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An Econometric Analysis of the California Raisin Industry

Carole Frank Nuckton,
Ben C. French, and Gordon A. King

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232 CLASSROOM OFFICE BLDG.
24 BUFORD AVENUE, UNIVERSITY OF MINNESOTA
ST. PAUL, MINNESOTA 55108

DIVISION OF AGRICULTURE AND NATURAL RESOURCES
CALIFORNIA AGRICULTURAL EXPERIMENT STATION

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1. INTRODUCTION

Natural Thompson seedless raisins (NTS) are an important California specialty crop. This naturally sun-dried product is unique on world markets. Distinctive features of this industry include:

- Raisin grapes are a perennial crop, so production in any year depends on decisions made in earlier years.
- The Thompson seedless grape is utilized in three major outlets: fresh, crush, and dried.¹ This flexibility has made it a popular grape for California growers for over a century.
- The sun-drying method of producing NTS involves considerable weather risk. Although salvage techniques are improving, rain on the laid-out raisins can severely reduce their value, particularly if cool weather follows the rain. Occasionally, extremely short crops result (as in 1978), with very high prices for those NTS that are salable.
- Unprocessed NTS raisins are storable for one to two years with no special treatment other than fumigation. This storability introduces the possibility of stock holding either by growers or packers.
- Nearly all NTS are produced within a 75 mile radius of the city of Fresno, making possible the effective implementation of certain provisions of a marketing order. (For a discussion of the economic and sociological conditions essential for accomplishing marketing order program objectives, see Farrell, 1966)
- Since 1949, the California raisin industry has operated under a federal marketing order, implementing several pro-

visions authorized under the Agricultural Marketing Agreement Act of 1937, including volume control in an attempt to stabilize prices and enhance grower returns.

- Twenty percent or more of the NTS crop is exported. The role of exports has changed over the last two decades from being a "noncompetitive outlet" for NTS diverted from the domestic market to one of crucial commercial importance to the industry.
- There are 21 processor-packers in the state's raisin industry, including one large cooperative, Sun-Maid, which represented about 40 percent of the growers in the early 1980s and generally about one-half of the tonnage. Since 1967, another 40 percent of the growers has belonged to a grower-bargaining cooperative, the Raisin Bargaining Association (RBA). Thus, although individual growers may be competitive price takers, above the farm level the structure is imperfectly competitive.

In recent years the industry has experienced some severe economic shocks. In 1983, the largest NTS crop of all time was delivered to packers: 347,943 short, sweat-box tons. This compares with deliveries of 74,410 tons in 1978, 263,108 tons in 1979, 254,657 tons in 1980, 224,463 tons in 1981, and 205,700 tons in 1982 (Raisin Administrative Committee). The direct reason for this unprecedentedly large raisin crop was the wineries' dramatically reduced demand for Thompsons for crushing. The Thompson seedless share which had been running 20 to 25 percent of the total crush fell to 12 percent in 1983 as wineries failed to renew contracts

1. A small portion of the crop (from 1 to 2 percent) is canned, mostly in fruit cocktail.

with Thompson growers.²

Grower's average returns for raisins were cut in half in 1983, \$590 per short ton, down from an average of \$1204 for the previous four years (California Crop and Livestock Reporting Service, CCLRS, 1984). Associated with reduced grower returns was a sharp drop in vineyard values: California's raisin grape vineyards fell from \$10,840 per acre in 1982 to \$6850 in 1984 (U.S. Department of Agriculture, 1984).

The raisin industry made several responses to this crisis situation of the early 1980s, including (a) an export incentive plan (EIP) whereby the export price was greatly reduced to be more competitive with raisins from other producing countries on foreign markets; (b) a self-help plan, the raisin incentive disposal, whereby growers volunteer to abort their crop by spur pruning, spraying, or vine removal, and then receive certificates for the previous year's reserve tonnage to sell to packers; (c) an inventory adjustment plan in 1984 (only) whereby packers were given reserve tonnage at \$100 per ton to blend with free tonnage already held, to lower the domestic price; and (d) the RBA's acceptance in 1984 of a field price of \$700 per ton—a little more than half its level of the previous several years.

Large price-depressing NTS supplies continued through the mid-1980s, but with sharply lower prices, new product development, and very successful product promotion, sales increased at home and abroad and the industry has begun to recover. In September 1988, the manager of the California

Raisin Advisory Board remarked "Raisin sales have increased 50 percent in the last five years, doing especially well in institutional/industrial (prepared foods) and overseas markets" (Nef, 1988).

There have been several descriptive marketing studies of the early California raisin industry (Howard, circa 1920; Shear and Howe, 1931; Watson, 1940; Nelsen, 1950). And Townshend-Zellner (1961, 1962, 1964) analyzed the first ten years of the federal raisin marketing order—from 1949 through 1959. However, there has never been a detailed quantitative analysis incorporating the unique features of the NTS industry.

