Export Demand Function Estimation for U.S. Raisins

Mohammad Soltani and Sayed Saghaian
Department of Agricultural Economics, University of Kentucky
Lexington, KY 40546

Selected Paper prepared for presentation at the Southern Agricultural Economics Association Annual Meeting, Birmingham, AL, February 4-7, 2012

CHANGES IN THE EXPORT DEMAND FUNCTION FOR US RAISINS

Abstract

Raisins are one of important products of California. Almost all U.S. raisins are produced near Fresno California's central valley due to its hot growing season and abundant water supply. U.S. is the leading exporter of raisins in the world. This paper investigates the export demand function of U.S. raisins for the top five importer countries. The relationship of quantity exported with export price, other exporters' prices, real income, and exchange rate is estimated. The model used is a logarithmic panel data model for the 1992-2008 periods. The model used is in log-log format to determine own- price, cross price, and income elasticities for the commodity.

Background

Today dried fruit consumption is widespread. Nearly half of the dried fruits sold are raisins, followed by dates, prunes (dried plums), figs, apricots, peaches, apples and pears. These are referred to as "conventional" or "traditional" dried fruits: fruits that have been dried in the sun or in heated wind tunnel dryers. Many fruits such as cranberries, blueberries, cherries, strawberries and mangoes are infused with a sweetener prior to drying. Some products sold as dried fruit, like papaya and pineapples are actually fruit. Today, dried fruit is produced in most regions of the world, and consumption occurs in all cultures and demographic segments. In the United States, Americans consumed an average of 2.18 pounds (processed weight) of dried fruit in 2006. Raisins accounted for about two thirds of this. Raisins may be eaten raw or used in cooking, baking and brewing. The global raisin industry is impressive in terms of the value of production and the dollar volume in trade. Almost all US raisins are produced near Fresno California's central valley (99% of the US crop of raisins) due to its hot growing season and abundant water supply. Turkey, United States and Iran are the lead exporters in raisins industry both in quantity and value. U.S with $1872 per ton has the highest unit value followed by turkey with $1754 and Iran with $964 per ton. United Kingdom, Germany, Russian, Netherlands, Canada, Japan and Australia are the lead importers in the past decade. United Kingdom, Canada,

Japan, Germany and Australia are the five major countries that U.S exports to, which also are major target markets for Turkey and Iran as well.

Global Production and Trade of Raisins

Turkey, United States and Iran are the world's largest raisin producers. Combined, these three countries account for about 80 percent of global production. New countries have tried to enter the market during past decades; we will have a quick look at those countries and their strategies in some cases.

Greece

Although Greece has typically been the third-largest exporter of raisins, behind Turkey and the United States in some years, it dropped to fifth place in 2002. In 2002, Greece's raisin exports totaled 27,636 tons. Between 2000 and 2002, exports to Greece's three-leading markets for raisins dropped by a combined 36 percent. Increased competition in European markets from Turkish and Chilean raisin exports, as well as a disastrous 2002 crop, led to the decline. Despite the production shortfall, raisin imports are minimal. In fact, Greek imports in 2002 declined by 78 percent. While imports from Germany, the United States, and Turkey (Greece's top suppliers) declined, imports from Chile and Iran increased by over 100 percent. In 2002, raisin imports totaled 489 tons.

Mexico

The main raisin-producing areas in Mexico are the northwestern states of Sonora, producing 98 percent of the total output, and Baja California, which accounts for about 2 percent of the total. Newer, more efficient irrigation systems are being installed in the state of Sonora in order to accommodate the problem of water availability. Currently, water is a major expense in raisin production, accounting for approximately 19 percent of the total cost. Generally, Mexican raisin processors prefer to sell their higher-quality product to the export market, and import lower-quality U.S. raisins for the domestic market. However, imports of low-priced Chilean raisins have been increasing rapidly.

Australia

Historically, Australia has both imported and exported dried vine fruit. Import levels have traditionally been well below exports, with imports rising only when domestic production is low. More recently, however, increased competition from wineries for grape supplies, combined with lower than average production has reduced domestic availability for the dried fruit market. As result, imports have increasingly displaced domestic production and have gained a greater share of the domestic market. Australia exported 7,581 tons of raisins in 2004, a growth of 32 percent from the previous year. Both Germany and the United Kingdom, Australia's top two markets, each increased their imports by more than 80 percent from 2003 levels. Germany, the United Kingdom, and Canada combined, purchased close to 70 percent of the total exported. Australia's raisin imports in 2004 declined by 5 percent to a level of 19,731 tons. Turkey supplied nearly 53 percent of Australia's raisin imports in 2004.

