The Conversion and Adjustment of National IO Table Series from WIOD
--The Case of Turkey

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What I did during the one month visit

- Presentaion（INFORUN model，TURINA，G7 and WIOD ）and discussion in the Modelling Division of MoD. Advantage and disadvantage of using TURINA or WIOD.

- Got decision which means to give up TURINA and to have a new model starting from data process.

- WIOD table comparison

- WIOD table convertion

- WIOD table adjustment

- Price vector processing

- Regression of household consumption and import vectors

- Model build with consumption and import equations

- The WIOD (World Input-Output Database) includes Input-output table series with 35 sectors, from 1995 to 2009, for 40 countries and regions plus international linkage table series, all in both of current price and previous year's price, in USD. There are also sectoral time series of value added, employment, capital stock and so on in national curency.

- The format of national Input-Output table in WIOD is different from the normal format of national Input-Output table which can be directly used in building INFORUM model. It is necessary to make some conversions and adjustments which are the contents of this presentation, by using Turkey table as an example.

The Format Input-Output Table from WIOD
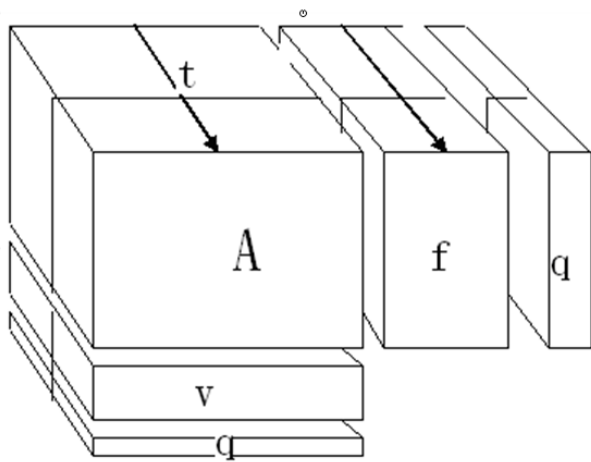
			Agriculture, Hunting, Forestry and Fishing		Private Households with Employed Persons	n expenditure by households	Changes in inventories and valuables	Exports	Total output
			TUR		TUR	TUR	TUR	TUR	TUR
			c1	......	c35	c37	c42	c44	
Agriculture, Hunting, Forestry and Fishing	TUR	c1							
......		......							
Private Households with Employed Persons	TUR	c35							
Agriculture, Hunting, Forestry and Fishing	Imports	c1	IMPORTS	IMPORTS	IMPORTS	IMPORTS	IMPORTS		
......		......							
Private Households with Employed Persons	Imports	c35							
Total intermediate consumption	TOT	r60							
taxes less subsidies on products		r99							
Cif/ fob adjustments on exports		r61							
Direct purchases abroad by residents		r62							
Purchases on the domestic territory by non-residents		r63							
Value added at basic prices		r64							
International Transport Margins									
Output at basic prices		r69							

Much rich information about imports.

The ″taxes less subsidies on products″ in income side.

″Taxes less subsidies on products″ for the final demand (expenditure) components.

″CIF/FOB (Cost-Insurance −Freight /Free-On-Board) adjustments on exports″

″Direct purchase abroad by residents″

″Purchases on the domestic territory by non-residents″

″International Transport Margins″

Step A. To allocate the item ＂International Transport Margins＂ to the corresponding column of import matrices for intermediate input and for final demand components.

Step B. To merge the import matrix into intermediate input matrix and final demand component matrix. Meanwhile, to create import share matrix for the resulted intermediate input matrix and import share matrix for the resulted final demand component matrix.

The Adjustment

Step C. To ignore the two numbers "Direct purchase abroad by residents" and "Purchases on the domestic territory by non-residents" mentioned in 4 and 5 above, according to the advices from expert in TURKSTAT.

To allocate the "taxes less subsidies on products" on final demand (expenditure) components into different categories of corresponding component.

It must be treated from both side: row(final demand side) and column(income side) plus corresponding adjustment for gross output.

