Factors Affecting Revenue Share of Iranian Tomato Paste Exporting Companies

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Abstract

This study aimed to investigate factors affecting the revenue share of Iranian tomato paste exporting companies. Flexible estimation method was used on a two-dimensional panel data set including 224 observations from 14 tomato paste manufacturing and exporting companies and 16 importing countries during 2005-12. Results showed that value added per employee in manufacturing or exporting companies, and dummy variables (common border, religion and number of documents needed to import) had positive effect on the revenue share of a given company. The import tariff rates of selected countries and distance had a negative effect on the export revenue share of all companies. Accordingly, programmers and policy makers should provide background information about the productivity of labor force in these companies via researching, developing, and promoting production technologies, which will increase the exporting revenue share of this product. Furthermore, by making bilateral and multilateral contracts and agreements, the tariff rates can be reduced to increase the revenue share of the tomato paste export.

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INTRODUCTION

Despite little attention paid to supportive policies for agricultural products, export of some agricultural products, such as tomato paste is of considerable importance. Iranian tomato paste production industry in 2004 reported exports worth $ 60.9 million and accounted for a 1.02% share of the total value of agricultural exports. According to FAO, the global export of tomato paste has increased from 2.36 to 3.09 million tons from 2005 to 2012, indicated an annual growth of 3.9%. This rate for Iran increased from 31.56 thou-sand tons to 136.34 thousand tons during the same period, indicated a 23.2% annual increase (FAOSTAT, 2014). Thus, the export share of the tomato paste of global exports during these years has increased from 1% to 4% (Figure 1). In addition, during2009-2014, the rank of Iran in tomato paste export improved from tenth to third behind China and Italy. The per capita production of tomato-paste and its by-products in Iran during 2009-14 was three times the global average. Thus, export development and marketing for tomato paste are essential.
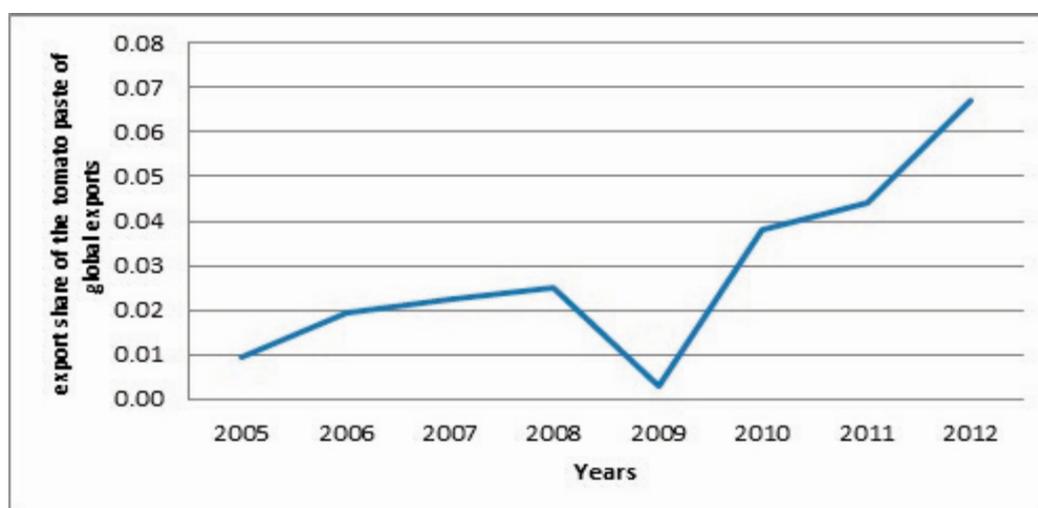

Figure 1: Iran's share of total tomato paste exports within 2005-12
Source: Food and Agriculture Organization (FAOSTAT, 2014)

Therefore, this study aimed to investigate the economic and non-economic factors affecting tomato paste export by Iranian companies. The aim was to propose practical and appropriate solutions and recommendations for improving the export of tomato paste. Currently, there are 14 active tomato paste manufacturers and exporters in Iran including Rozhintak, Osareh, Tara, Orum Ada, Marvdasht, OmideTus, Ailar Conserve, Shadchin, Dashte-Morghab, Iran Golba-e Marghub, Tunidasht, Dashte- Neshat-eTehran, NazaninShahd-e Khorasan, and Sahar-e Hamedan (Data of Trade Promotion Organization of Iran, 2015). These companies produce and export more than 70% of the total production of tomato paste in Iran. A summary of major studies on the export of agricultural crops and factors influencing them, are presented below.

