Building IndoTERM Database

Day 1 Session 4

Database

Highly simplified account

There is NEVER enough regional data: we need to make some up.

Plausible assumptions are better than just giving up.

Simulations are best way to find out data problems, so we need to get to the simulation stage fast.

After simulating, we can seek to improve the database.

Starting point: National USE table

	Size	Producers	Household	Investment	Government	Export
		← I →	← 1 →	← 1 →	← 1 →	← 1 →
Goods	C×S ↕	USE	USE	USE	USE	USE
Taxes	C×S ↕	TAX	TAX	TAX	TAX	TAX
Labour	O ↕	LAB				
Capital	1 ↕	CAP				
Land	1 ↕	LND				
Production Tax	1 ↕	PRODTAX				
Total Cost	1 ↕	VTOT				

C = Number of Commodities

I = Number of Industries

S = 2: Domestic,Imported

O = Number of Occupation Types

We need to split each column between R regions

Splitting industry columns

	Size	Producers ← I →	Household ← 1 →	Investment ← 1 →	Government ← 1 →	Export ← 1 →
Goods	C×S	USE	USE	USE	USE	USE
Taxes	C×S	TAX	TAX	TAX	TAX	TAX
Labour	O	LAB				
Capital	1	CAP				
Land	1	LND				
Production Tax	1	PRODTAX				
Total Cost	1	VTOT				

C = Number of Commodities

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Suppose we knew production shares:

Shr(i,r) = share region R in national output of i

Then we use these to uniformly split columns:

- **the "same technology everywhere" method.**

More plausible if the sectors are very detailed:

- **Grape-growing is same everywhere, but "Agriculture" is not.**

Sometimes we can do better:

- **in WestCape, Electricity uses Uranium, but not in KZN**

A variety of sources for the Shr(i,r) :

- **often the fall-back source is a employment survey**

Splitting household and Gov columns

	Size	Producers ← I →	Household ← 1 →	Investment ← 1 →	Government ← 1 →	Export ← 1 →
Goods	C×S	USE	USE	USE	USE	USE
Taxes	C×S	TAX	TAX	TAX	TAX	TAX
Labour	O	LAB				
Capital	1	CAP				
Land	1	LND				
Production Tax	1	PRODTAX				
Total Cost	1	VTOT				

C = Number of Commodities

I = Number of Industries

S = 2: Domestic,Imported

O = Number of Occupation Types

After splitting industry columns, we know factor GDP by region.
If no other data, GDP shares could be used to split C and G.
But we may have:

- **household survey data**
- **state or provincial accounts, listing main macro aggregates by region**

Splitting investment columns

	Size	Producers	Household	Investment	Government	Export
		← I →	← 1 →	← 1 →	← 1 →	← 1 →
Goods	C×S	USE	USE	USE	USE	USE
Taxes	C×S	TAX	TAX	TAX	TAX	TAX
Labour	O	LAB				
Capital	1	CAP				
Land	1	LND				
Production Tax	1	PRODTAX				
Total Cost	1	VTOT				

C = Number of Commodities

I = Number of Industries

S = 2: Domestic,Imported

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We need to split the satellite matrix:

INVEST(COM,IND) = value of investment at purchasers prices.

Usually we use

Shr(i,r) = share region R in national output of i

to do this, getting INVEST(COM,IND, REG)

We sum this over IND to get INVEST_I(COM,REG)

then sum over REG to get INVEST_IR(COM)

then compute shares

Q(COM,REG)= INVEST_I(COM,REG)/ INVEST_IR(COM)

which may be used to split investment columns of USE and TAX

Splitting the export column

	Size	Producers ← I →	Household ← 1 →	Investment ← 1 →	Government ← 1 →	Export ← 1 →
Goods	C×S	USE	USE	USE	USE	USE
Taxes	C×S	TAX	TAX	TAX	TAX	TAX
Labour	O	LAB				
Capital	1	CAP				
Land	1	LND				
Production Tax	1	PRODTAX				
Total Cost	1	VTOT				

C = Number of Commodities

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Given X(i) = national exports of i

We could use production shares:

Shr(i,r) = share region R in national output of i

To guess regional exports as X(i,r) = Shr(i,r).X(i)

For service goods, this is adequate.

