

The 2015 Economic Impact Study of the California Wine Industry

Methodology



Prepared for

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2015 Economic Impact of the California Wine Industry

Executive Summary

The *2015 Economic Impact of the California Wine Industry* estimates the economic contributions made by the California wine and winegrape industry to the U.S. economy in 2015. John Dunham & Associates (JDA) conducted this research, which was funded by Wine Institute and the California Association of Winegrape Growers (CAWG). This work used standard econometric models first developed by the U.S. Forest Service, and now maintained by the IMPLAN Group LLC. Data came from industry sources, government publications and Dun & Bradstreet, Inc.

The study defines the California wine industry as: Winegrape growing, wine production, and wine-related tourism in the state of California as well as the wholesaling, retailing and direct-to-consumer sales of California wine in all fifty states plus the District of Columbia.

Winegrowing and wine production comprise the first tier of the industry. Once wine is produced and bottled, it enters the second tier of the industry – the wholesaling tier. Wholesalers are involved in the transportation of wine from producers and the storage of products for a limited period of time.

The third tier of the industry is retailing, or directly selling products to the consumer. This can be through on-premise sales (as in the case of a restaurant, bars, etc), or sales for off-premises consumption (liquor stores, grocery stores, etc.). A small but growing percentage of California wine sales is sold directly to consumers in winery tasting rooms or through direct-to-consumer shipping which is now legal in 44 states and the District of Columbia.¹

Industries are linked when one industry buys from another to produce its own products. Each industry in turn makes purchases from a different mix of other industries, and so on. Employees in all industries extend the economic impact when they spend their earnings. Thus, economic activity started by the California wine industry generates output (and jobs) in hundreds of other industries, often in sectors and states far removed from the original economic activity. The impact of supplier firms, and the “induced impact” of the re-spending by employees of industry and supplier firms, is calculated using an input/output model of the United States. The study calculates the impact on a national basis, by state and by California congressional and legislative district.

The study also estimates taxes paid by the industry and its employees. Federal taxes include industry-specific excise and sales taxes, business and personal income taxes, FICA and unemployment insurance. Direct retail taxes include state and local sales taxes, license fees and applicable gross receipt taxes. The California wine industry pays real estate and personal property taxes, business income taxes and other business levies that vary in each state and municipality. All entities engaged in business activity generated by the industry pay similar taxes. Federal and state excise taxes paid for the sales of California wine in all fifty states and the District of Columbia are also included in this study.

The California wine industry is a dynamic part of the U.S. economy, with a **total economic impact of \$114.1 billion** accounting for about \$98.90 billion in total economic output, or roughly 0.55 percent of GDP.¹ Wine producers, wholesalers and retailers directly employed 447,982 Americans in 2015. These workers earned over \$16.32 billion in wages and benefits. When supplier and induced impacts are taken into account, the California wine industry is responsible for 786,387 jobs in the United States and \$34.92 billion in wages; as well as \$14.14 billion in direct federal, state and local taxes; not including state and local sales taxes imposed on California wine. The combined totals for economic output, wages and

¹ Based on 2015 GDP of \$18.2 trillion. See: “Gross Domestic Product: Fourth Quarter and Annual 2015 (Third Estimate)” *Bureau of Economic Analysis*. March 25, 2016. Available at: <https://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>

benefits and business and excise taxes are result in the economic impact of the industry of \$114.1 billion.

Summary Results

The *2015 Economic Impact of the California Wine Industry* measures the combined impact of the California wine industry on the United States; including California winegrape growing, wine production, and wine-related tourism, as well as the wholesaling, retailing and direct-to-consumer sales of California wine in all fifty states plus the District of Columbia.

The industry contributes about \$98.90 billion in total to the U.S. Economy, or 0.55 percent of GDP and, through its production and distribution linkages, impacts firms in 515 out of the 536 sectors of the U.S. economy.² When taxes are added in, the total impact equates to \$114.1 billion.

Table 1 – National Economic Contribution of the California Wine Industry

	Direct	Supplier	Induced	Total
Jobs (FTE)	447,982	122,450	215,955	786,387
Wages	\$16,324,475,200	\$7,636,203,000	\$10,961,858,400	\$34,922,536,600
Economic Output	\$39,026,437,300	\$24,581,257,000	\$35,296,807,000	\$98,904,501,300
Business Taxes				\$14,143,760,600
Federal Excise Tax				\$648,687,100
State Excise Tax				\$402,815,000
Total Economic Impact				\$114,099,764,000

The production process (as defined in this study) begins with the production of winegrapes at vineyards in the state. California vineyards, independent of wineries, directly employ 34,614 in the process of growing winegrapes.

