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GENERIC ADVERTISING OF FLORIDA NFC

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This paper discusses some of the issues with respect to a generic advertising program for not-from-concentrate (NFC) orange juice (OJ) aimed at increasing Florida grower returns. The focus is on the economic environment of the OJ market and how it may impact an NFC program. An effective program would involve differentiation of NFC from other OJ products; namely, frozen concentrated orange juice (FCOJ) and reconstituted FCOJ (RECON) produced in both Florida and elsewhere (imports). Efforts to differentiation may involve free rider problems and result in substitution between OJ products, impacting volume demands and prices of NFC and other OJ products. Other issues that may be important include preserving existing OJ markets, the relationship between retail and grower prices and NFC transportation costs.

Why an NFC Generic Advertising Program

Favorable demand and supply factors suggest considering a generic advertising program for NFC. On the demand side, U.S. gallon sales of NFC have been trending strongly upward for more than a decade. In 1995-96 NFC accounted for 24.6% of aggregate OJ gallon sales in all ACNielsen outlets. In 2003-04 and 2004-05, the NFC share had increased to 48.2% and 47.1%, respectively. The slight reduction in the NFC share in 2004-05 was related to the hurricane reduced supplies and the increase in the price of NFC relative to that for RECON. The share of Florida OJ production accounted by NFC has similarly grown from 32.5% in 1995-96 to around 40.0% in recent years, except in the 2004-05 hurricane impacted season when it was 62.0%.

The growth in NFC sales is supported by two factors—1) consumer preferences for a convenient ready-to-serve product form and 2) high quality, fresh tasting product. The first factor has also supported RECON sales but the second may be perceived to be specific to NFC by some consumers. The preference for high quality, fresh tasting product has led some consumers to choose NFC over RECON despite NFC prices tending to exceed RECON prices by 35% to 40% on average. Growth in consumer income has supported this choice.

On the supply side, Florida also has a competitive cost advantage relative to imports in shipping NFC to some markets, although the level of insulation provided by this factor may vary by market and may not exist in parts of the U.S. The cost of transporting NFC is relatively high compared to that for FCOJ given the shipping volumes required by NFC and FCOJ—one pound solid (PS) of NFC takes up more volume than one PS of FCOJ with a substantial amount of the water removed from the FCOJ. Thus, the cost of importing NFC from countries like Brazil is greater than that for FCOJ, although the NFC tariff is smaller than the FCOJ tariff partially offsetting this cost advantage. This issue is further discussed below.

A relatively strong consumer preference for NFC along with some transportation cost advantage suggest consideration be given to a generic advertising program for this product form. The following discussion focuses on issues related to such a possible program.

Free Rider Problem

Generic advertising focuses on a product group's common attributes valued by the consumer base. Nutritional benefits related to vitamin C, folate acid and antioxidants, among other nutrients, have been major attributes of the OJ product group. It may be difficult to differentiate NFC based on nutritional benefits alone since most OJ forms have relatively similar nutritional content. Advertising NFC based on nutritional attributes would tend to increase both the demands for Florida NFC and other Florida and Non-Florida OJ products, resulting in a free-rider problem where other OJ would benefit but not contribute a fair share to the cost of the advertising. Nutrition benefits have been important with consumers and have been central to FDOC advertising over time, and, for an NFC program that continued to rely on nutritional messages, a free rider problem to some degree may be unavoidable.

A variation of the above nutritional based free rider problem may also be a factor when generic promotions focus on countering negative, misleading and unsubstantiated claims about a product category. For example, if NFC and the OJ category in general were to suffer from another low-carb diet trend, countering such a trend with NFC advertising that focused on "good, heathy calories" may also positively impact the demands for competitive OJ products with the same healthy attributes.

NFC might be promoted with respect to it fresh attributes and positioned relatively closely with fresh oranges or fresh juice, but free rider problems associated with this message may still exist with respect to NFC imports and perhaps to some lesser extent with RECON/FCOJ products. Moreover, to the extent quality differences between NFC and RECON are more perceived than real, differentiating NFC with respect to quality may be on less solid grounds or objective.