The Adjustment

To treat the item ˝taxes less subsidies on products˝ of the income side as one component of value added. the value added and the gross output will be, in general, converted from at basic prices into at purchase prices.

To create a 35 sectoral vector variable, import, as one of the component of final demand and with minus sign in the balance equation for rows of the table.
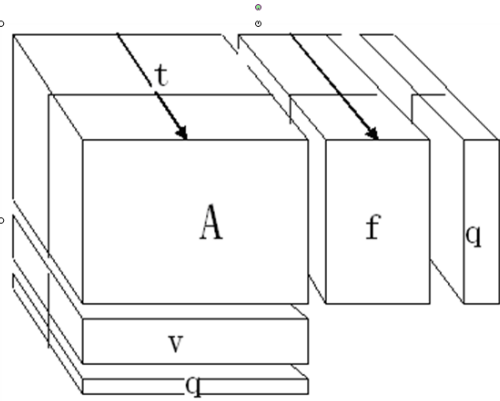
First table:

		Agriculture, Hunting, Forestry and Fishing		Private Households with Employed Persons	n expenditure by households	Changes in inventories and valuables	Exports	Import
		c1	......	c35	c37	...... c42	c44	
Agriculture, Hunting, Forestry and Fishing	c1							
......	......							
Private Households with Employed Persons	c35							
Total intermediate consumption	**r60**							
Value added	**r64**							
Gross Output	r69							

Second table:

			Agriculture, Hunting, Forestry and Fishing		Private Households with Employed Persons	n expenditure by households	Changes in inventories and valuables	Exports	Total o
			TUR		TUR	TUR	TUR	TUR	TUR
			c1	......	c35	c37	c42	c44	
Agriculture, Hunting, Forestry and Fishing	TUR	c1							
......	TUR	......							
Private Households with Employed Persons	TUR	c35							
Agriculture, Hunting, Forestry and Fishing	Imports	c1	IMPORTS	IMPORTS	IMPORTS	IMPORTS	IMPORTS		
......		......							
Private Households with Employed Persons	Imports	c35							
Total intermediate consumption	TOT	**r60**							
taxes less subsidies on products		r99							
Cif/ fob adjustments on exports		r61							
Direct purchases abroad by residents		r62							
Purchases on the domestic territory by non-residents		r63							
Value added at basic prices		**r64**							
International Transport Margins									
Output at basic prices		r69							

Further Treatments

- A comparison was done for two data surces: one is the GDP by expenditure in TL term, at current price which is from the MoD and another is GDP by expenditure in TL term, at curent price which is converted from the data in $ term in tables by using the implicit exchange rate in WIOD.

Further Treatments
Results 1

	1996	1997	1998	1999	2000	2001	2002
MOD GDP	19857	38763	70203	104596	166658	240224	350476
WIOD GDP	19967	39335	70203	104596	166658	240224	350476
DIF(%)	-0.55	-1.46	0.00	0.00	0.00	0.00	0.00
	2003	2004	2005	2006	2007	2008	2009
MOD GDP	454781	559033	648932	758391	843178	950534	952559
WIOD GDP	454781	559033	648932	758391	843179	950535	952559
DIF(%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1. Percentage differences between the two GDPs.

Further Treatments
Results2

from MOD	1996	1997	1998	1999	2000	2001	2002
Cons	12839	25347	46669	71641	117499	164299	238399
Exp	3750	8352	14980	20333	33495	65920	88381
Imp	-3996	-8519	-14167	-20172	-38488	-56009	-82652
sum	12593	25180	47481	71802	112506	174210	244128
from WIOD							
Cons	13671	26990	49694	74994	124768	179987	259441
Exp	2794	6466	11507	16298	25170	47842	63614
Imp	-3873	-8276	-13720	-19490	-37433	-53619	-78928
sum	12593	25180	47481	71802	112505	174210	244128
Cons	-6.09	-6.09	-6.09	-4.47	-5.83	-8.72	-8.11
Exp	34.19	29.17	30.18	24.76	33.07	37.79	38.93
Imp	3.18	2.94	3.26	3.50	2.82	4.46	4.72
sum	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Further Treatments
Results2