Wineries in California grow winegrapes in their own vineyards, purchase winegrapes from other vineyards in the state or both. Winegrapes are then turned into wine in the vinification process, which involves crushing, pressing, fermentation, blending and sometimes barrel aging. After the vinification process, the wine is bottled and ready to enter the wholesale and the retail tiers. All told, California wineries and the vineyards they own directly employ 30,823 people in the state.

The *2015 Economic Impact of the California Wine Industry* takes into account the fact that California wine is sold in all fifty states plus the District of Columbia, and, therefore, the retailing and wholesaling of California wine has an impact in all fifty states plus the District of Columbia. Table 2 shows that the economic impact of the industry in California alone which reached \$57.6 billion in 2015.

Table 2 – Economic Contribution of the California Wine Industry in California

	Direct	Supplier	Induced	Total
Jobs (FTE)	167,983	60,733	96,725	325,411
Wages	\$7,882,512,800	\$4,063,541,000	\$5,253,945,900	\$17,199,999,700
Economic Output	\$21,179,917,800	\$12,344,374,000	\$16,454,121,800	\$49,978,413,600
Business Taxes				\$7,435,337,400
Federal Excise Tax				\$121,083,200
State Excise Tax				\$20,498,600
Total Economic Impact				\$57,555,332,800

Once California wine has been produced and bottled, it enters the second tier of the industry – the wholesaling tier. Wholesalers are involved in the transportation of wine from the producers and the

² Economic sectors based on IMPLAN sectors.

storage of products for a limited period of time. The California wine industry is directly responsible for over 18,969 jobs nationwide in the wholesaling sector.

The third tier of the industry directly sells products to the consumer. For this analysis, the retail tier is assumed to consist of firms in the following industries: restaurants, hotels and taverns, wine and liquor stores, and, in states where sales are allowed, grocery, drug, convenience stores and gas stations. The California wine industry is directly responsible for 316,024 jobs in the retailing sector.

Finally, the direct impact of the California wine industry also includes the economic impact of wine-related tourism in the state. All told, California wine tourism is directly responsible for 47,552 jobs in the state.

Other firms are related to the California wine industry as suppliers. These firms produce and sell a broad range of items including machinery, tools, parts, processing aids and other materials needed to produce winegrapes and wine. In addition, supplier firms provide a broad range of services, including agricultural services, personnel services, financial services, advertising services, consulting services and transportation services. Finally, a number of people are employed in government enterprises responsible for the regulation of the wine industry. All told, we estimate that the California wine industry is responsible for 122,450 supplier jobs. Supplier firms generate about \$24.58 billion in economic activity.

An economic analysis of the California wine industry will also take additional linkages into account. While it is inappropriate to claim that suppliers to the supplier firms are part of the industry being analyzed,³ the spending by employees of the industry, and those of supplier firms whose jobs are directly dependent on the California wine industry, should be included. This spending on everything from housing, to food, to educational services and medical care makes up what is traditionally called the “induced impact” or multiplier effect of the California wine industry. In other words, this spending, and the jobs it creates are induced by the manufacturing and distribution of California wine products. We estimate that the induced impact of the industry generates 215,955 jobs and \$35.30 billion in economic impact, for a multiplier of 0.90.⁴

An important part of an impact analysis is the calculation of the contribution of the industry to the public finances of the country. In the case of the California wine industry, the business taxes paid by the firms and their employees provide \$14.14 billion in revenues to the federal, state and local governments. Wine excise taxes are estimated to be amount to \$1.05 billion. These figures do not include state and local sales taxes paid on California wine products by consumers.

Tables 1 & 2 on the prior page presents a summary of the total economic impact of the industry in the United States. Summary tables for each state as well as for California legislative and congressional districts are included in the report which will soon be publicly available on a website.

Output Model

³ These firms would more appropriately be considered as part of the supplier firm’s industries.

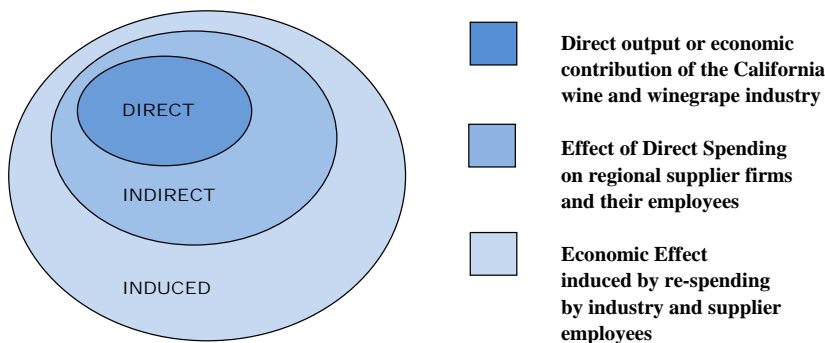
⁴ Often economic impact studies present results with very large multipliers – as high as 4 or 5. These studies invariably include the firms supplying the supplier industries as part of the induced impact. John Dunham & Associates believes that this is not an appropriate definition of the induced impact and as such limits this calculation to only the effect of spending by direct and supplier employees.