Substitution Effects

The close substitution between OJ products may also be an important factor for an NFC generic advertising program. Substitution between products may result from changes in an OJ product's price and/or advertising level, involving both volume and price implications for various goods in the OJ category.[1] Advertising has own and cross effects. The own-advertising effect of a generic NFC program would be expected to increase the demand for Florida NFC. More NFC

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[1] Tracking substitution effects across individual products in the OJ category can be complicated but some general tendencies occur. First, an increase in the price of one OJ product tends to result in increases in the prices of other OJ products whose supplies are less than perfectly elastic (the cross-price effects in quantity dependent demand equations are positive for substitutes). Second, an increase in demand of one OJ product due to advertising may involve product switching and decreases in the demand of other OJ products. These changes would tend to increase the advertised product's price and decrease the prices of the other products. Free rider effects may cancel or more than offset these latter cross-advertising effects with the result that the demand and price of all OJ products may tend to increase. Lastly, on the supply side higher prices tend to attract more supply, and in the long run supply tends to increase and dampen or reduce initial price increases; similarly initial price decreases are damped by supply decreases.

gallons would be expected to be sold and the NFC price would tend to increase to the extent the supply of NFC is less than perfectly price elastic. The cross-advertising effect would mean less RECON and FCOJ gallons would be sold with some consumers switching from buying RECON/FCOJ to NFC, although free rider problems would be expected to offset this effect to some degree. To the extent NFC were successfully differentiated, however, both Florida and imported FCOJ based products would be expected to suffer reduced demands. Given NFC demand increases and other OJ demands decrease, the Florida produced pound solids (PS) sold may change little. That is, at the grower level, the demand and price for pound solids (the aggregate for NFC and FCOJ) may remain relatively constant. Initially, pound solids going into NFC may get a price premium. Pound solids going into FCOJ may get a lower price with its demand decreased. A premium for NFC would attract more Florida oranges to this usage and less to the lower price usage (FCOJ). Eventually, more oranges going into NFC and less into FCOJ may dampen the NFC premium and raise the FCOJ price. After reaching an equilibrium, the aggregate NFC-FCOJ pound solids sold may remain about the same and there may be little change in grower prices.

Cross-price effects between NFC and RECON/FCOJ tend to manifest themselves at the retail level. To the extent price conscious consumers continue to exist, RECON and FCOJ will continue to compete against NFC. If generic advertising were successful in increasing the NFC price at both the grower and retail levels, cross-price effects may, to some extent, increase RECON/FCOJ demands and positively impact their prices. That is, NFC and RECON/FCOJ prices would be expected to continue to be highly correlated given they are close substitutes (Figure 1). From 1988-89 through 2004-05, the correlation between retail NFC and RECON prices was .95, while the correlations between retail NFC and FCOJ prices was .86.

Equity in Taxing Growers

The FDOC collects taxes from all Florida orange growers, whether their product is used in NFC or RECON/FCOJ. Some growers whose oranges are utilized to produce NFC and who have long term contracts or are in participation plans may benefit from NFC advertising through enhanced prices, while other growers may be left selling their oranges in the cash market for RECON/FCOJ utilization and receive a lower price.

Expansion of Retail OJ Revenue

Another issue is related to the amount of expenditures consumer allocate to the OJ category. If aggregate consumer expenditures on all OJ products remain unchanged, the sales of NFC at a significantly higher price at the retail level may mean less aggregate OJ pound solids sold,[2] which may negatively impact grower earnings. Thus, an important part of an NFC generic program may

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[2] This result depends on the associated reduction in retail gallon sales and the Brix level of NFC. If the Brix level of NFC were the same as other OJ products, less gallon sales of NFC would translate into less pound solids. The Brix level for NFC product, however, tends to exceed the 11.8 degree Brix level for RECON and other OJ product, offsetting to some extent a reduction in gallon sales in determining the pound solids involved.

be to convince consumers to allocate significantly more of their food budget to OJ.

Market Preservation

Another factor to consider is market preservation during periods of supply shortfalls resulting, for example, from hurricanes and freezes. It has been argued that the FCOJ imports that offset the Florida OJ supply shortfalls following the freezes of the 1980s helped preserve the U.S. OJ market created in previous years by investments in generic advertising by the FDOC. To the extent imports of NFC are more costly and less readily available than imports of FCOJ, a Florida supply shortfall in NFC would be more difficult to make up with NFC imports, and the NFC market may not be preserved to the extent the U.S. OJ market was in the 1980s.

