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# **Factors Determining IRAN'S Share in World Agricultural Markets**

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## Summary

This study concentrates on identifying the main influential factors on Iran's share in world pistachios and raisins, as two main agricultural export products, markets. To do so different econometric models are estimated using panel data for the period 1980-2002. The main findings indicate that relative prices (domestic to world) and exchange rate explain the majority of Iran's market share variations. Also volatility of prices has negative effect on market share implying that importer countries are sensitive to price variations.

## 1. Introduction

Non-oil exports is one of the most important issues in Iranian economy and government tries to diminish dependency of public budget on oil revenue. In this regard agriculture plays a vital role and its exports earnings is considered as a core political variable. On the other hand within the agriculture sector, pistachios and raisins (dried grape) provide over 50 percent of total exports income. Also Iran is identified as a dominant player in the world markets of these products. According to the FAO statistics in 2003, Iran was among the three top producers and exporters of pistachios and raisins (p&r) in the world. Of course during the last three decades the Iran's share has experienced some declining trend. Decreased Iran market shares may be associated with increased sales by the competing suppliers. This study examines the main factors in the Iran market shares variation. Specifically, we analyze the effects of the following variables: 1) Iran p&r prices and their volatility 2) Iran rial values and their volatility 3) competition between the p&r exporting countries.

In order to incorporate the effects of competition between exporting countries, product prices, exchange rates, and their volatilities are formatted as relative values: the Iran variables are divided by corresponding US and Turkey (as two main competitors) variables. Using the relative form helps to incorporate, in a parsimonious way, the third country effect into an import demand model. This helps to minimize

specification errors that arise from the fact that trade flows depend on the costs of purchasing products not only from an exporting country but also from competitors of the exporting country. On the other hand using FAO statistics, three countries as main importing markets are selected for each product. As a result Canada, China, and Saudi Arabia for pistachios and Canada, Australia, and Saudi Arabia for raisins considered as destination markets.

Estimation results show that relative export prices and their volatilities are important factors affecting the Iran market shares, while the relative volatility of currency values are not statistically significant. This suggests that importing countries are sensitive to changes in p&r prices and their volatilities, but not sensitive to volatility of exchange rate. Increased Iran export prices and appreciation of the Iran rial had negative effects on the Iran export performances in the markets, suggesting that US and Turkey could take advantage of a situation when Iran p&r prices were relatively higher or when the Iran rial appreciated against the currencies of its competitors.

The remainder of the paper is organized as follows. A model for Iran market share analysis is specified in the second section. The third section details data used in the study, The fourth

section presents the procedure of empirical analysis and shows estimation results. A summary and conclusion follows in the last section.

## 2. Model specification

A standard long-run relationship model is specified, following Cushman(1983); Kenen and Rodrik(1986); Asseery and peel(1991); and Chowdhury(1993). The relationship can be derived as a long-run solution of behavioral demand and supply functions for a product trade. The dependent variable is the level of market shares held by Iran p&r in three countries. The explanatory variables are Iran p&r prices relative to US and Turkey prices; relative volatility of prices; Iran rial values relative to US and Turkey currencies in three destination markets; and relative volatility of the rial values. The equation is written as follows:

$$x_{it} = \alpha_0 + \beta_1 \cdot (p_{tu})_t + \beta_2 \cdot (p_{us})_t + \beta_3 \cdot v(p_{tu})_t + \beta_4 \cdot v(p_{us})_t + \beta_5 \cdot (r_{tu})_{it} + \beta_6 \cdot (r_{us})_{it} + \beta_7 \cdot v(r_{tu})_{it} + \beta_8 \cdot v(r_{us})_{it} + e_{it}$$

where  $x$  denotes Iran market shares in the destination markets;  $p_{tu}$  and  $p_{us}$  are Iran p&r prices divided by Turkey and US prices, respectively;  $r_{tu}$  and  $r_{us}$  represent Iran rial values divided by Turkey and US currencies, respectively, in destination markets;  $v(\cdot)$  denotes the volatility of US or Turkey prices or currency values;  $e$  is an error term; and  $\alpha_0$  and  $\beta_i$  are unknown parameters. Price variables are time-variant but cross-sectional invariant. All other variables are both time and cross-sectional variant (panel data). The subscript  $i$  denotes cross-sectional changes for three importing countries (for each product). The subscript  $t$  represents time changes from 1980 to 2002 by fiscal year.

A rise in Iran p&r prices would reduce the demand for Iran p&r, thus reducing its market share, while an increase in competitors' p&r prices might encourage the importers to purchase more from Iran. Thus expected signs of the coefficients of price variables are negative. If the Iran rial value rises, holding US and Turkey currencies constant, then p&r import prices from Iran increase, resulting in comparatively higher purchasing costs for Iran p&r and, therefore, reduced demand. Thus, expected signs of the coefficients of exchange rate variables are negative. If the volatility of an exporting country's p&r price or currency value increases, the importers would reduce p&r purchase from the country and switch to other exporters to avoid the risk. Higher volatility implies greater risk for the importers. So expected signs of relative risk variables of prices and exchange rates are also negative.

