

RES 162

Contribution of the Grape and Wine Industry to Idaho's Economy

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Executive Summary

The grape and wine industry is one of the fastest growing agribusiness industries in the United States. Although this strong level of growth may not continue indefinitely, the market is still expanding and appears to have further room for growth. The corresponding economic impacts of the industry will also increase.

Idaho's grape and wine industry is relatively small, but is beginning to grow and gain regional and national recognition. This report details the contribution of the grape and wine industry to Idaho's economy. Because the majority of grape production and wineries are concentrated in Canyon County, we will also examine the contribution of the grape and wine industry to the economy of this county.

Industry contribution can be measured two ways: economic size or impact. Measuring the size of the industry is an accounting task; counting up the number of growers, grape acreage, wine sales, and so on.

From a Size Standpoint:

- Idaho's eleven wineries produce over 165,000 cases of wine annually.
- Idaho's grape growers cultivate 1,000 acres to produce \$3.6 million of grapes.
- Idaho wine sales were \$15 million from tasting rooms and via wholesale.
- More than 100 people are employed in Idaho's grape and wine industry.
- Taxes generated from wine sales in Idaho exceed \$2.3 million.

Economic impacts are driven by exports, or "new" money that ripples through the economy. The grape and wine industry - wineries in particular - impact the economy in two ways: first as a commercial agribusiness that produces wine and secondly, as a tourist attraction, producing wine tourism, which has become of increasing importance.

Thus, the impact analysis is similarly divided into the impacts of the grape and wine industry as an agribusiness and as a tourist industry. As an agribusiness industry there are significant sales and jobs impacts.

From an Impact Standpoint:

- Grape and wine exports from Canyon County to the rest of Idaho and other states generates a potential of \$22 million in sales and 142 jobs in Canyon County.
- Grape and wine exports from Idaho to other states generate \$15 million in sales and 124 jobs in Idaho.

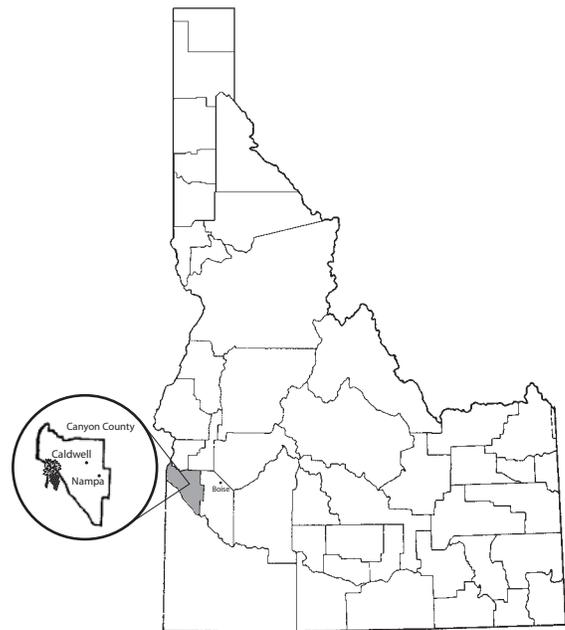
Wine tourism also creates impacts. In addition to wine purchases, tourists spend money on other items such as gasoline and food. These expenditures ripple through the economy and produce a greater impact to the county and state. For example, in Canyon County, wineries need only sell 75 percent or \$9 million in wine sales compared to the agribusiness analysis of \$12 million in wine exports to create the identical \$22 million impact.

Introduction

Idaho has a unique combination of geography, climate, and soils favorable for growing wine grapes. Relatively cold winters help vines become dormant, which aids in the plant's defense against pests and diseases. Long hours of daylight during warm summer days allow the grapes to fully ripen before harvest and cool nights help the grapes retain their natural acidity and flavor. Idaho's dry climate and free-draining volcanic ash soils also help with the growing of wine grapes as vines struggle for water and nutrients in the region's dry soil. This struggle actually produces more deeply colored, flavorful grapes (Roberto 1999). Low rainfall allows growers to control the water applied during the different growing stages. Most Idaho vineyards are concentrated along the Snake River, in Canyon County. The Snake River tempers the climate on hillside vineyards by drawing off warm air in the summer and provides frost protection by reducing cold air pockets in the spring and fall. Idaho's wine growing region adjoins Idaho's metropolitan area. Canyon County is home to Idaho's second largest city, Nampa and is 30 miles from Boise, Idaho's capital and largest city.

