



Robert Mondavi Institute

Center for Wine Economics

Quantitative Indices on the Early Growth of the California Wine Industry

Alan L. Olmstead
University of California, Davis

Paul W. Rhode
University of Arizona

RMI-CWE Working Paper number 0901

May 8, 2009

The analyses and views reported in this paper are those of the author(s). They are not necessarily endorsed by the RMI Center for Wine Economics, by the Department of Agricultural and Resource Economics or by the University of California, Davis.

Copyright © 2009 by Alan L. Olmstead and Paul W. Rhode. All rights reserved. Readers may make copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

QUANTITATIVE INDICES ON THE EARLY GROWTH OF THE CALIFORNIA WINE INDUSTRY

Alan L. Olmstead
University of California, Davis
Professor of Economics,
Director of the Institute of Governmental Affairs, and
Member of the Giannini Foundation for Agricultural Economics

Paul W. Rhode
University of Arizona
Professor of Economics, and
Research Associate at the National Bureau of Economic Research

Today, California dominates the wine industry in the United States and ranks among the world's leaders in wine production. In 2000 the state's producers crushed over 3 million tons of grapes valued at nearly \$2 billion and marketed about 90 percent of all U.S. wine output. The state is also a significant, though far from dominant, player in the world market. In 1998 California produced about 7 percent of the world's wine, ranking fourth behind Italy, France, and Spain. California has several wine-producing regions, with 45 of the state's 58 counties recording some commercial production in 1999. Map 1 displays some of the more important regions. In 1999 over one-half of the state's roughly 470,000 acres of wine grapes were located in the vast Central Valley. In general, the state's premium wines come from the cooler coastal valleys of northern California, with the best known of these located in Napa and Sonoma counties. These counties along with neighboring Lake and Mendocino counties make up the North Coast region that contains about one quarter of the state's grape acreage. The prestigious Napa County had about 30,000 acres of wine grapes in 1999, most of which were devoted to Cabernet Sauvignon, Chardonnay, and Merlot varieties. Other prominent wine areas include the Central Coast region (including Monterey, San Luis Obispo, and Santa Barbara counties) and the Foothill region on the western slope of the Sierra Nevada Mountains. Since the end of the nineteenth century, Southern California has not been a major producer.¹

Although the California state seal depicts an image of Minerva, implying a state and an economy born fully grown, imbued with wisdom and technical skills, nothing could be further from the truth in describing the development of the state's wine industry. Over its first century of Anglo settlement, California farmers and vintners struggled to overcome numerous obstacles and to gradually learn how to perfect their products. Given the significance of the grape and wine industries in California today, and the special appeal

¹ Compiled from, Office International de la Vigne et du Vin (2000, pp. 24-25); Walker (1997, pp. 16-50). In 1996 grapes were the state's second most important agricultural commodity ranking just below the value of milk and cream output. Of course, a significant fraction of the state's grape output goes to make raisins or to the fresh grape market. Carter and Goldman (1997, p. 36); Map 1, see Johnston (1997, p. 79).

that wine has in our culture, it is not surprising that numerous scholars, including many European economic historians, have examined the industry's history. All of this work invariably confronts data problems stemming from the incompleteness of the American sources. In this paper we bring the available data together from various state and national sources and provide new estimates defining key aspects of the industry's development.

First, we systematically compile the available data on the number of producers, output, prices, and industry structure to provide a firmer quantitative perspective of the early development of the industry. We attempt to bring greater harmony and completeness to the disparate and spotty statistical data published in U.S. Censuses of Agriculture and Manufactures and the various California agricultural reports. Data problems have clouded previous efforts to understand the industry's evolution. For example, the most commonly used statistics from the Census of Agriculture enumerating wine production on farms cover every decade between 1850 and 1910, except 1880. The gap is significant because it occurs in the midst of the state's rise to ascendancy. As discussed below we employ an 1880 USDA report to fill this void. Our analysis shows that past accounts had misdated important industry trends and failed to appreciate key differences between the California industry and that in other states.

Many early observers recognized California's potential to become America's best wine-growing region. For example, the author of the section on grapes and wine in the 1860 U.S. Census of Agriculture observed:

The vineyards of Europe are estimated at twelve million acres. We have far more grape territory than that in the United States; but our climate, with the exception of California, is less equable. In California alone, it is stated, there are five millions of acres well adapted to grape culture. Here is something to reflect upon, and to give hope for the future.²

Californians were already reflecting or, more aptly, dreaming. As an example, in 1854 the founding editor of the *California Farmer* noted, "California is destined to become a mighty vineyard—her wine presses running over with wine. Those beautiful hillsides and undulating slopes along our broad and endless valleys, in a few years, will become the vineyards of California."³ But even with all its promise, the state's industry required a lengthy period of development, involving many fits and starts, before gaining its current position of leadership.

A long view of the growth of the California industry is offered in Figure 1, which graphs the annual wine and brandy output (in millions of gallons) from 1865 to 1916.⁴

² U.S. Census Bureau (1864, p. clxi).

³ As quoted in Butterfield (1938, p. 30).

⁴ The reporting year for these data begins on July 1. The series began to distinguish between sweet and dry wine in 1890. Shear and Pearce (1934) table 42 presents an alternative series for the post-1890 period which differs in minor details from that presented here. The production statistics for dry wine were "estimated, as no complete records were kept." As the California State Board of Agriculture (1919, p. 232) noted "No accurate record of dry wine production in California is obtainable, because this class of wine is

The data, drawn from the *Transactions of the State Board of Agriculture*, contain many round figures, suggesting that they should be treated as best “guesses” rather than hard numbers. They are especially suspect in the early years. The series indicate slow growth in output, only one-percent per annum over the period from 1865/67 to 1870/72. The data also show that, contrary to many accounts, the completion of the transcontinental railroad in 1869 appears to have had little immediate positive impact on the industry. Given the time period between the planting of vines and the bearing of fruit one might not expect much of a response by 1872. But, as Albert Fishlow and others have shown, farmers and entrepreneurs often invested in anticipation of the building of railroads. California grape growers as a group evidently did not follow this course.⁵ Wine production did rise from 3 million gallons in the year beginning July 1, 1868, to 4.5 million in 1870, only to fall to 2.5 million gallons in 1872. The conventional wisdom (as expounded by Vincent Carosso and others) is that the early 1870s was a period of large-scale plantings which led to “overproduction,” low prices, and widespread bankruptcy in the industry in mid-decade. But this view is not consistent with the best available series, which date the surge in wine output to the late 1870s.⁶ This growth wave (15 percent per annum between 1875/77 to 1880/81) was followed by a lull in the early 1880s and then another wave of growth in the second half of the decade.