An import demand model usually includes a variable that captures the effects of the importing country's income level changes, if the dependent variable is the quantity imported. However, since the dependent variable is market share rather than quantity imported, a variable representing importing countries' income is not included in equation (1), under the assumption that changes in income level in an importing country will not affect the market shares of an exporting country unless consumers' preferences for p&r in the importing countries significantly change in favor of an exporting country's p&r over other competitive countries' p&r as the income level change.

## 3. Data

The data consist of Iran p&r market shares in three destination countries (Canada, China, and Saudi Arabia or pistachios, Canada, Australia, and Saudi Arabia for raisins). Data also includes average p&r export prices of Iran, US, and Turkey, and real exchange rates between destination and three exporting countries. The data are annual and range from 1980 to 2002 by fiscal year.

The data used in this study are acquired from FAO, central bank of Iran (CBI), and some statistical databases such as: International Financial Statistics (IFS) and Trade Analysis and Information System (TRAINS).

Presence of a unit root process makes the panel data nonstationary, which has the potential to lead to serious errors in inferences and cointegration between nonstationary variables. Therefore I performed a panel unit root test devised by Maddala and Wu (1999). Test results indicate that observations follow stationary processes.

#### 4. Procedure of empirical analysis

Each set of real exchange rate panel data is normalized to make each time series equivalent in magnitude. Note that there are three panel exchange rate data, i.e.,  $r_{it}$ ,  $r_{us}$  and  $r_{tu}$  and that in each data there are three time series. A sample average was calculated for each time series and each observation is divided by the sample average and multiplied by 100 to rescale the observation. The variances of p&r prices and exchange rates were obtained using moving sample standard deviation of changes that has been used extensively in literature. The volatility measure is calculated as follows:

$$V_t = \sqrt{k^{-1} \sum (r_{t+i-1} - r_{t+i-2})^2}$$

Where  $V_t$  is the volatility and  $k$  is the order of moving average. In this study,  $k$  is specified to be one.

#### 5. Empirical results

The results from the panel estimation of equation (1) are presented in tables 1 and 2. The model is estimated using three estimation methods, namely: Ordinary Least Squares (OLS), Generalized Least Squares (GLS) and Seemingly Unrelated Regression (SURE). Finally model with best results is selected. Also variables are included in natural logarithm.

**Table 1. Estimation Results for Pistachios**

Variables	Expected Sign	Coefficient	t-Statistic
$\alpha_0$	-	21.388	2.473*
$Lp_{tu}$	Negative	-0.803	-2.536*
$Lp_{us}$	Negative	-0.563	-0.989
$Lv(p_{us})$	Negative	-3.263	-1.562***
$Lv(p_{tu})$	Negative	-5.588	-1.948**
$L(r_{tu})$	Negative	-0.021	0.312
$L(r_{us})$	Negative	-0.007	-0.113
		$R^2 = 0.60$	$D.W = 2.149$

Notes: The symbols \*, \*\*, \*\*\* denote statistical significance at 1, 5 and 10 percent levels, respectively.

**Table 2. Estimation Results for Raisins**

Variables	Expected Sign	Coefficient	t-Statistic
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$Lp_{tu}$	Negative	-0.126	-0.536
$Lp_{us}$	Negative	0.309	1.383***
$Lv(p_{us})$	Negative	-2.662	-2.229*
$Lv(p_{tu})$	Negative	2.563	2.047*
$L(r_{tu})$	Negative	-0.001	-0.025
$L(r_{us})$	Negative	-0.309	-3.505*
		$R^2 = 0.986$	D.W=2.174

Notes: The symbols \*, \*\*, \*\*\* denote statistical significance at 1, 5 and 10 percent levels, respectively.

In table(1) the price variables have negative signs, as expected in the model specification but only  $Lp_{tu}$  is statistically significant at 5 percent level. The results imply that Iran pistachios export price relative to Turkey export price is important variable affecting Iran market shares in destination markets. Also the price volatility variables have negative effect on market shares which is consistent to theoretical expectations. The exchange rate variables have also negative sign but surprisingly insignificant.

In table(2) the price variables have expected signs but only  $Lp_{us}$  is statistically significant at 10 percent level. It means that Iran market share in raisins destination market is sensitive to Iran export price relative to US price. That's because US is more important competitor than Turkey. On the other hand both of the price volatility variables are significant at 5 percent level but  $Lv(p_{tu})$  is surprisingly positive.

## 6. Summary and conclusion

The objective of this paper is to examine factors affecting the Iran p&r market shares in 6 destination markets (3 market for each product). I included competition effects between p&r exporting countries in the markets in addition to prices, exchange rates and their volatilities. The results show that relative p&r export prices (mostly) are important factors affecting Iran market shares. The variables of relative volatility of p&r prices are statistically significant implying that importing countries are sensitive to price risk. So according to this study the Iran p&r exporters and policy makers need to give additional consideration to relative prices and their volatilities compared to the competing suppliers.

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