Hosseini and Permeh (2009) in a study entitled "*Tariff and nontariff barriers of Iranian saffron exports*" reported that in the global market of saffron, more than 45 importing countries impose non-tariff trade barriers. It is notable that the highest tariff rates in the global market belong to Iran. The results suggested that, due to the relative advantage of Iran, this kind of tariff had a negative effect on the export of Iranian saffron; therefore, the import tariff of this crop must be revised and decreased to supporting saffron export.

Jaleh-Rajabi et al. (2014) analyzed the costs

of trade and sources for the growth of bilateral trade of Iran with its partners using the Novy model. Their results showed that changes in trade growth in agricultural crops compared to the revenue growth were not sensitive to bilateral trade costs; thus, costs such as tariffs and shipping should be calculated with respect to the country of origin.

Moghaddasi and Rahimi (2011) appliedthe panel data method to evaluate the effects of bilateral agricultural trade arising from free trade agreements. These researchers studied the effect of variables such as the Gross Domestic Product (GDP), population, language, and the common border and distances between countries and membership in Free Trade Agreements (FTA) on the export volume. Results indicated that Iran and Turkey had the largest volume of trade because of their trade agreements; however, distance between them had a negative effect on the trade volume.

Azarinfar et al. (2005) found that export of pistachio and date depended on the informal exchange rate, their real prices in Iran, their global prices, and GDP of the importing country and its geographical location (whether locating in Asia or not). Analyzing the obtained data using Ordinary Least Squares (OLS) and Autoregressive Distributed Lag (ARDL), these researchers showed that export demand of pistachio and date had an inverse relationship with the ratio of the export price of Iran to the global price. However, it had a positive relationship with the exchange rate and GDP of the importing country. In addition, both non-Asian and Asian countries were suitable markets for pistachio and dates. Increase in export revenues derived from these two products was potentially possible through their export price increase.

Zaki (2010)'s study on time series and document database showed that bureaucracy (involving documents such as non-tariff barriers of the importing country) results in a longer delay in trade. For example, the requirement of paper work and data submitted to local authorities are administrative barriers

to bilateral trade. Further, availability of internet and absence of corruption made a difference in the time to import. Martınez-Zarzoso (2013) in a study entitled "The log of gravity revisited" applied various methods to estimate the gravity model with heteroscedasticity and zero trade values. Their results showed that the coefficients of variables in the generalized gravity model were proportional to theoretical expectations. However, to ensure for the selection of a proper model, they recommended that a number of estimation methods should be used with respect to the data set.

Xiong et al. (2013) used the export demand model of French Champagne in order to measure the effects of tariff reduction in non-European markets. Panel data in the gravity model were estimated for years 2004 to 2007. Considering the fractional data and high frequency of zero values used in the data, logit distribution was utilized. The results suggested that the price of French sparkling wine and other sparkling wines in the world, the value added per employee, the distance, colonies and common language had a positive effect on an export revenue share of each champagne exporter company while tariff rates and the number of documents to import, had a negative effect on it.

Santos Silva et al.(2014), in a study entitled "Estimating the extensive margin of trade", concerning the gravity model, applied binary choices in some of exporting sectors whose dependent variable was bounded by 0 and 1 for estimation and specification. These models were: OLS, Log-Lin, Poisson (pseudo) maximum likelihood, negative binomial (pseudo) maximum likelihood, two-limit Tobit, and three types of Bernoulli (pseudo) maximum likelihood estimation labeled, respectively, as CLL, P&W and Flex. They concluded that the P&W and Flex estimation provided reasonable results, while, in case of misspecifications, flex performed better. Analyses were done by estimating a gravity-like model incorporating the related variables. Parameters of the mentioned estimation methods and

average partial effects almost had the expected results particularly in the case of flexible estimation. The coefficient of the distance had a negative effect on the export share of a sector, but the coefficient of variables such as border, both islands, both landlocked, colonial tie, common currency, RTA[1] , common language, both WTO and religion showed a negative effect on it.

