Data Preparation and Preliminary Trails with TURINA --TURkey's INterindustry Analysis Model

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Background

- The first INFORUM Turkey Model was built by Paul Salmon, and Gazi Özhan, in 2008. It was presented at the 16th INFORUM World Conference (2008) held in the European University of Lefke, North Cyprus.
- From the middle of May to the middle of June of 2010, Wang was invited to do further work on the model. This paper is an overview of that one month work.

Contents

1. Data Situation

There are 22 excel files which contain different or duplicate data. (Table1.1). In addition, there is an electronic copy of the book *Statistical Indicators, 1923 - 2008* (TurkStat, 2009):

(A) There are two Input-output tables,1998 and 2002;

(B) Some relatively detail sector classification time series started from 1998;

(C) Most economic statistics end at 2008;

From them, 1998-2008 is considered as the sample period of the INFORUM Turkey model version 2.0.

some problems:

(A) The sector 30 (recycling materials) is blank in 1998 IO table. Sector 6 (Uranium and thorium ores) is blank in 1998 and 2002 tables.

(B) The sum of value added (third quadrant, “Value added at basic price” plus “Taxes less subsidies on products”) or sum of final demand (second quadrant, “Final uses at basic prices” minus “imports”) from 2002 table is 315867104, which is different from the yearbook data “350476089” (about 10% less).

(C) The sum of value added (third quadrant, “Value added at basic price” plus “Taxes less subsidies on products”) or sum of final demand (second quadrant, “Final uses at basic prices” minus “imports”) from 1998 table is 53412104, which is different from the yearbook data “70203147” (about 30% less).

(D) Similar inconsistent figures are also visible for GDP by expenditure components between the IO tables and the national account statistics.

(E) The comparison of GDP by cost components between the IO tables and national accounts reveals further inconsistent results.

(F) The inconsistency problem exists not only in the data between Input-output tables and national accounts, but also in different statistics sources. For example, the GDP from file “Costcomponents.xls, Cost components of the gross domestic product” is about 25% less than the GDP from the file “IST_gostergeler1923-2008.pdf, Table 22.4”.

2. The Initial Adjustments on the IO Tables

A. The original Turkey Input-output table for 1998 and 2002 is at basic price. The sum of value added by sectors at basic prices is not equal to the sum of final demand and the difference comes from the item "Taxes less subsidies on production"

B. The treatment of Sector 30 (Recycling) in 1998 IO table (original, there is no this sector in 1998 table)

C. The treatment of sector 6 (Uranium and thorium ores) in 1998 and 2002 Input-output tables (59-1=58)

3.Treatment of the Inconsistency Between IO Tables and National Accounts

Basic control data: GDP from SNA and by Expenditure (Six categories)

(A) Value added by 17 sectors, the sum of these 17 sectors is not the same as the GDP. They are scaled so that the sum of the resulted 17 sectors' value added can be equal to GDP.

(B) Aggregate the 58 sector value added data from Input-output table into 17 sectors. The ratios of the 17 sector's value added between SNA and IO 2002 are shown in following, Table 3.6.

C. scaling (-up) the columns of the first and third quadrants of the 2002 Input-output table by using these ratios.

D. Adjusting the second quadrant of the table. Alloacation of final demend vector into component vectors, such as Household consumption, Investment and so on is done by their shares in Table of GDP by Expenditure.

The resulting input-output table will still keep the identities: intermediate output plus final demand equal to output and intermediate input plus value added equal to output. And also the GDP from value added side and from final demand side will be consistent with the GDP from national account.

4. The Preparation of Time Series Vector: Household consumption

There are household consumption data by 10 categories. Their sum is slightly inconsistent with the corresponding number of household consumption in GDP by expenditure from national account. Adjustment necessary.

- To build up a bridge matrix for the purpose of converting the 10 categories into 58 Input-output sectors.