from MOD	2003	2004	2005	2006	2007	2008	2009
Cons	324016	398559	465402	534849	601239	663944	680768
Exp	104575	131661	141826	171926	188225	227253	222103
Imp	-109321	-146386	-164514	-209172	-231738	-269388	-232632
sum	319270	383834	442714	497604	557725	621809	670239
from WIOD							
Cons	345723	423620	490692	564897	628734	695620	714245
Exp	79185	102982	112665	137550	155103	185760	182088
Imp	-105637	-142768	-160643	-204844	-226111	-259570	-226094
sum	319270	383834	442714	497604	557725	621810	670239
Cons	-6.28	-5.92	-5.15	-5.32	-4.37	-4.55	-4.69
Exp	32.06	27.85	25.88	24.99	21.35	22.34	21.98
Imp	3.49	2.53	2.41	2.11	2.49	3.78	2.89
sum	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The Adjustments on Consumption, Export and Import

If the value of the item ″Purchases on the domestic territory by non-residents″ is added into export, in the framework of WIOD, the export will be the same as in TURKSTAT/WoD.

If the value of the item ″Direct purchases abroad by residents″ is added into import, in the framework of WIOD, the import will be the same as in TURKSTAT/WoD.

The Adjustments on Consumption, Export and Import

If the sum of the items, mentioned above, is substructed from the item ″Final consumption expenditure by households″ , in the framework of WIOD, the resulted numbers will be the same as the ″private final consumption expenditure″ in TURKSTAT/WoD.

It is clear, the adjustment of WIOD tables for the three vectors of consumption, export and import can be adjusted in three steps:

The Adjustments on Consumption, Export and Import

Step(A) To allocate the item "Purchases on the domestic territory by non-residents" and add to export, according to share information.

Step (B) To allocate the item "Direct purchases abroad by residents" and add to import vector, according to the share information.

Step (C) To substruct the sum of the numbers added to export in (A) and the numbers added to import in (B) from the vector "Final consumption expenditure by households".

The share information helps not to destroy the balance in rows of the IO tables.

The Share Information Used in Adjustments

To allocate ″Purchases on the domestic territory by non-residents″ and ″Direct purchases abroad by residents″ to export and import, it is necessary to have their share information.

Results without share information.

Alternative opinion.

Tourism statistics from TURKSTAT

Share Information of the Expenditure of Nonresidents in Turkey

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total of Individual Expenditures	100	100	100	100	100	100	100	100	100
Total of food-beverage	24.2	24.5	24.3	25.8	26.6	28.3	31.0	32.0	34.5
Total Accommodation	19.7	20.5	20.0	20.5	19.4	17.0	17.0	15.8	14.6
Health Total	1.6	1.6	1.9	2.3	2.5	2.8	2.9	2.7	2.6
Total Transport	6.3	5.9	5.7	7.4	7.9	9.2	10.0	10.6	11.6
Total sports, education, culture	2.6	2.6	2.6	1.9	1.8	1.3	1.1	1.0	0.9
Total tour Services	1.4	1.6	1.5	1.8	2.0	1.7	1.5	1.5	1.3
Total of Other Good and Services	44.1	43.3	43.9	40.4	39.8	39.7	36.6	36.4	34.6
Clothes and Shoes	9.5	12.0	12.8	14.9	15.2	15.6	14.9	15.2	14.7
Souvenirs	7.0	7.4	8.3	9.1	9.6	10.1	9.8	9.9	9.1
Carpet, Rug	3.5	3.2	2.7	3.3	2.9	2.6	2.2	2.2	2.2
Other Expenses	24.1	20.7	20.1	13.0	12.0	11.4	9.6	9.1	8.6

Assigned Split Shares for Categories in Table above

Type of expenditures	Sector number	sector share of assigned
Total of food-beverage	3	100
Total Accommodation	22	100
Health Total	33	100
Total Transport	23-26	35,15,40,10
Total sports, education, culture	32,34	50,50
Total tour Services	34	100
Total of Other Good and Services		
Clothes and Shoes	4,5	50,50
Souvenirs	16	100
Carpet, Rug …..	4	100
Other Expenses	7,19,21,27,28,30	10,20,20,20,10,20