Chile

In 2004, Chile was the third-largest raisin exporter in the world, exporting over 90 percent of its raisin production. Only the best quality raisins are exported, with the remainder going to the domestic market, which is small and usually consists of the baking, pastry, and ice cream industries. In 2004, Chile exported 41,525 tons of raisins, an increase of 11 percent from the 2003 volume. Mexico, the United States, Peru, and Colombia were its top export markets, comprising 59 percent of all exports in 2004. Chile's raisin imports totaled 190 tons in 2004, with 64 percent originating from the United States. Argentina and Iran supplied the remaining 36 percent.

South Africa

South Africa was the world's fourth-largest exporter of raisins in 2002, raisin exports totaled 33,693 tons, an increase of 29 percent from the previous year. Its top three export markets, Canada, Germany, and the United Kingdom, consumed a combined 50 percent of the total volume of exports in 2002; an increase of 31 percent from the previous year. Despite a strengthening rand against the U.S. dollar, raisin exports to the United States climbed to 2,576 tons in 2002, up 163 percent from 2001. South

African raisin exports to the United States have benefited from duty-free treatment under the African Growth and Opportunity Act (AGOA). Most raisins are produced in the area along the Lower Orange River while most currants are produced in the Credenda district. Domestic and international sales of raisins have operated 6 under a free-market system in South Africa since 1997 when the Agricultural Product Marketing Act liberalized the market.

Literature Review

Along the high unit value raisins have, there have not been many literatures written about this commodity which the same thing can be generalized about similar commodities like dried fruits and pistachio with high value units. It is not hard to understand the reason why export demand studies have been few (Faini, 1994). The issues surrounding the behavior of both exporters and importers are inherently difficult. It is possible to find similar studies for other commodities like beef, Eenoo and Purcell (2000) Economics of Export Demand for U.S. Beef, Hussein (2009), structural changes in export demand function for Indonesia, Bahmani (1984), Determinant of International trade flows. Other literatures regarding to the raisins situation has more focused on consumer marketing issues such as, Keeling (2004), Welfare analysis and policy recommendation for the California raisin marketing. Brant (2005) Consumer Demand Model Applied to Dried Fruit, Raisins, and Dried Plums, and similar studies can be found in this area. As it can be seen there has not been much attention paid to the trade part of raisins as is focused on its marketing and consumer part. The major goals of this research is to identify the drivers of growth in export demand and examine how trade flows respond to changes in prices, exchange rates, and incomes. This assessment targets the top five export destinations for U.S. raisins.

Model

In export demand specification linking real exports with a measure of foreign real income and relative price is an important element in most conventional trade models. Export demand specification is crucial for meaningful export forecast, international trade planning and policy formulation (Arize,

2001). Export demand function will be expressed as a log-log model where the coefficients will show the own and cross price elasticity's. Mathematically the export demand equation is specified as:

$$LnRX_t^i = \propto_0 + \propto_1 LnPR_t^i + \propto_2 LnPO_t^i + \propto_3 LnEX_t^i + LnNI_t^i$$

Where *RX* denotes the U.S. raisin volume export, *PR* is the raisins price; *PO* represents the alternative prices in the importing countries. In this estimation, we use export prices of Turkey and Iran as the competitors. *I* will be real income and *EX* represents bilateral exchange rates. We use data from FAO for volume of exports and real income for the 1992-2008 periods. Exchange rates are reported by Federal Reserve Board. Data on prices of raisins are from USDA commodity outlook. We estimate five export demand functions for the top five export destinations, using OLS estimator. Table 1 represents the variable chart.

[Insert Table 1 Approximately Here]

Why Turkey and Iran?

According to FAO Stats Iran and Turkey are the main exporters to those five countries as long as United States. Also Iran and Turkey Raisins were selected because they were the first substitute alternative for United States raisins. The Import status of each of those five countries is as follows: for Australia 77% of Raisins are imported from these 3 countries for Canada is 66%, United Kingdom 77%, Germany 70% and as for Japan is 95% which 85% is imported from United States. As it was mentioned before there have been changes in market share in past decades between these main exporters prices of all of these exporters have changed and also United States share of the market has a notable increase in past five years which on the other hand Iran and Turkey quantity exported has decreased.

Result

After gathering all the data for each importer we run three different kind of model for each country a log-log model a lin-log model and a lin-lin model. After running the RESET test for each one of them all log-log models didn't have misspecification problem on the other hand we had misspecification

problem for Australia, Canada and Germany in the lin-log model and for Australia and Canada in lin-lin model. Next step we checked for multicolinearlity with VIF test and all of our models were fine except for Australia and Canada lin-lin model. Last step was checking for auto correlation with Durbin-Watson test Australia, Germany and Japan had auto correlation in all three models. After fixing auto correlation with Yule Walker and checking the sign of own price and cross price and also the level of significant for the entire variables Log-log model for all five countries turned out to be the best option the results for each country are as follows:

[Insert Table 2 Approximately Here]

For Australia we can say that since the variables are not significant for Iran and Turkey price their price effect is zero also we can use same reason for exchange rate. After fixing auto correlation we can see the increase in DW. The sign of own price is fine. Only 20% of Australia s Raisins import is from United States. For Canada we can see only Iran s price is not significant and the Own price sign is fine we didn't have auto correlation problem for Canada. Cross price elasticity for Iran is unusual.

