Statistiska centralbyrån Statistics Sweden

Understanding National Accounts

Chapter 10, Supply and Use and Input-Output

Basic identity

- Y = P – IC (Production method)
- Y = C + I + E – M (Expenditure method)
- P + M = IC + C + I + E

Supply (sales) = Use (purchases)

Supply side (basic prices)

What the producer obtains from the production (excluding taxes etc, that are only passed on to the government)

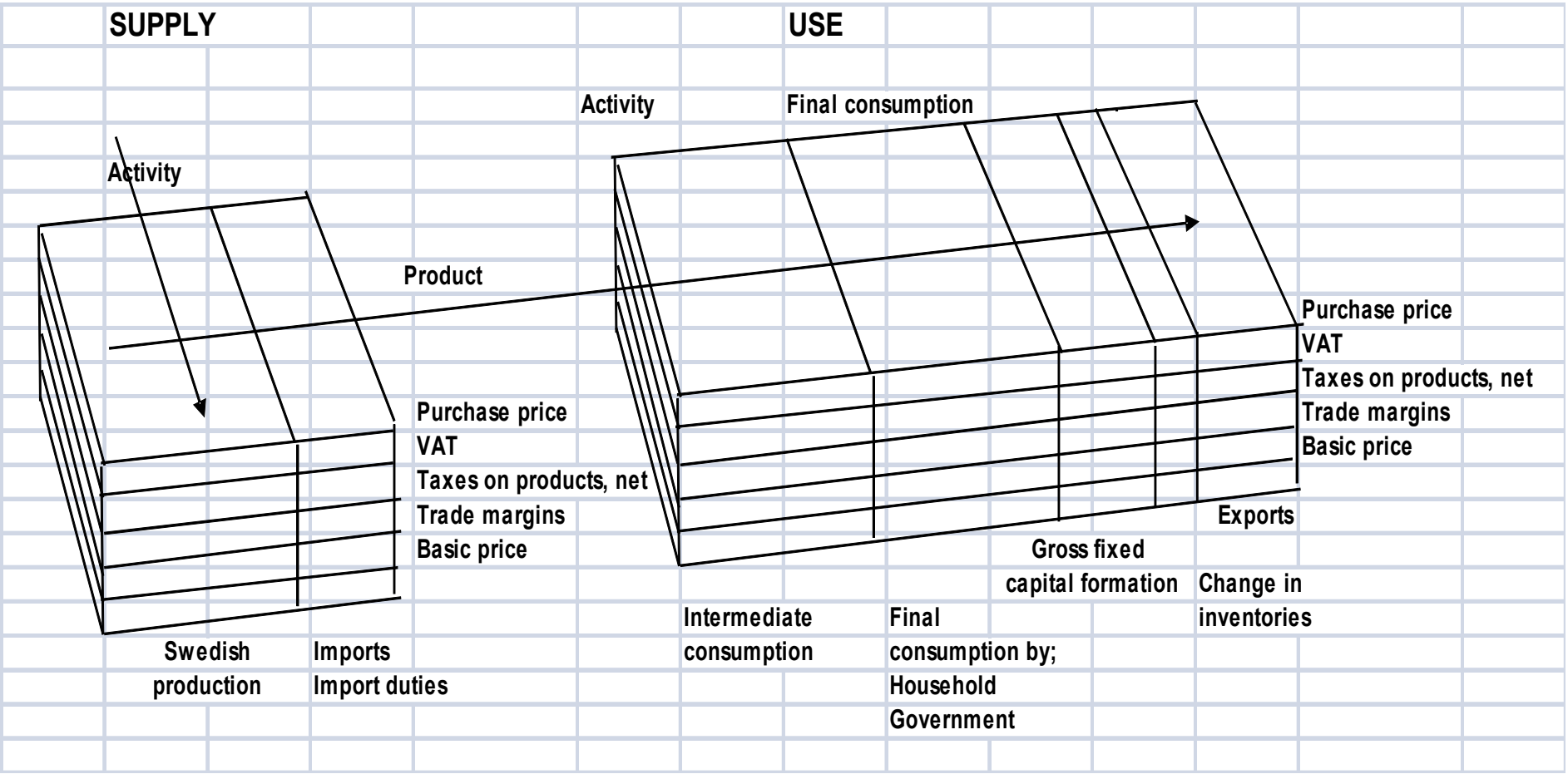
Use side (purchaser price)