Supplementing the production data, Figure 2 graphs the gallons of California wine and brandy shipped out of the state by rail and sea over the 1864-1912 period. It also charts the prevailing transcontinental railroad rates, in currency per hundred-weight, for shipping a carload of wine in wood barrels from San Francisco to New York from 1870 to 1910.⁷ As Carosso noted, at least until the mid-1870s, most wine was still shipped by sea because of the high cost of shipping overland.⁸ Rail shipments, reflected in the gap between total and sea shipment, began to rise substantially in the early 1880s, after transcontinental rates fell sharply. After the railroad rates stabilized at their new lower level in the late 1880s, both modes of shipment expanded in tandem.

Comparing the annual shipments and production data reveal that out-of-state exports in a given year averaged less than one-half of the previous year’s vintage.⁹ Among the factors accounting for this difference were home consumption, losses from evaporation and leakage, and the placing of wine into inventory for aging. The proportion of output exported out of state generally increased, climbing about one-tenth in the mid-1860s to one-half by the early 1910s. The shipment data indicate the volume of exports increased much more rapidly over the 1864-94 period, when the annual growth rate

made without government supervision and private records of inventories of this class of wine as far as individual producers are concerned are not given out.”

⁵ Fishlow (1965, pp. 196-203).

⁶ Carosso (1951, p. 95).

⁷ Shipment data were compiled from California Bureau of Labor Statistics (1884, pp. 178-180); California Board of State Viticultural Commissioners (1887, pp. 20-35), (1890, pp. 20-35), and (1892, pp. 14-17); California State Board of Horticulture (1902, p. 38); and Wickson (1914, p. 50). Transportation rates from Rhode (1995 p. 135).

⁸ Carosso (1951, p. 87).

⁹ In several years during the 1890s, reported shipments were close to or exceed reported production. These episodes typically occurred following years of exceptionally high production (1892, 1897).

averaged 15.3 percent, than in the post-1894 period, when growth averaged only 1.1 percent per annum.

The data on wine production on farms from the Census of Agriculture, displayed in Table 1, provide a clearer picture of California's changing place in American wine-making. As noted above, these data cover every decade except 1880.¹⁰ We fill this gap using a special USDA report on *Statistics of Grape Culture and Wine Production in the United States for 1880* authored by William McMurtrie.¹¹ While the McMurtrie estimates are not entirely consistent with the earlier figures (and seem relatively high), they are largely in line with the standard 1890 data from H. Gardner's special report of "Viticulture: Statistics of Grape Growing and Wine Production in the United States" published in the *Eleventh Census*. The McMurtrie numbers appear, moreover, to capture well the distribution of output across major producing centers. In general, the Census of Agriculture statistics reveal both how small and how widely diffused wine production was in American agriculture. The data indicate that California was the leading winemaking state in 1850, with production of a mere 58,000 gallons. This small level of output made up about one-quarter of all U.S. production on farms. Despite nearly a 10-fold increase in the state's output over the 1850s, California temporarily slipped behind Ohio as the leading producer in 1860. To give a sense of just how tiny the California industry was, Perinou and Greenleaf's study of the manuscript census of 1859 only turned up 202 individuals growing grapes and/or making wine.¹² By 1870, California again was in the lead with over six-tenths of national output. Over the 1860s, production in Ohio declined and Missouri became the largest winemaking state east of the Rocky Mountains. New York also emerged as an important player. According to the

¹⁰ It is important to understand some of the limitations of the standard data. First, the Agricultural Census data cover only production on farms, not in wineries operating as separate establishments. Moreover, based on our familiarity with the Census manuscripts gained in other research, it appears likely that the enumeration of wine production was far from complete. Some Census marshals filled in figures for every product on the census forms whereas others left entirely blank the columns for minor products (including wine, honey, bee's wax, and maple syrup). Enumeration is presumably more complete in the regions where wine production was important and well established.

¹¹ McMurtrie (1881). These estimates are broadly similar to the 1890 Census figures published in its special report on viticulture. The McMurtrie 1880 figure for California is somewhat high compared to the 1879/81 observations in the annual data appearing in Figure 1. Across the board, the McMurtrie 1880 estimates are significantly higher than the Census 1870 data. The U.S. Dept. of Agriculture (USDA) estimates were based on a survey of "those directly engaged in grape culture and wine making," the department's network of crop reporters, and county postmasters regarding the acreage and output of vines and the production and price of wine in the respondents' county. Although the survey population was agricultural, the resulting estimates were more comprehensive (and probably include more industrial wineries) than the earlier Censuses of Agriculture. One key difference was that the McMurtrie study estimated the value (as well as the volume) of output.

¹² In addition, Perinou and Greenleaf (1967, pp. 1-77) discovered about 60 other individuals that the census had omitted, but this still leaves a grand total of only 262 people in the trade. Many of the 202 individuals enumerated were undoubtedly farmers who produced little or no wine for commercial distribution. But for many of these individuals, the manuscript census reported the amount of wine on hand. Sixty individuals reported having 1,000 or more gallons on hand. The largest quantity listed was 22,500 gallons held by Benjamin Wilson of San Gabriel.

Agricultural Census, California's growth in the 1880s was slow in comparison to that in the 1870s.

