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An Economic Evaluation of Hamlin Versus Valencia Orange Production in Florida¹

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Introduction

The Florida citrus industry has changed rapidly over the last twenty years. A series of freezes in Florida during the 1980s destroyed a large portion of the state's citrus tree population. After the freezes, many growers chose to replant with early-maturing varieties such as Hamlin. The harvest season for Hamlin oranges begins in early December, and a large proportion of the crop is harvested before March.

As a result, there has been a substantial increase in the production of early-maturing varieties (mainly Hamlin) in Florida. While early-maturing varieties production has always exceeded Valencia production in Florida, this gap has widened in recent years as illustrated in Figure 1. For example, the 1999-00 growing season in Florida produced 125.7 million boxes of early-maturing varieties (Hamlin) and 99 million boxes of Valencia oranges.

Another important phenomenon affecting the Florida citrus industry has been the rapid growth of not-from-concentrate orange juice (NFC) production. Although introduced in the 1950s, NFC production was relatively small until 1990 (200 million SSE

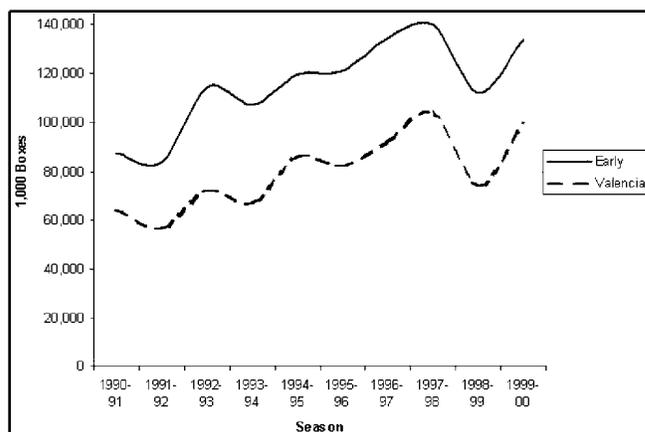


Figure 1. Florida orange production by variety, 1990-91 through 1999-00 seasons.

gallons). After 1990, NFC production increased dramatically (2000-01 production was 600 million SSE gallons) [Figure 2].

When discussing Hamlin versus Valencia, increased NFC production becomes important because a higher proportion of Valencia oranges are used for NFC production than are used for frozen concentrated orange juice (FCOJ). In the 1999-00 growing season, the Florida Citrus Processors Association (FCPA) reported that Valencia

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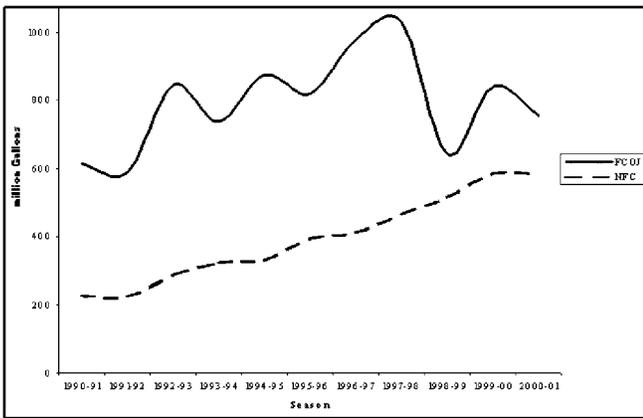


Figure 2. Estimated U.S. orange juice production, 1990-91 through 2000-01 seasons.

accounted for 50 percent of the oranges allocated to NFC, compared to 40 percent for FCOJ. However, although Florida orange production has shifted from Valencia to Hamlin, the demand for oranges by Florida processors has apparently shifted from Hamlin to Valencia. This dichotomy suggests that processors are paying increasing premiums for Valencia.

An analysis of returns per acre from the last 10 growing seasons was used to examine the hypothesis that Valencia production has become more profitable than Hamlin production in Florida and to address the question: Have processors established premiums of significant magnitude for Valencia oranges in an effort to stimulate Valencia orange production and discourage continued expansion of early-maturing varieties such as Hamlin?