John Dunham & Associates produced the *2015 Economic Impact Study of the California Wine Industry* for Wine Institute and the California Association of Winegrape Growers. The analysis consists of a number of parts, each of which will be described in the following sections of this document. These include data, models, calculations and outputs. These components were joined together into an interactive system that allows Wine Institute and the California Association of Winegrape Growers to examine the links between the various parts of the industry and to produce detailed California output documents on an as-needed basis. As such, there is no book – no thick report – outlining the impact of the industry, but rather a system of models and equations that can be continuously queried and updated.

Economic Impact Modeling – Summary

The study begins with an accounting of the direct employment California winegrowing, winegrape production, and wine-related tourism, as well as the wholesaling and retailing of California wine in all fifty states plus the District of Columbia. The data come from a variety of government and private sources.

It is sometimes mistakenly thought that initial spending accounts for all of the impact of an economic activity or a product. For example, at first glance it may appear that consumer expenditures for a product are the sum total of the impact on the local economy. However, one economic activity always leads to a ripple effect whereby other sectors and industries benefit from this initial spending. This inter-industry effect of an economic activity can be assessed using multipliers from regional input-output modeling.



The economic activities of events are linked to other industries in the state and national economies. The activities required to produce and sell California wine, in addition to tourism activities, generate the direct effects on the economy. Regional (or indirect) impacts occur when these activities require purchases of goods and services such as machinery or

electricity from local or regional suppliers. Additional induced impacts occur when workers involved in direct and indirect activities spend their wages. The ratio between induced output and direct output is termed the multiplier.

This method of analysis allows the impact of local production activities to be quantified in terms of final demand, earnings and employment in the states and the nation as a whole.

Once the direct impact of the industry has been calculated, the input-output methodology discussed below is used to calculate the contribution of the supplier sector and of the re-spending in the economy by employees in the industry and its suppliers. This induced impact is the most controversial part of economic impact studies and is often quite inflated. In the case of the *2015 Economic Impact Study of the California Wine Industry* model, only the most conservative estimate of the induced impact has been used.

Model Description and Data

This analysis is based on data provided by the state of California, Wine Institute, the California Association of Winegrape Growers (CAWG) and Dun & Bradstreet, Inc. (D&B, Inc.). The analysis utilizes the IMPLAN Group, LLC’s model in order to quantify the economic impact of the California

wine industry on the economy of the United States.⁵ The model adopts an accounting framework through which the relationships between different inputs and outputs across industries and sectors are computed. This model can show the impact of a given economic decision – such as a factory opening or operating a sports facility – on a pre-defined, geographic region. It is based on the national income accounts generated by the US Department of Commerce, Bureau of Economic Analysis (BEA).⁶

Vineyards

The vineyards that supply winegrapes to California's wine industry are vital to the state's economy. Viticulture has a long tradition in the state, dating back to the Spanish Jesuit missionaries who planted vineyards to produce wine for Mass.⁷ In order to estimate the economic impact of vineyards in the state of California, JDA first gathered data on all of the vineyards in the state of California.

Vineyard location, acreage and employment data is based on data collected from state reports for seventeen counties in the state of California representing 94.8 percent of winegrape acreage, and data gathered from D&B, Inc.⁸ Data was entered into a database, and physically located in a geographic analysis system. Vineyards that were part of a winery operation were not included in the vineyard economic analysis, so as to avoid double counting (these operations were included in the winery economic analysis).

Including both wineries and vineyards, the California Association of Winegrape Growers (CAWG) estimates that there are 615,000 winegrape acres in the state of California and about 5,900 winegrape growers.⁹ This analysis found that California has winegrape vineyards in 49 of its 58 counties. Sonoma County leads the way with 645 vineyards. Fresno County, with 587 vineyards, is not far behind.¹⁰

After vineyards that are integral parts of wineries were excluded, JDA determined that there are 3,868 individual vineyard locations in the state, and these vineyards account for 434,000 winegrape acres, or about 71 percent of the total. These vineyards employed 34,600 full-time equivalent employees in the state, for an acreage-per-employee ratio of 12.5.

