prod.	2.562.978
	Other food industry	99.130
Import		530.580
Total supply		**3.192.688**
Input in production	Slaughterhouses etc.	69.031
	Preparation of fish fish prod.	498.944
	Other food industry	87.208
	Hotels and restaurants etc.	740.806
Private consumption	Fish	199.039
Changes in inventories		13.888
Export		1.583.772
Total use		**3.192.688**

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How to get from SUT to IOT

V160400 Fish prepared or conserved

	Slaughter houses	prepar. of fish and fish prod	Other food industry	Hotels and restaur.	Private consumpt of fish	Changes in invent.	Export	Total
Preparation of fish								2.562.978
Other food industry								99.130
Import								530.580
Total	**69.031**	**498.944**	**87.208**	**740.806**	**199.039**	**13.888**	**1.583.772**	**3.192.688**

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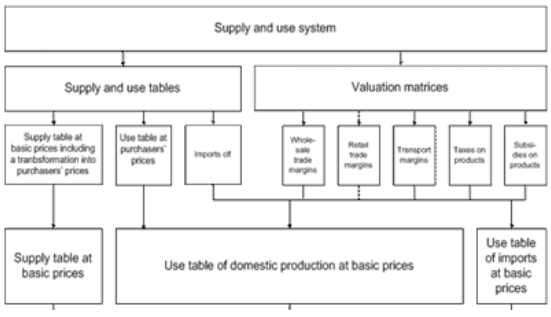
From SUT to IOTs



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How to get from SUT to IOT

- Input-output tables are based on supply/use tables and just a few additional data. Statistics Denmark follows some basic principles in converting SUTs to IOTs
  - Existing micro-macro links should be retained as far as possible
  - As little of the original information as possible should be lost
  - Comparability with other statistics and the rest of the National Accounts is very important and should be maintained
  - Applied methods should be transparent and based on observed data
  - Assumptions are necessary, but should be made with as much respect to the type of data actually available as possible in order to obtain the SIOT with a minimum of data manipulation.

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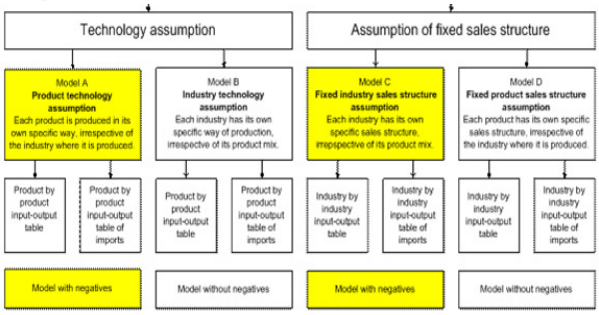
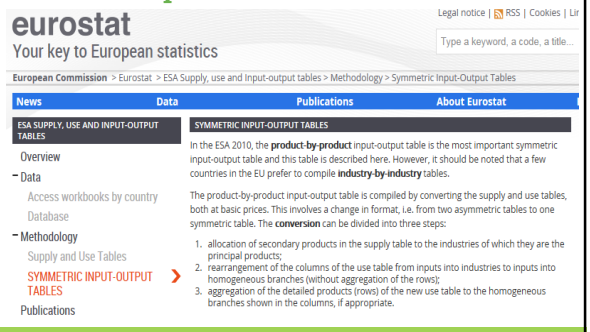
Assumption behind input-output tables



Technology assumptions or not?

- Method (d) *product by product table* is chosen to best comply with quality criteria and the principles that are important to Statistics Denmark.
- Definition of "fixed product sales structure"
- *it is assumed that the relative shares in which a product is supplied (from domestic production industries and import) is the same no matter to which use the product is supplied.*
- Does not require any technology assumption and no negatives must be corrected

What is the most common assumption in the EU area?



How to get from SUT to IOT

V160400 Fish prepared or conserved, total and shares

Supply / use	Industry	Basic price mio. DKK
Danish production	Preparation of fish fish prod.	2.562.978
	Other food industry	99.130
Import		530.580
Total supply		**3.192.688**

Supply / use	Industry	Basic price mio. DKK
Danish production	Preparation of fish fish prod.	0,803
	Other food industry	0,031
Import		0,166
Total supply		**1,00**

How to get from SUT to IOT

V160400 Fish prepared or conserved

	Slaughter houses	prepar. of fish and fish prod	Other food industry	Hotels and restaur.	Private consumpt of fish	CHanges in invent.	Export	Total
Preparation of fish	0,803* 69.031							**2.562.978**
Other food industry	0,031* 69.031							**99.130**
Import	0,166* 69.031							**530.580**
Total	**69.031**	**498.944**	**87.208**	**740.806**	**199.039**	**13.888**	**1.583.772**	**3.192.688**

How to get from SUT to IOT

V160400 Fish prepared or conserved

	Slaughter houses	prepar. of fish and fish prod	Other food industry	Hotels and restaur.	Private consumpt of fish	CHanges in invent.	Export	Total
Preparation of fish	55.432	0,803* 498.944	0,803* 87.208	0,803* 740.806	0,803* 199.039	0,803* 13.888	0,803* 1.583.772	**2.562.978**
Other food industry	2.140	0,031* 498.944	0,031* 87.208	0,031* 740.806	0,031* 199.039	0,031* 13.888	0,031* 1.583.772	**99.130**
Import	11.459	0,166* 498.944	0,166* 87.208	0,166* 740.806	0,166* 199.039	0,166* 13.888	0,166* 1.583.772	**530.580**
Total	**69.031**	**498.944**	**87.208**	**740.806**	**199.039**	**13.888**	**1.583.772**	**3.192.688**