Importance of analyzing the export revenue share of a business instead of the export volume

Small businesses, particularly good exporters, play a crucial role in creating jobs and domestic economy; they constitute up to 97 percent of exports with growing export value share in the United States. It is noteworthy that in spite of trade benefits for firms and small businesses such as diversifying their customer base and lowering the risk, they often fail to develop their market and provide some equipment. Thus, smaller firms would tend to be a loser among rivals in the international markets (Delehanty, 2015).

Relating to agro food exporting sectors, sugar industry was one of the important producing sectors influencing revenue and employment in South Africa. This crop was exported annually to more than half of the world, so that South Africa was ranked amongst 10 major global exporting countries. There were several provinces exporting specially to the Far East and Middle East sugar refiners in this country. Based on the descriptive data, comparative advantages were revealed not only by comparing aggregated data, but also by comparing provincial export value share data during a time series. In addition to such comparisons, the data of importing markets' shares in a targeted year have provided a better background for policymakers to overcome challenges such as duty free quotas, lack of market access, tariffs and dumping (Directorate marketing, 2012). It is important to note that instigating the

export volume of a crop does not comparatively reveal exporters' status. Therefore, instead of studying merely the annual export volume of a company, recognizing the source of variations of the revenue export share is particularly desirable. Accordingly, we investigated this fact in our study for tomato-paste exporting companies.

This study was conducted to briefly discuss the gravity model and its generalized form, followed by presenting the problem of the estimation considering the fractional and zeros values of the dependent variable and the methods to resolve it by flexible estimation.

METHODOLOGY

The study conducted by Tinbergen (1962) is considered significant in the theoretical and empirical literature on gravity equation. Theoretical foundations based on different issues in trade include the difference in technology and increasing return to scale all predict the gravity flow similar to the Newton's law of gravity. According to the definition, gravity equation in the simplest form states that the trade flows from country i to j by Tij has a direct relationship with the production quantity of the two countries and has an inverse relationship with their distance (Silva & Tenreyro, 2006).

If D_{ij} represents all the factors that prevent or cause the trade, then:

$$T_{ij} = \alpha 0 Y_i^{\alpha 1} Y_j^{\alpha 2} D_i^{\alpha 3} \qquad (1)$$

where α_1 to α_3 are unknown parameters. Given the random component, the gravity model will be as follows (ibid., P. 642):

$$T_{ij} = \alpha 0 Y_i^{\alpha 1} Y_j^{\alpha 2} D_i^{\alpha 3} \eta_{ij} \qquad (2)$$

In this case, it is assumed that the trade costs are related to the tariffs and thus they are included in the model. Given N countries with a set of goods, Eq. 3 is expressed as:

[1] Regional Trade Agreements

$$T_{ij}= Y_iY_j/Y(t_{ij}/\textstyle\prod_iP_j)^{1-\delta} \qquad (3)$$

Where Y_i and Y_j are GDP of two countries and Y is the GDP of the world. In addition, t_{ij} denotes the cost of the country j for the imports from the country i that includes tariff, as well. P_j and $\prod_i$ are market access of two countries j and i and δ is the elasticity of substitution (Bacchettaet al., 2012).

In the generalized gravity model, the volume of exports between countries in year t is a function of their per capita income, geographical distance, and a set of dummy variables that prevent or cause the bilateral trade (Martınez-Zarzoso, 2013). Frankelet al., (1995) have represented a common gravity model as:

$Ln(Trade_{ij})=\beta_0 + \beta_1 (Ln(GNP_i)(GNP_j) + \beta_2 (Ln(GNP_i/Pop_i)(GNP_j)/Pop_j) + \beta_3Ln(Distance_{ij}) + \beta_4(Adjacency_{ij}) + \beta_5(Trading\ Bloc\ Membership_{ij}) + u_{ij}$ (4)

Whereas in addition to GNP of countries, income per capita is included to consider the effect of wealth level on the trade volume. Adjacency and trading bloc membership are related to geographic and political effects[1].