4. The Preparation of Time Series Vector: Government consumption, investment

- To allocate the government consumption in total into 58 Input-output sectors the sector shares of the government consumption for year 1998 and 2002 are used.
- There is gross investment in tangible goods for non-agricultural sectors for years 2003 to 2006. For other years it is assumed that the structure of the gross investment will be the same.

4. The Preparation of Time Series Vector, Inventory change and Export & import

- Inventory changes is simply worked out by allocation operation on the control total number because there is no any further available information.
- The export and import data from the components of the GDP by expenditure are consistent with other data to be used in the model. Expanded the coverage of sectors from 10 to 58 and including services part of both exprts and imports.
- Formed export and import bridge matrices

4. The Preparation of Time Series Vector: Prices

four different sources:

- (1) Wholesale Price Index Data for 35 sectors
- (2) Consumer Price Index Data Table for 6 sectors,
- (3) GDP at current prices, for 17 sectors;
- (4) GDP at 1998 constant 1998 price
- Price index for 41 sectors are directly obtained from the first two sources.
- Implicit GDP price deflators for the remaining 17 sectors are obtained from current and constant GDP series.

4. The Preparation of Time Series Vector: Value added

- There are detailed value added data by sectors for the years from 2003 to 2006. The whole table in the source file occupies 717 lines and 27 columns (Nace Rev. 1.1)
- Its two-digit system corresponds to the 59-sector classification of IO Table of Turkey. Therefore, it is easy to use its two-digit sector classification to get value added by sector details for the years from 2003 to 2006.

4. The Preparation of Time Series Vector: Value added

Problems:

1. Some sectors with no data. They are the agricultural sectors 1, 2, 3 and sectors 43, 44, 45 (financial related sectors) and sector 51 (Public administration and defence services), sector 55 (Membership organization services n.e.c.), and sector 57 (other service). This problem is solved quite well because the value added (and output) data of 1998-2008 for crops of agriculture and for financial sectors (43-45) are found elsewhere. Also the value added for sectors 51, 55 and 57 are estimated finally.

4. The Preparation of Time Series Vector: Value added

2. Differences between these data and the value added statistics by 17 sectors from the national account.

	2003	2004	2005	2006
From Table 4.14	143318607	174004663	185797967	210976441
From SNA	404835610	494884058	571714470	668418265
SNA/Table 4.14	2.825	2.844	3.077	3.168

- By using the control total of 17 sector value added from SNA and the structure of Table 4.14 for detailed noagriculturel and some service sectors, to solve the problem to a large extent. Then using some additional information and reasonable ratio assumptins for the remaing sectors for abtaining the value added vector for 58 sectors.

4. The Preparation of Time Series Vector: Gross output

- Good discovery: there are industrial production (output) indexes (in physical units) for 27 industry sectors from 1997 to 2008.
- By using these 27 industrial sector production indexes, combined with price index vector, 27 industrial sectors' output value are created.
- For other sectors we employed some ratio (from value added/output raios) and some scaling operations.

5. The Framework of the Model

- the data preparation described above is not the whole work before getting into the regression and simulation steps. Two things:

(1) the across-the-row procedure to create Input-output coefficient matrices which, together with the output vector, are consistent with the national account data of GDP by expenditure (final demand) and GDP by cost (value added).

(2) to convert the GDP expenditure components and the Input-output coefficient matrixes from current price into constant price.

5. The Framework of the Model

The initial framework of the TURINA was designed by the calculation approach in the following steps:

- Step 1. Give an assumed per capita disposable income in constant price for the year when the model runs.
- Step 2. Use the per capita disposable income to calculate the per capita household consumption in constant price by 58 sectors according to the equations resulted from the regression in the sample period 1998-2008.

- Step 3. Get total household consumption by 58 sectors through multiplying out the population in that year by the calculated household consumption per capita.
- Step 4. Get final demand vector “fd” if all the other component vectors such as government consumption, fixed capital formation, inventory changes, export and import are exogenously given.

