Measuring the Rates of Protection in Turkish Economy using IO Technic

(First Preliminary Report)

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Introduction

- In this paper, the rates of protection in the Turkish economy are analysed using input-output tables in a historical perspective.
- After a long period of trade restriction a liberalization policy launched in 1980s.
- Main reason was the result of adapting the rules of Customs Union required by the EU.
- This research consists of two parts: First part reports the results of the computations over the initial period (1985 to 1989). IO table of 1985 was applied.
- Second part is devoted to analyse the recent period starting from 2015. For this period 2012 IO table is adapted.
- Actual numerical computations for the second part are still under construction.

Part I: Historical Analysis

De Jure and *de Facto* Nominal Protection Rates

- *De jure* rates are those rates set out by the Ministry of Trade on 31 Dec applicable for the following year. This is called *Import Regime Decree*.
- In practice these rates are lowered for many reasons: Some goods, institutions, firms, and industries are exempted from high tariff rates or pay smaller rates than *de jure* rates.
- Therefor average overall *de facto* nominal rates are always smaller than *de jure* nominal rates.
- This study starts with *de facto* nominal rates.
- Accordingly, average *de facto* nominal protection rate (NPR) was 16 percent in 1985 and fell to 8.7 percent in 1989.
- One other study based on *de jure* rates found average NPR as 65.2 percent in 1983 and 41.2 percent in 1989.

NPR (con`d)

- Those high NPRs are apparently misleading.
- A World Bank report supports our calculations. (Rep No. 6374-TU, 12 Sep, 1986).
- The report states that total tariff revenues including additional contributions to various funds was only 16 percent of total imports.
- In the same report it is also noted that approximately 70 percent of total imports are exempted from tariff.
- Similarly, in 1989 *de facto* total import duties was only a tiny fraction of total government budget revenues (3.7 percent).
- Formal definition of NPR in sector j:
- $$NPR_j = t_j = \frac{Actual\ tariff\ collected\ in\ sector\ j}{Value\ of\ total\ output\ produced\ in\ sector\ j} \qquad (1)$$

Calculating EPRs

- In the following formulas NPR_j will be denoted by t_j.
- Once NPRs are properly measured it will be easier to calculate the EPRs and the results will be accurate.
- Two methods are employed to measure EPRs: Balassa method and Corden method.
- In Balassa method EPR in sector “j” is defined by the following formula

$$EPR_j = \frac{t_j - \sum_{i=1}^{n} t_i a_{ij}}{1 - \sum_{i=1}^{n} a_{ij}} \qquad (2)$$

where

EPR (con'd)

a_{ij}: elements of the matrix A of the technical coefficients in an input-output matrix.

t_j: nominal tariff on sector j

t_i: nominal tariff on inputs purchased from sector i

In vector notations

$EPR = \frac{t - tA}{s - sA}$ *ebe* division of two vectors (3)

EPR (con’d)

Where

EPR: Row vector of effective protection rates

t: row vector of nominal protection rates

s: sum vector (row): $s = [1 \;\; 1 \ldots 1]$

A: matrix of input-output technical coefficients obtained at free-trade prices.

Formally, EPR for sector “j” is the difference between the nominal protection enjoyed on the output minus the weighted average of tariff paid on the required inputs, divided by value-added at free-trade prices (Diakantoni-Ecsaith, 2014).

Defining Input Coefficients at World Prices

- IO flow matrix of 1985 was constructed at domestic prices. To convert this matrix to trade-free prices (world prices), the entries in each row was reduced by the amount of tariff paid at constant nominal rate t_i.
- Resulting flow matrix gives the IO table at world prices (Assumption!).
- Total output vector q also corrected (reduced) at the same rate.
- Then the coefficient matrix A is defined at world prices.
- Finally, s – sA gives the row vector of value added at world prices

Balassa method conceders only tradable goods. That is it excludes the non-tradable goods. Prior to 2000s service sectors were assumed non-tradable goods. For that reason our calculations treated only the first 49 sectors out of 64-sector IO table.

Corden Method

Corden method includes the imported input content of nontradable goods into the computation process of effective protection rates in tradable goods.

The method is explained in the following two new formulas.

The first equation introduces the price equation of the standard IO model:

$$p = pA + rM + v \qquad (4)$$

Where

p: price vector in row form

A: domestic input coefficient matrix

Corden Method (con’d)

r: import price vector (row form)

M: import coefficient matrix

v: unit value added row

Solution to equation (4) is given below in Equation (5):

$$p = rM[1 - A]^{-1} + v[I - A]^{-1} \qquad (5)$$

In Equation (5), $[I - A]^{-1}$ is the Leontief inverse.