Reduced OJ demand in the western markets might also be another possibility. Due to the cost of transporting NFC, these markets tend to be dominated by RECON/FCOJ. Even with a generic NFC advertising program, it may be difficult to make large gains in NFC sales in western markets because of the transportation cost disadvantage. With more NFC advertising and presumably less RECON/FCOJ advertising, the OJ demands in western markets may be negatively impacted and perhaps open to more imports.

NFC and OJ Demand Increases

Overall, to obtain a positive impact on the OJ price, generic advertising needs to increase the demand for OJ, after substitution effects between NFC and RECON/FCOJ are fully realized. The total consumption of OJ in the U.S. is now (2005-06) about 1,300 million single strength equivalent (SSE) gallons, with NFC accounting for about 550 million SSE gallons and RECON/FCOJ accounting for most of the remaining 750 million SSE gallons. Based on the recent advertising-impact study by Ward et al.,[3] generic OJ advertising increases volume sales, prices constant, by about 5% to 10%, or 65 to 130 million SSE gallons (.05 and .10 times 1,300 million SSE gallons). Assuming generic NFC advertising only impacted NFC sales (no negative cross-advertising effects), the advertising impact on NFC demand would need to be 11.8% to 23.6% (65/550; 130/550) to obtain an equivalent impact on total OJ gallons as the historical generic OJ advertising programs studied by Ward et al.[4]

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[3] The study was entitled "Generic Promotions of Florida Citrus" and was prepared by Ron Ward and a panel of economists appointed by the Florida Citrus Commission. The findings were reported on April 8, 2005, by the Florida Department of Citrus, Lakeland Florida.

[4] The above increases in gallon sales due to advertising are under the assumption that all other factors like prices and income are constant. Thus, the 13.2% to 26.4% increases in NFC would be on top of the growth rate due to other factors. For example, over the last decade the growth in NFC sales was relatively strong, sometimes over 10% per year, due to trends in consumer preferences and other factors. This growth occurred when the price of NFC tended to be either flat or increasing. At the same time, consumer income was increasing, supporting the growth in NFC sales, along with FDOC OJ generic advertising. While NFC sales were growing, FCOJ sales were declining. RECON gallon sales also declined in some years but were relatively flatter . Thus, to the extent the FCOJ and RECON trends were to continue, some growth in NFC sales would be needed to just to keep total OJ gallon sales constant, and additional NFC growth would be needed to have overall OJ growth. Thus, if the growth rate in NFC demand were say 5% without generic NFC advertising and this growth just kept total OJ gallon sales constant

Linkage Between Retail and Grower Prices

The combination of an increase in demand resulting from generic advertising and a less than perfectly (price) elastic supply tends to result in a price increase. The recent advertising study by Ward et al. found that OJ generic advertising did have such a positive impact on price. Advertising focuses on increasing "consumer" demand and tends to increase the retail price. The question then becomes "is this retail price increase passed down to growers?" To answer this question in the Ward et al. study, a regression analysis was made to determine the relationship between the retail and FOB prices (given the high correlation between grower and FOB prices, it was assumed that FOB price changes were completely passed on to growers). A weighted average retail OJ price was constructed by multiplying the retail prices for FCOJ, reconstituted OJ (RECON) and not-from-concentrate (NFC), by their associated 1993-94 season gallon shares (out of total FCOJ, RECON and NFC gallons) and summing the results. This weighted average retail price along with the nominal Florida bulk FOB FCOJ price, reported by Florida Citrus Mutual, were then deflated by the consumer price index (CPI) for all items. The deflated FOB price was then regressed on time and the deflated weighted average retail price. Annual data for the period from 1988-89 through 2003-04 were used. The regression estimates indicate that a one dollar per SSE gallon change in the retail price results in roughly a $.50 per SSE gallon change in the FOB price.

The above approach was extended to try to determine if the retail NFC and RECON/FCOJ prices have disproportionate impacts on the grower price—here the delivered-in grower price, as opposed to the FOB price in the Ward et al. study, is analyzed. First, the CPI deflated delivered-in price for OJ (NASS) was regressed on time and the deflated retail price for RECON/FCOJ (a gallon weighted average of the RECON and FCOJ prices), using annual data for the period from 1988-89 through 2003-04. The estimates for this equation (r-square=.955) indicate that a dollar per SSE gallon change in the retail RECON/FCOJ price results in a $.54 per SSE gallon change in the delivered in price, supporting the earlier Ward et al. findings.