This study constructs a dynamic econometric model of the California raisin industry which accounts for the interactions and feedback effects among sectors of the industry: growers' raisin grape vine planting and removal decisions; growers' allocation of the grape crop among alternative uses; RAC's division of the NTS crop into free and reserve tonnage; RBA's bargaining process with packers for the free tonnage price; RAC's determination of reserve sales, especially exports; packer-processor f.o.b. price-establishment behavior; and domestic and foreign NTS demand. No econometric model can fully reflect all of the complexities of the economic processes it attempts to measure. The empirically estimated relationships focus on the major raisin price and quantity variables and the primary demand and supply shifting variables. The influences of omitted variables enter the model as unexplained random disturbances. Hence the

2. The San Joaquin Valley bearing wine grape acreage doubled over the decade of the 1970s; yields there under irrigation were higher than in the traditional wine-growing regions of the state, magnifying the impact of the increased acreage on total production. Further, much of this new acreage was in wine varieties directly competing with Thompsons for blending in generic wines: French Colombard, Chenin Blanc, and Chardonnay. And in 1983, the law was changed to require that 75 percent of a varietal wine be made from grapes of that variety—up from 51 percent—further reducing the demand for Thompsons for blending.

The strong dollar in the early 1980s made foreign wines cheaper to U.S. consumers; U.S. consumption of foreign wine increased from 8 percent of the total wine consumed to 25 percent in 1983 (Sun-Maid Growers, 1984). While some imported wine is of premium quality, much of it is in direct price competition with California jug wines in which the Thompson seedless has been an important ingredient.

economic relationships measured are in the form of expected values within probability distributions of actual values. In this context and with these limitations, the model is utilized to evaluate the dynamic effects of changes in exogenous variables such as cost of production or exchange rates, and the probable effects of changes in marketing order programs such as price blending to reduce export prices.

Section 2 presents a description of the industry, including (1) raisin grape and NTS production; (2) a brief review of U.S. raisin

marketing problems, policies, and programs; (3) the institutional setting of the industry; and (4) NTS on world markets. Section 3 constructs a theoretical framework for the industry model. Section 4 specifies the model empirically and presents the econometric estimates. Section 5 constructs a dynamic simulation model from the econometric results and various identities and linking relationships. Section 6 uses the model to analyze policy issues and to evaluate the dynamic effects of changes in important exogenous factors.

2. DESCRIPTION OF THE CALIFORNIA RAISIN INDUSTRY

Production

California's grapes are classified into three groups according to their most significant, but not exclusive use: table grapes, wine grapes and raisin grapes. Table grapes represent about 10 percent of the state's grape acreage, wine grapes about one-half, and raisin grapes, 40 percent (CCLRS, *California Grape Acreage*, 1985). The share in wine grapes increased dramatically in the late 1970s (Figure 1).

Raisin grapes are the most versatile of the three types. Besides the portion of the crop that is dried (the 1963-83 average is 52 percent), a large share is crushed (36 percent average), from 10 to 11 percent is sold fresh, and from 1 to 2 percent is canned (mostly in fruit cocktail). Partly because of this versatility, the raisin grape has been popular with growers. Since the mid-1960s, bearing acreage remained relatively steady at around 250,000 acres; then favorable returns in the late 1970s encouraged plantings with a subsequent increase in bearing acreage in the 1980s (Figure 1).

Not all raisin grape growers have the option to sell on the fresh market. For those raisin producers who do choose to sell to the fresh market, the decision must be made in the spring when the trellis structure must be changed to protect the fruit from the sun.

Figure 1A. Bearing Grape Acreage

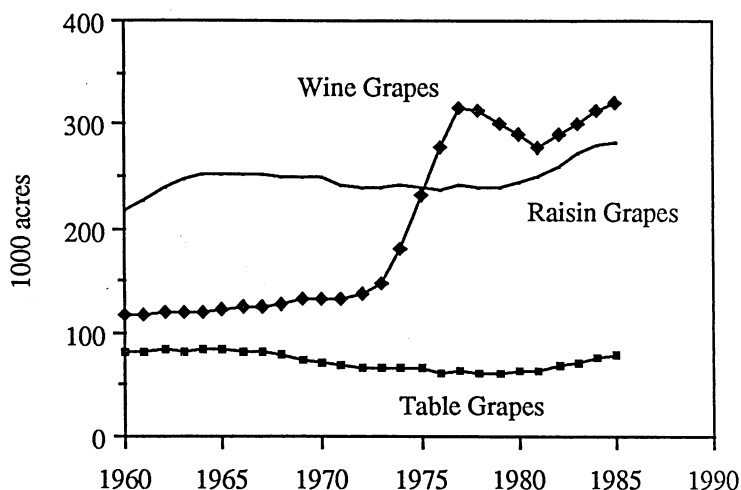


Figure 1B. Nonbearing Grape Acreage