Analysis

Data were collected from the *Citrus Summary* on average per-acre yields of early-maturing varieties (such as Hamlin) and Valencia for 1990-91 through 1999-00. Early-maturing varieties typically produce more boxes per acre than do Valencia for a number of reasons. For example, because the presence of fruit during bloom may adversely affect the next year's crop of Valencia, Valencia yields are almost always substantially lower than Hamlin yields. Tables 1 and 2 illustrate the average statewide yields and juice yields disaggregated by time of maturity as reported by the Florida Agricultural Statistics Service (FASS). Although early-maturing varieties produce more boxes per acre, Valencia produces higher juice yields

per acre. Juice yields for early-maturing varieties such as Hamlin are presented in column two of Table 1, and juice yields for Valencia are presented in column two of Table 2.

The first step of the analysis is to determine pound solids per acre yields. This is accomplished by multiplying per-acre box yields with juice yields. These figures are shown in column three of Tables 1 and 2, respectively. Although per-box juice yields from Valencia are higher, larger per-acre box yields result in higher pound solids per acre yields for early-maturing varieties. On average, early-maturing varieties yield 336 more pound solids per acre than Valencia.

The next step is to establish the prices paid for different varieties of oranges. In the annual report of the Florida Citrus Processors Association (FCPA), delivered-in prices are reported by month-of-delivery. Since the processing season for early-maturing varieties ends by March 1, delivered-in prices for early-maturing varieties are derived from average prices paid from December through February, and delivered-in prices for Valencia are derived from prices averaged over March through June. These prices are shown in column four of Tables 1 and 2. Notice that although the prices paid for Valencia are higher than those paid for early-maturing varieties, there are years when the price difference is small.

On the issue of prices, FCPA reports three prices: cash or spot market, contract, and weighted-average. In this study, the weighted-average price is used based on the assumption that it better reflects the average price received by Florida orange growers. In the last few years, the prevalence of long-term contracts has expanded greatly although the exact percentage of fruit sold through such contracts is unknown.

Gross revenue per acre is derived from multiplying pound solids per acre with delivered-in price per pound solids as illustrated in column five of Tables 1 and 2. Note that even though gross revenue per acre for Valencia was typically higher than for early-maturing varieties, there are four years when early-maturing varieties realized greater gross returns per acre. Average gross returns per acre over the 10 years considered was \$2279.58 for early-maturing

varieties and \$2374.60 for Valencia, a difference of \$95 per acre. Considering the additional freeze risk associated with Valencia, an advantage of \$95 per acre seems quite small.

To clarify actual grower returns per acre, an additional calculation should be made. Since per-acre box yields for early-maturing varieties are substantially higher compared to Valencia, differences in harvesting and hauling costs should be incorporated. These costs are imposed on a per-box basis, but the cost per box across varieties is comparable. (In recent years, there have been problems with the availability of harvest labor late in the harvest season, which means that some growers have had higher harvesting costs per box for Valencia than for early-maturing varieties.) Column six of Tables 1 and 2 illustrates the net revenue per-acre adjustment for estimated harvesting and hauling costs. (Harvesting and hauling costs are reported by Muraro and Still, 1990-1999, various issues.) Because of the higher fruit yields associated with early-maturing varieties, adjusting the revenue per acre for harvest costs has a greater impact on early-maturing varieties than on Valencia. As a result, net revenue per acre has been greater from Valencia than from early-maturing varieties in seven of the 10 years considered. The average net return was \$1789.78 per acre for Valencia and \$1522.05 for early-maturing varieties. The advantage associated with Valencia was nearly \$268 per acre.

Conclusion

Two major events have impacted the Florida citrus industry over the past 20 years. First, a series of freezes in the early 1980s that destroyed a large number of groves has been instrumental in the citrus industry relocating farther south. In response to a perceived risk aversion, citrus growers have increased their plantings of early-maturing varieties such as Hamlin. Second, the introduction of NFC production has dramatically changed the orange juice market in the United States. While NFC consumption has helped support grower prices for processed oranges, a higher proportion of Valencia oranges are used in NFC production than are used in FCOJ production. Consequently, the demand for Hamlin has been decreasing while, at the same time, the

supply of Hamlin has been increasing. On average, early-maturing varieties (in this case, Hamlin) produce more pound solids per acre than Valencia. In six of the 10 years studied, gross revenue per acre for Valencia production exceeded that realized from early-maturing varieties. When harvesting costs were considered, the return from Valencia exceeded that from early-maturing varieties in seven of the 10 years studied. The average difference in net return per acre was nearly \$268. These results would appear to confirm that citrus processors are sending signals to growers that production of early-maturing varieties such as Hamlin should be curtailed and production of Valencia should be expanded. A premium of less than 15 percent per acre, however, does not constitute a strong signal. Even though delivered-in prices paid for Valencia for the 1999-00 growing season was nearly \$0.15 per pound-solid higher than those paid for early-maturing varieties, the realized revenue per acre was less than 15 percent greater. This suggests that processors will have to pay even greater premiums for Valencia if they intend to encourage greater plantings of Valencia.