Many of the jobs on farms are different than other occupations in that they are not the normal eight hours a day, 40 hours a week kind of activity. Even many owners of small farms operations only work part-time on agricultural activities, and a great majority of labor intensive vineyard activities (harvesting, pruning, shoot thinning and suckering) are performed by teams of seasonal workers who move from vineyard to vineyard and between agricultural sectors. These workers often only work for a few days or weeks on any given farm.

Due to the seasonal nature of vineyard work, one full-time equivalent farm job is equal to the work performed by 4.2 actual farm workers, with an average farm worker performing about 450 hours of labor

⁵ The model uses 2014 input/output accounts.

⁶ The IMPLAN model is based on a series of national input-output accounts known as RIMS II. These data are developed and maintained by the U.S. Department of Commerce, Bureau of Economic Analysis as a policy and economic decision analysis tool.

⁷ *The History of California Wine*, Wine Institute. Available at: http://www.discovercaliforniawines.com/wp-content/files_mf/ecawinehistory.pdf.

⁸ Data was gathered from Department of Pesticide Regulation reports published by the individual counties of California, and aggregated by the California Association of Winegrape Growers, and provided to John Dunham & Associates.

⁹ Since the model was completed, the estimated number of winegrape producing acres in California has fallen slightly to 608,000. This 1.1 percent reduction does not have a material impact on the overall economic impact numbers.

¹⁰ The vineyard counts do not include vineyards that are solely the operation of a winery and supply grapes exclusively to that individual winery. These operations are included in winery section of this analysis.

in the industry (compared with about 1900 hours for a full-time worker in a non-agricultural occupation).¹¹

In order to estimate employment and acreage, JDA first matched acreage data for individual vineyards from the state reports with employment data gathered from D&B. For those establishments where a match could not be found, econometric techniques were used to estimate employment and acreage. JDA analyzed the median vineyard size by county, in terms of both acreage and employment and statewide vineyard employee-to-acreage ratios in order to construct estimates for records with missing data. Total acreage estimates were then reconciled to equal the total acreage estimates provided to JDA by CAWG, whose estimates were in turn based off of county-level annual USDA grape acreage data for the state of California.¹²

Wineries

With over 4,600 wineries in the state, the California wine industry produces 85 percent and is responsible for an estimated sixty percent of all wine consumed in the United States. This makes California among the most important wine producing regions in the world. California's wine regions encompass nearly the entire state, or more exactly 49 out of its 58 counties. These wineries are an important part of California and the United States' economy for more reasons than being an important producer of wine for the entire country. Tourists from across the nation – as well as across the world – enjoy traveling to the Golden State not only for its beautiful landscape and vibrant urban life, but also to enjoy world-class wine.

To better identify the impact California's wineries have on the economy, the study based its information on the following sources: California Department of Alcoholic Beverage Control License Reports, Dun and Bradstreet (D&B) and data provided by Wine Institute. The licensing data was structured to remove duplicates, inactive licenses and any non-winery related records. Wineries are defined as: wineries producing their own wines brands, wineries/production facilities contracted to produce wines for other companies, and companies marketing their own wine brand, but not producing the wine itself (so called virtual wineries).¹³

It is estimated that there are about 4,600 bonded wineries in California.¹⁴ The California Licensing data is then compared with data provided by Wine Institute in order to generate a facility listing of wineries throughout the state. Where available, employment figures for each facility are obtained from D&B data. Facilities missing employment figures were replaced by medians as reported in the California Licensing data fee code.¹⁵ This fee code gives an estimate of the volume of wine produced at any given facility. When possible, jobs relating to the actual production or marketing of wine were separated from any other occupation occurring at the facility. An example of this separation are jobs relating to lodging and food because these jobs were already captured in the wine tourism segment. JDA estimates that there are about 30,823 jobs relating to the production or marketing of wine in California.

¹¹ US Department of Agriculture, 2012 Census, USDA, National Agriculture Statistics Service. Farm jobs statistics are measured differently than non-agricultural jobs as most workers are either seasonal or hourly. Many agricultural employees are seasonal workers who move from vineyard to vineyard over the planting and harvest period.

¹² *Grape Acreage Report: Detailed Report for 2015 Crop Year*, USDA's National Agricultural Statistics Service Pacific Regional Field Office. Available at: https://www.nass.usda.gov/Statistics_by_State/California/Publications/Grape_Acreage/.

¹³ There are companies that are licensed as wineries for marketing purposes only. These companies might consist of just a single individual or small group of individuals who have simply developed a label and have sales agreements with restaurants or distributors. The actual wine is produced under contract with either a larger branded winery, or at a so-called custom crush facility that provides all of the labor and equipment. Both custom crush facilities and the companies that market this wine are included in this analysis as wineries.

