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Quantifying the Trade Effects of SPS and TBT Agreements on Export of Pistachios from Iran

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Abstract: According to World Trade Organization (WTO) regulations, countries are permitted to adapt regulations under the Sanitary and Phyto-Sanitary (SPS) and Technical Barriers to Trade (TBT) agreements; in order to protect human, animal and plant health as well as environment, wildlife and human safety. These standards are currently becoming a main stumbling block in food and agricultural trade for developing countries. Contrasting with previous works, this paper with aid of a gravity model estimates the trade effect of SPS and TBT regulations on export of Pistachios from Iran. Our results suggest that these measurements have a negative impact on export of pistachios from Iran. The export and the world demand for agricultural products are strictly focusing on the quality, packaging, labeling and standards of the goods. Policy makers in countries that export agricultural products, such as Iran, must consider such characteristics when they are planning their programs. Therefore; if Iran builds up-to-date production systems, it will increase her exports of agricultural products.

JEL Classification: F13 · Q17
Key words: Pistachios · SPS, TBT · Gravity Model · Exports

INTRODUCTION

Sanitary and Phyto-Sanitary measures (SPS) and Technical Barriers to Trade (TBT_S) have an important role in conduct of international discussions. Different measurements have been recommended in the literature for identification of non-tariff barriers to trade and estimate their impact. These measurements can be classified into four groups: (1) the frequency and coverage type of measurements, (2) the quantity-impact measurements, (3) the price-comparison measurements, (4) and the price effect on measurements based on import demand elasticity. The first group identifies NTB_S, while the second one quantifies their restrictive impacts on trade. The two latter groups offer estimations of ad-valorem equivalents of NTB_S [1-3].

WTO members must inform their non-tariff measurements. These notifications are collected and analyzed by UNCTAD, distinguishing between seven large categories of measurements:

- Para-tariff measurements
- Price control measurements
- Finance measurements
- Automatic licensing measurements
- Quantity control measurements
- Monopolistic measurements
- Technical measurements

Our empirical implementation focuses on measurements which are notified under Sanitary and Phyto-Sanitary and Technical Barriers to Trade agreements. These barriers fit into all of the above-mentioned categories, except price control measurements. Countries can come up with six different motivated plans to impose measurements on agricultural and food products trade flow: (1) protection of environment, (2) protection of wildlife, (3) protection of plant health, (4) protection of animal health, (5) protection of human health, (6) protection of human safety [1-3].

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This study attempt to estimate the trade forgone from Iranian Pistachios exports due to SPS and TBT agreements to main importing countries. Pistachios are an export product of Iran's agricultural sector. Pistachios are the second ranked non-oil export and Iran is the largest producer of pistachios but it has the potential to produce more of this product. In addition, many countries have an unused import capacity for Pistachios.

MATERIALS AND METHODS

Beghin and Bureau [4] noted that estimation of the trade forgone as a result of NTBs is an approach to capturing the trade impacts of NTBs. So, gravity models are appropriate to capture the trade effects of NTBs. Moenius [3] and Mahe [5] also confirmed that the gravity model is one of the most successful and hence widely used frameworks for empirical analysis of trade flows between countries. Among countries, the gravity model has some advantages over other similar methods in estimation of the trade flows. First, it requires a limited amount of data; hence, it is helpful for application when data are scarce and costly to obtain. Second, as Poncet [6] noted, theoretical considerations are now completely elaborated and developed for the gravity model. Thus, the model can estimate the effects of protection on the volume of trade. Third, the gravity model is able to hold the trade-enhancing effect of regulations and the distinct forms of NTBs in estimation of the trade flows [4].

Regression variables that are mostly included in a standard gravity equation used to estimate the impacts of NTBs on agricultural export are included in the specific model used in this study, which holds the following functional form:

$$Ln\ Ex_{ij} = \alpha_0 + \alpha_1 LnGDP_i + \alpha_2 LnGDP_j + \alpha_3 LnPOP_i + \alpha_4 LnPOP_j + \alpha_5 LnD_{ij} + \alpha_6 SPS\&TBT + \varepsilon_{ij} \quad (1)$$

Where ln is the natural log. For our dependent variable (EX_{ij}), we choose the value of export of country i (Iran) to country j. GDP_i, GDP_j, POP_i and POP_j are Iran's GDP, the importing country's GDP, the population of Iran and the population of the importing country, respectively. D_{ij} is the distance between Iran and the importing countries.

The main focus in this paper is on the trade impact of measurements notified by importing countries under the SPS and TBT agreements. We consider three different variables: (i) a dummy variable equal to one if the importing country notifies at least one barrier, (ii) a frequency index and (iii) a tariff equivalent [1, 2].