The problem of zero and fractional values in the dependent variable

In the present study, the dependent variable (i.e., the share of export revenue of the manufacturers of tomato paste) can take values from zero to less than one. Papke and Wooldridge (1996) state that in some economic sets the dependent variable is often defined as the ratio of a number, namely between zero and one, like a part of the land allocated to agriculture and the share of exports in total sales. In these models, many estimation methods cannot accurately predict the dependent variable. Therefore, recently, researchers introduced some of regression models for the functions with fractional data.

In the flexible approach, both upper and lower bounds are taken into account. The as-sumption is that the economy is divided into S parts and T_{ij} designates parts where exports are aimed at country i to j. Assuming $0 \leq T_{ij} \leq S$, and its conditional expectations as $E(T_{ij}|x_{ij})$ include the same non-random boundaries where X_{ij} denotes a set of variables in international trade between the two countries. So, the relationship E $(T_{ij}|X_{ij})$ is also a function that is in the range of zero and is used as one of the specifications of models in case of binary values. The expected value can be as follows (Santos Silva et al., 2014):

$$E\ (T_{ij}|x_{ij}) =SF(x'_{ij}\beta) \qquad (5)$$

where β denotes the parameter vector and F $(x'_{ij} \beta)$ represents the probability that the selected part (company) exports from the source country i to the target country j. By considering the similar models proposed by Ramalho and Ramalho (2011), we have:

$$F(x'_{ij} \beta)=1-(1+\omega exp(x'_{ij}\beta))^{-1/\omega} \qquad (6)$$

where $\omega > 0$ is a parameter that provides a symmetric distribution (ω=1); left-skewed (ω<1) or right-skewed (ω>1), which is dictated by the data. Such a model is simple for estimation and is logically flexible. Also, other specification with ω=1 and when $\omega \to 0$ are as limitary cases. By substituting (5) and (6):

$$E(T_{ij}|x_{ij})=S-S(1+\omega exp(x'_{ij}\beta))^{-1/\omega} \qquad (7)$$

Since the above equation specifies a conditional expectation and S is a constant, export model with the fractional value should be rewritten as follows:

$$T_{ij}/S=1-(1+\omega exp(x'_{ij}\beta))^{-1/\omega} + u_{ij} \qquad (8)$$

where T_{ij}/S is between 0 and 1 and $u_{ij}= T_{ij}-E(T_{ij}|x_{ij})$, which $E(u_{ij}|x_i) = 0$

By assuming the Bernoulli distribution, the ultimate estimation of β and ω can be found in different ways e.g., using a software such as Stata (Santos Silva et al., 2014).

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[1] The effect of membership comprised elected countries that were defined as dummy variables.

Research model

This research is based on the analytical and descriptive methods and econometric tools applied to estimate the demand function in the form of panel data. Additional variables can also be used in addition to major variables in the trade cost such as common border, common language and some of the dummy variables. Among dummy variables, tariffs are usually in the form of dummies, while they can be used as bilateral tariffs data. Tariffs and non-tariff barriers reflecting all trade costs can be declared as follows (Bacchetta et al., 2012):

$$\text{Ln}\tau_{ij}=\delta_1\text{Ln}(distance_{ij}) + \delta_2(1+tariff_{ij}) + \delta_3\text{Ln}(NTB^1)+\text{€}_{ij} \qquad (9)$$

According to the generalized gravity model, a regression equation consisting of all basic variables of the research model are expressed as follows:

$$E\{Sh_{ijt}\}=F\{b_0+b_1\text{Ln}(dist_j)+b_2D+b_3R+b_4Lang+b_5\text{Ln}(docs_{jt})+b6\text{Ln}(1+tar_{jt})+b_7\text{Ln}(Va_{it})+b_8\text{Ln}(GNP_j/Pop_j)\} \qquad (10)$$

Thus, useful variables in the model were obligated to be described:

Sh_{ijt} is the export revenue of Iranian tomato paste of the ith company divided by world export revenue to the jth country; takes a value between zero and less than 1.

$Dist_j$ is the distance between Iran and the jth importing country

And D is the dummy variable that represents a common geographical border or adjacency between Iran and Asian importing country.