Idaho is the new frontier of wine producing in the United States, although the state actually has a long wine history. The first wineries in the Pacific Northwest were located in Idaho, and wine grapes were first planted in Idaho as far back as the 1870s. But national Prohibition, followed by state Prohibition in 1919 and lasting until 1933, took its toll on the wine-producing region. Vineyards were not planted again in Idaho until 1970 (Idaho Grape Growers and Wine Producers Commission 2001). Since 1970, vineyards and wineries have been gradually developing throughout the state. Although the Idaho grape and wine industry is in its infancy, the number of acres planted to wine grapes continues to increase. Since 1993, Idaho's wine grape acreage has doubled, making it the fourth largest fruit industry in the state (USDA). With four wineries opening in the spring of 2002, and Idaho wines winning distinguished awards, the future of the Idaho wine industry looks promising.

Wineries produce a dual product — commercial wine and wine tourism. This study examines the size and impact of Idaho's growing grape and wine industry as an agribusiness industry, producing wine and as a tourist industry. The size and impact of the industry in terms of wine grape production, wine consumption and production, tourism, and taxes are evaluated.



Size of Idaho's Grape and Wine Industry

The economic size of the grape and wine industry, measured by employment, taxes, value added, or sales, is the jobs or sales directly created by the growers and wineries in Idaho's economy. In this study, we measure size by the contribution the industry makes to employment, gross output, and exports (the sales of goods and services to customers outside Idaho). Measuring industry size is an accounting task; counting the number of people employed or total sales made by each industry.

Wine Grape Production

As of 2001, the Idaho Grape Growers and Wine Producers Commission listed 55 growers, but not all of these growers have land planted to wine grapes. Between 36 and 40 wineries and /or growers are estimated to actually have wine grape acreage. Since 1970, over 1,000 acres of wine grapes have been planted in six Idaho counties and currently close to 700 acres have been reported in production in six counties (table 1). From this acreage, more than 164,000 cases of wine are produced each year. Total acreage is expected to reach 2,000 acres in the next five to ten years, bumping production up to approximately 325,000 cases. The predominant red variety grown in Idaho is Cabernet Sauvignon and the predominant white varieties are Riesling and Chardonnay. Vineyards also grow common varieties such as Merlot, Syrah, and Gewurztraminer.

Table 1. Idaho grape production.

County	Total Acres	Producing Acres
Canyon	846.5	510
Ada	145	140
Elmore	36.5	25
Gooding	6	6
Washington	6	6
Twin Falls	4	4
Total	1044	691

Source: Wine grape acreage reported to ID Wine Commission, 2001

Wine Production

The United States ranks fourth in worldwide wine production behind France, Italy, and Spain (Wine Institute 2001). California dominates the United States wine market, producing 91 percent of total U.S. wine and 72 percent of total wine sales (Motto, Kryla, and

Fisher 2000). In 1998, Idaho ranked 12th in the nation in wine production (Motto, Kryla, and Fisher 2000 and Bureau of Alcohol, Tobacco, and Firearms 2001). In 2000, however, Idaho's ranking fell to 18th. In 2001, Idaho produced 166,000 cases of wine, of which 143,000 cases were sold.

As of the spring of 2002, fifteen wineries exist in Idaho (table 2). Eight of the fifteen wineries are located within the grape growing region of Canyon County. Thus, the concentration of both grape production and wineries creates a mini Napa Valley in Canyon County, Idaho.

Table 2. Idaho winery numbers.

County	Number of wineries
Canyon	8
Ada	3
Bonner	1
Elmore	1
Latah	1
Twin Falls	1

Source: Wineries listed with ID Wine Commission, 2002

Since four wineries have just recently opened, production estimates are based on the eleven wineries operating in 2001. More than 60 percent of California wineries produce less than 25,000 cases of wine per year (Motto, Kryla, and Fisher 2000). Idaho wineries are relatively small compared to California, with the vast majority producing fewer than 10,000 cases (table 3 includes only the 11 wineries of 2001). Only one winery produces over 100,000 cases of wine annually. The majority of wineries are family operated businesses, with only two of the state's larger wineries owned by outside companies: Canandaigua Wine Company, based in New York, recently acquired Ste. Chapelle Winery, and Corus Brands of Washington owns Sawtooth Winery.

Table 3. Idaho winery sizes.

production (cases)	number of wineries
Over 100,000	1
5,000 - 10,000	2
2,500 - 5,000	3
1,000 - 2,500	2
Under 1,000	3

Source: Survey of ID wineries, 2001

Wine Consumption and Sales

Nationally, over the last three decades, the wine industry has experienced tremendous growth. Americans spent \$19 billion on wine in 2000, up from \$17 billion in 1998, an increase of over 10 percent (Wine Institute 2001). Compared to the rest of the world, the U.S. continues to be both a major aggregate consumer and producer of wine, although it ranks 34th in per capita consumption, by country. In 2000, the average person drank 2.8 gallons of wine (Wine Institute 2001). Among U.S. states, Idaho ranked 28th in total wine consumption (Motto, Kryla, and Fisher 2000).