The California industry experienced major shocks over the 1880s as phylloxera and Pierce's Disease hit the state's vineyards hard. One impact of these shocks was the effective destruction of the industry's "traditional" leading center in Southern California and the shift of production to the North. Table 2, which shows the distribution of wine production on farms across California counties, documents the decline of Los Angeles as an area of production. In 1870, Southern California accounted for 29.3 percent of the state's wine output whereas the San Francisco Bay Area made up about 28.0 percent. As late as 1880, the Southland's output of over 3.4 million gallons represented 25 percent of the state total. But the new diseases struck Southern California with greater force reducing output both in relative and absolute terms. By 1890, the region produced only 1.3 million gallons, 9.1 percent of the state total. Major grape-producing areas, such as the German colony at Anaheim (today the home of Disneyland), were permanently wiped out. The availability of profitable alternative uses of the land, such as citrus cultivation, undoubtedly explains in part why Southland growers did not return to viticulture as did their counterparts in the North. There, production continued to increase after the crisis of the early 1880s. Both in California and the country as a whole, wine production on farms decreased after 1889. This did not indicate a decline in viticulture, but rather a shift of wine-making towards factory production.

Further insight into this movement can be gained by considering information regarding the number of establishments, wage-earners, the value of production, and value added from the Census of Manufactures (see Table 3). The Censuses of Agriculture and Manufactures attempted to divide the nation's wine producers into two distinct populations. As the 1900 Census noted, the agriculture report included wine "made on farms" whereas the manufacture report covered "the production of wine in so far as this is a factory industry." In that year, the Census estimated that factory product "constituted more than two-thirds of total production."¹³ Our estimates developed below suggest the share was closer to three-quarters by this date, but our study of the manufacturing

¹³ U.S. Census Bureau (1902b, p. xxxiii). Elaborating on the distinction, John Garber, the author of the section on "Alcoholic Liquors" observed: "Wine-making establishments are often difficult of correct classification, because the industry includes both agricultural and manufacturing enterprise. In almost every state considerable quantities of wine are made from small vineyards attached to gardens or farms. Wine, when so manufactured, belongs to the agricultural products of the country, and at the Twelfth Census was returned to the division of agriculture. Such wines were made primarily for home consumption, although small quantities are often retailed in the neighborhood. In contradistinction to this class of producers are the large establishments, not engaged directly or indirectly in grape growing, which manufacture wine from must and grapes purchased in the open market, or on contract with vineyardists; these are purely manufacturing enterprises. Intermediate between these extremes are those establishments engaged in both grape growing and wine-making, the winery being attached to the vineyard, and working into the finished product not only its own crop, but also those of neighboring vineyards. In such cases the two branches of enterprise in which each establishment is engaged have been separated, and there is included in this (manufacturing) report only statistics of the branch relating to manufactures. Statistics pertaining to the growing and harvesting of grapes are included in the reports of the division of agriculture." U.S. Census Bureau (1902a, p. 625).

statistics also serves to emphasize that the factory sector remained largely rural, with close ties to the agricultural sector.

The Census of Manufactures data tell a story of sporadic growth in the early years of California industry. There was extremely rapid expansion between 1859 and 1869 as the number of establishments in the state increased from 11 to 139, and employment soared from 40 wage earners to 752. The 1870s witnessed deep declines with the number of establishments reported, in 1879 falling to 45, one-third of the 1869 level, and the number of wage earners contracting to 409. In 1879, California wineries accounted for roughly 40 percent of activity in the industry nationally. These data support the interpretation that the 1880s represented the period when California achieved leadership and were the beginning of sustained growth of the business until the outset of Prohibition in 1920. By 1914, the state accounted for almost two-thirds of national production. California's high ranking needs to be tempered by the realization that most Americans relied on other products to satisfy their "recreational" needs. Even in California wine was not the most important form of alcohol production. Through the entire pre-Prohibition period, the value of malt liquor production in California outweighed the value of wine production by two to five times.

The growth of factory and farm wine-making tended to be inversely related in California. The 1870s were a decade of rapid growth in farm production and contraction in factory production. The 1880s and 1890s witnessed the dramatic expansion of the factory sector and the stagnation and then decline in wine production on the farm. Overall, the relative importance of the factory sector increased substantially over the late nineteenth century. In California, lower-bound estimates of the factory share in the value of wine output rose from about 13 percent in 1880 to 38 percent in 1890 and then to about 78 percent in 1900. In the United States as a whole, the fraction climbed from 14 percent in 1880 to 27 percent in 1890 to about 75 percent in 1900.¹⁴

A rare in-depth statistical picture of the factory sector is offered in John Garber's special report on the vinous liquor industry in the 1900 Census. Table 4 presents a broad overview of the status of the California and U.S. vinous liquor industries in 1899, highlighting the distinctive nature of the industry in the Golden State. One may readily observe that the California wineries dominated the sector nationally, but that they differed substantially from their eastern counterparts. Table 5 provides a more focused comparison of the industrial structure, output mix, and market environment of California and eastern (that is, all non-California) wineries. In terms of the value or volume (total gallons of wine and brandy) of production, the scale of California operations was significantly higher. As an example, the average California establishment produced 102,000 gallons of wine, whereas the average eastern establishment yielded less than 26,000 gallons. On the input side, the relative scale is harder to characterize. The average California winery crushed more grapes than its eastern cousins (857 tons versus

¹⁴ The 1880 and 1890 proportions are lower-bound estimates assuming the McMurtrie and Gardner output values are exclusive of manufacturing production. The upper-bound share estimates assuming the McMurtrie and Gardner figures include all production are 15 percent in 1880 and 61 percent in 1890 for California and 16 percent in 1880 and 37 percent in 1890 for the United States. The 1900 estimates assume wine produced on farms had the same value as the factory-made product.

