What Marketing Measures Can Organic Apple and Pear Growers Take to Increase Their Receipts?

H. Holly Wang and Yuanlong Ge[1]

Introduction

A significant interest in organic tree fruit production has developed over the last 10 to 15 years. Total U.S. sales of organic food were about $13.8 billion for 2005, and is growing by nearly 20% annually (OTA 2006). Fresh fruits and vegetables are the largest category of organic food sales domestically (Dimitri and Greene 2002). Apples and pears are the dominant fruits grown in the Northwest.

The driving force for growers to convert from conventional production into organic production is the price premium the market provides for organic products. Unfortunately, it has been observed that the price premium is becoming smaller, which brings about the question of whether or not organic production can be profitable. Due to reduced price premiums, certified organic apple and pear acreages in Washington State dropped since their peaks in 2002 with only a slight increase in 2006 (Granatstein and Kirby 2006).

Several general discussions on organic fruit marketing have recently emerged. Some of the studies find the organic system for fruit is more profitable (Dimitri and Greene 2002; Greene and Kremen 2002), but this higher return is achieved only by a premium quality in the right market with the right marketing strategies (Parsons 2005; Estes and Smith 1996; Thompson and Kidwell 1998). The existing studies also claim that successful organic growers will choose suitable market channels from among farmers' markets, local grocery stores, restaurants and wholesale markets as well as brokers and processors (Dimitri and Greene 2002; Gaskell et al. 2000; Hansen et al. 2004). Processors of higher value products such as baby food may be able to offer better prices to producers for processing organic fruits. Consequently, a key question rises whether selling low grade organic fruits to processors instead of selling them to the fresh market will boost the price of higher grade fruits and bring higher profits to growers.

Despite the existing studies on organic fruit marketing, analysis of the marketing factors' impacts on market price is rarely found. The goal of this paper is to empirically analyze marketing factors affecting organic apple and pear prices in the Northwest. Specific objectives of this paper include: 1) investigating the general price response to some key physical attributes and marketing factors of fruits; 2) studying the seasonal effect on price; and 3) analyzing the profit effect from a reduction in lower grade supplies. This empirical analysis based on Washington organic apples and pears will provide some general understanding of organic fruit marketing for the industry.

[1] Wang is Associate Professor, Department of Agricultural Economics, Purdue University and Adjunct Associate Professor, School of Economic Sciences, Washington State University. Yuanlong Ge is a Graduate Research Assistant, Department of Agricultural Economics, Purdue University. Wang is corresponding author: wanghong@purdue.edu. The authors thank Larry Makus, Garth Taylor, and Joseph Sherburn for their contribution to the project and the financial support of WSU CSANR.

Model and Data

We estimate an inverse demand function to reveal price response to quantities and other factors for organic apples and pears. Hedonic price functions are incorporated in this case to measure a wide variety of commodity characteristics such as size and grade, based on Lancaster's (1966) theory that consumers take commodity characteristics as the fundamental sources of utility.

The regression model uses the price of each grade in each variety of apples and pears as the dependent variable, so that we have a separate regression equation for each grade and each variety of apples and pears. The explanatory variables used in each equation include all quantities sold for the variety, one for each grade, dummy variables for 2004/2005 and 2005/2006 crop years, medium (original size 88 to 125) and large (size 80 and larger) size dummies, Euro pack (using a 2 layer or 3 layer tray pack with a 27 or 40 pounds net weight) and bag pack dummies, and a regular (RG) cold storage dummy. We leave the 2003/2004 crop year, small size (135 and under), regular tray pack, and fruits from controlled atmosphere (CA) storage as the defaults.

Fruit prices are highly seasonal. Thus, we include additional five seasonal dummy variables to allow flexibility. They are bimonthly dummies for September/October, through May/June, leaving July/August as the default. Each of the bimonthly dummies is also included in combination with the regular cold storage dummy, so that the seasonality effect is allowed to be different for fruits from RG versus from CA storage.

Weekly shipment data from November 10, 2003 to August 28, 2006 for apples and from August 23, 2004 to August 28, 2006 for pears were provided by the Wenatchee Valley Traffic Association (WVTA). WVTA keeps a record of most transactions for apples and pears grown in Washington, a primary apple/pear production state in the United States. We analyze the five biggest apple varieties and three top pear varieties. Over the three year period, the largest apple variety is Gala, accounting for 29.80% of the total quantity, followed by Red Delicious, Fuji, Golden Delicious, and Granny Smith. The dominating pear variety is D'Anjou, accounting for 74.34%, followed by Bartlett, and Bosc. There are 31,130 entries for apples, and 4,453 for pears, by week and by grades/size/pack/storage categories.