Second, the CPI deflated delivered-in price for OJ was regressed on time and the deflated retail price for NFC. The estimates for this equation (r-square=.928) indicate that a dollar per SSE gallon change in the retail NFC price results in a $.50 per SSE gallon change in the delivered in price. This result still supports the Ward et al. findings but does not suggest that the retail NFC price has a larger impact on grower prices than the retail RECON/FCOJ price, given the estimated coefficient on the NFC price is slightly smaller than that found for the RECON/FCOJ price.

Two other regressions were run next: one that included both the deflated retail price for RECON/FCOJ and the deflated retail price for NFC as explanatory variables, along with time; and

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because of declines in RECON/FCOJ demand, the growth in NFC demand may need to be of 18.2% to 31.4% with NFC generic advertising (5% greater than the above 13.2% or 26.4%) to match past advertising programs. That is, a high growth rate in NFC demand would be needed to be equivalent to past FDOC generic advertising impacts on volumes and prices.

another that included these latter variables plus the NFC share of Florida OJ production as explanatory variables. The RECON/FCOJ and NFC prices are, however, relatively highly correlated (correlation coefficient = .93) so that these results are not likely to be very accurate.[5] These regressions are mentioned to provide background for the regression discussed below.

Last, in an attempt to deal with the multicollinearity problem and better specify the equation, the CPI deflated delivered-in price for OJ was regressed on 1) time, 2) the deflated retail price for RECON/FCOJ times the RECON/FCOJ share of Florida OJ production and 3) the deflated retail price for NFC times the NFC share of Florida production. This equation can be viewed as a varying parameter specification of the Ward et al. equation:

(1) $\quad p_0 = \alpha + \beta\, p_1$,

(2) $\quad p_1 = (p_a\, q_a + p_b\, q_b)/(q_a + q_b)$

(3) $\quad \alpha = \alpha_1 + \alpha_2\, t$

(4) $\quad \beta = \beta_1\, w_a + \beta_2\, w_b$

(5) $\quad w_a = p_a\, q_a/(p_a\, q_a + p_b\, q_b)$

(6) $\quad w_b = p_b\, q_b/(p_a\, q_a + p_b\, q_b)$,

where p_0 and p_1 are deflated delivered-in grower price and retail OJ price, respectively; p_a and p_b are deflated retail prices for RECON/FCOJ and NFC, respectively; q_a and q_b are quantities of RECON/FCOJ and NFC, respectively; w_a and w_b are RECON/FCOJ and NFC shares of total expenditures $(p_a\, q_a + p_b\, q_b)$, respectively; t is time; and the α's and β's are parameters to be estimated. Substituting equations (5) and (6) into equation (4), and then equations (2), (3) and (4) into equation (1) results in

(7) $\quad p_0 = \alpha_1 + \alpha_2\, t + [\beta_1\, p_a\, q_a/(p_a\, q_a + p_b\, q_b) + \beta_2\, p_b\, q_b/(p_a\, q_a + p_b\, q_b)]\, [(p_a\, q_a + p_b\, q_b)/(q_a + q_b)]$,

(8) $\quad p_0 = \alpha_1 + \alpha_2\, t + [\beta_1\, p_a\, q_a/(q_a + q_b) + \beta_2\, p_b\, q_b/(q_a + q_b)]$.

The estimate of equation (8) is

(9) $\quad p_0 = -.96 + -.03\, t + .57\, p_a\, q_a/(q_a + q_b) + .42\, p_b\, q_b/(q_a + q_b)$ $\quad$ (r-square=.952).

All estimated coefficients were significantly different than zero. Except for the 2004-05 hurricane season, the NFC volume share $(q_a/(q_a + q_b))$ was around .4 in recent years, while the

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[5] The results for these two regressions were as follows. For the regression of the CPI deflated delivered-in price for OJ on time and the deflated retail price for RECON/FCOJ and the deflated retail price for NFC, the RECON/FCOJ price had a positive, significant impact on the grower price, while the NFC price was insignificant (r-square=.958).