163 tons) but employed fewer wage-earners (2.8 versus 3.7) and reported a smaller capital stock. The value of machinery, tools, and implements per establishment was higher in California. Reflecting these differences, the Census commentator (p. 625) pointed out “In California machines capable of stemming and crushing 300 tons of grapes daily are in use; and tanks or cisterns with a capacity for 25,000 to 30,000 gallons are common.”¹⁵ These findings hint that the California wineries were relatively more efficient, a conclusion supported by their higher average “crude profit rate” reported in the Census data.¹⁶ But far more detailed analysis is required before such a claim can be sustained.

The Census figures do reveal that the California wineries produced a distinctive output mix, with a much greater emphasis on still wines and less on effervescent wines than their eastern counterparts. The state’s wineries also operated in a different factor cost environment, with higher average wage rates and lower grape prices than in the East. On the output side, average product prices were lower across the board. Such aggregate figures must be taken with caution because wine was hardly a homogenous commodity. But it is difficult to believe the lower unit price (at the point of production) was a result of an average lower quality product than in the East. Instead, it probably reflects the lower production costs and the much higher freight cost California producers faced in reaching the major consuming centers in the East.

The 1900 Census of Manufactures data yield other important insights. The typical establishment, both in California and the East, was small, averaging roughly five workers including firm owners. In addition, the published data show the factory sector in California was highly seasonal, much like the agricultural economy on which it was based. Employment of wage-earners in the California wine industry varied sharply over the year, reaching a peak in October at about 210 percent of the annual average and a trough in July at 60 percent. Hence, at its maximum, employment was three times higher than at the minimum (just three months earlier). It appears that most of these wine producers were located in rural or semi-rural areas. For example, we know that of 187 establishments operating in California in 1900 only 25, employing 62 wage-earners, were in the state’s major cities. Los Angeles led with 16, San Francisco followed with 6 and San Jose with 3. None were reported in Sacramento or Oakland. Wineries, together with sugar-beet mills and fruit-and-vegetable processing plants, became the “factories in the field” which so distinguished the California rural economy in the eyes of many contemporaries. The gulf between the agricultural and manufacturing sectors appeared much narrower in the Golden State than in most other developing regions.¹⁷ More

¹⁵ U.S. Census Bureau (1902a, p. 625). Note that the largest component of the capital stock was “cash and sundries” which included “finished products on hand,” e.g. maturing wine held in inventory.

¹⁶ The “crude profit rate” is calculated as the value of production minus the cost of materials, expenses, wages and salaries, divided by the value of capital. Based on the 1899 census data, the average “crude profit rate” was about 17 percent for California wineries and 13 percent for non-California wineries. Note that the Census warned against using its data to estimate industrial profits. This statement appears motivated by the fear that business critics would publicize such figures for specific industries, leading their potential targets to misreport the data to the Census.

¹⁷ The rural nature of the industry had a significant impact on how it appeared in the Census analysis of the geographical concentration of industries. In the Census measures of “local concentration” across states,

importantly for the present discussion, this observation suggests that even in the factory sector the success of a wine-producer was intimately dependent on the performance of the local grape-growing community.¹⁸

To provide perspective on the evolution of the wine market as a whole, Shear and Pearce, two of the leading authorities of the early industry, assembled the data displayed in Table 6. Again, the series are based on fragmentary information and must be handled with care. They indicate that it was during the 1884-88 period that wine production in California first exceeded that in the rest of the country.¹⁹ (Note the internal inconsistency in the data because Consumption does not equal Production plus Net Imports.) By the 1899-1903 period, California accounted for 95 percent of national wine output, dwarfing all other sources. It is worth noting that the tripling of California wine production between the mid-1880s and the turn of the century is only one side of the story; the collapse of viticulture outside the state represents the other less-well-known side. Over the same period, wine production outside California fell from 8.6 million gallons to only 1.3 million. The regions outside the state experienced some recovery in the years immediately before Prohibition, but output never returned to the levels of the late-1870s and early-1880s.

Consistent long-run data on the prices of wine and wine grapes in California are extremely hard to come by. Part of the problem is that viticultural inputs and outputs were not standardized commodities, especially at the higher end of the quality scale. Figure 3 presents the best available series on the real prices of California wine over the late-nineteenth and early-twentieth centuries. The series include the prices of alcoholic beverages and selected wines drawn from Berry's archival sources and the price of ordinary dry red wine from Shear and Pearce.²⁰ These series suggest that over most of the nineteenth century, as the state's industry was becoming established, real prices of alcoholic beverages in California were generally rising, calling into question the emphasis in the existing literature on frequent bouts of persistent overproduction. This literature apparently failed to account for the distinction between real and nominal prices and overly emphasized short run episodes. Other evidence, such as the Shear and Pearce production and consumption data, support our reinterpretation of Carosso. The fall in eastern wine prices that he notes for the mid-1870s was more likely due to the increase in production in eastern states than to an expansion in California.

vinous liquor ranked among the nation's most geographically clustered industries. For example, in 1914 California's dominance of wine production was roughly comparable to New York State's position in fur goods and gloves and greater than Michigan's in automobiles. But in terms of measures across metropolitan areas, the wine industry did not appear concentrated. U.S. Census Bureau (1913, pp. 124-28); U.S. Census Bureau (1917, pp. 265-60).

¹⁸ As noted above, many of the wineries enumerated in the Census of Manufactures utilized their own supplies of grapes. In addition to standard contracting reasons for vertically integrating, Internal Revenue Service policy favored this practice. "(N)o internal-revenue tax is imposed upon wine made from grapes grown by the manufacturer, or upon wine made from purchased grapes when it is sold at the place where it is made or at the general business office of the manufacturer." U.S. Census Bureau (1918, p. 83).

¹⁹ Shear and Pearce (1934).

²⁰ Thomas Berry San Francisco Wholesale Price Project Archives; Shear and Pearce (1934).

More generally, it is important to note that although the state's wine industry finally acquired a successful footing during the late-nineteenth century, the entire U.S. industry remained small by world standards. In 1911, the United States produced about 50 million gallons of wine, a tiny fraction of the output of France, the world leader (see Table 7). Overall, the United States ranked as the 11th nation worldwide, producing more than Germany but less than Russia. It was not even the leading producer in the New World. That honor belonged to the Argentine Republic where the annual vintage was almost twice that of the United States as a whole and more than twice that of California.