In 1998, \$137 million was spent on 1.9 million cases of wine in the state of Idaho. On-premise sales (restaurants, bars, etc.) totaled \$45 million from 301,000 cases of wine. Off-premise sales (grocery stores, etc.) totaled \$91 million from 1,583,000 cases of wine. The average on-premise price per case was \$150 (\$12.50 per bottle) and \$57.75 (\$4.81 per bottle) for off-premise wine (Motto, Kryla, and Fisher 2000 and Bureau of Alcohol Tobacco and Firearms 2000 for all wine sold in Idaho).

By 2001, sales of wine had increased to 2.2 million cases in the state of Idaho. Of this amount, 73,000 cases were produced in Idaho. Tasting room sales of Idaho wine totaled \$4.2 million on sales of 26,000 cases. The average price per case (tasting room) was \$161 or \$13.42 per bottle. Wholesale sales of Idaho wine totaled \$10.7 million on sales of 117,000 cases. The average wholesale price per case was \$92 or \$7.67 per bottle.

Employment

Employment or jobs is defined as the "average annual monthly employment," and thus includes both full and part time employment. The jobs that are measured are "covered employment," i.e., jobs covered by social security. These jobs may not include owners of business not on payroll or other uncompensated family members. For certain agricultural businesses these "non-covered" workers can be significant. There are a total of 115 jobs in the grape and wine industry in Idaho: 49 are in grape production (vineyards) and 66 are in wine production (wineries) (IMPLAN 1998 database).

Tourism

Wine tourism is no longer a Napa Valley nor French phenomenon, but is spreading throughout the U.S. and the world (Hall and Macionis, 1998). With the addition of North Dakota in 2002, all 50 states now have wineries. Last year over 10 million people visited the Sonoma and Napa wineries and spent \$2 billion (WSJ 2002). New York wine tourism is "through the roof" with visits up 25 to 30 percent over last year (WSJ 2002). Although Idaho wineries do not attract tourist numbers in the millions – winery tourism in Idaho has been steadily gaining in popularity. Tourism provides advantages for the wineries, customers and for local economies as well. Winery tourism builds brand loyalty, increases wine sales margins, and provides alternative distribution outlets. Moreover, winery tourism is an inexpensive source of marketing intelligence for wineries because of the benefit from immediate feedback from the tourists. Benefits to the consumer are twofold; an opportunity to try new products at no cost and an educational experience to develop wine appreciation, create awareness, and improve knowledge of wine and the wine industry (King and Morris 1997). Lastly, wine tourism spins off benefits for local economies. Winery visitors not only purchase wines, but also make other purchases in the local economy.

A better understanding of cellar door visitors enables winery owners to develop improved marketing programs and specialized tourism opportunities tailored to this market. For these reasons and to gather data to analyze for tourism impacts, a survey was constructed and sent to three wineries in Canyon County in August 2001 and four wineries in October 2001. Five wineries existed in the county during the study period, but contact could only be made with three in August and four in October. Canyon County was chosen as the study site for the simple reason that it is the location of the majority of Idaho wineries. The goal of the questionnaire was to obtain information about visitor demographics, tastes and preferences, marketing responses, wine purchase decisions, and trip expenditures. (The questionnaire is available from the authors.)

From information gathered via the survey, we can profile a typical Canyon County wine tourist. The wine visitor is well educated (34

percent with a graduate degree) with a moderate to high income and a household size of only two people. Wine tourists are usually between the ages of 36 and 49. Visitors prefer moderately priced wines, spending an average of between \$8 and \$15 on a bottle of wine. Fig. 1 depicts the Canyon County wine tourists' wine drinking habits, with 83 percent of the visitors drinking wine every week and one-third of these drinking it two to three times a week. (Fig. 1)

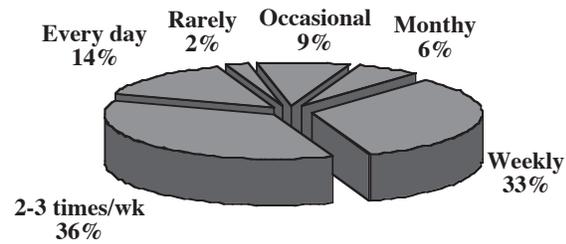
Sixty percent of wine tourists come from inside the state, with the majority visiting from the Boise-Metropolitan area (Fig. 2). The visitors are generally on a day outing, with wine tasting as a specific activity. Wine tourists from outside the state are generally on extended family visits and visit the wineries for an enjoyable afternoon of wine tasting. The average number of miles traveled to the wineries is approximately 26 miles one way. However, despite the close proximity of the wineries to the majority of visitors, the typical (modal) trip was only one per year, while the average number of trips was 2.8.

