International Journal of Agricultural Science and Research Volume 2, Number 1, Winter 2011(Serial #2)

Study on Trade Restrictiveness of Agricultural Policies in Iran

G. Norouzi[1]*; R. Moghaddasi[1] ; S. Yazdani[2]

1: Department of Agricultural Economics, Science and Research Branch, Islamic Azad University, Tehran, Iran
2: Department of Agricultural Economics, Collage of Agricultural and Natural Resources, University of Tehran, Iran

Received: May, 11, 2011 *Accepted: July, 24, 2011*

ABSTRACT

In this paper the trade restrictiveness of agricultural policies in Iran was measured by the TRI index for the nine major agricultural products including wheat, rice, barely, maize, soybean, meat (beef meat), soybean oil, sugar and banana over the period 1981 to 2007. The main results indicate that there is no trend in above index and high volatility especially in 2006 and 2007 years due to considerable increases in tariff of sugar, rice, meat and oil. Based on calculated ad-valorem equivalents (AVE_s) of non-tariff barriers (NTB_s), these barriers have a significant contribution to the level of trade restrictiveness measured by the TRI index. Thus, neglecting the restrictiveness of NTB_s identify can be very misleading. Moreover, two sets of protected products: First, Over-protected products (rice, oil, sugar and banana) which their actual tariffs are higher than their optimum ones. Second, Under-protected products (wheat, barely, maize, soybean and beef meat) which their actual tariffs are lower than their optimum ones. Due to this, we found that most products are heavily protected and trade policies in agriculture sector have the prohibitive role on welfare and import. This can lead to the decrease in domestic welfare level as well as country's trade volume with trading partners. Thus, it is necessary to adjust Iran's agricultural trade tariff regime in order to bridge the gap between the current structure of protection and optimum import duties.

Keywords: Tariff; Non-tariff Barriers; Import Demand Function; Ad-valorem of NTB; TRI index.

***Corresponding Author Email**: ghnorouzi@yahoo.com

INTRODUCTION

Finding the best way to measure the average level of tariffs and non-tariff measures which restrict trade in an economy is an important subject because trade restrictions have a substantial influence on the allocation of resources and on the level and distribution of social welfare in a tariff-imposing country. Trade restrictions of course also affect imports from the country's trading partners and, therefore, the welfare in these countries (Lioyd & Maclaren, 2008). Indicators of trade restrictiveness are used to study the effects of trade policy on growth, poverty, social welfare and trade distortions. They are also an essential input to trade negotiators, and to any study attempting to understand the institutional and political determinants of trade protection (Grossman & Helpman, 1994).

Most studies use such measures as simple or trade-weighted average tariffs, non-tariff barrier coverage ratios, price –wedge method and measures of tariff dispersion that are not well grounded in trade theory, and often, they only vaguely define the aspects of the restrictiveness of the trade regime (Anderson & Neary, 1998; Kee *et al*., 2008). The easiest way to measure a country's formal trade barriers is the import-weighted average tariff rate, which can be readily calculated by dividing the revenue from import duties by the value of total imports (Irwin, 2009). Unfortunately, this measure has four critical shortcomings that make it a poor indicator of the tariff's height and static welfare cost. First, the average tariff is downward biased: goods that are subject to high tariffs receive a low weight in the index, and goods that are subject to prohibitive tariffs will not be represented at all. Second, the average tariff understates the welfare cost of a given tariff structure because it ignores the dispersion in import duties across goods. Third, the average tariff lacks any economic interpretation: an average tariff of 50 percent may or may not restrict trade more (or generate deadweight losses larger) than an average tariff of 25 percent. Fourth, the average tariff will not reflect the impact of non-tariff barriers, such as import quotas, in restricting trade (Irwin, 2009).

Given these problems, Anderson and Neary (1994, 1998, 2005) provided several indices of trade barriers that have a well-defined theoretical basis in terms of economic welfare and the volume of trade. They using computable general equilibrium (CGE) models introduced indices of trade restrictiveness index (TRI) and mercantilist trade restrictiveness index (MTRI). The trade restrictiveness index (TRI) refers to the uniform tariff which, if applied to all goods, would yield the same welfare level as the existing tariff structure (Anderson & Neary, 1994). The mercantilist trade restrictiveness index (MTRI) refers to the uniform tariff that would yield the same volume of imports as the existing set of tariffs (Anderson & Neary, 2005).