The post World War II takeoff in the California wine industry, and especially the development of premium wines, that catapulted the state to international prominence was the product of the foundation built over the late nineteenth and early twentieth centuries. Bringing together the disparate sources on the early wine industry offers a clearer quantitative view of the industry's development—a view that stands in sharp contrast with many generalizations hitherto put forth by wine historians.

REFERENCES

- BERRY, THOMAS SR. *San Francisco Wholesale Price Project*. Miscellaneous Berry Documents Donated to, and held by, Authors.
- BUTTERFIELD, H. M. (1938): *History of Deciduous Fruits in California*. Sacramento: Inland Press.
- CALIFORNIA. BOARD OF STATE VITICULTURAL COMMISSIONERS. (1887): *Annual Report 1887*. Sacramento: State Printers.
- . (1890): *Annual Report 1889-90*. Sacramento: State Printers.
- . (1892): *Annual Report 1891-92*. Sacramento: State Printers.
- CALIFORNIA. BUREAU OF LABOR STATISTICS. (1884): *First Biennial Report 1883-84*. Sacramento: State Printers.
- CALIFORNIA. DEPT. OF FOOD AND AGRICULTURE. (2000): *Final Grape Crush Report: 2000 Crop*. Sacramento: CASS.
- CALIFORNIA. STATE BOARD OF AGRICULTURE. (1919): *Statistical Report 1918*. Sacramento: State Printers.
- CALIFORNIA. STATE BOARD OF AGRICULTURE. (1914): *Statistical Report 1913*. Sacramento: State Printers.
- CALIFORNIA. STATE BOARD OF HORTICULTURE. (1902): *Eighth Biennial Report 1901-02*. Sacramento: State Printers.
- CAROSSO, V. P. (1951): *The California Wine Industry: A Study of the Formative Years*. Berkeley: University of California Press.
- CARTER, H. O. and GOLDMAN, G. (1997): "The Measure of California Agriculture: Its Significance in the State Economy." In J. B. SIEBERT (ed.), *California Agriculture: Issues and Challenges*. Berkeley: Giannini Foundation, University of California.
- FISHLOW, A. (1965): *American Railroads and the Transformation of the Ante-Bellum Economy*. Cambridge: Harvard University Press.

- JOHNSTON, W. (1997): "Cross Sections of a Diverse Agriculture: Profiles of California's Production Regions and Principal Commodities." In J. B. SIEBERT (ed.), *California Agriculture: Issues and Challenges*. Berkeley: Giannini Foundation, University of California.
- MCMURTRIE, W. (1881): "Statistics of Grape Culture and Wine Production in the United States for 1880." *U.S. Dept. of Agriculture Special Report*, no. 36.
- OFFICE INTERNATIONAL DE LA VIGNE ET DU VIN. (2000): *The State of Vitiviniculture in the World and the Statistical Information in 1998: Supplement au Bulletin De L'O.I.V.* Paris, France: The Office, 2000.
- PENINOU, E. P. AND GREENLEAF, S. S. (1967): *A Directory of California Wine Growers and Wine Makers in 1860*. Berkeley, CA: Tamalpais Press.
- RHODE, P. W. (1995): "La Intensificación De La Agricultura Californiana." In J. Morilla Critz (ed.), *California Y Mediterráneo: Estudios De La Historia De Dos Agriculturas Competidoras*. Madrid: Ministerio de Agricultura, Pesca, y Alimentación.
- SHEAR, S. and PEARCE, G. (1934): "Supply and Price Trends in the California Wine--Grape Industry." *Giannini Foundation Mimeo*, no. 34.
- U.S. CENSUS BUREAU. (1917): *Abstract of the Census of Manufactures 1914*. Washington, DC: GPO.
- . (1918): *Census of Manufactures 1914*. Vol. 1, *Reports by States*. Washington, DC: GPO.
- . (1864): *Eighth Census 1860*. Vol. 2, *Agriculture*. Washington, DC: GPO.
- . (1874): *Ninth Decennial Census 1870*. Washington, DC: GPO.
- . (1895): *Report on the Statistics of Agriculture in the United States at the Eleventh Census, 1890*. Washington, DC: GPO.
- . (1913): *Thirteenth Census 1910*. Vol. 3, *Manufactures 1909 General Report*. Washington, DC: GPO.
- . (1902a): *Twelfth Census 1900*. Vol. 9, *Manufactures, Pt. 3, Selected Industries*. Washington, DC: GPO.
- . (1902b): *Twelfth Census 1900*. Vol. 7, *Manufactures, Pt. 1, General Report*. Washington, DC: GPO, 1902.
- WALKER, L. (1997): "U.S. Wines Gained Again in 1996." *Wines & Vines* (July).
- WICKSON, E. J.(1914): *California Fruits: How to Grow Them*. 8th ed. San Francisco: Pacific Rural Press.