Grades appear in the data range from the lowest US#1, US Fancy, US Extra Fancy (USXF), Washington Fancy (WAF), up to Washington Extra Fancy #1 (WAXF1), #2 (WAXF2), and Premium (WAXFP). Any apple grades lower than WAF are considered as low grades. We do not consider any pear to be low grade because only two grades are marketed, WAF and US#1 with the latter being the more popular grade.

All quantity units are converted into a standard 42 pound box for apples and 44 pound box for pears, although they are reported differently for different pack types. The prices range from $5.04/box to $77.78/box with a weighted average of $23.10/box for apples and from $7.04/box to $62.04/box with a weighted average of $23.93/box for pears. The low grade apples are currently marketed as fresh. For the five varieties over the three years, about 2.30% of apples are in grade US Extra Fancy or lower. Fuji has the highest percentage, 4.47%, in low grades, followed by Granny Smith (3.80%). The other three varieties have less than 3% each in the lower category. Because the prices of these grades are lower, the sales revenues they bring to the industry only account for 1.56% of the total. They range from 3.12% for Fuji down to 0.58% for Red Delicious (Table 1).

Table 1. Quantities and sales for organic apples (2003-2006) and pears (2004-2006).

		Percent Weight				Percent by Sale	
	Quantity	Over all varieties	Low Grade*	Small Size	Sales	Low Grade*	Small Size
	(million lbs)	(%)	(%)	(%)	(million $)	(%)	(%)
Apple							
Fuji	27.49	19.65	4.47	14.57	16.56	3.12	10.55
Gala	41.69	29.80	1.20	34.29	23.55	0.95	27.65
Golden Delicious	24.73	17.68	2.55	22.04	13.58	1.68	17.30
Granny Smith	17.77	12.70	3.80	30.92	9.81	2.51	24.18
Red Delicious	28.21	20.17	0.89	34.42	13.31	0.58	31.54
Apple Total	139.89	100.00	2.30	27.88	76.81	1.56	20.86
Pear							
D'Anjou	22.34	74.34	83.26	15.26	11.98	85.55	10.62
Bartlett	5.39	17.94	83.94	6.94	2.99	88.97	4.42
Bosc	2.32	7.72	94.04	6.19	1.28	95.35	3.38
Pear Total	30.05	100.00	84.21	13.07	16.25	86.99	8.91

*"Low grade" for pears refers to US#1 in the table, which is not a low grade actually.

Results

Detailed numerical regression results are not reported in this paper but are available from the authors upon request. General regression results are discussed below.

Price Effect of the Key Physical Attribute and Market Factors

In general, grade has the most price effect in that higher prices are clearly observed for higher grades. Size also has some significant effect but is secondary to grade, since it is only significant for higher grade Fuji, Gala, and Red Delicious apples, but not for lower grade Golden Delicious and Granny Smith apples, or WAF grade pears. For example, medium sized apples have $0.08 to $0.19 price premiums over the small sized ones while large sized have $0.02 to $0.05 price premiums for Fuji, Gala, and Red Delicious. Medium sized WAXF1 Fuji apples achieve the largest price premium compared to small sized ones. For those pears that do have size effects, they have a larger price premium from size than that of apples. The large sized pears have a 6 cents price premium over medium sized ones. The large sized Bartlett US#1 pears maximize the price premium at $0.30 over small sized ones.