¹⁴ Based on the US Department of Treasury, Alcohol and Tobacco Tax and Trade Bureau (TTB) listings of bonded wine producers including multiple facilities of single wine companies, bonded wine cellars and alternating proprietorships. Figure through June 2016

¹⁵ *License Query System – Reports: Weekly Data Exports*, California Department of Alcoholic Beverage Control. Available at: <http://www.abc.ca.gov/datport/SubscrMenu.asp>

Overall, the California wine industry adds significant value to the basic inputs of labor and raw materials. California winery workers each add on average about \$108,174 in economic value to the state's economy through their efforts transforming every dollar of grapes into nearly \$3.60 worth of wine at the production level, and almost \$9.50 at the retail level.

Wholesale

The wholesaling tier is responsible for the transportation of California wine from wineries and for the storage of these products for a limited amount of time across the entire country. Data to identify these facilities include Alcohol Wholesaler Permit Lists from the US Department of the Treasury Alcohol and Tobacco Tax and Trade Bureau (TTB), Dun and Bradstreet (D&B) and the Wine and Spirits Wholesalers of America (WSWA). The Alcohol Wholesaler Permit Lists from the TTB includes facilities that have been licensed to distribute alcohol beverages. The limitations of this list is that it includes defunct facilities and facilities that have moved locations as well as the lack of data regarding the alcohol beverage types being distributed at the facilities. JDA therefore cross-references the list against multiple sources including company websites, Google Maps, D&B, industry sources and data provided by the WSWA. JDA estimates that there are about 3,913 facilities in the United States that are responsible for the wholesaling of wine. D&B records, when available, for these facilities are then used to estimate total employment at these facilities. Medians are used to replace employment figures for facilities with missing employment data. Based on TTB production data¹⁶ and the 2015 Edition of Shanken's Impact Databank Review and Forecast – The U.S. Wine Market,¹⁷ California wine consumption as a percent of total wine consumed is calculated. By applying this percent to the employment figures at each of the 3,913 facilities that wholesale wine in the United States, about 18,970 employees are estimated to be responsible for the wholesaling of California wine.

Retail

Retailing, the final tier of the three-tier system, can take place in either of two forms: On-premise or off-premise. On-premise retailers are locations that allow the consumption of alcohol beverage products on their property, such as restaurants, bars, and sporting venues. Off-premise retailers are locations that sell alcohol beverage products to take away and consume elsewhere, such as grocery stores, liquor stores, and warehouse clubs. Alcohol beverage retailing laws vary by state. Some states include dry counties which prohibit all sales of alcohol beverage products, while other jurisdictions allow just on-premise sales or off-premise sales. The types of retail stores allowed to sell alcohol beverage products are also different across all states. These particular alcohol beverage retailing laws are taken into account when estimating the number of jobs relating to the sale of California wine across the United States.

Employment data were gathered at the zip code level from Dun and Bradstreet (D&B). The Economic Census of Retail Trade by Product Line¹⁸ and U.S. Department of Commerce – Bureau of Economic Analysis – Personal Consumption Expenditures by Type of Product¹⁹ is used to determine the type of off-premise stores that sell wine as well as the percent of sales at each store type that is due to the sale of wine. IMPLAN Use data and U.S. Department of Commerce – Bureau of Economic Analysis – Personal Consumption Expenditures by Type of Product is used to determine the type of on-premise stores that sell wine as well as the percent of sales at each store type that is due to the sale of wine. These two methods

¹⁶ 2015 – Wine Monthly Statistical Release – Summary Calendar Year 2015, U.S. Department of the Treasury – Alcohol and Tobacco Tax and Trade Bureau

¹⁷ 2015 Edition Shanken's Impact Databank Review and Forecast – The U.S. Wine Market, a publication of M. Shanken Communications, Inc., New York, NY

¹⁸ 2012 Economic Census - Retail Trade: Subject Series - Product Lines: Product Lines Statistics by Industry for the U.S. and States: 2012, United States Census Bureau.

¹⁹ Table 2.4.5U Personal Consumption Expenditures by Type of Product, U.S. Department of Commerce – Bureau of Economic Analysis.

are used to estimate the number of jobs in each state that are responsible for the sale of wine. Based on TTB production data²⁰ and the 2015 Edition of Shanken's Impact Databank Review and Forecast – The U.S. Wine Market,²¹ California wine consumption as a percent of total wine consumed is calculated. The percent of California wine consumption is then used to estimate the number of jobs attributed to the sale of California wine in the fifty states and District of Columbia.