For non-service goods, TERM requires that

Exports(i,r) = value of i loaded onto ship at r

Port data will tell us (roughly):

V(r) = value of all goods loaded onto ship at r

We scale (RAS) X(i,r) = Shr(i,r).X(i).A(r).B(i) ***multipliers***

so that $\sum_i X(i,r) = V(r)$ and $\sum_r X(i,r) = X(i)$

Regional Demand and Supply

	Size	Producers ← IxR →	Household ← R →	Investment ← R →	Government ← R →	Export ← R →	Demand ← R →
Goods	C×S	USE	USE	USE	USE	USE	USE
Taxes	C×S	TAX	TAX	TAX	TAX	TAX	TAX
Labour	O	LAB					
Capital	1	CAP					
Land	1	LND					
Production Tax	1	PRODTAX					
Supply	1	VTOT					

Demand

Supply

With all columns split, we can work out:
- **Supply by each region of each domestic good**
- **Demand by each region for each domestic and imported good**

For non-service goods, TERM requires
Imports(i,r) = value of i unloaded from ship at r
We use port data to estimate this, similar to method used for exports

For each good, domestic or imported, a region is:
- **self-sufficient if Supply>Demand**
- **deficient if Supply<Demand**

We assume that deficient regions export less to other regions, and that self-sufficient regions import less from other regions.

Forming the TRADE matrix

TRADE("Machin","dom")

User or destination region

Producer or source region

TRADE	1 NAD	2 SUMUT	3 SUMBAR	4 RIAU	5 JAMBI	6 SUMSEL	7 BABEL	8 BENGKULU	9 LAMPUNG	10 DK
1 NAD	0,053	0,002	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2 SUMUT	301	740	172	2,15	31,2	108	2,70	16,9	53,1	0,913
3 SUMBAR	0,002	0,001	0,038	0,000	0,000	0,002	0,000	0,000	0,001	0,000
4 RIAU	252	1097	312	13076	254	676	36,7	66,3	252	74,9
5 JAMBI	0,000	0,000	0,001	0,000	0,013	0,007	0,000	0,000	0,001	0,000
6 SUMSEL	0,001	0,001	0,000	0,000	0,001	0,076	0,000	0,000	0,005	0,000
7 BABEL	0,000	0,000	0,000	0,000	0,000	0,001	0,005	0,000	0,000	0,000
8 BENGKULU	0,000	0,000	0,001	0,000	0,000	0,003	0,000	0,006	0,001	0,000
9 LAMPUNG	0,000	0,000	0,000	0,000	0,000	0,002	0,000	0,000	0,036	0,000
10 DKI	255	798	312	36,1	90,5	344	83,2	49,7	295	9406
11 JABAR	2650	8387	2963	3709	912	3532	675	501	2917	42782
12 BANTEN	32,6	103	37,1	45,7	11,7	46,8	10,3	6,29	35,8	962
13 JATENG	18,5	39,5	17,5	0,552	5,82	23,5	2,99	3,19	18,7	3,05
14 DIY	3,39	9,58	3,08	0,874	1,06	4,29	0,516	0,582	3,34	3,92
15 JATIM	32,3	34,6	27,5	0,991	10,5	43,4	3,99	5,28	30,8	3,04
16 KALBAR	0,001	0,000	0,000	0,000	0,000	0,001	0,000	0,000	0,001	0,000

Row and Column Totals are already known.

Diagonal (goods produced and used in same region):
based on Min(Demand,Supply).

Off-Diagonals follow Gravity rule: = K.Distance(org,dst)$^{-\alpha}$

TRADE and TRADMAR

TRADE matrix does not really matter if:

- **a good is mainly produced in one region**
- **goods from different regions are very good substitutes**

Shares from TRADE matrix are used to create TRADMAR, bearing in mind that:

- **long trips need more transport**
- **some regions have no railway**
- **islands need more shipping**