Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development
Vol. 17, Issue 2, 2017
PRINT ISSN 2284-7995, E-ISSN 2285-3952

IMPACT ASSESSMENT OF TARIFF REDUCTION IN SUGAR MARKET IN TURKEY

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Abstract

The aim of this study is to assess the impact of the possible reduction in Tariff Rate of sugar in Turkey under The World Trade Organization's (WTO). Sugar is an important product for human life and obtained from sugar beet, sugarcane, starch-based sweeteners and chemical sweeteners. In almost all countries a protected product and 70% of world production is consumed in the domestic markets of the countries and remaining 30% share in the sugar trade between countries as an important product.Sugar is obtained from sugar beet in Turkey and it's Tariff Rate is 135%. Under the title of market access in WTO, tariff reduction for products which are protected by more than 130% is 46% in developing countries. In this study; there are four model considered such as production, consumption, import and export and analyzed with 2 different scenarios which are zero Tariff Rate and prices after 46% discount on Tariff Rates of sugar. Partial equilibrium model was used. According to research findings; in each of two scenarios consumer welfare is observed to be increasing but these increases remain in low level. Producer and social welfare have emerged negatively in all three scenarios and the negative effect has been observed.

Key words**:** *WTO, Tariff Rate, Sugar beet, Impact Assessment*

INTRODUCTION

Sugar is an important product for human life and obtained from sugar beet, sugarcane, starch-based sweeteners and chemical sweeteners. In the face of increasing health problems of our day, it is considered as one of the "three whites" that one should keep a distance to (flour, salt and sugar). Nevertheless, it is quite an important food item in the context of food culture of and dietary habits in Turkey.

Extraction of sugar from sugar beet first started in Europe and then spread to other parts of the world. Due to her geographical features, Turkey produces sugar only from sugar beet. As to sugarcane, it is grown in mild-climate and topic countries. Besides sugar obtained from this crop, the side products of the process such as molasses and sugar residues are used in producing feed and ethanol, which constitute a significant economic contribution to other industrial branches. Furthermore, sugar beet culture is politically important in countries where it is practised in terms food security, employment, added vale it brings to the economy and some social considerations. In approximately 110 countries around the world are producing beet and cane sugar (Coban, 2009) [7]. In almost all countries a protected product and 70% of world production is consumed in the domestic markets of the countries and remaining 30% share in the sugar trade between countries as an important product (Benirschka et al., 1996) [5].

Of total sugar output marketed in 2015/16 80.06% was from sugarcane and 19.94% from sugar beet (Anonymous, 2017) [4]. Sugar prices in world markets are determined by cane sugar which is relatively less costly and more productive than beet sugar (Anonymous 2011) [3]. Sugar is one of those products protected in world markets by highest tariffs (Gibson *et. al*., 2001) [9] Sugar production and consumption is rising over years. Countries to its sugar policy; provide large investments in sugar production, is an important employment area and continue to intervene with the aim to provide food security (Demirci, 2003) [8]. In Turkey beet derived from sugar cost is more than the sugar

cane by the efficiency is low and dominating the world of production from sugar cane is taking place due to the price of sugar to other countries and the world price is higher than. This price is high for a reason, is protected by the policy (Cakıroglu, 2010) [6]. Sugar, raw and refined sugar obtained form and both are subject to international trade (Koo and Taylor, 2008) [10]. As the years with the production of sugar consumption is also increasing. The leading sugar producer countries at the same time important consumers and these countries are still widely in commerce (Anonymous, 2006) [1].

The leading sugar producers in the world include according to 2016 India(29,100 million tons), Brazil (35,590 million tons), EU(15,270 million tons), China (10 million tons), Thailand (12 million tons), Mexico (6,275 million tons), Australia (4,800 million tons) and Turkey (2,055 million ton)(Anonymous, 2017) [4]. As far as beet sugar is concerned, the EU and Turkey lead the list. In terms of world sugar consumption, the leading countries are India (25,500 million tons), EU (19,456 million tons), Brazil (12,125 million tons), Australia (1,005 million tons), US (10,180 million tons), China (15,640 million tons) and Russia (5,550 million tons), indicating that some leading producers are leading consumers as well (Anonymous, 2017; OECD, 2017) [4,11]. In terms of per capita sugar consumption in 2015, we see Brazil, also the leading producer, at the top of the list with 59.10 kilograms followed by Israel (58.50 kg), Australia (47.60 kg) and EU (37.90 kg). Per capita sugar consumption in the US is 31.60 kg, which is nearly half of that in Brazil (Anonymous, 2017) [4].