Retail employment figures are down by about 6.6 percent since this study was last conducted in 2008. While the study methodologies are not completely comparable, it would be expected that retail jobs would be down from pre-recession levels to today. This is because overall retail trade jobs per capita is down by roughly 5.1 percent in the United States over the same period.²²

Wine Tourism

One of the important elements of the impact of wineries on the economy of California is their attractiveness to tourists. Every year, millions of people visit California in part to visit (or even stay at) wineries, learn about wine and sample different wines from the thousands of producers located across the state. In order to estimate the economic impact of these visits it was first necessary to calculate the number of visitors to the state's nearly 4,600 wineries. This was done at the county level. Based on the data used in this model, California has wineries in 50 of its 58 counties, ranging from about 1,320 in Napa and 1,100 in Sonoma to a few in other counties like Lassen and Modoc.

A number of counties have conducted separate studies of wine tourism and have collected at least some limited data on the number of visitors or wineries visited. These are Napa County, Sonoma County, San Diego County, San Luis Obispo County and Santa Barbara County.²³ Together, these counties account for 3,376 wineries, or 63 percent of the state total. Using the county studies, JDA calculated that a total of 18,879,000 visits were made to these wineries, or about 5,590 per winery per year. This, of course differed by county, with the average Napa winery having almost 7,300 visitors per year, and the average winery in Santa Barbara hosting just 2,260.

Taking these data at face value, a function was developed that estimated the number of visits per winery based on the number of wineries in the county. This relies on the idea of economic clustering, which suggests that a larger grouping of wineries would attract more visitors to each winery than a smaller grouping. The tendency of locational clustering of similar types of firms has been documented by economists since at least the beginning of the twentieth century. British academic Stephen Brown described the rule of 'retail compatibility,' which explains how retail businesses, such as restaurants, know that two compatible firms in close proximity will show an increase in business volume directly proportionate to the incidence of consumer interchange between them.²⁴ This concept was confirmed by

²⁰ 2015 – Wine Monthly Statistical Release – Summary Calendar Year 2015, U.S. Department of the Treasury – Alcohol and Tobacco Tax and Trade Bureau.

²¹ 2015 Edition Shanken's Impact Databank Review and Forecast – The U.S. Wine Market, a publication of M. Shanken Communications, Inc., New York, NY.

²² Data from the US Department of Labor, Bureau of Labor Statistics, *Employment, Hours, and Earnings from the Current Employment Statistics survey (National)*, at: <http://data.bls.gov/cgi-bin/dsrv>

²³ See: 2014 Napa Valley Visitor Profile: Report of Findings, prepared by Destination Analysts for Visit Napa Valley, March 2015, at <http://sodacanyonroad.org/docs/Napa%20Valley%202014%20Visitor%20Profile%20Study%20-%20Final%20Report%20of%20Findings.pdf>; *Annual Tourism Report: 2015 Sonoma County*, Sonoma County Economic Development Board, July 2015, at: http://www.keegancoppin.com/pdf/market/sonoma/Tourism_Report_2015.pdf; *San Diego Destination Marketing Plan: 2015 – 2016*, San Diego Tourism Authority, January 30, 2015 at: <http://www.sdtmd.org/wp-content/uploads/2015/09/2-Exhibit-A-Scope-of-Work-Destination-Marketing-Plan.pdf>; *Economic Impact Of Paso Robles Wine Country*, Paso Robles Wine Country, at: http://www.pasowine.com/media/economic_impact.php (2007 Data); *Santa Barbara South Coast Visitor Profile Study, Final Report of Findings*, Prepared for Visit Santa Barbara by Destination Analysts, Inc., August 2013, at: <http://santabarbaraca.com/content/uploads/2016/02/Visit-Santa-Barbara-Visitor-Profile-Research-Final-Report.pdf>

²⁴ See: DeFranco, Laurence, William Lilley III, and John Dunham, *The Case of the Transient Taxpayer: How Tax-Driven Price Differentials for Commodity Goods Can Create Improbable Markets*, *Business Economics*, July 1998.

a study by Andrei Rogers who found that the clustered spatial pattern exhibited by consumer goods retailers appears to contradict a common hypothesis that these stores tend to repel one another.²⁵

While Rogers suggests that population densities have a lot to do with the clustering, there is significant economic theory that suggests that the tendency of activities to cluster is related more to competitive characteristics than to generalized demographic characteristics.²⁶

Using this model JDA calculates that a winery existing alone in a county would receive just under 2,050 visitors in a year, and that the number of annual visitors would rise linearly at a rate of about 3.5 additional visits per year for each additional winery in the county.²⁷ As such, a county with 100 wineries would see just fewer than 240,000 visits, while one with 1,000 wineries would report nearly 5.7 million.