The price paid by the customers (including taxes and margins)

Example

Furniture etc	Mnkr
Production	28 000
Imports	15 000
Trade margins	*10 000*
Taxes on products	*0*
Subsidies on products	*0*
VAT	*6 000*
Total supply	59 000
Intermediate consumption	10 000
Final consumption	23 000
GFCF (Investments)	9 000
Exports	17 000
Total Use	59 000

Supply and use



ANALYSTABEL Use 1993-2001 **Productgroup Fish**

		Interm.consumpt		Final consumtion				Supply-Use			
	År	Market prod›n	market+NPISH	Hush olds	Inv	stocks	Export	Residual	Sum	Production	Import
Current price	1994	982	14	968	0	0	647	2	2 613	1 104	615
	1995	1 025	13	981	0	0	1 353		3 372	1 143	1 211
	1996	1 035	8	1 045	0	0	1 183	1	3 272	1 098	1 142
	1997	1 009	9	1 159	0	0	1 524	3	3 704	1 114	1 453
	1998	1 168	14	1 051	0	0	1 775	1	4 009	1 139	1 763
	1999	1 211	15	1 134	0	0	2 086	2	4 448	1 079	2 137
	2000	1 182	15	1 164	0	0	2 637		4 998	1 069	2 631
	2001	1 276	16	1 216	0	0	2 800		5 308	1 330	2 616
constant price (T-1)	1994	1 231	14	966	0	0	530	2	2 743	1 252	554
	1995	1 078	13	1 003	0	0	1 313		3 407	1 189	1 203
	1996	1 278	9	1 085	0	0	1 218	1	3 591	1 108	1 341
	1997	960	9	1 064	0	0	1 412	3	3 448	1 061	1 333
	1998	867	11	973	0	0	1 866	1	3 718	1 233	1 505
	1999	1 075	18	1 070	0	0	2059	2	4 224	981	2085
	2000	1 054	15	1 134	0	0	2 533		4 736	1 056	2 437
	2001	1 339	16	1 060	0	0	2 810		5 225	1 208	2 753
Implicit price change	1995	95,1	100	97,8			103		99	96,1	100,7
	1996	81	88,9	96,3			97,1	100	91,1	99,1	85,2
	1997	105,1	100	108,9			107,9	100	107,4	105	109
	1998	134,7	127,3	108			95,1	100	107,8	92,4	117,1
	1999	112,7	83,3	106			101,3	100	105,3	110	102,5
	2000	112,1	100	102,6			104,1		105,5	101,2	108
	2001	95,3	100	114,7			99,6		101,6	110,1	95
Volume change	1995	9,8	-7,1	3,6			102,9		30,4	7,7	95,6
	1996	24,7	-30,8	10,6			-10		6,5	-3,1	10,7
	1997	-7,2	12,5	1,8			19,4	200	5,4	-3,4	16,7
	1998	-14,1	22,2	-16			22,4	-66,7	0,4	10,7	3,6
	1999	-8	28,6	1,8			16	100	5,4	-13,9	18,3
	2000	-13	0	0			21,4		6,5	-2,1	14
	2001	13,3	6,7	-8,9			6,6		4,5	13	4,6

Supply matrix

•SEK Million current prices.

Product	Description	Output	Imports	Trade margins	Product taxes, net	Purchasers prices
01-05	Jord, skog, fisk	68 153	19 849	16 464	-771	103 695
10-14	Mineraler	14 808	40 741	4 242	817	60 608
15-37	Tillverkningsind.	1 302 097	590 214	288 582	165 992	2 346 885
40-41	El, gas, värme, vatt	85 671	4 116		30 594	120 381
45	Byggnad	183 345			28 356	211 701
50-52	Handel, reparationer	60 001	4 238		4 280	68 519
55	Hotell, restaurang	80 008	1 462		12 075	93 545
60-64	Transport,kommunik.	388 887	30 533		5 901	425 321
65-67	Finansiella tjänster	70 979	8 542		2 928	82 449
70	Fastighetsverksamhet	402 696	59		13 326	416 081
71-74	Företagstjänster	533 045	109 143	2 321	20 123	664 632
75	Offentlig förvaltn.	183 133	50			183 183
80-85	Utbildning, sjukvård	480 737			993	481 730
90-95	Andra tjänster	158 474	2 279	1 681	12 271	174 705
FISIM	FISIM	46 162				46 162
Travelling abroad	Travelling abroad		71 847			71 847
TOTAL		4 058 196	883 073	313 290	296 885	5 551 444