Table 1. Total sugar production in the world (000 tons)

Years	Sugarbeet	Turkey (Sugarbeet)	Share of Turkey's in World Sugarbeet Production (%)	Sugarcane	World Sugar Production
2009/10	34,313	2,262	7	120,453	154,766
2010/11	34,100	2,275	7	131,500	165,600
2011/12	40,000	2,263	6	135,100	175,100
2012/13	37,907	2,128	6	145,577	183,484
2013/14	38,530	2,390	6	145,972	181,502
2014/15	39,279	2,055	5	142,789	182,068

Source: Anonymous 2017

Table 1 gives total sugar production figures for the period 2009/10- 2014/15. The peak in total sugar production took place in the interval 2012/2013 as 183,484 million tons. The production of sugarbeet reached its highest value in 2011/12 with 40 million tons. The total world output in the early 2000s was 142.4 million tons, later climbing to 182,068 million tons in 2014/15. According to 2014/2015 while sugar production from sugar beet has its weight mainly in Europe (22,582 million tons), Asia (60,011 million tons) is the leading producer of sugar from care, followed by Latin America (43,537 million tons)(Anonymous, 2017) [4]. Lower ranking in total output is shared by Northern and Central America and Oceania in 2014/15.

According to 2015 data supplied by the Turkish Statistics Institute (TURKSTAT) there are about 200,000 farmers in Turkey engaged in sugar beet production. Sugar beet is grown on some 273,000 hectares of land. According to same data the total sugar output is 2.055 million tons, share of Turkey's in World sugar beet production 5% and annual per capita sugar consumption is 29.40 kilograms. This production data suggests that Turkey ranks fifth in the world after France(4 million tons), Germany (3,228 million tons), the US (4,679 million tons) and Russia (5,540 million tons) in beet sugar production and third in Europe (Anonymous, 2009; Anonymous 2017) [2, 4].

Sugar is one of the important agriculture-

based commodities discussed in WTO negotiations. Turkey's Tariff (Custom Dutty Rate) in sugar is 135%. Turkey sustains her domestic sugar beet production by imposing a high tariff in sugar.

The World Trade Organization's advanced rounds of negotiation on agricultural products essentially target substantial reductions in tariffs for such products under its market access. The objective of the present study is to analyze the economic implications of possible reductions in sugar tariff by Turkey.

MATERIALS AND METHODS

The core material of the present study consists of data obtained from databases of national and international organizations. Analyses are based on production, consumption, export, import, figures and domestic and international prices for 7 years in the period 2009-2015.

Firstly, the study constructs four distinct models for production, consumption, import and export as follows.

$$Q_{consumpton} = f(p,t)$$

$$Q_{import} = f(p)$$

$$Q_{production} = f(p)$$

$$Q_{exxport} = f(p)$$

In equations $Q_{consumption}$ denotes domestic sugar consumption, Q_{import} sugar import, Q_{export} sugar export, $Q_{production}$ sugar production, α fixed coefficient βp sugar price coefficient and βt trend coefficient. In the model for domestic sugar consumption two independent variables as sugar price and trend are used while sugar price is used as the only independent variable in all other models. In the second phase of the study, Partial equilibrium model is used to calculate the effect of a possible reduction in tariff and the price is calculated as shown below as the point where supply matches demand. Then, by changing the price in the model with respect to 2 scenarios, the effect of a reduction in Tariff is calculated on the basis of 2015 data. The two scenarios are as follows:

$$p_W = -(\sum \alpha_{demand} / \sum \beta_{demand}) + (Q_{spply} / \sum \beta_{demand})$$

(i)46% reduction in the Tariff which is 135%, and (ii) Zero tariff rate.

RESULTS AND DISCUSSIONS

Coefficients corresponding to production, consumption, import and export models constructed are given below. In the production model, sugar price is taken as independent variable and its coefficient is calculated as 720,370. The coefficient of the constant term in the model is 910,999. Both coefficients affect production at a significance level of 5%.