The TRI index measures the distortions imposed by each country's trade policies on its own welfare. It answers the following question: What is the uniform tariff hat if applied to imports instead of the current structure of protection would leave home welfare at its current level? The MTRI (in this paper labeled Overall Trade Restrictiveness Index (OTRI)) measures the impact of each country's trade policies on its aggregate imports. It answers the following question: What is the uniform tariff that if imposed on home imports instead of the existing structure of protection would leave aggregate imports at their current level?

Feenstra (1995) developed a simplified partial-equilibrium version of the TRI that can be calculated without resorting to complex general equilibrium simulations. Kee, Nicita, and Olarreaga (2005, 2008, 2009), lioyd and Maclaren(2008), Irwin(2009) and Yu *et al*., (2009) have used this approach to evaluate the trade restrictiveness. They find that the TRI and OTRI are highly correlated but that the TRI is higher than the OTRI because of the variance in tariff rates.

Following Kee, Nicita and Olarreaga's studies (2008, 2009), in this paper we measure Trade Restrictiveness of Agricultural Policies in Iran using the TRI index over the period 1981 to 2007. This main objective can be divided into the following specific objectives:

- Estimating ad-valorem equivalents (AVE_s) of non tariff barriers (NTB_s) in the agricultural Sector of Iran.
- Computing trade restrictiveness index (TRI) of traded agricultural products of Iran

- Measuring the influence trade restrictiveness of Agricultural Policies on welfare level

MATERIALS AND METHODS

This section describes the methodology used to estimate ad-valorem of NTB_s and trade restrictiveness index too. With regard to trade restrictiveness index summarize impact of all trade barriers (nominal tariff line and non- tariff barriers) in uniform tariff-equivalent thus we requires first to bring all types of trade policy instruments into a common metric. Section 1 computes AVE_s of NTB_s of selected agricultural products.

Estimating AVE_s of NTB_s

To obtain the AVE_s of NTB_s, we first estimate the quantity-impact of NTB on imports using log-linear model of import demand with assuming constant return technologies similar to Kee *et al*.,(2005, 2008). Then we convert the quantity impact of NTB_s on imports into a tariff equivalent based on import demand elasticities. Log-linear model used and adopted in this study is the following:

$$\ln m_i = \alpha_0 + \alpha_1 \ln GDP + \beta_{1i} D_i + \beta_{2i} \ln NPR_i + \varepsilon_i \ln(1+t_i) P_{iw} + \mu_i \qquad (1)$$

Where m_i is the import volume of good i, GDP is real value added of agricultural sector, D_i is a dummy variable indicating the presence of a core non-tariff such as technical barriers, import quota system and import license, NPR_i is agricultural domestic support (nominal protection rate), t_i is the nominal tariff imposed on good i in country and p_{iw} is domestic equivalent of world price of good i. In equation (1), β_{1i} and β_{2i} are the coefficients that captures the quantity impact of NTB on imports and ε_i is import demand elasticity. This model allows for both tariff and NTB to deter trade with effects that vary by importing country and good. In this paper, nominal protection rate (NPR) which is indicator of agricultural domestic support obtains the following:

$$NPR = \frac{P_d}{P_c . E} \times 100 \qquad (2)$$

Where p_d is domestic price of good i, p_c is CIF price of traded good i in country and E is formal exchange rate in country. To make NTB_s comparable with ad-valorem tariffs, one needs to transform the quantity impact into price-equivalents. This is referred to as an AVE of NTB, and is defined as follows:

$$AVE = \frac{d \log(P^d)}{dNTB} \qquad (3)$$

According to equations (1) and (3) and with respect to non-tariff parameters of D_i and NPR_i :

$$\frac{d \log(m_i)}{dD_i} = \frac{d \log(m_i)}{d \log(P^d)} \times \frac{d \log(P^d)}{dD_i} = \varepsilon_i . AVE_i^D \qquad (4)$$

$$\frac{d \log(m_i)}{d \log(NPR_i)} = \frac{d \log(m_i)}{d \log(P^d)} \times \frac{d \log(P^d)}{d \log(NPR_i)} = \varepsilon_i . AVE_i^{NPR} \qquad (5)$$