The Shares for Allocating "Nonresident Consumption in Turkey"

sector	1995	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
3	22.69	24.19	24.53	24.27	25.75	26.64	28.29	30.99	32.04	34.45	34.73	34.64
4	9.33	8.19	9.20	9.07	10.75	10.49	10.42	9.71	9.84	9.49	8.96	9.29
5	4.15	4.73	5.98	6.39	7.45	7.61	7.79	7.47	7.61	7.33	6.92	7.32
7	2.07	2.41	2.07	2.01	1.30	1.20	1.14	0.96	0.91	0.86	0.92	0.75
16	7.01	7.01	7.38	8.34	9.11	9.65	10.08	9.77	9.89	9.13	8.93	8.80
19	4.15	4.83	4.14	4.03	2.61	2.40	2.29	1.93	1.81	1.73	1.83	1.51
21	4.15	4.83	4.14	4.03	2.61	2.40	2.29	1.93	1.81	1.73	1.83	1.51
22	21.66	19.75	20.51	20.03	20.50	19.42	17.03	16.97	15.82	14.61	15.05	16.49
23	1.86	2.21	2.07	2.00	2.58	2.78	3.20	3.49	3.69	4.06	3.97	3.89
24	0.83	0.95	0.89	0.86	1.10	1.19	1.37	1.49	1.58	1.74	1.70	1.67
25	2.49	2.53	2.37	2.28	2.95	3.17	3.66	3.98	4.22	4.64	4.54	4.44
26	0.52	0.63	0.59	0.57	0.74	0.79	0.92	1.00	1.06	1.16	1.13	1.11
27	5.16	4.83	4.14	4.03	2.61	2.40	2.29	1.93	1.81	1.73	1.83	1.51
28	2.89	2.41	2.07	2.01	1.30	1.20	1.14	0.96	0.91	0.86	0.92	0.75
30	5.16	4.83	4.14	4.03	2.61	2.40	2.29	1.93	1.81	1.73	1.83	1.51
32	1.55	1.31	1.32	1.31	0.95	0.88	0.67	0.57	0.50	0.44	0.53	0.45
33	1.24	1.64	1.57	1.94	2.31	2.48	2.77	2.88	2.70	2.58	2.58	2.61
34	3.11	2.71	2.88	2.81	2.77	2.89	2.37	2.04	1.98	1.73	1.81	1.74

The Shares for Allocating "Direct Purchase Abroad"

sector	1995	2004	2005	2006	2007	2008	2009	2010	2011
3	29	32.26	31.03	34.94	36.43	36.06	37.21	37.50	36.28
4	3	3.26	3.34	3.16	2.78	3.12	3.22	3.10	3.20
5	3	2.98	2.93	2.76	2.44	2.85	3.07	2.93	3.07
7	1.3	1.18	1.53	1.24	1.20	1.11	1.07	0.92	0.99
16	15	12.79	14.49	11.71	11.82	10.98	8.85	7.71	8.76
19	3	2.37	3.06	2.48	2.41	2.21	2.13	1.84	1.97
21	3	2.37	3.06	2.48	2.41	2.21	2.13	1.84	1.97
22	24	23.06	21.07	20.60	21.12	22.68	23.65	25.15	24.91
23	2	2.71	2.84	3.79	3.52	3.44	3.34	3.76	4.02
24	1	1.16	1.22	1.62	1.51	1.48	1.43	1.61	1.72
25	2.8	3.10	3.25	4.33	4.03	3.94	3.81	4.30	4.60
26	0.6	0.77	0.81	1.08	1.01	0.98	0.95	1.08	1.15
27	2	2.37	3.06	2.48	2.41	2.21	2.13	1.84	1.97
28	1.2	1.18	1.53	1.24	1.20	1.11	1.07	0.92	0.99
30	2	2.37	3.06	2.48	2.41	2.21	2.13	1.84	1.97
32	2.5	2.07	0.94	0.87	0.94	1.21	1.42	1.38	0.98
33	1.8	1.53	1.50	1.45	1.16	0.85	0.84	0.79	0.44

Tnak you !