R indicates the common religion between Iran and importing country (the second dummy variable)

$Lang$ implies the common language between Iran and the partner country, i.e. Persian in Afghanistan, Tajikistan etc.

Other explanatory variables include the number of documents needed to import, by the jth country.

i.e. import documents ($docs_{ij}$) as one of the non-tariff barriers, are registered according to trade agreements, including documents referring to customs, items relating to authorities of portal containers, sanitations, bank documents for insurance and licenses (World Bank, 2015).

tar_{jt} denotes the jth target country's ad-valorem tariff rate (Figure 2). One of the major outcomes of Novy's research (2012) is that trade costs (tariffs) might not only be included in cross-section data, but also can emerge in time series data.

Va_{it}: Since there are exporting sectors and not exporting countries, in case of a company incorporating product levels, mentioning value added per employee can be counted as a coherent variable to use along with income per capita of importing countries in the gravity model. It is also the partial productivity of labor force.

GNP/Popor Gross National Product per capita in the regression equation was underlined for all importing countries of Iranian tomato paste.

RESULTS

The dependent variable information is shown in Table (1). Export revenue share is the ^{ith}company export revenue divided by the world value of tomato paste export to ^{jth} country. In this investigation, 14 export companies of tomato paste that were also producers and exported nearly 70% of Iran's total exports in 2005-2012, were selected along with 16 main importing countries e.g., Iraq, Tajikistan, Russia, Saudi Arabia, UAE, Afghanistan, Turkmenistan, Sweden, America, Canada, Kuwait, the United Kingdom, Azerbaijan, Qatar, Japan and Australia as the business partner of Iran during these years (The Islamic Republic of Iran Customs Administration, 2014).
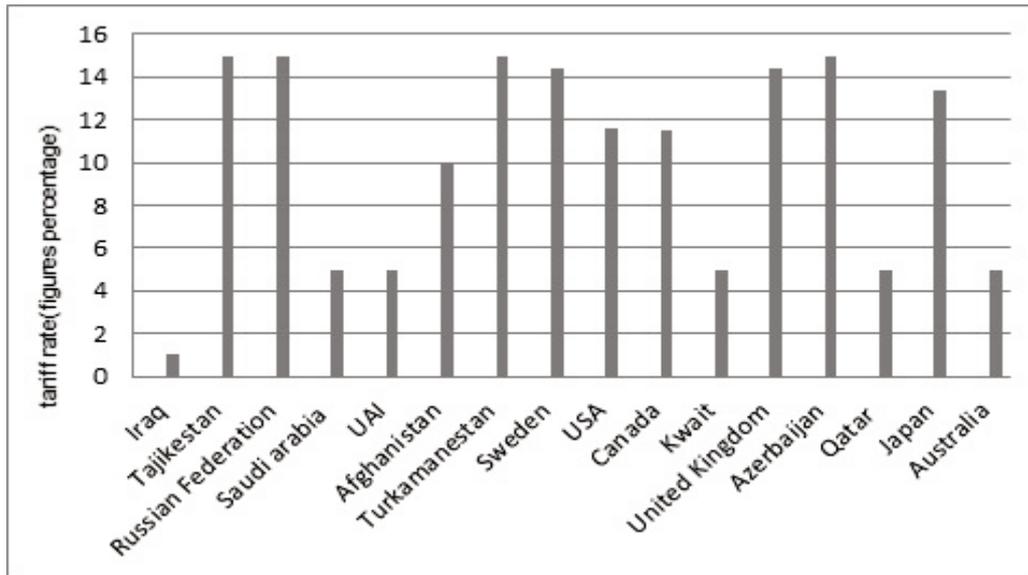
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[1] Non Tariff Barriers

Figure 2: Tomato paste import tariff rate sampled in 2012
Source: Market Analysis Tools Account, 2015

Table 1
Descriptive Statistics of the Export Revenue Share of the Factories

Variable	Mean	S.E.	Minimum value	Maximum value
The share of ith Company export revenue to j^{th} country	0.005	0.041	0	0.98