Where AVE_i^D and AVE_i^{NPR} are the ad-valorem equivalents of core NTB and domestic support imposed on good i respectively. Solving (4) and (5) for two NTB, we obtain tariff equivalent of non-tariff barriers as follows:

$$(6)\ AVE_i^D = \frac{1}{\varepsilon_i}\frac{\partial \ln m_i}{\partial D_i} = \frac{1}{\varepsilon_i}.\beta_i^D = \frac{1}{\varepsilon_i}.\beta_{1i}$$

$$(7)\ AVE_i^{NPR} = \frac{1}{\varepsilon_i}\frac{\partial \ln m_i}{\partial NPR_i} = \frac{1}{\varepsilon_i}.\beta_i^{NPR} = \frac{1}{\varepsilon_i}.\beta_{2i}$$

Overall AVE for each good i is obtained by simply adding the two AVE of NTB components, and is denoted AVE_i:

$$AVE_i = AVE_i^D + AVE_i^{NPR} \qquad (8)$$

Estimating trade restrictiveness index

The overall level of protection imposed on imports of good i is given by:

$$T_i = t_i + AVE_i \qquad (9)$$

Where T_i is the overall level of protection that country imposes on imports of good i, t_i and AVE_i are nominal tariff and ad-valorem non tariff imposed on good i respectively. In this paper, based on the partial equilibrium model and Following Feenstra's method (1995) and Kee, Nicita and Ollareaga (2008, 2009), we calculate the measure of trade restrictiveness (TRI) in a similar method.

The TRI summarizes the restrictions imposed by each country's trade policies on its own welfare. It answers the following question: What is the uniform tariff that if applied to imports instead of the current structure of protection would fix welfare at its current level? The TRI is (implicitly) defined by:

$$TRI_c : \sum_n W_{n,c}(TRI_c) = \sum_n W_{n,c}(T_{n,c}) = W_c^0 \qquad (10)$$

Where $W_{n,c}$ is the welfare associated with imports of good n in country c and W_0^c is the current level of aggregate welfare in country c given its protection structure. It is well known that in a partial equilibrium setup a second-order linear approximation to the welfare cost is given by:

$$\Delta W_{n,c} = \frac{1}{2} m_{n,c}.\varepsilon_{n,c}.T_{n,c}^2 \qquad (11)$$

Thus, the extent of welfare loss increases with the elasticity of import demand, imports, and the squared of the level of protection (overall tariff). Totally differentiating (10), using (11) and solving for TRI yields:

$$TRI_c = \left(\frac{\sum_k m_{n,c} \varepsilon_{n,c} T_{n,c}^2}{\sum_k m_{n,c} \varepsilon_{n,c}} \right)^{\frac{1}{2}} \quad (12)$$

In this paper, a simplified and transformed TRI for country's agricultural sector and can be expressed as:

$$TRI = \left(\frac{\sum_i m_i \varepsilon_i T_i^2}{\sum_i m_i \varepsilon_i} \right)^{\frac{1}{2}} \quad i=1,\ldots, n \quad (13)$$

Where m_i is import volume of product i, ε_i is import demand elasticity of product i and T_i is overall tariff imposed on product i.

Equation (13) shows that the partial equilibrium TRI is the weighted sum of squared protection levels, where weights are given by the elasticity of import demand and imports (Kee *et al*., 2008). Kee *et al*., (2008, 2009) statement that the squared of the partial equilibrium TRI can be decomposed into the squared of the import weighted average tariff, the tariff variance, and the covariance between tariff squared and import demand elasticities. Thus a higher tariff variance and higher levels of protection on goods with large import demand elasticities lead to a higher TRI.