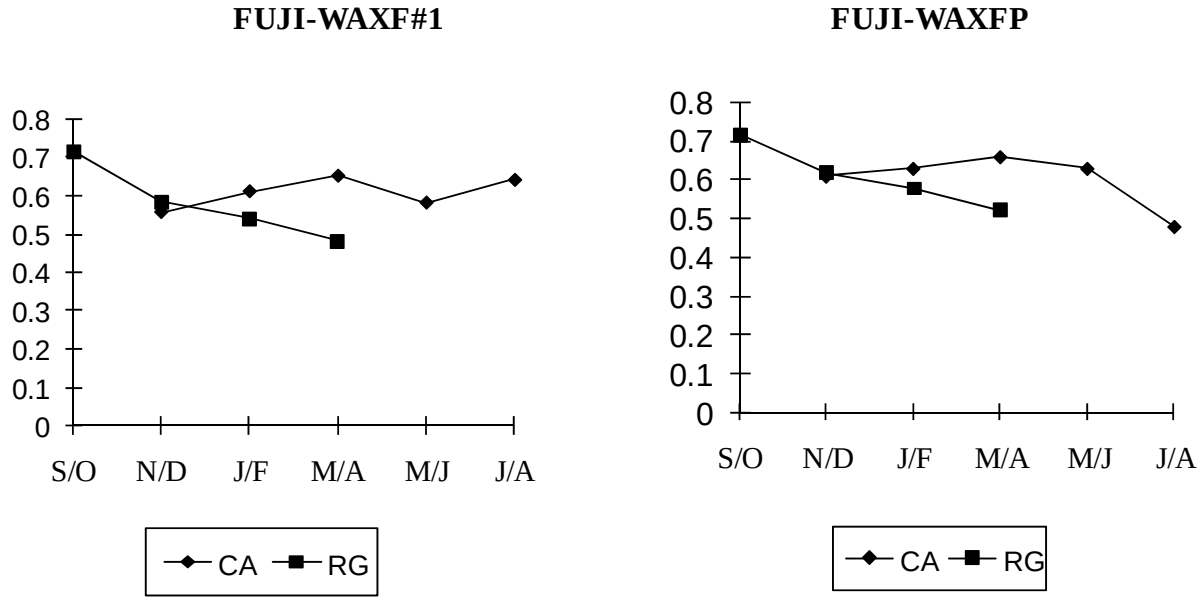
Pack type is also an important factor contributing to the price differentiation. For high grade apples, the Euro packs have a price premium of $0.04 to $0.37 over the regular tray packs, while the two package types have similar prices for low grade apples. On the contrary, most bagged apples have $0.06 to $0.22 lower prices than the corresponding regular tray packed ones.

One recommendation arising from these results is that apple packers, representing growers in most cases, should try to replace their bagged supply by tray packs and promote more use of Euro packs. However, this recommendation does not hold for pears as the Euro pack pears are not necessarily more expensive than regular tray pack counterparts. The WAF D'Anjou price is $0.16 higher for the Euro pack, but US#1 Bosc price is actually $0.08 lower. On the other hand, the bagged price is higher than the tray packed one across all grades except for the WAFs of Bartlett and Bosc. Apparently, pear packers don't need to be as concerned about packages and can go with packing methods.

Seasonal Effects

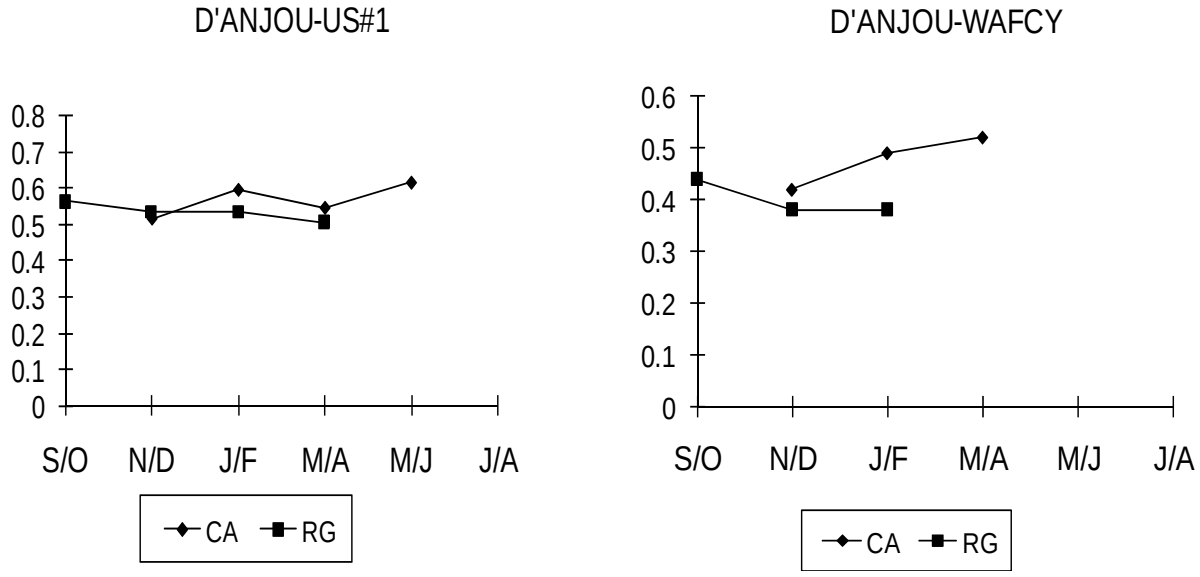
The timing of marketing is very important for organic fruits as their prices are highly seasonal. In general, RG fruits leave the market for several months between May and August. Gala apples and Bartlett pears show an early entry in late August. CA stored fruits normally enter the market no earlier than November. We also observe that the prices of RG fruits tend to decrease later in the season after harvest. To make it easier to understand, we present the seasonal patterns of prices for the top two grades WAXFP and WAXF1 for Fuji apples and WAF and US#1 for D'Anjou pears in Figures 1 and 2.