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How to get from SUT to IOT

V160400 Fish prepared or conserved

	Slaughter houses	prepar. of fish and fish prod	Other food industry	Hotels and restaur.	Private consumpt of fish	CHanges in invent.	Export	Total
Preparation of fish	55.432	400.652	70.028	594.867	159.828	11.152	1.271.769	**2.562.978**
Other food industry	2.140	15.467	2.703	22.965	6.170	431	49.097	**99.130**
Import	11.459	82.825	14.477	122.974	33.040	2.305	262.906	**530.580**
Total	**69.031**	**498.944**	**87.208**	**740.806**	**199.039**	**13.888**	**1.583.772**	**3.192.688**

How to get from SUT to IOT

	1. Agriculture …	8. Slaughters	9. Prep. of fish …	13. Other food ind. …	80-81. Hotels etc. …	Private consumption	Export
1. Agriculture …							
8. Slaughter houses							
9. Preparer. of fish		55.432	400.652	70.028	594.867	159.828	1.271.769
13. Other food..		2.140	15.467				
80-81. Hotels etc. …							
Import		11.459	82.825				

Matrix of data for SIOT

	Products (2365)	Industries (117)	Final use	Total
Products (2365)		U	F	q + b
Industries (117)	V			g
Imports (1)	b'			i * b'
Primary input (5)		Y	Y_f	y
Total	q' + b'	g'	f'	

Calculations for SIOT, 1

- Total domestic production by product

$$q_j = \sum_{i=1}^{117} V_{i,j}$$

- Market share matrix

$$D = V(\hat{q})^{-1}$$

- How large a share of each product does each of the 117 industries produce.

Calculations for SIOT, 1

- Vector of import shares

$$m_j = \frac{b_j}{(b_j + \hat{q}_j)}$$

- How large a share of each of the 2350 products is imported.

$$U_D = (I - \hat{m}) \cdot U \quad , \quad F_D = (I - \hat{m}) \cdot F$$

$$U_M = \hat{m} \cdot U \quad , \quad F_M = \hat{m} \cdot F$$

Calculations for SIOT, 2

- Compilation of domestic produced and imported intermediate consumption

$$DZU = D(I - \hat{m})U \qquad DMU = D(\hat{m})U$$

- Compilation of domestic produced and imported final demand

$$DZE = D(I - \hat{m})F \qquad DME = D(\hat{m})F$$

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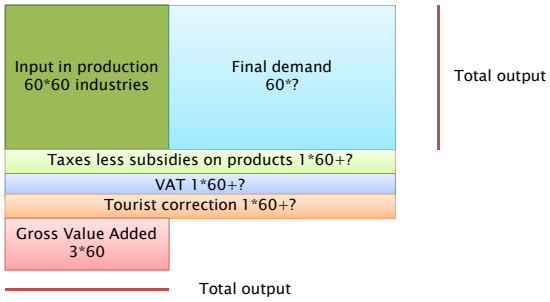
Jordan IO table, suggested layout



From SUT to IOT - additional challenges, 1

- For imported goods that are not produced in Jordan the column in the Market share matrix is not defined. There are two solutions to this
  - To compile a list of "characteristic industries" so that it is assumed in which industry every single product would be produced if it had been produced in Jordan
  - To accept just one single row of imports
- Private consumption by tourists in Jordan should be added as a negative sum to the sum of household consumption and as a positive sum to the sum of the exports column.

From SUT to IOT - additional challenges, 2

- The column sums of the matrices of product taxes and product subsidies should be added as a row in the table
- The column sums of the matrix of VAT should be added as a row in the table
- Some calculations are needed to collect the retail and wholesale margins and place them in the trade industries producing those margins
-

From SUT to IOT - additional challenges, 3

- A block of Gross Value Added must be compiled and added to the table
  - Other production taxes less other production subsidies
  - Compensation of employees in every industry
  - Gross operating surplus and mixed income

Use of software for the compilation of IOT's

- Technically, it will be possible to do the calculations in Excel…
- But it is **highly** recommended to start from the beginning to do most of the calculations in a software that can handle matrices and do matrix algebra in a convienient environment.
- It i really easy to loose the overview of the calculations in Excel, and thus, it is easier to make mistakes.
- It can be difficult for a new employee to see what is going on in a long series of linked Excel tables.
- When there will be more years and more price-levels the amount of Excel sheets wil grow considerably.

Use of software for the compilation of IOT's

- When mistakes are discovered or the method is changed it will be a huge job to update all Excel sheets and to do it in a consistent way.
- When data are stored in a format directly readable by the software it is realy easy and fast to make various analyses like e.g. a vector of employment multipliers etc.

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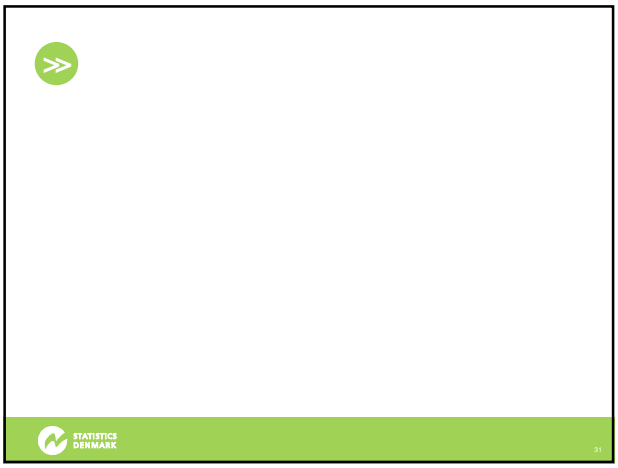
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