In this paper, we study Trade restrictiveness of agricultural policies in Iran for the nine major agricultural product including wheat, rice, barely, maize, soybean, meat (beef meat), soybean oil, sugar and banana. These products own more 70 percent of the value of Iranian agricultural imports among 2002 to 2007. Data of this paper are annual data for during 1981-2007 periods which there are obtained from different sources. Tariff data is collected from tariff schedule were presented in the annually import and export rules which published by ministry of commerce. Exchange rate, Price index and real GDP data are available in central bank database of Iran. Domestic price of agricultural products are gained from agriculture ministry of Iran. World price and trade data of agricultural products are obtained from FAO's statistical database.

RESULTS AND DISCUSSION

In this section, we first discuss the estimates of AVE of NTB for each selected product and then present the estimates of trade restrictiveness index (TRI).

ad-valorm equivalents of non- tariff barriers(AVE_s of NTB_s)

In order to measuring tariff equivalent of non- tariff barriers, we first estimate import demand function for each good i based on equation (1). Each of these regressions provided us the coefficients that measure the impact of the two different types of NTB_s (dummy variable for core non-tariff barriers and agricultural domestic support) on imports. These are the coefficients in front of the two NTB variables (β_{1i} , β_{2i}) interacted with a constant coefficients and import demand elasticity (ε_i) that allow us to measure the impact of world price changes on imports.

The results of the estimations of import demand functions for 9 agricultural products are shown in Table (1). As the table shows, most variables in the regressions have the expected signs and are statistically significant. The F-statistic indicates the overall significance of the sample regression and it suggesting that the overall fit of the import equations is very good.

Table 1: The results of the estimated import demand functions for 9 agricultural products

variable	ln GDP	D	lnNPR	LnP_d	R^2	D.W	F-statistic
wheat	2.11 (.0001)*	1.1 (.0001)	-.62 (.23)	-.14 (.05)	.84	2.1	41.2
rice	1.22 (.0001)	.02 (.91)	-.21 (.33)	-.31 (.002)	46	2.1	4.48
barely	.50 (.087)	-.010 (.98)	-.96 (.12)	-.44 (.07)	42	1.9	5.6
maize	1.25 (.0001)	-.47 (.02)	-.010 (.90)	-.43 (.0001)	61	2.01	12.2
soybean	.96 (.0001)	-.19 (.025)	-.06 (.70)	-.08 (.034)	81	2.09	22.4
meat	1.45 (.06)	-1.32 (.005)	-1.02 (.003)	-1.4 (.0001)	86	2.07	35.5
oil	2.12 (.12)	-.10 (.53)	-.045 (.83)	-.30 (-.006)	37	1.93	4.7
sugar	2.29 (.28)	.10 (.70)	-.58 (.088)	-.22 (.02)	33	1.98	4.59
banana	1.09 (.0001)	-.59 (.311)	-.36 (.06)	-.12 (.008)	88	2.07	41.8

* Figures in Parenthesis are significance level

Given the findings of table (1) and following equation (6) and (7), the AVE_s of NTB_s for selected products estimated and the results are presented in table (2). The results shows the average AVE_s of NTB_s for 9 group products are: -3.43% for wheat, ./61% for rice, 1.74% for barely, 1.12% for maize, 3.13% for soybean, 1.67% for meat, ./47% for oil, 2.18%for sugar and 7.92% for banana. Based on the results reported in table (2) we can also conclude AVEs of all products are positive except wheat.

Table 2: AVE of NTB_s for the selected products and trade support

product	Own Price elasticity of demand	AVE of NTB_s (%)	Trade support	Average of NPR (%)	NPR-100(%)	Domestic price support
wheat	-.14	-3.43	no	77.6	-22.4	No
rice	-.31	.61	Yes=protective	101	1	Yes
barely	-.44	1.74	Yes=protective	72.1	-27.9	No
maize	-.43	1.12	Yes=protective	70.1	-29.9	No
soybean	-.08	3.13	Yes=protective	67.8	-32.2	No
beef meat	-1.4	1.67	Yes=protective	180.2	80.2	Yes
oil	-.3	.47	Yes=protective	101.1	1.1	Yes
sugar	-.22	2.18	Yes=protective	105.8	5.8	Yes
banana	-.12	7.92	Yes=protective	65.4	-34.6	No