Use matrix

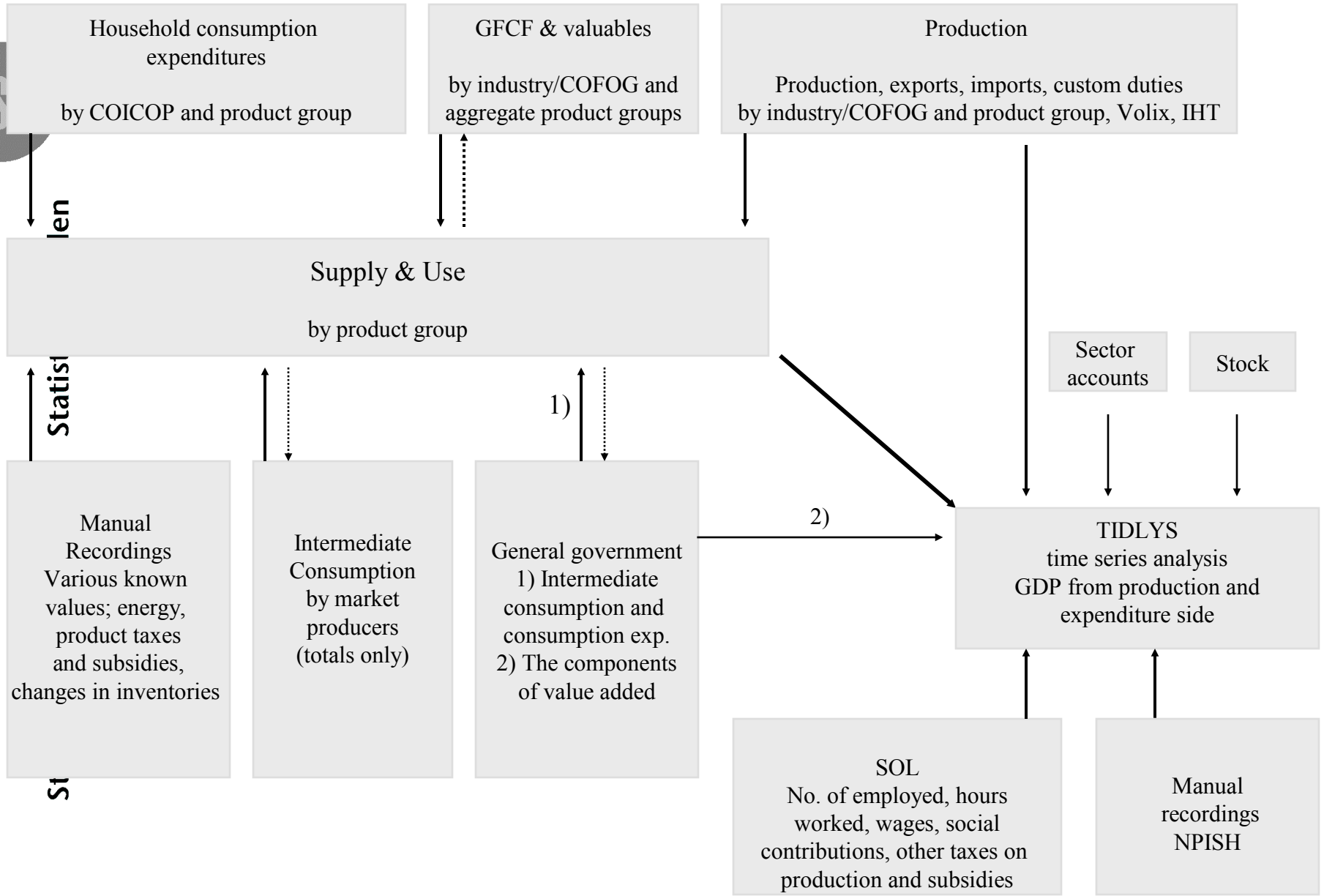
•SEK Million current prices.