- Step 5. Calculate the gross output vector, in constant price, according to the equation

  $out = (I-A)^{-1} * fd$

- Step 6. Calculate the value added vector “va”, in current price, according to the relationship analysis between output and value added from the sample period 1998-2008.

- Step 7. Calculate the price index vector, p, according to the equation

$$A^T p + va/out = p$$

- Step 8. Have GDP in current price and in constant price, which is the sum of value added vector and final demand vector, respectively.

- Step 9. Have GDP per capita in constant price and in current price, and the GDP deflator.

- Step 10. Estimate the disposable income per capita in current price and in constant price according to the regression analysis from the sample period 1998 and 2008.

- Step 11. If the resulted disposable income per capita is very close to the one used in step 2, the model finishes the run for that year and goes to the next year.

  Otherwise, use this new disposable income per capita and go to step 2 for the next iteration of the model.

Personal disposable income!

- However, the modeling practice got trouble from the very beginning which caused by the most simple time series data “personal disposable income”. There is no official report directly about the variable “personal disposable income” in Turkish statistics.

- From the annual report of Turkish national planning agency, there is data about personal disposable income of previous year or years. According to these data, a time series of personal (?) disposable income of Turkey was obtained. However, the name of this income series is “Private disposable income” but not “Personal disposable income” for some reason.

A check on personal disposable income

- A comparison between this series and the household consumption series from the GDP by expenditure in National Accounts is listed in the following table (T5.1).

Table 5.1 Comparison of Disposable Income and Consumption

	Private Disp Inc (DY)	Consumption (C)	Ratio (C/DY)
1998	48173	46668	0.97
1999	73280	71641	0.98
2000	116903	117499	1.01
2001	170723	164299	0.96
2002	255670	238399	0.93
2003	331947	324015	0.98
2004	382847	398559	1.04
2005	408426	465401	1.14
2006	467756	534849	1.14
2007	744124	601238	0.81
2008	830368	662997	0.80

- The ratio in Table 5.1 which shows the average propensity to consume gives the impression:
- (A).The expenditure is very close to, or even is in excess of the income in many years which means Turkish households have very low saving rate or, even negative savings in some years.
- (B).The disposable income in real nominal terms increases about 60% from 2006 to 2007 which is unacceptable (-with 10% inflation only).

- Other efforts were tried. For example, there is Table 22.1 “Distribution of annual incomes by quintiles ordered by household disposable income, 2006-2007” in the “Turkey’s Statistical Yearbook, 2009”. The average household disposable income from this survey is 15102 TL and 18827 TL in 2006 and 2007, respectively.

- If these numbers are multiplied by the number of households, the total disposable income for 2006 and 2007 will be 267148 and 326421 million TL respectively. Now, total disposable income is 35.2 percent and 38 percent of GDP in these two years respectively, which are too small to accept.

- Finally, it was given up to use the personal disposable income in the model and the consumption per capita in constant price is directly explained by GDP per capita in constant price.
- At aggregate level, the regression result between consumption per capita in constant price and the GDP per capita in constant price is shown as following:

Consumption per capita, real

SEE = 15.57 RSQ = 0.9809 RHO = 0.35 Obser = 11 from 1998.000

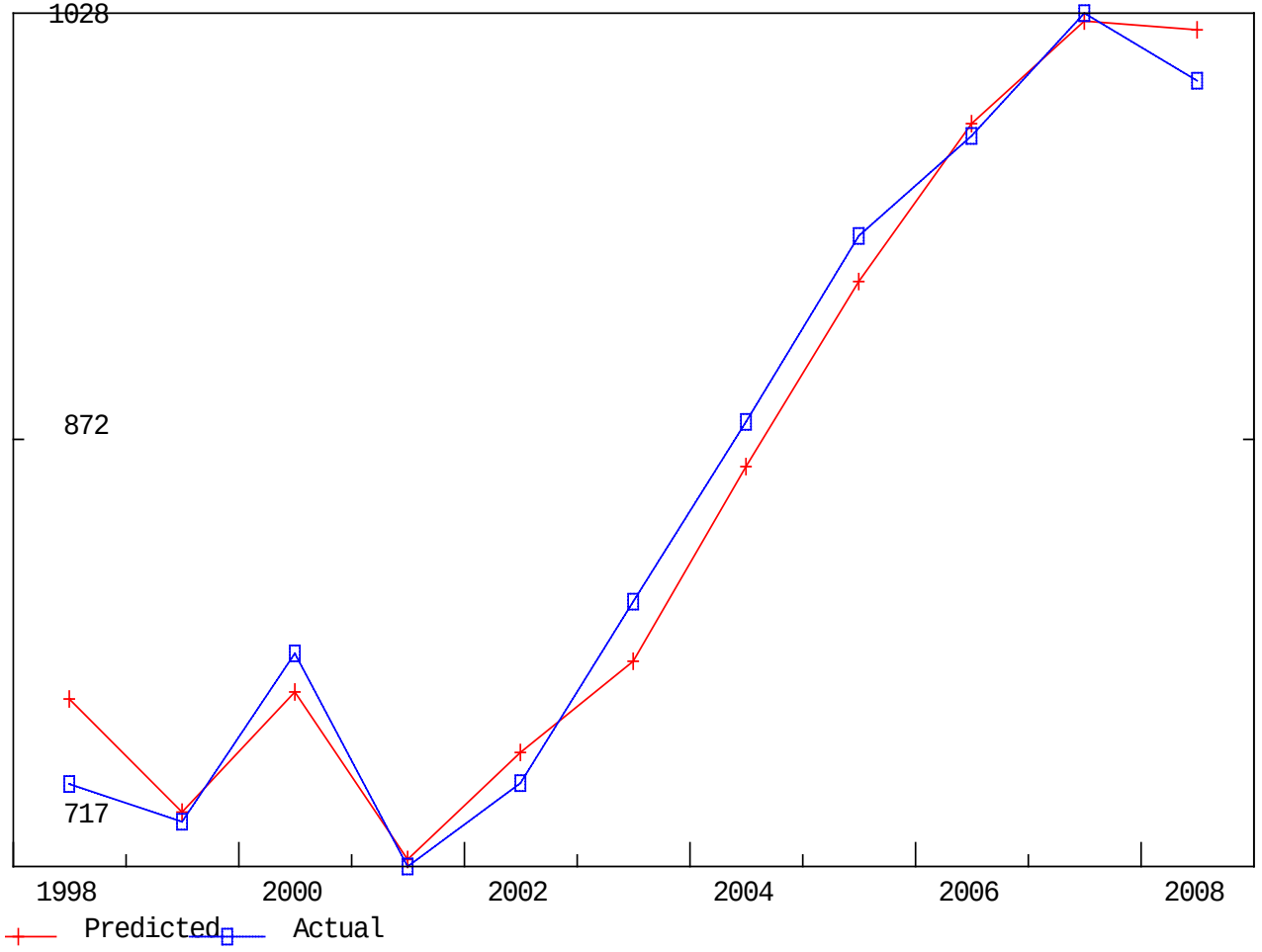
SEE+1 = 15.83 RBSQ = 0.9787 DW = 1.31 DoFree = 9 to 2008.000

MAPE = 1.55

Variable na	Reg-Coef	Mexval	Elas	NorRes	Mean	Beta	t-val	FStat
0 phhconsR	- - - - - - - - - - - - - - - - - -				853.78	- - - - - - - - - -		
1 intercept	-94.48297	22.5	-0.11	52.24	1.00		-2.125	
2 pgdpR	0.77641	622.8	1.11	1.00	1221.35	0.990	21.475	461.16

The simulation effect is shown in Figure 5.1.

Figure 5.1 Simulation of Consumption Per Capita at Aggregate Level



TURNA (Cranes)

THANK YOU!