MAP 1

CALIFORNIA WINE GROWING REGIONS



TABLE 1**WINE PRODUCTION ON FARMS BY STATE, 1850-1910**

In Gallons	1850	1860	1870	1880	1890	1900	1910
Maine	724	3,164	7,047	1,500		628	328
New Hampshire	344	9,401	2,446			2,642	2,846
Vermont	659	2,923	1,038			160	1,199
Massachusetts	4,688	20,915	10,956	6,338		10,266	12,937
Rhode Island	1,013	507	765	262		3,503	2,856
Connecticut	4,269	46,783	27,414	5,336		26,589	30,572
New York	9,172	61,407	82,607	584,148	2,528,250	290,365	346,973
New Jersey	1,811	21,083	24,970	215,122		123,454	233,880
Penn.	25,590	38,621	97,165	114,535		194,610	106,756
Ohio	48,207	568,617	212,912	1,632,073	1,934,833	350,615	264,213
Indiana	14,055	102,895	19,479	99,566	224,500	126,730	130,976
Illinois	2,997	50,690	111,882	1,047,875	250,000	223,819	247,951
Michigan	1,654	14,427	21,832	62,831		134,859	199,030
Wisconsin	113	6,278	9,357	10,968		45,783	33,785
Minnesota		412	1,750	2,831		6,197	4,567
Iowa	420	3,369	37,518	334,970		76,301	76,092
Missouri	10,563	27,827	326,173	1,824,207	1,250,000	122,382	245,656
North Dakota						99	128
South Dakota						5,593	10,096
Nebraska		671	470	5,767		38,789	47,703
Kansas		583	14,889	226,249	130,990	117,452	26,625
Delaware	145	683	1,552	4,050		1,847	1,379
Maryland	1,431	3,222	11,583	21,405		15,524	20,783
Virginia	5,408	40,808	26,283	232,479	461,000	41,336	49,609
West Virginia			6,093	71,026		17,658	15,449
North Carolina	11,058	54,064	62,348	334,701	388,833	146,699	205,152
South Carolina	5,880	24,964	13,179	16,988		14,187	12,371
Georgia	796	27,646	21,927	903,244	107,666	140,991	2,665
Florida	10	336	681	11,180		31,736	16,393
Kentucky	8,093	179,948	62,360	81,170		51,668	45,138
Tennessee	92	13,566	15,778	64,797	208,333	28,567	16,576
Alabama	220	18,267	5,156	422,672		32,666	12,820
Mississippi	407	7,262	3,055	209,845		12,464	7,986
Arkansas	35	1,004	3,734	72,750		92,591	75,070
Louisiana	15	2,912	578			1,929	1,205
Oklahoma						35,283	16,999
Texas	99	14,199	6,216	35,528		104,987	42,036
Montana						676	368
Idaho						1,064	3,452
Wyoming						(NA)	197
Colorado			67			1,744	1,116
New Mexico	2,363	8,260	19,686	908,500	296,500	34,208	1,684
Arizona					25,000	397	5,100
Utah		60	3,131	114,975		16,804	12,173
Nevada			711			2,074	2,693
Washington		179	235			4,973	5,891
Oregon		2,603	1,751	16,900		21,219	31,232
California	58,055	246,518	1,814,656	13,557,155	14,626,000	5,492,216	16,005,519
United States	221,249	1,627,242	3,091,430	23,253,943	22,431,905	8,246,344	18,636,225

Table 1 Sources and Notes:

1850 and 1860: U.S. Census Bureau (1864, pp. 186, 190).

1870: U.S. Census Bureau (1864, p. 84).

1880: McMurtrie (1881, pp. 5-8). Total includes other production of 1,875 thousand gallons

1890: U.S. Census Bureau (1895, p. 602). New York includes 1,000 acres in Erie County, PA, known as part of the Chautauqua district.

1899 and 1909: U.S. Census Bureau (1913, p. 717).

TABLE 2

WINE PRODUCTION OF FARMS BY CALIFORNIA COUNTY, 1850-1900

In Gallons	1850	1860	1870	1880	1890	1900
Alameda		8,040	2,785		1,000,000	453,094
Alpine						
Amador		87	54,165		80,000	13,066
Butte		2,300	27,919		32,000	5,218
Calaveras		277	99,860	144,000	115,200	26,680
Colusa			170		40,500	700
Contra Costa		2,527	10,330	108,000	320,000	83,621
Del Norte						
El Dorado		6,464	118,831		128,000	49,597
Fresno				490,000	1,200,000	622,576
Glenn						1,816
Humboldt			5			935
Imperial						
Inyo					7,600	1,151
Kern					60,000	6,560
Kings						
Klamath			580			
Lake			16		78,800	14,635
Lassen						
Los Angeles	57,355	162,980	531,710	3,386,782	1,342,800	93,405
Madera						240
Marin			800		41,600	24,560
Mariposa		10,700	395		40,000	2,767
Mendocino			500	1,763	8,700	23,190
Merced			10,815	54,000	41,200	86,093
Mono						40
Monterey		700	5,200		16,000	5,908
Napa		8,745	46,745	2,411,068	3,000,000	407,612
Nevada			10,183	69,582	18,800	11,253
Orange						31,778
Placer		722	61,209	140,200	177,700	16,631
Plumas						
Riverside						2,720
Sacramento		4,550	74,797		872,850	11,962
San Benito					8,800	2,310
San Bernardino		8,520	48,730		279,000	69,530
San Diego		70	1,000	31,575	30,000	33,850
San Francisco						5,000
San Joaquin		50	21,165	27,275	160,000	55,864
San Luis Obispo				640	5,000	5,062
San Mateo		1,000	500		60,000	79,800
Santa Barbara	700	10,550	6,275		7,500	38,758
Santa Clara		3,721	85,150	2,060,000	2,260,000	975,895
Santa Cruz			14,550	61,250	284,000	160,843

Shasta			19,287		25,000	6,832
Sierra			400		12,500	
Siskiyou			525		200	250
Solano	3,095	54,780	660,000	280,000	30,120	
Sonoma	1,990	308,496	2,292,120	1,756,300	1,193,716	
Stanislaus		5,140	45,000	39,900	18,885	
Sutter	1,375	14,630		35,400	12	
Tehama		33,000	87,000	397,800	802,079	
Trinity				250		
Tulare		5,430		15,000	200	
Tuolumne	5,825	51,590	1,293,500	71,200	6,465	
Ventura			11,250	8,000	4,939	
Yolo	50	10,250	176,150	255,200	2,933	
Yuba	2,180	76,743		13,200	1,065	
California	58,055	246,518	1,814,656	13,551,155	14,626,000	5,492,216
Los Angeles Area	57,355	162,980	531,710	3,386,782	1,342,800	125,183
Bay Area		29,168	519,036	7,707,338	8,931,500	3,226,791

Sources and Notes: Same as Table 1.

Los Angeles Area includes Los Angeles and Orange counties.

The Bay Area includes Alameda, Contra Costa, Napa, San Francisco, Santa Clara, San Mateo, Solano, Sonoma and Yolo Counties.