Corden Method (Con’d)

- If, initially, all prices are assumed to be 1.00, the first component in the right hand side of Equation (5) measures the import component of one unit of output in each industry.
- The second component shows the valued added share of one unit output of each industry.
- In this paper inputs coming from 15 nontradable sectors and going into the production of all other sectors are distributed in accordance with equation (5).
- Finally, the first model explained in Equation (3) in relation to Balassa method was rerun. The solution values are named as the results of the Corden method.

Results

IO No	Sector	NPRot	NPRg	EPRot	EPRg
1	Agr	28.9	5.9	31.1	4.4
2	Animal husb	20.9	6	14.4	0.9
3	Forestry	59.3	4.1	62.6	3.6
4	Fischery	126.2	68,6	143.2	73.9
5	Coal mining	23.7	0.7	27.9	-1.3
6	Pet nat g prod	24.2	0.0	45.1	-1.7
7	Iron ore	36.9	0.6	40.6	-2.5
8	Other min	41.8	8.7	52.1	7.6
9	Nonferrous met	57.3	8.9	66.5	7.9
10	Quarrying	14.6	7.6	16.4	4.6
11	Slaugthering	43.6	2.4	96.4	-1.8
12	Fruit veg process	42.4	55.5	72.5	101.7
13	Fat and oil prod	140.1	1.5	506.9	-1.6
14	Flour mill pro	97.1	1.4	-323.9	-9.0
15	Sugar	73.8	173.9	218.1	333.4

Results (Con’t)

16	**Other food items**	**80.6**	**54.9**	**194.7**	**93.1**
17	Beverage	188.5	132.1	363.9	159.9
18	Alcohol	93.5	103.7	189.5	113.6
19	Tobacco	71.8	46.7	101.2	61.2
20	Cotton milling	10.4	1.3	-3.8	-4.6
21	Textile	37.5	11.1	67.5	12.9
22	Clothing	68.2	35.8	158.4	62.0
23	Leather	38.1	2.4	51.0	-1.0
24	Footwear	55.0	17.4	74.0	21.9
25	Wood and cork	54.6	21.2	65.1	32.4
26	Wood furniture	74.6	33.1	113.7	38.8
27	Paper and pap pro	45.6	11.2	93.1	11.1
28	Printing publish	25.8	17.4	24.7	20.8
29	Chemical fertiliser	23.5	1.9	21.7	-5.2
30	Medical drugs	42.6	2.2	49.6	-0.4

Results (Con’t)

31	**Other chem prod**	**37.6**	**11.2**	**48.1**	**9.2**
32	Petrol refining	30.5	26.6	50.0	61.6
33	Other petrol prod	24.7	16.5	30.8	11.1
34	Ruber and r. prod	32.9	22.7	36.9	29.2
35	Plastics	69.5	22.9	159.3	32.1
36	Glass and glass pro	73.3	32.5	100.0	36.6
37	Cement	27.6	1.7	54.0	-3.1
38	Other stone and	49.8	21.1	83.8	25.8
39	Iron and steel ind	17.3	2.5	31.9	0.6
40	Other metal ind	33.7	4.5	62.2	1.8
41	Metal products	64.8	15.9	202.3	26.4

Results (Con’t)

42	**Nonelectrical mach**	**53.2**	**12.8**	**80.4**	**14.8**
43	Agricultural machinery	49.0	17.5	129.4	23.9
44	Electrical machinery	47.5	14.5	62.0	16.7
45	Sea transport mach	90.4	6.4	125.7	5.9
46	Railway machine	42.7	8.5	55.1	6.3
47	Motor vehicals	60.2	28.5	99.8	33.7
48	Other tansport mach	8.3	5.4	15.6	4.9
49	Other manufacturing	47.7	19.4	58.6	22.6
	Mean	41.2	8.7	53.8	9.1
	OT: Olgun-Togan (1989)		G: Gazi Ozhan (1992)		

Part II: Upcoming Study

- The second part of the study is still underway. In this part foreign trade policy after 2010 will be evaluated using 2012 IO table. Further policy analysis, evaluation, and recommendations will be presented in due course.
- An extensive historical analysis presented in the first part reveals that the Turkish economy is not heavily protected both in terms of nominal tariff rates and effective protection rates.
- The model(s) presented in this paper should also serve to evaluate the effects on the Turkish economy of the trade war between Turkey and the USA currently underway.

Thank You!