Other statistics in the model include Coefficient of Determination, Adjusted Regression and F-test. R^2 expresses to what extent the independent variable used in the model can explain the dependent variable and it is desired to be close to 1. In this model, R^2 is 0.42 meaning that price as the independent variable taken explains 42% of production.

The sugar price coefficient in Sugar Import Model is found as -91.569. The statistical value for t in the confidence interval 99% is found as 2.882, which is statistically significant. The sugar price coefficient sign is found as negative, meaning that imports increase as price rises up. The constant term coefficient in the model is calculated as 179,601. Explaining 50.9% of importation, the coefficient of determination is 0.509.

Table 2. Sugar production model

Independent variables	*Coefficients*	*Standard Errors*	*t*	*P*	*Sign.*
Constant	910,999	461,600	1.974	0.084	0.05
Sugar Price	720,370	299,529	2.405	0.043	0.05

Statistics for the model: Original $R^2 = 0.420$ Corrected $R^2 = 0.347$ F-statistic = 5.784

Table 3. Sugar import model

Independent variables	*Coefficients*	*Standard Errors*	*t*	*P*	*Sign.*
Constant	179,601	48,960	3.668	0.006	0.001
Sugar Price	-91,569	31,770	-2.882	0.020	0.001

Statistics for the model: Original $R^2 = 0.509$ Corrected $R^2 = 0.448$ F-statistic = 8.307

In sugar consumption model, the sugar price and trend is taken as independent variable. Time has greater effect on consumption relative to price. While one may expect fall in consumption as the price of sugar rises up, consumption has increased over years. The price coefficient is (-65,134), denoting that a unit increase in price leads to decrease of 65,134 units in consumption. The trend coefficient is 55,408 which mean that sugar consumption increases by 55,408 units each year. The price effect is not found significant in the consumption model while that of trend is found significant at the level of 1%. R^2 is 0.932; in other words independent variables explain consumption by 93.2%.

Table 4. Sugar consumption model

Independent variables	*Coefficients*	*Standard Errors*	*t*	*P*	*Sign.*
Constant	1,856.241	182,966	10.145	0.000	0.001
Sugar Price	-65,134	163,191	-0.399	0.702	
Trend	55,408	13,448	4.120	0.004	0.001

Statistics for the model: Original $R^2 = 0.932$ Corrected $R^2 = 0.913$ F-statistic = 48.201

In the Sugar Export Model, sugar price as the independent variable has the level of significance of 1% and sugar price coefficient is calculated as 830,394. The coefficient of the constant term in the model is 1,421.884. The t statistics is found as 3.946 in the confidence interval 99%. The coefficient of determination in the model is 0.661, explaining 66.1% of exportation.

Table 5. Sugar export model

Independent variables	*Coefficients*	*Standard Errors*	*t*	*P*	*Sign.*
Constant	1,421.884	324,291	4.382	0.002	0.001
Sugar Price	-830,394	210,430	-3.946	0.004	0.001

Statistics for the model: Original $R^2 = 0.661$ Corrected $R^2 = 0.618$ F-statistic = 15.572

Table 6. Basic data in sugar welfare analysis

Data	**2014/2015**
Production (000 tons)	**2,055**
Import (000 tons)	**4.6**
Export (000 tons)	**15.9**
Consumption (000 tons)	**2,639**
Market Price in Turkey (TL/kg)	**2.68**
SCENARIO 1: 46% reduction Tariff Rate which is 135% (TL/kg)	**1.13**
SCENARIO 2: Zero Tariff Rate (TL/kg)	**0.77**

*1 Turkish Liras 3,01 Euro (Average 2015)

The Partial Equilibrium Analysis of the model was conducted through supply and demand coefficients calculated on the basis of data given in Table 5 and coefficients of models mentioned above. The analysis is conducted with respect to 2 different scenarios by taking the year 2015 as base.

According to 2015 data, production is 2,055 million tons whereas the level of consumption is 2,639 million tons sugar prices for Turkey 2.68 TL.(Anonymous, 2017) [4].

In vase there is 46% decrease in Tariff Rate which is 135% at present as a result of a possible reduction by the WTO, sugar price

will be 1.13 TL.