Product	Description	IC	Cons. Exp.'s	GCF	Exports	Residual	Sum purchasers prics
01-05	Jord, skog, fisk	59 124	29 848	8 197	6 526	0	103 695
10-14	Mineraler	54 722	563	-453	5 776	0	60 608
15-37	Tillverkningsind.	909 900	480 931	166 730	789 324	0	2 346 885
40-41	El, gas, värme, vatt	64 096	54 591		1 694	0	120 381
45	Byggnad	80 830	27	130 844		0	211 701
50-52	Handel, reparationer	24 394	17 572		26 553	0	68 519
55	Hotell, restaurang	36 440	57 105			0	93 545
60-64	Transport,kommunik.	256 748	111 263		57 310	0	425 321
65-67	Finansiella tjänster	40 405	32 072		9 972	0	82 449
70	Fastighetsverksamhet	159 074	250 540	6 245	222	0	416 081
71-74	Företagstjänster	451 051	42 163	79 531	91 887	0	664 632
75	Offentlig förvaltn.	23 757	157 574		1 852	0	183 183
80-85	Utbildning, sjukvård	24 480	457 250			0	481 730
90-95	Andra tjänster	60 519	109 191	2 631	2 364	0	174 705
FISIM	FISIM	46 162				0	46 162
Resevaluta	Resevaluta	23 731	1 012		47 104	0	71 847
TOTAL		2 315 433	1 801 702	393 725	1 040 584	0	5 551 444

Level of detail (approx.)

- 400 product groups, ProdSNI07, SPIN
- 100 industries, SNI2007
- 140 household cons. exp. by purpose, COICOP
- 50 governmentt. cons. by function, COFOG
- GFCF (investments): by 80 industries
  20 COFOG

Available systems, overview



The calculation process

- Starting point: the result from the previous year in current prices.
- Time series perspective
- Current and constant prices (t-1) simultaneously
- Changes in volume
- Implicit price index (t / t-1)

Step 1 in the process of the yearly calculations

- Assume that we will calculate GDP by production and expenditure approach in current and constant prices for 2009.

- We start off with the *available statistics* for the supply side and calculate a production value by product and industry/COFOG, as well as, imports and exports by product, in current and constant prices.

Step 2 – Price index for domestic supply (IHT)

- Price index for domestic supply, DSI (IHT), is the NA's own index used to reflate and deflate all use in an early stage of the yearly calculations.

- The index is calculated *by product*:

$$= \frac{\text{Output} + \text{Imports} - \text{Exports}\ \ \text{current prices}}{\text{Output} + \text{Imports} - \text{Exports}\ \ \text{constant prices}\ (t-1)}$$

Step 3 – Extrapolation of the use side structure

- Starting point: GDP by expenditure approach for 2008 in current prices.
- We assume that the allocation by product and use, *in constant prices*, has not changed between 2008 and 2009.
- In the extrapolation the price change between 2008 and 2009 for different products is taken into account.

Example – Extrapolation of IC

Statistiska centralbyrån Statistics Sweden

Assume that the statistics show that industry Z's volume growth of production is +10%.			Extrapolation of volume		Reflate to reach current prices		
	Product	Year 2008 current prices		Year 2009 constant prices = t-1	Price change, DSI		Year 2009 current prices
IC in industry Z	A	100	100*1,1=	110	102,3	110*1,023=	113
	B	300	300*1,1=	330	110,2	330*1,102=	364
	C	800	800*1,1=	880	101,9	880*1,019=	897
	D	200	200*1,1=	220	104,5	220*1,045=	230
	Total	1 400		1 540			1 604

Step 4 – Adaptation to statistical sources

Statistiska centralbyrån Statistics Sweden

- In the next step extrapolated values are adapted to the statistical sources for the use side.

• IC	-totals per industry
• Household cons.	-by COICOP and product
• GFCF	-totals per industry/COFOG
• Exports	-by product
• ”Known values”	-by product and use

Example – Adaptation to totals, IC

- Assume that total intermediate consumption (IC) in current prices for industry Z according to sources = 1750 MSEK.

$$\text{Adjustment ratio} = \frac{1750}{1604} = 1{,}091.$$

Example – Adaptation to totals cont.