If the gravity model is estimated by time-series and cross-sectional method, it will be biased. Since the bilateral trade can be affected by qualitative factors that are not identifiable, the panel data would be an efficient method (Martinez-Zarzoso& Nowak-Lehmann, 2003). Thus, 16 tomato-paste importing countries from 14 Iranian companies for eight years (2005-2012) were collected that included totally 1792 observations. In this study, Iranian companies and their partner countries were selected in such a way that they account for more than 70% of the Iran export revenue. Accordingly, given the panel data, 14×16=224 cross-sections were defined for eight years. The framework of symmetry in the panel data obligated frequent cross sections of countries and companies during 2005-12. This fact also induced many zero trade values in the dependent variable. Meanwhile, eligible samples were selected with more aggregated

and continuous data in 8 years. Such multiplied cross sections have overcome the problem of the inadequacy of sample size.

According to the number of samples with a large number of zero values, the R^2 measure was estimated as 19%; however R^2 did not dramatically increase even by extending the data observations. Also, Ramsey test had confirmed the functional form of the model.

DISCUSSION

According to the study of Bacchetta et al. (2012), firms are more interested in trading with similar countries with cultural and common bases, since it would cause them to operate better. As shown in Table (2), religion and adjacency (geographical common border) had statistically significant positive effect while distance had a negative effect on the export revenue share of tomato-paste companies, implying the importance of Iran's ex-

ports to the neighboring countries.

As shown in Table (2), the number of documents needed to import as non-tariff barriers, contrary to expectations, had a positive impact on the share of each exporting tomato paste company. Thus, any increase in documents in bilateral exchanges would lead to a 7.65%

increase in the export share of Iranian companies. Such an increase might be the result of the major role of exporting companies because the major part of tomato paste is exported by commercial companies and officially through the customs.

The impact of tariffs is to raise the price

Table 2
The Estimated Coefficients of the Gravity Model

Variable	Coefficient	S.E. Robust type	z	*P*-value
Constant factor (b_0)	-12.05	1.02	-11.77	0.002**
Distance ($Ln(dist_j)$)	-0.21	0.06	-3.04	0.00**
Adjacency (D)	1.60	0.45	3.51	0.00**
Religion (R)	0.71	0.30	-3.37	0.02*
Number of documents ($Ln(docs_{jt})$) Needed to import	7.65	2.50	3.05	0.002**
Add-Valorem Tariff ($Ln(1+tar_{jt})$)	-11.53	3.42	-3.37	0.001**
Value added per employee ($Ln(Va_{it})$)	0.39	0.07	5.06	0.00**

*$P<0.05$, **$P<0.01$

level of imports, therefore it naturally decreases the import demand (Bowen et al., 2012). The results indicated that, it's expected for 1% increase in ad-valorem tariffs, imports of tomato paste from an Iranian company decreased 11.53%.

The development of countries is directly associated with their trade volume. Therefore, the effect of GNP per capita as a proxy of development should be positive on the trade (Cyrus, 2002). The estimation results showed no significant effect of GNP per capita. However, the coefficient of the coherent variable, i.e. value added per employee was positive. For a 1% improvement in productivity of employee (as the technology improvement proxy of an Iranian company) led to a positive and significant effect on the export revenue share; i.e., 0.39%.

It is noticeable that the coefficients of language as GNP per capita were not so significant to be tested as redundant variables, therefore

it was dropped from the table of results.

CONCLUSION AND RECOMMENDATION

- Since ad-valorem tariff had a negative significant effect on the revenue share of the exporting firms of tomato paste, the public sector and authorities in exporting agricultural crops are implored to use preferred tariffs by making bilateral and multilateral regional contracts and agreements. This would enable and support qualified tomato paste exporting companies.

- Since promotion of labor force and the use of machinery and modern factories had a significant positive effect on the export revenue share of tomato paste companies, the public sector is recommended to provide some background information about restructuring and equipping the required facilities by allocating low-interest loans further enhance the export of tomato paste.

- Due to the competition of Iranian compa-

nies with other exporting countries, price competition cannot work on the revenue share of the companies. Therefore, packaging and branding methods, development of cross-border advertising, cooperation of factories, and governmental support should be helpful in the long run. Some ways to develop export to neighboring countries depend on packaging promotion, export subsidies and improved infrastructure, particularly refrigerated vehicles (Mousavi, 2017).

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