For the regression that extends the above equation by including the NFC share of Florida OJ production as an explanatory variable, the NFC share had a positive, significant impact on the grower price while the retail NFC price had a negative, signifcant impact; the RECON/FCOJ price impact continued to be positive and significant.(r-square=.969). Again, these results should be viewed cautiously due to the multicollienarity problem with prices..

RECON/FCOJ volume share was around .6. Hence, the marginal impacts of the NFC and RECON/FCOJ retail prices on the delivered-in price for the above volume shares are

(10) .17 = (.42) (.4)   (NFC)
(11) .34 = (.57) (.6)   (RECON/FCOJ)

As was the case for the initial, simpler regressions noted above, these results do not support the conjecture that NFC provides more support to grower prices than RECON/FCOJ.

NFC Transportation Costs

A final issue noted here concerns the Florida and Brazil NFC transportation costs. A primary factor that has given Florida NFC a competitive cost advantage over Brazil NFC in the U.S. market in the past has been the cost of transporting NFC. The NFC transportation cost from Brazil to the U.S. is much greater than that for FCOJ since NFC requires about seven times more volume than FCOJ (at 66 degrees Brix). But larger tanker ships introduced recently have reduced NFC transportation costs. It is estimated that Brazil can now deliver bulk NFC to the Northeast U.S. at a slightly lower cost than Florida can (Muraro[6]). Brazil cannot, however, deliver bulk NFC to a Florida juice plant at a lower cost than producing NFC from Florida oranges. These results are based on an estimated cost of shipping bulk NFC from Florida to the Northeast that exceeds the cost of shipping NFC from Brazil to the Northeast. To the extent Florida does not have a NFC transportation cost advantage, as the Murao estimates indicate, the likelihood that a generic advertising program for NFC would have a free rider problem with respect to NFC imports increases.

Conclusions

The FDOC generic advertising program for OJ has struggled over the years with the free rider problem with foreign OJ imports benefitting from the increased OJ demand resulting from the advertising without contributing to the cost of the program, excluding some imports into Florida and some imports around Florida in past years upon which the equalization tax has been paid. Minimizing the free rider problem would provide benefits to Florida growers in terms of increased volume sales and prices. An NFC generic advertising program might be considered as one approach to dealing with this problem. The high quality of Florida NFC, consumer preferences for such product and some NFC transportation cost advantages favor NFC over other OJ product forms. Yet, a number of issues would have to be dealt with successfully for such an NFC advertising program to be effective in supporting grower prices. Foremost are the nutritional attributes that are common to all OJ product forms and have been historically advertised. Advertising messages that continue to stress OJ's nutritional benefits along with some differentiating feature perhaps dealing with the quality and freshness of NFC might be considered. Nevertheless, the nutritional messages would tend to benefit all OJ products to some extent. Moreover, differentiating NFC with respect to quality

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[6] The discussion of bulk NFC shipping costs is based on unpublished work by Ron Muarao, Food and Resource Economics Department, University of Florida, Citrus Research and Education Center, Lake Alfred, FL.

may be on less solid grounds to the extent quality differences between NFC and RECON are more perceived than real. Additionally, a generic advertising program that increased the demand for NFC would likely have cross-advertising and substitution effects with respect to other OJ product forms. Cross-advertising effects may initially result in reduced demand for RECON and FCOJ products to the extent consumers were to switch to NFC, although free rider effects may offset these demand decreases to some extent. Higher NFC prices resulting from advertising may also result in substitution or demand shifts towards RECON and FCOJ. Depending on the strengths of these shifts and the individual NFC and RECO/FCOJ supply responses, FCOJ and RECON prices may increase. Generally, NFC, FCOJ and RECON prices tend to be highly correlated as a result of the high degree of substitution between OJ product forms and an NFC price increase that holds may eventually result in increases in the prices for FCOJ and RECON.

Although Florida NFC may have a transportation cost advantage in some markets, this advantage may be relatively small or may not exist in other markets. For example, the cost of delivering Brazil NFC to the Northeast may actually be slightly less than that for delivering Florida NFC. Finally, although a statistically significant linkage between retail NFC prices and grower prices exists, the linkage does not appear to be stronger than that between retail RECON/FCOJ prices and grower prices.

Figure 1. Retail OJ Prices By Product Form