Table source: calculated author

Trade restrictiveness indices

Considering the results of table (2) and based on equations (13) and (16) we compute trade restrictiveness indices (TRI and OTRI) for agriculture sector of Iran. In order to evaluate the effect of non-tariff barriers, the TRI index is estimated in two cases: first with consider to both tariff and NTB (AVE of non-tariff) and second, using nominal tariff data only. Table (3) provides our estimates of TRI and OTRI indices compared to weight average of tariff for agriculture sector of Iran during 1981-2007.

Table 3: trade restrictiveness index and weighted average of tariff

year	TRI (%) (with NTB_s)	TRI (%) (without NTB_s)	Weighted average of tariff (%)
1981	14.1	12.8	9.1
1982	16.6	15.4	10.5
1983	15.1	14.1	9.1
1984	15.1	13.8	8.8
1985	15.4	14.2	9.4
1986	13.2	12.1	8.1
1987	12.4	11.4	6.4
1988	11.2	10.1	4.9
1989	12	10.9	5.9
1990	13.1	11.9	7.4
1991	14.3	13	7.6
1992	15.3	14	9.2
1993	4.3	3	1.4
1994	6.4	5.2	1.7
1995	7.4	6.3	2.3
1996	7.2	5.8	2.2
1997	10.4	9.3	2.3
1998	12.7	11.4	3.2
1999	12.1	11	3
2000	18.7	17.6	5.1
2001	8.2	7.1	2.8
2002	16.1	15.1	8.6
2003	25	24	15.2
2004	15	13.7	7.4
2005	13.9	12.4	8
2006	41.4	30.4	39.6
2007	35.6	26.8	25.9
Average	14.9	13.1	8.3

Table source: calculated author

As already been stated, the TRI is the uniform tariff that if applied to imports instead of the current structure of protection would fix welfare at its current level. In the other words, it is iso-welfare measure. Therefore, we can recognize the effect of current trading policies imposed on agricultural products on the welfare level using TRI index. Table (4) indicates the prohibitive impact of trade tariff regime on Welfare in agriculture sector of Iran. As this tables show, optimal tariff to keep welfare in accordance with the TRI index is 14.9%.

Table 4: The influence of agricultural trade policies on welfare in Iran

Product	Average of nominal tariff (%)	TRI index(%)	Condition analyze	change in welfare
wheat	./9	14.9	TRI>nominal tariff	+
rice	20.3	14.9	TRI<nominal tariff	-
barely	8.3	14.9	TRI>nominal tariff	+
maize	6.5	14.9	TRI>nominal tariff	+
soybean	5.1	14.9	TRI>nominal tariff	+
meat	9.7	14.9	TRI>nominal tariff	+
oil	11.1	14.9	TRI>nominal tariff	+
sugar	20.9	14.9	TRI<nominal tariff	-
banana	77.2	14.9	TRI<nominal tariff	-

Table source: calculated author

CONCLUSION

In this paper we measure Trade Restrictiveness of Agricultural Policies in Iran using the TRI index over the period 1981 to 2007. For this purpose, we first to bring all types of trade policy instruments into a common metric. On the other hands, we quantify non-tariff restrictions.

The main results show the Tariff equivalents of all products are positive except wheat. This means non-tariff restrictions imposed on these products have been protective. Based on the results reported in table (2) we can also conclude AVEs of most products are correlated with NPR coefficients (except barely, maize and soybean). This reflects that when domestic support of agricultural products is done and are significant, the trade policies also have a protective effect.

Considering the results of AVE of NTB_s of selected products and based on equation (13) we compute trade restrictiveness index (TRI) for agriculture sector of Iran in two cases: first with consider to both tariff and NTB_s and second, using nominal tariff data only. According our estimates of TRI compared to weight average we can make several important observations as follows:

- In over this period, trade restrictiveness indexes no consistent trend and is volatility especially in 2006 and 2007 years due to considerable increases in tariff of sugar, rice, meat and oil. This represents the fact that the TRI depends almost entirely on the mean and the variance of tariff rates (Irwin, 2009).