For Germany we can see all variables except exchange rate are significant we have to remember the fact that the currency has changed for Germany to euro since 1999 and that might be the reason that is not significant. Turkey has higher effect than Iran, the sign of the own price is fine and DW is higher after we run Yule Walker. As for Japan we had an auto coloration problem from the beginning even after running Yule Walker the variables didn't become significant and the sign of the own price is positive which shouldn't be, we have low R square but DW changed after we run GLS. Over 85% of raisins import in Japan is from United States that might be reason that the prices of other countries are not effective and are almost zero. For UK all of our variables were significant except exchange rate. Turkey has a higher effect than Iran. We didn't have auto correlation problem. Income effect sign for all countries except Japan and United Kingdom is correct and significant.

Conclusions

It is in the interest of the writer to use a panel data model to estimate United States export Demand. Japan was not a good country to estimate since Iran and Turkey had a low market share. New countries are entering the market and are gaining market share it is reasonable to add Chile to the study. Turkey had a higher impact than Iran in almost all countries; own price elasticity for US raisins is almost 1 in all destinations except Japan. United States can reach the standards of EU countries but it is harder for its competitors to reach those standards. US situation has become more stable during past 10 years and also had a great increase in the value of the raisins export compare to Iran and Turkey.

References

1- Akhtar Hossain, A, 2009, Structural change in the export demand function for Indonesia: Estimation, analysis and policy implications, Journal of policy marketing 31, 260-271.

2- Arize, A.C, 2001, Traditional export demand relation and parameter instability, Journal of Economic studies, Vol.28 No.6, pp.378-396.

3- Bahmani-Oskooee, M, 1986, Determination of International trade flows, Journal of Development Economics 20, 107-123.

4- Bervejillo, J and Sumner, D, A, an Assessment of Market Shares of California Agricultural Exports in 2002, No.24, University of California Agricultural Issues Center.

5- Duffy P.A, Wohlgenant M.K and Richardson J.W, 1990, The elasticity of Export Demand for U.S. Cotton, American Journal of Agriculture Economics, Vol.72, No2, pp.468-474.

6- Faini, R, Export supply, capacity and relative prices, Journal of development economics, Vol.45, pp.81-100.

7- Raisin Administrative Committee, Analysis report, August 2001, Fresno, California

8- Sun-Maid, annual Report, Kingsburg, California 1998-2007.

9- http://www.raisins.org/

10 http://raisin.importers.com/

Table 1: Variable Chart

Item	Variable
US Raisins Volume Export	**RX**
US Raisins Price	**PR**
Iran Raisins Price	**POI**
Turkey Raisins Price	**POT**
Exchange Rate	**EX**
Income	**I**
Error	**ε**

Table 2: Results

	Intercept	PR	POI	POT	EX	I	R-Square
AUSTRALIA	-33.3628	-0.7758	0.2653	0.9727	-3.1502	6.0274	0.9231
SE	4.1882	0.1592	0.5003	1.1715	1.8184	0.6532	
T-value	-7.97	-4.87	0.53	0.83	-1.73	9.23	
Pr>t	<.0001	0.0005	0.6065	0.4240	0.1111	<.0001	
CANADA	8.3765	-0.8240	0.0453	0.1054	-0.5379	0.2630	0.7069
SE	0.9329	0.2645	0.0782	0.0925	0.3640	0.1185	
T-value	8.98	-3.12	0.58	1.14	-1.48	2.22	
Pr>t	<.0001	0.0098	0.5736	0.2788	0.1676	0.0484	
GERMANY	-1.1644	-1.2418	0.5058	0.9288	0.4637	1.3467	0.8593
SE	6.2394	0.3703	0.1528	0.3554	0.3333	0.7889	
T-value	-0.19	-3.35	3.31	2.61	1.39	1.71	
Pr>t	0.8554	0.0064	0.0070	0.0241	0.1916	0.1158	
JAPAN	30.1400	0.2647	-0.0224	0.0897	0.1956	-2.5329	0.6703
SE	5.1212	0.2931	0.0715	0.2697	0.4007	0.6057	
T-value	5.89	0.90	-0.31	0.33	0.49	-4.18	
Pr>t	0.0001	0.3857	0.7599	0.7456	0.6351	0.0015	
UNITED KINGDOM	11.2448	-0.9162	0.1388	0.8053	-0.2395	-0.0929	0.7296
SE	2.2414	0.3332	0.0861	0.2547	0.6028	0.3185	
T-value	5.02	-2.75	1.61	3.16	-0.40	-0.29	
Pr>t	0.0004	0.0189	0.1351	0.0090	0.6988	0.7759	