Multiplying out the number of visits across all counties with wineries gives a total of almost 23,614,700 unique visits. Based on data from Napa, each person visits on average 3.29 wineries, so dividing visits by 3.29 gives an estimate of just over 7,172,700 actual wine related tourists across the state.²⁸

Once the number of visitors was calculated, spending propensities were applied based on data from the state of California.²⁹ This was calculated for: Accommodations; food services (restaurants); food stores; local transportation; arts, entertainment and recreation, retail sales and air transportation. Average spending per visitor was applied to each of these categories based on the state data.

Once total spending by category was calculated, it was broken into 25 industries based on percentages derived from the US Department of Commerce, Bureau of Economic Analysis.³⁰ These were in turn, combined into 20 categories for processing with the IMPLAN model.

IMPLAN

The IMPLAN Group model is designed to run based on the input of specific direct economic factors. It uses a detailed methodology (see IMPLAN Methodology section) to generate estimates of the other direct impacts, tax impacts and supplier and induced impacts based on these entries. In the case of the California wine model, direct employment in the California wine industry is a base starting point for the analysis. Direct employment is based on data provided to John Dunham & Associates by D&B, Inc. as of December 2015; from state data, and industry data provided by Wine Institute and CAWG. D&B data is recognized nationally as a premier source of micro industry data. The D&B database contains

²⁵ See: Rogers, Andrei, *A Stochastic Analysis of the Spatial Clustering of Retail Establishments*, Journal of the American Statistical Association, December 1965.

²⁶ See: Braid, Ralph, *Spatial Price Competition with Consumers on a Plane, at Intersections, and Along Main Roadways*, Journal of Regional Science, Vol 33, No. 2, 1993.

²⁷ The model had an R-squared statistic of 0.748 suggesting that a linear model was appropriate. The T-statistic on the coefficient was 2.982 meaning that the model was significant to the 10 percent level. This is a good level of significance considering the very low number of counties for which data were available.

²⁸ See: *2014 Napa Valley Visitor Profile: Report of Findings*, prepared by Destination Analysts for Visit Napa Valley, March 2015, at <http://sodacanyonroad.org/docs/Napa%20Valley%202014%20Visitor%20Profile%20Study%20-%20Final%20Report%20of%20Findings.pdf>. These were the only data available on visits per person.

²⁹ *California Travel Impacts: 1992-2014p*, prepared by Dean Runyan Associates for Visit California, April 2015, on-line at: http://industry.visitcalifornia.com/media/uploads/files/editor/California_Travel_Impacts_April_2015.pdf.

³⁰ U.S. Travel and Tourism Satellite Accounts, US Department of Commerce, Bureau of Economic Analysis, at: http://www.bea.gov/industry/tourism_data.htm. The following categories were used in the analysis: Traveler accommodations, food services and drinking places, domestic passenger air transportation services, international passenger air transportation services, passenger rail transportation services, passenger water transportation services, interurban bus transportation, interurban charter bus transportation, urban transit systems and other transportation services, taxi service, scenic and sightseeing transportation services, automotive rental, other vehicle rental, automotive repair services, parking lots and garages, highway tolls, travel arrangement and reservation services, motion pictures and performing arts, spectator sports, participant sports, gambling, all other recreation and entertainment, gasoline, retail Sales, food stores.

information on over 17 million businesses in the United States.³¹ It is used extensively for credit reporting, and according to the vendor, encompasses about 98 percent of all business enterprises in the country. This data is gathered at the facility level; therefore, a company with a winery, corporate headquarters, and sales office would have three facilities, each with separate employment counts. Since the D&B data are adjusted on a continual basis, staff from John Dunham & Associates scanned the data for discrepancies.

Once the initial direct employment figures have been established, they are entered into a model linked to the IMPLAN database. The IMPLAN data are used to generate estimates of direct wages and output. Wages are derived from data from the U.S. Department of Labor's ES-202 reports that are used by IMPLAN to provide annual average wage and salary establishment counts, employment counts and payrolls at the county level. Since this data only covers payroll employees, it is modified to add information on independent workers, agricultural employees, construction workers, and certain government employees. Data are then adjusted to account for counties where non-disclosure rules apply. Wage data include not only cash wages, but health and life insurance payments, retirement payments and other non-cash compensation. It includes all income paid to workers by employers.

Total output is the value of production by industry in a given state. It is estimated by IMPLAN from sources similar to those used by the BEA in its RIMS II series. Where no Census or government surveys are available, IMPLAN uses models such as the Bureau of Labor Statistics' growth model to estimate the missing output.