- Non-tariff barriers (NTB_s) have a significant contribution to the level of trade restrictiveness measured by the TRI index. According table (3), the estimated TRI value with respect to non- tariff barriers is higher than the TRI value using nominal tariff data only in the all years. Thus, neglecting the restrictiveness of NTB can be very misleading.

- Table (3) shows the annual deviation of the TRI from the weighted average tariff measure. In the other words, the average tariff can understate or unpredicted the TRI by a significant margin because the import-weighted average tariff does not include the variance of the tariff rates across goods. Over this period, TRI exceeds the average tariff by about 79.5 percent, on average (14.9 % against 8.3%). Of course, TRI and average tariff index tend to move closely together when the number of commodities is small and when the dispersion of tariffs is low. Other calculations have found deviations of similar magnitudes: Anderson and Neary (2005) calculate that the TRI is about 50 percent higher than the average tariff for the United States in 1990, and Kee, Nicita, Olarreaga (2008) found that the TRI is about 80 percent higher than the import-weighted average tariff, on average, across many countries. This suggests that in trade negotiations and in order to determine optimal tariff lines, most countries would prefer to use the TRI to evaluate their own trade policies.

- Based on the results of TRI index in table (4), we identify two sets of protected products: First, Over-protected products (rice, sugar and banana) which their actual tariffs are higher than their optimum tariffs. Second, Under-protected products which their actual tariffs are lower than their optimum tariffs including wheat, barely, maize, soybean, oil and beef meat. Due to this, we discover that some products are heavily protected and their trade policies have deterrent effect. This can lead to the decrease of domestic welfare level as well as country's trade volume with trading partners. Thus, it is necessary adjust Iran's agricultural trade tariff regime in order to bridge the gap between the current structure of protection and optimum import duties.

REFERENCES

1. Anderson, J., Neary, P. (2005). The Mercantilist index of trade policy. *International Economic Review*, 44(2), pp.627-649. 2005.
2. Anderson, J., Neary, P. (1998). A new approach to evaluating trade policy. *Review of Economic Studies*, 63(1), pp.107-125. 1998.
3. Anderson, J., Neary, p. (*1994)*. Measuring the restrictiveness of trade policy. *World Bank Economic Review*, v.8, pp.151-169. 1994.
4. Feenstra, R. (1995). *Estimating the effects of trade policy*. Handbook of International Economics., v.3, Amsterdam. March 1995.
5. Food and Agricultural Organization.(2008). *Trade and price statistics*. Retrieved from www.fao.org/statistics. 1981-2007.
6. Grossman, G. M., Helpman, E.(1994). Protection for sale. *American Economic Review*. 84:4, pp.833–50. 1994.
7. Irwin, D. (2009). *Trade restrictiveness and deadweight losses from U.S. tariffs, 1859-1961*. National Bureau of Economic Search., Cambridge University. Januray 2009.
8. Kee, H.L., Nicita, A., Olarreaga, M. (2009). Estimating trade restrictiveness indices. *Economic Journal, Royal Economic Society*. 119(534), pp.172-199. 2009.
9. Kee, H. L., Nicita, A., Olarreaga, M. (2005). Import demand elasticity and trade distortions. *Review of Economics and Statistics*. Pp.666-682, 2005.
10. Kee, H. L., Nicita, A., Olarreaga, M. (2008). *Estimating trade restrictiveness indices*. *World Bank*. September 2008.
11. Lioyd, P., Maclaren, D. (2008). *A trade restrictiveness index of the level of protection in Australian manufacturing*. University of Melbourne, Department of Economics., Working Papers, number 1024, pp.1-23, December 2008.
12. Yu, E., Wailes, E., Chavez, E. (2009). *A quantitative analysis of trade policy responses to high agriculture commodity prices*. Agricultural Economics Conference. Beijing, China, August 16-22, 2009.