Another interesting issue is the prospect of the increased use of mechanical harvesting of citrus in Florida. Because the next year's crop is present during the harvest of Valencia, it is more difficult to use mechanical harvesting for Valencia without adversely affecting the next year's crop. Current estimates are that mechanical harvesting could reduce harvesting costs by at least \$0.30 per box. If mechanical harvesting can only successfully be applied to early-maturing varieties, then the analysis presented in this document will need to be modified. There is some research, however, to suggest that abscission chemicals will be developed to facilitate the use of mechanical harvesting in Valencia.

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Table 1. Calculation of revenue per acre for early-maturing varieties, 1990-91 through 1999-00 seasons.

| Citrus Growing Season | Boxes Per Acre Yield | Pound Solids Per Box Yield | Pound Solids Per Acre Yield | Dollars Per Pound Solids (\$) | Gross Revenue Per Acre (\$) | Net Revenue Per Acre (\$) |
|-----------------------|----------------------|----------------------------|-----------------------------|-------------------------------|-----------------------------|---------------------------|
| 1990-91 | 392 | 5.788685 | 2,269.164 | 1.446098 | 3,281.43 | 2,595.43 |
| 1991-92 | 343 | 6.102920 | 2,093.301 | 1.241362 | 2,598.54 | 1,995.21 |
| 1992-93 | 433 | 6.337069 | 2,743.951 | 0.625138 | 1,715.35 | 957.60 |
| 1993-94 | 395 | 6.320154 | 2,496.461 | 0.880566 | 2,198.30 | 1,487.30 |
| 1994-95 | 400 | 6.001264 | 2,400.506 | 0.779168 | 1,870.40 | 1,150.40 |
| 1995-96 | 385 | 6.016849 | 2,316.487 | 0.935358 | 2,166.74 | 1,473.74 |
| 1996-97 | 408 | 6.332082 | 2,583.489 | 0.909875 | 2,350.65 | 1,595.85 |
| 1997-98 | 441 | 6.203038 | 2,735.540 | 0.686796 | 1,878.76 | 1,062.91 |
| 1998-99 | 353 | 6.583686 | 2,324.041 | 1.052375 | 2,445.76 | 1,775.06 |
| 1999-00 | 437 | 6.133175 | 2,680.198 | 0.854363 | 2,289.86 | 1,459.56 |

Sources: FASS, FDOC, FCPA

Table 2. Calculation of revenue per acre for Valencia, 1990-91 through 1999-00 seasons.

| Citrus Growing Season | Boxes Per Acre Yield | Pound Solids Per Box Yield | Pound Solids Per Acre Yield | Dollars Per Pound Solids (\$) | Gross Revenue Per Acre (\$) | Net Revenue Per Acre (\$) |
|-----------------------|----------------------|----------------------------|-----------------------------|-------------------------------|-----------------------------|---------------------------|
| 1990-91 | 324 | 6.479827 | 2,099.464 | 1.399489 | 2,938.18 | 2,371.77 |
| 1991-92 | 280 | 7.048908 | 1,973.694 | 1.451030 | 2,863.89 | 2,373.89 |
| 1992-93 | 321 | 7.010590 | 2,250.399 | 0.782115 | 1,760.07 | 1,198.32 |
| 1993-94 | 281 | 6.896550 | 1,937.930 | 1.044662 | 2,024.48 | 1,518.68 |
| 1994-95 | 326 | 6.576039 | 2,143.789 | 1.041460 | 2,232.67 | 1,645.87 |
| 1995-96 | 293 | 6.939647 | 2,033.317 | 1.343408 | 2,731.57 | 2,204.17 |
| 1996-97 | 311 | 6.969654 | 2,167.562 | 0.919153 | 1,992.32 | 1,416.97 |
| 1997-98 | 356 | 7.12879 | 2,537.774 | 1.125840 | 2,857.13 | 2,198.53 |
| 1998-99 | 251 | 7.264937 | 1,823.499 | 1.115764 | 2,034.59 | 1,557.70 |
| 1999-00 | 335 | 6.912924 | 2,315.830 | 0.997951 | 2,311.08 | 1,674.58 |

Sources: FASS, FDOC, FCPA