According to 2015 data again, the price of sugar will be 0.77 TL in case no customs tariff is imposed.

Table 7. Sugar supply and demand coefficients and welfare values

Data	**2014/2015**
Supply Function Constant	911,178
Supply Function Price Coefficient	720,279
Demand Function Constant	1,857.662
Demand Function Price Coefficient	-65,965
Producers' Welfare (000 TL)	2,887
Consumers' Welfare (000 TL)	30,951
Social Welfare(000 TL)	33,838

Sugar supply and demand coefficients and welfare values and Supply Function Constant are calculated as 911,178 and Supply Function Price Coefficient as 720,279. While the Demand Function Constant is 1,857.662, the Demand Function Price Coefficient is -65,965. Given these, while producers' welfare is 2,887 TL, consumers' welfare is found as 30,951 TL. Social Welfare value is 33,838 TL.

Table 8. Welfare analysis according to scenario 1

Coefficient			
	TL	**Variatio TL**	**Variation %**
Producers' Welfare (000TL)	1,792	-1.094	-37.91
Consumers' Welfare (000TL)	31,761	810.750	2.62
Social Welfare (000TL)	33,554	-284.034	-0.84

Under scenario 2, in case there is 46% cut down in the existing 135% Tariff Rate for sugar, production will decrease by 22.37% while consumption increases by 2.62%. Producers' welfare will turn 1.7 million TL with a decline by 37.91%. This points out to a loss on the part of producers. Consumers' welfare, under the same scenario, will be 31.7 million TL with an increase by 810.750 TL. In spite of an increase by 2.62%, the effect on consumers' welfare is not so significant. As the sum total of both consumers' and producers' welfare, social welfare is down by 284.034 TL, turning out as 33.5 million TL, a decrease by 0.84%.

Table 9. Welfare analysis according to scenario 2

Coefficient			
	TL	**Variation TL**	**Variation%**
Producers' Welfare (000TL)	1,228	-1.658	-57.45
Consumers' Welfare (000TL)	32,179	1.228	3.97
Social Welfare (000TL)	33,408	-430.386	-1.27

The scenario 2 shown producers', consumers' and social welfare situations in case Customs Tariff Rates are fully lifted and trade in sugar is completely free. In this case, production will decline by 33.89% while consumption rises by 3.97%. As for producers' welfare, it is now 1.22 million TL after a decline by 1,658 million TL. This means a decline by 57.45% over the previous welfare figures. This decline means losses incurred by producers and occurrence of a negative impact. The consumer rant, on the other hand, emerges as 32.17 million TL with an increase of 1,228,000 TL. This is a rate of increase by 3.97% over the year 2010. While this may appear as a plus in terms of consumer welfare, the actual effect is not so big. Social welfare, it turns out as 33.4 million TL, dropping by 430,386 TL, corresponding to a decline by 1.27**%.**

CONCLUSIONS

Given its climatic and geographical features, Turkey responds to consumers' sugar need by focusing on sugar beet which is presently an important crop in terms of its place in overall production, contribution to national economy and overall consumption pattern. The purpose of the present study is to analyze the economic effects any prospective discount in sugar tariff. Accordingly, first four distinct models were constructed with respect to production, consumption, import and export. Then, the equilibrium price for sugar was calculated on the basis of partial balance analysis. The market effect of any possible reduction in tariff was examined under 2 different scenarios as follows: (i)46%

reduction in the Tariff which is 135%, and (ii)Zero tariff rate.

By altering the equilibrium sugar price found at rates envisaged in respective scenarios, the impact of a possible tariff reduction on production, consumption and welfare was examined.

The findings show that price as a variable is meaningful and as expected in production, export and import models whereas time is the significant variable when it comes to the consumption model.

According to the first scenario which assumes 46% reduction in tariff of 135%, there will be 22.37% decrease in production, 2.62% increase in consumption, 37.91% decline in producers' welfare and 2.62% increase in consumers' welfare.

Under the second scenario, if there is no tariff at all as envisaged under the third scenario, production will decrease by 33.89% consumption will increase by 3.97%, there will be 57.45% decrease in producers' welfare and 3.97% increase in consumers' welfare.

ACKNOWLEDGEMENTS

This research work was from Master Thesis at Ankara University.

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