

Measuring Restrictiveness of Agricultural Trade Policies in Iran

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Abstract: The objective of this paper is to measure the trade restrictiveness of agricultural policies in Iran using the TRI and OTRI indices over the period 1981 to 2007 for the following products: wheat, rice, barely, maize, oil, soybean, beef meat, sugar and banana. For this purpose, we first to bring all types of trade policy instruments into a common metric. On the other hands, we convert the quantity impact of non-tariff barriers (NTB_s) on imports into a tariff equivalent based on import demand elasticities. The results suggest that the difference between TRI and import-weighted tariff is shown to depend on the variance of tariffs and the covariance between tariffs and import demand elasticities. On average, TRIs are 79.5 percent higher than the simple and import-weighted average tariffs (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. Moreover, 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.

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Key words: Tariff, Non-tariff Barriers · Import Demand Function · TRI and OTRI indices

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 [1]. 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 [2].

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 [3, 4]. 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 [5]. 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 [5].

Given these problems, [3, 7, 6] 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 [6]. 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 [7].

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 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?

[8] Developed a simplified partial-equilibrium version of the TRI that can be calculated without resorting to complex general equilibrium simulations. [1, 4, 5, 9-11] 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 [4, 10] studies, 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 METHOD

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. To obtain the AVE_s of NTB_s, we first estimate the quantity-impact of NTB_s on imports using log-linear model of import demand with assuming constant return technologies. we convert the quantity impact of NTB_s on imports into a tariff equivalent based on import demand elasticities. Then, based on the partial equilibrium model and Following [8] method and [4, 10], we calculate the trade restrictiveness indices (TRI and OTRI) 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:

$$TRI_c : \sum_n W_{n,c}(TRI_c) = \sum_n W_{n,c}(T_{n,c}) = W_c^0 \quad (1)$$

Where W_{nc} is the welfare associated with imports of good n in country c and W_c^0 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:

$$\Delta W_{n,c} = \frac{1}{2} m_{n,c} \cdot \epsilon_{n,c} \cdot T_{n,c}^2 \quad (2)$$

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 (1), using (2) and solving for TRI yields:

$$TRI = \left(\frac{\sum_i m_i \epsilon_i T_i^2}{\sum_i m_i \epsilon_i} \right)^{\frac{1}{2}} \quad i=1, \dots, n \quad (3)$$

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 .

The OTRI (this same is Anderson and Neary's MTRI index) summarizes 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 imports instead of the existing structure of protection would preserve aggregate imports at their current level? Following [4], the OTRI is implicitly defined by:

$$OTRI_c : \sum_n m_{n,c}(OTRI_c) = \sum_n m_{n,c}(T_c) = m_c^0 \quad (4)$$

Where $m_{n,c}$ is aggregate imports of good n in country c and m_c^0 is the current level of aggregate imports in country c given its protection structure. Totally differentiating (4) in a partial equilibrium setup and solving for OTRI yields (4, 9, 10):

$$OTRI = \frac{\sum_i m_i \varepsilon_i T_i}{\sum_i m_i \varepsilon_i} \quad (5)$$

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 [12]. Exchange rate, Price index and real GDP data are available in central bank database of Iran [13-15]. Domestic price of agricultural products are gained from agriculture ministry of Iran [12]. World price and trade data of agricultural products are obtained from FAO's statistical database [16].

RESULTS

Ad-valorm Equivalents of Non-Tariff Barriers (AVE_s of NTB_s): Given results of the estimated import demand functions for 9 agricultural products, the AVE_s of NTB_s for selected products estimated and the results are presented in Table 1. The results shows the average AVE 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 1 we can also conclude AVEs of all products are positive except wheat.

Trade Restrictiveness Indices: Considering the results of Table 1 and based on equations [3, 5] 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_s (AVEs of non-tariff) and second, using nominal tariff data only. Table 2 provides our estimates of TRI and OTRI indices compared to weight average of tariff for agriculture sector of Iran during 1981-2007.

As already been stated, the TRI and OTRI are the uniform tariffs that if applied to imports instead of the current structure of protection would fix welfare and trade volume at theirs current level. Therefore, we can recognize the effect of current trading policies imposed on agricultural products on the welfare and trade level. Tables 3 and 4 indicate the prohibitive impact of trade tariff regime on Welfare and trade level in agriculture sector of Iran. As this tables show, optimal tariff to keep welfare and trade in accordance with the TRI and OTRI indices are 14.9% and 9.1% respectively.

DISCUSSION

In this paper we measure Trade Restrictiveness of Agricultural Policies in Iran using the TRI and OTRI indices 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.

Table 1: 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

Table 2: trade restrictiveness index and weighted average of tariff

Year	TRI (%) (with NTB _s)	TRI (%) (without NTB _s)	OTRI (%)	Weighted average of tariff (%)
1981	14.1	12.8	10.5	9.1
1982	16.6	15.4	12.7	10.5
1983	15.1	14.1	11.2	9.1
1984	15.1	13.8	11.1	8.8
1985	15.4	14.2	12.1	9.4
1986	13.2	12.1	9.4	8.1
1987	12.4	11.4	8	6.4
1988	11.2	10.1	5.9	4.9
1989	12	10.9	7.7	5.9
1990	13.1	11.9	8.8	7.4
1991	14.3	13	8.9	7.6
1992	15.3	14	10.3	9.2
1993	4.3	3	1.9	1.4
1994	6.4	5.2	2.2	1.7
1995	7.4	6.3	2.7	2.3
1996	7.2	5.8	2.6	2.2
1997	10.4	9.3	1.7	2.3
1998	12.7	11.4	2.3	3.2
1999	12.1	11	2.5	3
2000	18.7	17.6	5	5.1
2001	8.2	7.1	3	2.8
2002	16.1	15.1	8.8	8.6
2003	25	24	14.9	15.2
2004	15	13.7	8.1	7.4
2005	13.9	12.4	7.5	8
2006	41.4	30.4	39.8	39.6
2007	35.6	26.8	26.1	25.9
Average	14.9	13.1	9.1	8.3

Table source: calculated author

Table 3: 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

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

Product	Average of nominal tariff (%)	TRI index (%)	Condition analyze	Influence on trade volume
Wheat	.9	9.1	OTRI>nominal tariff	+
Rice	20.3	9.1	OTRI <nominal tariff	-
Barely	8.3	9.1	OTRI >nominal tariff	+
Maize	6.5	9.1	OTRI >nominal tariff	+
Soybean	5.1	9.1	OTRI >nominal tariff	+
Meat	9.7	9.1	OTRI <nominal tariff	-
Oil	11.1	9.1	OTRI <nominal tariff	-
Sugar	20.9	9.1	OTRI <nominal tariff	-
Banana	77.2	9.1	OTRI <nominal tariff	-

Table source: calculated author

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 1 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_s of NTB_s of selected products and based on equations [3, 5] we compute trade restrictiveness indices 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 indices no consistent trend and are 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 and OTRI depend almost entirely on the mean and the variance of tariff rates [5].
- Non-tariff barriers (NTB_s) have a significant contribution to the level of trade restrictiveness measured by the TRI index. According table 2, 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_s can be very misleading.
- Table 2 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: [6] calculate that the TRI is about 50 percent higher than the average tariff for the United States in 1990 and [4] 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 and OTRI indices in Tables 3 and 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.

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