The model also includes information on income received by the Federal, state and local governments, and produces estimates for the following taxes at the Federal level: corporate income; payroll, personal income, estate and gift, and excise taxes, customs duties; and fines, fees, etc. State and local tax revenues include estimates of: corporate profits, property, sales, severance, estate and gift and personal income taxes; licenses and fees and certain payroll taxes.

While IMPLAN is used to calculate the state level impacts, Infogroup data provide the basis for California Congressional and legislative district level estimates. Publicly available data at the county and Congressional district level is limited by disclosure restrictions, especially for smaller sectors of the economy. Our model therefore uses actual physical location data provided by Infogroup in order to allocate jobs – and the resulting economic activity – by physical address or when that is not available, zip code. For zips entirely contained in a single congressional district, jobs are allocated based on the percentage of total sector jobs in each zip. For zips that are broken by congressional districts, allocations are based on the percentage of total jobs physically located in each segment of the zip. Physical locations are based on either actual address of the facility, or the zip code of the facility, with facilities placed randomly throughout the zip code area. All supplier and indirect jobs are allocated based on the percentage of a state's employment in that sector in each of the districts. Again, these percentages are based on Infogroup data.

IMPLAN Methodology³²

Francoise Quesnay one of the fathers of modern economics, first developed the analytical concept of inter-industry relationships in 1758. The concept was actualized into input-output analysis by Wassily

³¹ The D&B information database updates over 1 million times a day, over 350 million payment experiences are processed annually, and over 110 million phone calls are made to businesses. In addition, D&B uses a patented matching technology and over 2,000 information computer validations to ensure a high standard of data quality.

³² This section is paraphrased from IMPLAN Professional: Users Guide, Analysis Guide, Data Guide, Version 2.0, MIG, Inc., June 2000.

Leontief during the Second World War, an accomplishment for which he received the 1973 Nobel Prize in Economics.

Input-Output analysis is an econometric technique used to examine the relationships within an economy. It captures all monetary market transactions for consumption in a given period and for a specific geography. The IMPLAN model uses data from many different sources – as published government data series, unpublished data, sets of relationships, ratios, or as estimates. The Minnesota IMPLAN group gathers this data, converts it into a consistent format, and estimates the missing components.

There are three different levels of data generally available in the United States: Federal, state and county.

Most of the detailed data are available at the county level, but there are many issues with disclosure – especially in the case of smaller industries. IMPLAN overcomes these disclosure problems by combining a large number of datasets and by estimating those variables that are not found in any of them. The data is then converted into national input-output matrices (Use, Make, By-products, Absorption and Market Shares) as well as national tables for deflators, regional purchase coefficients and margins.

The IMPLAN Make matrix represents the production of commodities by industry. The Bureau of Economic Analysis (BEA) Benchmark I/O Study of the US Make Table forms the bases of the IMPLAN model. The Benchmark Make Table is updated to current year prices, and rearranged into the IMPLAN sector format. The IMPLAN Use matrix is based on estimates of final demand, value-added by sector and total industry and commodity output data as provided by government statistics or estimated by IMPLAN. The BEA Benchmark Use Table is then bridged to the IMPLAN sectors. Once the re-sectoring is complete, the Use Tables can be updated based on the other data and model calculations of interstate and international trade.

In the IMPLAN model, as with any input-output framework, all expenditures are in terms of producer prices. This allocates all expenditures to the industries that produce goods and services. As a result, all data not received in producer prices is converted using margins which are derived from the BEA Input-Output model. Margins represent the difference between producer and consumer prices. As such, the margins for any good add to one. If, for example, 10 percent of the consumer price of wine is from the purchase of electricity, then the electricity margin would be 0.1.

Deflators, which account for relative price changes during different time periods, are derived from the Bureau of Labor Statistics (BLS) Growth Model. The 224 sector BLS model is mapped to the 536 sectors of the IMPLAN model. Where data are missing, deflators from BEA's Survey of Current Businesses are used.

Finally, the Regional Purchase Coefficients (RPCs) – essential to the IMPLAN model – must be derived. IMPLAN is derived from a national model, which represents the “average” condition for a particular industry. Since national production functions do not necessarily represent particular regional differences, adjustments need to be made. Regional trade flows are estimated based on the Multi-Regional Input-Output Accounts, a cross-sectional database with consistent cross interstate trade flows developed in 1977. These data are updated and bridged to the 536 sector IMPLAN model.

Once the databases and matrices are created, they go through an extensive validation process. IMPLAN builds separate state and county models and evaluates them, checking to ensure that no ratios are outside of recognized bounds. The final datasets and matrices are not released before extensive testing takes place.