TABLE 3
CALIFORNIA WINE

	California			Percent of Nation		
	Establish-ments	Wage-Earners	Value Added	Establish-ments	Wage-Earners	Value Added
1859	11	40	\$107,270	34.38	37.74	52.40
1869	139	752	\$399,000	34.92	50.61	39.04
1879	45	409	\$330,012	38.46	42.30	39.83
1889	128	735	\$898,641	54.24	70.13	58.81
1899	187	526	\$1,411,100	52.09	45.23	49.37
1904	273	1146	\$3,019,276	62.76	59.91	55.87
1909	181	1287	\$4,262,907	62.41	67.35	65.63
1914	202	1602	\$4,471,116	63.52	69.90	62.72
1919	287	600	\$5,227,027	83.92	59.35	55.97

TABLE 4

**THE VINOUS LIQUOR INDUSTRY IN CALIFORNIA
AND THE UNITED STATES, 1899**

	California	United States	Share
Establishments	187	359	52%
Total Capital	\$ 4,658,625	\$ 9,838,015	47%
Land	\$ 139,315	\$ 364,075	38%
Buildings	\$ 866,971	\$ 1,927,731	45%
Machinery, Equip- ments, & Implements	\$ 699,750	\$ 1,237,948	57%
Cash and sundries	\$ 2,952,589	\$ 6,308,261	47%
Proprietors and Firm Members	172	329	52%
Salaried Officials and Clerks			
Number	106	344	31%
Salaries	\$ 124,465	\$ 365,498	34%
Total Wage-earners			
Number	526	1,163	45%
Wages	\$ 224,849	\$ 446,005	50%
Men, 16 years and older			
Number	526	1,099	48%
Wages	\$ 224,849	\$ 436,857	51%
Miscellaneous Expenses	\$ 265,487	\$ 552,338	48%
Rent of Works	\$ 24,059	\$ 39,017	62%
Taxes	\$ 24,984	\$ 42,476	59%
Other	\$ 216,444	\$ 470,708	46%
Contract Work	\$ -	\$ 137	0%
Cost of Materials Used	\$ 2,526,768	\$ 3,689,330	68%
Grapes Tons	160,199	188,252	85%
Value	\$ 2,160,655	\$ 2,752,416	79%
Fuel	\$ 62,197	\$ 77,688	80%
Rent of Power/Heat	\$ 225	\$ 1,625	14%
Mill Supplies	\$ 6,210	\$ 9,021	69%
Other	\$ 259,214	\$ 782,254	33%
Freight	\$ 38,214	\$ 66,326	58%
Value of Production	\$ 3,937,871	\$ 6,547,310	60%
Still Wine			
Gallons	1,9019,378	23,256,512	82%
Value	\$ 3,817,582	\$ 5,680,869	67%
Effervescing Wine			
Gallons	8,880	169,055	5%
Value	\$ 27,200	\$ 664,972	4%
Brandy			
Gallons	60,785	114,185	53%
Value	\$ 36,635	\$ 100,651	36%

Source: U.S. Census Bureau (1902b, pp. 625-42).

TABLE 5

COMPARISON OF CALIFORNIA AND EASTERN WINERIES IN 1899

	<u>California</u>	<u>Eastern</u>	<u>Ratio</u>
Capital per Establishment	\$ 24,912	\$ 30,113	0.83
Wage-earners per Establishment	2.81	3.70	0.76
Value Added per Establishment	\$ 6,126	\$ 6,744	0.91
Value of Production per Establishment	\$ 21,058	\$ 15,171	1.39
Total Gallons per Establishment	102,080	25,876	3.94
Total Gallons per Wage-earner	36,291	6,987	5.19
Tons of Grapes Used per Establishment	857	163	5.25
Share of Output Value			
Still Wine	96.9%	71.4%	na
Effervescing Wines	0.7%	24.4%	na
Brandy	0.9%	2.5%	na
Average Annual Wage	427	347	1.23
Average Price			
Grapes (per ton)	\$ 13.49	\$ 21.09	0.64
Still Wine (per gal.)	\$ 0.20	\$ 0.44	0.46
Effervescing (per gal.)	\$ 3.06	\$ 3.98	0.77
Brandy (per gal.)	\$ 0.60	\$ 1.20	0.50

Source: U.S. Census Bureau (1902b, pp. 625-42).

TABLE 6**U.S. CONSUMPTION, PRODUCTION, AND IMPORTS OF WINE
IN MILLIONS OF GALLONS PER YEAR**

Vintage Year	Consumption U.S.	Production			Net Imports
		U.S.	Calif.	Other	
1870-73	16.6	7.6	3.4	4.2	9.9
1874-78	19.4	15.4	4.2	11.2	5.2
1879-83	23.2	17.1	8.5	8.6	5.3
1884-88	22.3	21.4	15.2	6.2	4.2
1889-93	26.1	22.9	17.7	5.2	4.4
1894-98	22.7	20.8	19.2	1.6	2.3
1899-1903	30.1	29.8	28.4	1.3	2.9
1904-08	39.6	38.2	35.2	3.0	6.4
1909-13	49.4	49.1	43.6	5.5	2.2
1914-18	48.4	38.3	36.1	2.1	3.7

Source: Shear and Pearce (1934, table 41).

TABLE 7**1911 WINE PRODUCTION IN MILLION GALLONS**

France	1,427
Italy	1,117
Spain	400
Algeria/Tunis/Corsica	150
Austria	125
Hungary	100
Argentina	92
Portugal	70
Bulgaria	65
Russia	60
United States	50
California	45
Germany	44
Chile	42
Turkey Cyprus	38
Greece	35

Source: California State Board of Agriculture (1914).