Technical barriers to trade are regulatory and certification mechanisms that are considered in a way that puts imports at a disadvantage relative to domestic goods. Unfortunately, they are one of the most difficult NTB_s conceivable to quantify. For a particular technical barrier that is thought to exist in a specific industry, the best approach is to collect information from experts in industry itself. Whatever information is required, depends somewhat on the nature of the barrier. Technical standards, regulations and certification requirements can constitute barriers to trade in several different ways [7]:

- If more stringent standards are applied to imported as compared to domestically produced goods; then one must determine how much more costly it is to satisfy those more stringent standards. Letting the per unit cost of satisfying domestic standards be denoted as C_{StandD} and the cost of satisfying the standard on imports defined as C_{StandM}, the tariff equivalent of the standard is

$$TE^{STAND1} = \frac{C_{StandM} - C_{StandD}}{P_C} \quad (2)$$

Where P_C is the c.i.f price.

- If identical regulations are enforced more stringently on imports rather than on domestic goods; then of course one needs to compare the costs of the two groups of producers which are satisfying the standards. If these costs are identifiably different, then the formula for the standard TE^{STAND1} is directly used. Otherwise, if the measurable difference is in the fractions of product units that are made to satisfy a single standard at a cost of C_{Stand}, then letting θ_D and θ_M be the fractions of output which are satisfying the standard, then the standard formula is resulted as follows:

$$TE^{STAND2} = \frac{\left(\theta_M - \theta_{(D)} C_{Stand}\right)}{P_c} \quad (3)$$

- Lastly, if imports are subjected to more costly certification procedures than domestically produced goods, then TE^{STAND1} again is directly used but by measuring two costs, then the costs of certification may satisfy the standards.

Because of lack of sufficient data for calculation of a tariff equivalent; in this paper, the proxy of SP0S and TBT using a dummy variable was obtained. Let us set SPS and TBT=1, that is for the members of European Union; SPS and TBT=0 is considered for the other countries [8].

Similarly, based on mass of two bodies, as stated in the law of gravity that determines the force of attraction between them. The Gross Domestic Product (GDP) of the trading countries represents both the productive and consumption capacity that mainly determines the trade flow between the countries. An importing country's GDP is expected to play a significant role in determination of the trade flow originated from the exporting countries; because of the importing country's GDP, like the income of the consumer, plays a significant role in determination of the demand for the goods originated from exporting countries. An exporting country's GDP also plays a role in determination of the productive capacity of the exporting country. The impact of population on trade flow is inconclusive. Population may increase trade flow due to an enlarged market size. On the other hand, a large population may also mean low per capita income; hence, it may change the trade flow between two countries negatively. Distance is another important variable that is used to capture the trade cost between countries. Countries divided by a short distance are expected to trade more than those that lie far apart due to a lower transaction costs. The impact of SPS and TBT variable on trade flow is inconclusive. A stringent food safety requirement, for example, may effectively forbid imports from some countries, due to the cause of trade to be diverted to those countries that can comply and have the overall impact of reducing trade. However, those countries with up-to-date production systems may actually be able to increase their exports [6].

Panel data are used to estimate the trade effect of SPS and TBT regulations imposed by countries importing this good from Iran. Since both the cross sectional and time series data are combined, the pool-ability of the data would require to be experienced using the F-test to choose the appropriate model for the panel data.

The null and alternative hypotheses of the F-test are as follows:

H_0: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4$ (No individual effects; same intercept for all cross section).

H_1: Not all are equal, i.e. (Fixed effect or within estimation in which each country has a country specific effects on the repressor; hence, it has unique intercept for each country).

The F-test is applied by combining the residual sum of squares of the regression both with (under the null) and without constraints (under the alternative).

Table 1: The share of major countries importing goods from Iran (1996-2008)

Country	Share (%)
Germany	22.2
The United Arab Emirates	21.9
Hong Kong	12.3
Russian	4.6
Turkey	4.0
Italy	3.6
Spain	3.5
Syria	2.4
India	2.0
Total	76.5

Source: Based on calculation

$$F = \frac{(RRSS - URSS)/(N-1)}{URSS/(NT-N-K)} \approx F(N-1),(NT-N-K) \quad (4)$$

Regression with constraint refers to an ordinary least square estimation, since individual effects (that may arise due to the country specific factors such as language, colonial ties and the like) on the trade flow are not considered in the estimation. Unconstrained regression, on the other hand, is estimated using the within estimation or fixed effect model; which allows to capture the impact of country specific factors on trade flow [9].