		Extrapolated values		Values adjusted to totals according to source			
	Product	Year 2002 current prices	Year 2002 constant prices = t-1		Year 2002 current prices		Year 2002 constant prices = t-1
IC industry Z	A	113	110	113*1,091 =	123	110*1,091=	120
	B	364	330	364*1,091 =	397	330*1,091=	360
	C	897	880	897*1,091 =	979	880*1,091=	960
	D	230	220	230*1,091 =	251	220*1,091=	240
	Total	1 604	1 540		1 750		1 680

Step 5 – Balancing and industry analysis

- At this stage we have GDP by production and expenditure approach 2009 in current and constant prices according to all different statistical sources.
- Since supply is *not* equal to use at this stage we continue with balancing and industry analysis.

Balancing

- **Insufficient coordination**

Difference in units, multinational companies

- **Mistakes**

Wrong period in survey data, inconsistent data

Incorrect product allocation

Incorrect value and/or grossing up of sample

- **Incomplete data**

Hidden economy

Integration is making supply equal to use, ensuring a plausible production value added ratio for all industries

- **How to solve problems: confrontation of data from different sources, increase data quality, labour data, productivity, price and volume indices, earnings per hour, etc**

Example - Balancing

- Example – balancing a service product. MSEK.

	Year 2001 current prices	Year 2002 current prices	Year 2002 constant prices =t-1	Volume growth 2001/2002
Supply (S)				
Production	***24 100***	***22 050***	***21 000***	**-13%**
Imports	**11 600**	**11 550**	**11 000**	**-5%**
Total	**35 700**	**33 600**	**32 000**	**-10%**
Use (U)				
IC	**29 700**	**30 975**	**29 500**	**-1%**
Changes in inventories	**200**	**210**	**200**	**0%**
Exports	***5 800***	***8 505***	***8 100***	**40%**
Total	**35 700**	**39 690**	**37 800**	**6%**
Residual = S-U	**0**	**-6 090**	**-5 800**	

Example - Balancing

- Example – balancing a service product – solution. MSEK.

	Year 2001 current prices	Year 2002 current prices	Year 2002 constant prices =t-1	Volume growth 2001/2002
Supply (S)				
Production	*24 100*	*28 140*	*26 800*	11%
Imports	11 600	11 550	11 000	-5%
Total	35 700	39 690	37 800	6%
Use (U)				
IC	29 700	30 975	29 500	-1%
Changes in inventories	200	210	200	0%
Exports	*5 800*	*8 505*	*8 100*	40%
Total	35 700	39 690	37 800	6%
Residual = S-U	0	0	0	

Example - Balancing

- Example – price index problem, goods product. MSEK.

	Year 2002 current prices	Year 2002 constant prices =t-1	Implicit price index
Supply (S)			
Production	**400**	**378**	**105,8**
Imports	***730***	***543***	***134,4***
Trade margin	**800**	**778**	**102,8**
VAT	**400**	**394**	**101,5**
Total	**2 330**	**2 093**	**111,3**
Use (U)			
IC	***215***	***170***	***126,5***
Household consumption exp.	***2 020***	***1 990***	***101,5***
Exports	**120**	**117**	**102,6**
Total	**2 355**	**2 277**	**103,4**
Residual = S-U	**-25**	**-184**	**13,6**

Example - Balancing

- Example – price index problem, goods product. MSEK.

	Year 2002 current prices	Year 2002 constant prices =t-1	Implicit price index
Supply (S)			
Production	**400**	**378**	**105,8**
Imports	***730***	***727***	**100,4**
Trade margin	**800**	**778**	**102,8**
VAT	**400**	**394**	**101,5**
Total	**2 330**	**2 277**	**102,3**
Use (U)			
IC	***190***	***170***	**111,8**
Household consumption exp.	***2 020***	***1 990***	**101,5**
Exports	**120**	**117**	**102,6**
Total	**2 330**	**2 277**	**102,3**
Residual = S-U	**0**	**0**	

Input – output analyses

$x_j = X_{j1} + X_{j2} + \ldots + X_{jn} + y_j$

Where y is final demand

I.e. output of product j is equal to the sum of the intermediate consumption of product j by the industries 1 to n, plus the final demand for this product