FIGURE 1

CALIFORNIA WINE AND BRANDY PRODUCTION, 1865-1916

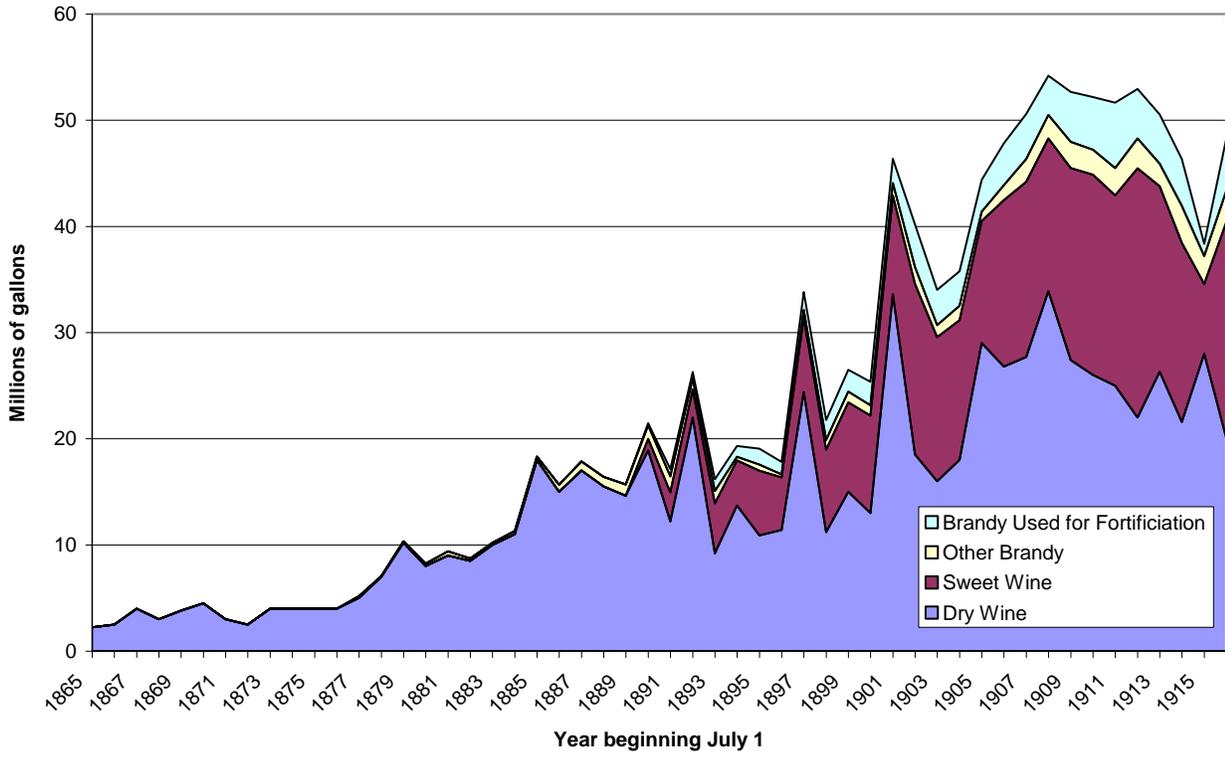


FIGURE 2

**CALIFORNIA WINE AND BRANDY SHIPMENTS
BY RAIL AND SEA, 1864-1912**

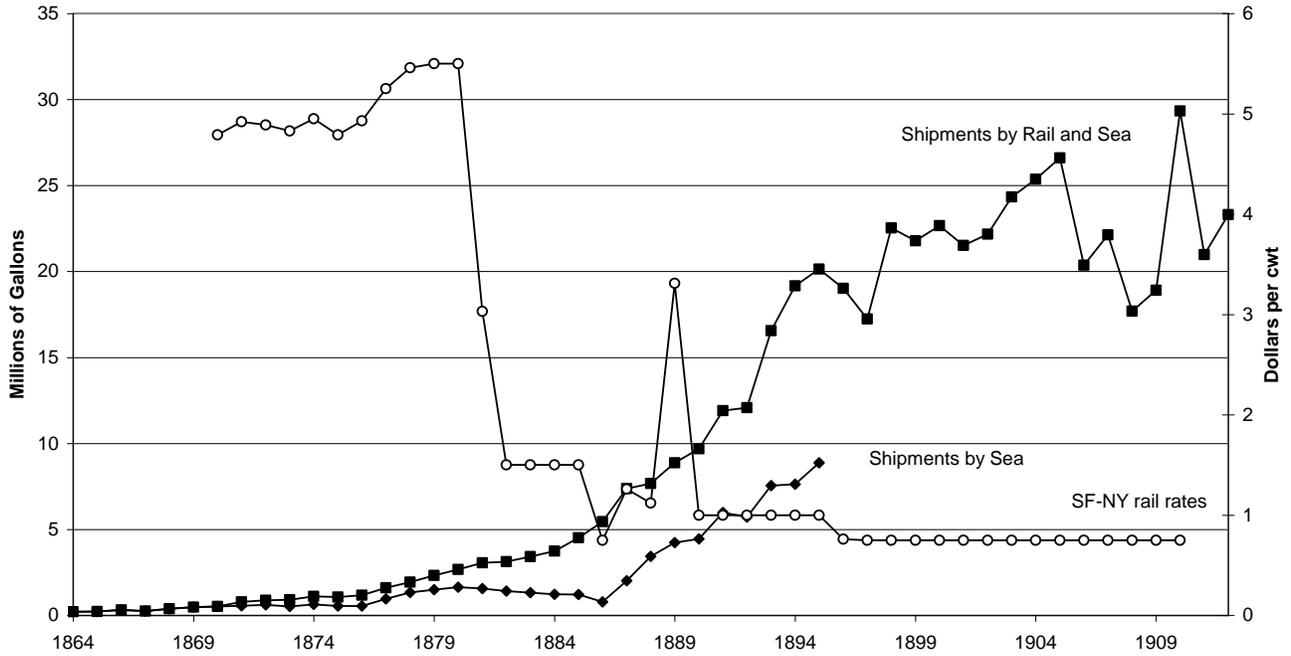


FIGURE 3

REAL PRICES OF SELECTED CALIFORNIA WINES, 1866-1909