Data for GDP and population of all countries were obtained from the World Bank. The trade flows of pistachios from Iran to the importing countries were obtained from the database of Iran's Customs Administration. The distances were extracted from the CEPII database. The distances were calculated as the sum of the distances between the biggest cities of both countries, weighted by the share of the population living in each city. All values of GDP are expressed in US $. The data were deflated using the countries' Consumer Price Index (CPI), which was obtained from FSI [10]. All data for all variables were included in the study for the duration of years 1996-2008.

RESULTS AND DISCUSSION

In this study, the trade flow of Pistachios from Iran for the duration of 1996-2008 were investigated. The major importers of pistachios from Iran were Germany, the United Arab Emirates, Hong Kong, Russia, Turkey, Italy, Spain, Syria and India. The shares of these countries are shown in Table 1.

The pool ability of the data has been tested using the F-test:

Table 2: The results of the model estimation

Dependent variable: ln	EX_{ij}	
Variable	Coefficient	Std. Error
ln GDP_i	0.23	0.11
ln GDP_j	0.62*	0.09
ln POP_i	-0.56*	0.06
ln POPj	-	-
ln D_{ij}	-0.37**	0.22
SPS and TBT	-1.16*	0.25
R-squared	0.99	
Adj R-squared	0.99	
Durbin-Watson	1.92	
F Stat.	224589.7	

Source: Based on calculation

*, ** are respectively level of significant at 1% and 5%

$$F = \frac{(98.23 - 95.43)/(9-1)}{(95.43)/(108-9-5)}$$

F= 0.31 which is evaluated against the critical value which is distributed as

F (N-1), (NT-N-K)

F critical = F (8, 94) = 2.02 at 5% and 2.45 at 10% (From the F distribution table).

The null hypothesis failed to reject since the computed F value is less than the critical F value; that states the poolability of the data across the cross section. As a result, a pooled model is chosen in this study to undertake the analysis of the panel data. The classical econometric problems of the models have been tested. Serial correlation was not found in the models, as indicated by the Durbin Watson value. White heteroskedasticity consistent standard errors and covariance also were used in the models. Stationary was checked in the models as well. The POP of the major importers of pistachios from Iran was insignificant in the estimation resulted by the proposed equation. The coefficients of the other variables were significant and had the expected sign. The result of model is given in Table 2.

Because of the log-log nature of the model, the variable coefficient value is the elasticity. According to Table 2, with a 1 percent increase in Iran's GDP there would be 0.23 percent increase in Iranian Pistachios exports and 1 percent increase in Importer's GDP there would be a 0.62 percent increase in Pistachios export flows between Iran and its trade partners. With a 1 percent increase in Importer's population there would be a -0.56 percent decrease in Pistachios export flows between Iran and the main importing country. The log of distance had the expected sign (-) and was highly significant. With a 1 percent increase in distance between Iran and the importer j, there would be a 0.37 percent decrease in Iran Pistachios exports to importers. The elasticity of SPS and TBT variable obtained from the formula as defined in equation 5 [11]:

Elasticity = {exp (The coefficient of dummy variable)-1}

*Elasticity = {exp (-1.17)-1}*100 = -68.96* (5)

According to that, with an increase in SPS and TBT regulations by importing countries there would be mainly decrease in Pistachios export flows from Iran. The obtained results largely confirm the finding of previous studies. Moenius [3] reported that country-specific product and process standards of importers reduce imports in the agricultural sector. Fontagne *et al*. [2] focused on Sanitary and Phyto Sanitary (SPS) and Technical Barriers to Trade (TBT)[12] measurements. They have shown that these measurements negatively influence bilateral trade of cut flowers and of processed foods such as beverages. Such results showed that if Iran doesn't consider to standards of Pistachios, then Iranian exporting Pistachios to importing countries specially the European Union members would be stopped.

CONCLUSION

Thus, the Obtained Results Suggest the Following Conclusions: SPS and TBT regulations negatively impact on the trade of pistachios product. According to WTO rules, the most important reasons for countries are allowed to adopt regulations under the SPS and TBT agreements in order to protect human, animal and plant health as well as the environment, wildlife and human safety. On the other hand, the export and the world demand for agricultural products is increasing focusing on quality, packaging, labeling and standards of products. SPS and TBT agreements consist of these characteristics. Consequently:

- Policy makers in countries that export agricultural products, such as Iran, must consider these characteristics when designing their programs. These measures have not yet been imposed on the main agricultural exports of Iran. Therefore, the countries that import pistachios especially Europe Union members, have reduced their imports from Iran.

- Research and policy analysis networks should also invest in research programmes aimed at estimating the trade effects of various SPS and TBT regulations. This would enable informed decision-making by governments to request compensation claims, where applicable, as stated in the SPS and TBT agreements.
- In final conclusion, if Iran builds up-to-date production systems, it will increase its exports of agricultural products.

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