$a_{jj} = X_{ji} / x_i$

Technical coefficient (what is needed to make a certain product)

where X is the IC of product j by industry i

x is the output of industry i

$\Rightarrow x_j = a_{j1}x_1 + a_{j2}x_2 + \ldots + a_{jn}x_n + y_j$

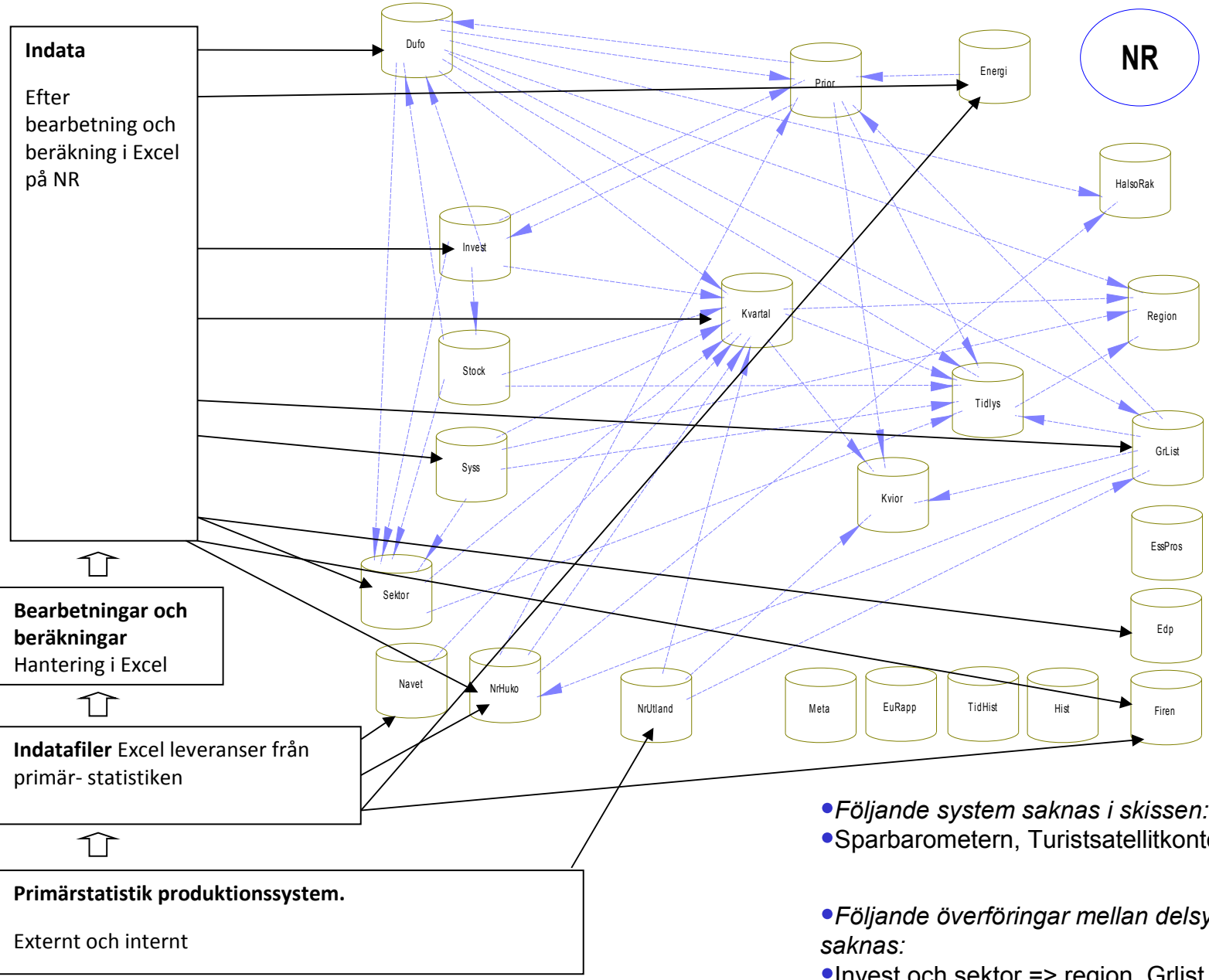
$\Rightarrow [x] = [A].[x] + [y]$

$\Rightarrow [x] = [I-A]^{-1}.[y]$

$\Rightarrow [\Delta x] = [I-A]^{-1}.[\Delta y]$ (assumes fixed technical coefficient)

Can be used to analyze a change in the economy and its direct and indirects effects

Statistiska centralbyrån Statistics Sweden



- *Följande system saknas i skissen:*
- Sparbarometern, Turistsatellitkonto

- *Följande överföringar mellan delsystem saknas:*
- Invest och sektor => region, Grlist => Energi, Prior => Energi, Kvartal => Sektor