Figure 1. Fitted prices with seasonal effects for Fuji apples of two top grades.



For each figure, the price curve for RG has a negative slope, implying that the quality of the fruit decreases over time when it is not kept in CA storage. The increasing coefficients for seasonal dummy variables alone indicate the prices for CA storage fruit actually increase slightly caused by the reduction in inventory after early fall. For example, the Fuji WAXFP seasonal dummy coefficients are 0.13, 0.15 and 0.18 for November/December, January/February, and March/April CA price, indicating the prices increase one cent every month after the fall season. The CA curves in the right panel of Figure 1 show this upward slope from November to April. After April, apple prices stagnate or even decrease. The pattern can be slightly different for each variety. For example, the CA prices keep going up until the next harvest for Golden Delicious WAXFP apples. Compared to apples, pears are usually more perishable. As we can see from Figure 2, they usually disappear from the market by June (including those from CA storage), and have a sharp price drop for RG storage.

Figure 2. Fitted prices with seasonal effects for D'Anjou pears.



The crop year 2004/2005 was a bad year for apples as almost all grades exhibit a price at least 4 cents lower than the year before. Prices recovered somewhat in the year 2005/2006. This price trend is also captured by pears in the year 2005/2006 with at least 7 cents price premium over the base year of 2004/2005 except for variety of Bosc which has limited transactions over the two years.

Price Effects

All prices are inelastic with respect to own quantities. One percent increase in the supply of a particular grade causes either no change or less than a one percent decrease of its own price. The most sensitive price is Fuji USXF, which is only 0.19 percent. This negative but inelastic relationship also holds for high grade of Golden Delicious and Granny Smith apples and D'Anjou and Bosc pears.

The quantity of low grade Fuji apples has a negative effect on WAXFP and WAXF1 prices, the two highest priced fruits. Again, the response is inelastic in that a one percent increase in the total supply of low grade apples only causes 0.03 percent fall in WAXFP and WAXF1 prices each. These values suggest that if low grade apples in crop year 2005/2006 are reduced by 10% (which is 440 boxes for the entire crop year), the prices of WAXFP and WAXF1 will increase by $0.0021/lb, and $0.00071/lb. This trade-off converts to a reduction in low grade apple sales of $9,122 (assuming they not sold anywhere), and a sale increase of WAXFP and WAXF1 of $12,050 and $7,650, respectively. It suggests that for Fuji apples, marketing fewer low grade apples will make the whole industry more profitable.

However, for other varieties, there is no clear evidence that lower grade quantities will affect higher grade prices. Reducing low grade crop volume does not help improve the revenue of the industry.

The overall inelastic own and cross price effects also indicate that the market can accept more organic fruits, because an increase in quantities will not significantly impact prices.

Summary

Both good production and feasible marketing strategies are crucial to the profitability. This study is dedicated to providing some useful marketing implications for organic fruit growers. We find that organic apple and pear prices are risky from year to year, and price variation is larger for apples, which may stimulate the application of risk management to fruit production and marketing. Grade is the primary factor that affects prices, and size is another factor. Size sensitivity is different by apple variety, but for pears sensitivity is primarily dependent on grade. Pears also have a larger size price premium than apples. We also find that unlike their apple counterparts, the Euro packs for organic pears are not necessarily sold at higher prices than traditional tray packs, and bags are not necessarily sold at lower prices. This suggests that the industry can try to pack more apples in Euro packs, and doesn't need to devote much effort to sizing apples for some varieties.

Both apple and pear prices are highly seasonal, with those from regular storage having a price decrease and those from controlled atmosphere storage having a price increase in the period up to early summer. Pears have been marketed for a shorter period than apples, although those from CA storage still enjoy a price increase by May/June for D'Anjou. More CA storages of pears are called for the industry.

The crop sizes only have a slightly negative impact on prices. The crop size of the lower grade apples has a negative impact on the price of higher grade apples for Fuji only. However, if all the lower grade apples were removed from the market, without considering the value of this fruit being sold to processors, the sales gain would be quite small. On the other hand, an increase in supply will not harm the prices greatly and can increase the total revenue of the industry.

Although each variety of different fruits has its own price pattern, the overall conclusion from this empirical analysis suggests that to achieve higher prices, growers and packers should focus more on the quality (grade), package type, and storage method.

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