There is some indication that there is a group for whom "wine tasting" is a regular recreational activity in that 61 percent of the respondents did say that they had previously visited wineries in other states. When asked what they would have done as an alternative activity to wine tasting, 39 percent responded that they would have stayed home, while 30 percent would have participated in other activities such as shopping or sightseeing. Respondents were also asked how they made a decision to buy wine. They listed top choices:

- previously tasted the wine,
- word-of-mouth,
- wine was on sale, and
- the particular wine had a good reputation.

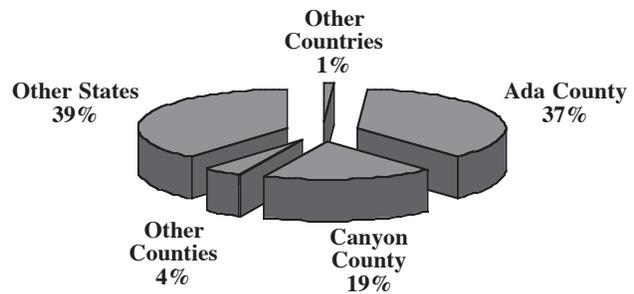
In addition to the buying decisions they are faced with, wine visitors were also asked where they normally purchased their wine. The three locations listed most often were wineries, grocery stores and specialty stores (specifically the Boise Consumer Co-op). An important source of marketing information for winery owners is to ask tourists how they find out about their winery. Most visitors learned of the wineries by word of mouth, through

Fig. 1. Wine consumption of Canyon County wine tourists.



Source: Wine tourism survey, 2001

Fig. 2. Visitor origin of Canyon County wine tourists.



Source: Wine tourism survey, 2001

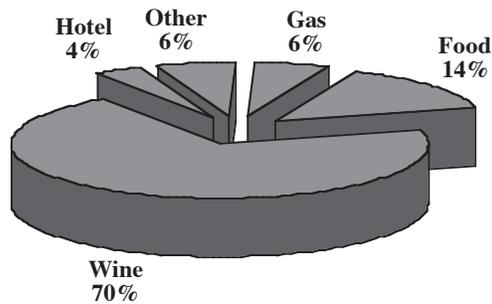
their own knowledge, road signs, and brochures.

Respondents were also surveyed about their total trip expenditures, which included purchases made in Canyon County and elsewhere in Idaho. During a wine trip, an average of \$139 was expended in Canyon County, with 70 percent of this total spent on wine (Fig. 3). The remaining 30 percent of the purchases were made from other businesses in Canyon County. Thus, \$42 of the purchases made during an average wine trip "spin-off" to other industries in the county. To estimate total trip costs on the state level, expenditures were totaled up for both Canyon County and elsewhere. This resulted in an average state expenditure of \$170 with 58 percent of the total sales going directly to the wineries. On the state level, \$70 of the total purchases is made with other businesses in the state.

Tax Revenues

The wine industry generates significant tax dollars, benefiting federal, state, and local governments. Tax dollars are raised through sales

Fig. 3. Canyon County expenditures of Canyon County wine tourists.



Source: Wine tourism survey, 2001

taxes, excise taxes, income taxes, estate and gift taxes, payroll taxes, property taxes, and other business taxes and fees, including occupational taxes, licenses, and import duties (Motto, Kryla, and Fisher 2000).

In 1997, federal state and local governments collected over \$1.9 billion related to the con-

sumption of wine nationwide. From 1977 to 1997, tax revenues increased 244 percent. In the same time period, wine volume grew 30 percent compared to a decline in overall alcoholic spirits volume of 23 percent, and a beer volume increase of 20 percent. The growth in wine volume has resulted in higher tax revenues from wine across the U.S. (Motto, Kryla, and Fisher 2000).

In 2001, \$2.3 million in tax revenues was collected on all wine sold in Idaho. Almost 73,000 cases of Idaho wine were sold in the state, generating \$78,000 in taxes (73,000 cases x 2.377 gallons x .45/gal) from Idaho wine sales (Idaho wine producer interviews 2001). Forty-five cents is the sales tax levied per gallon on all wine sold in Idaho.

Wineries produce two commodities: commercial wine and tourism. Correspondingly, we will assess the impact of the grape and wine industry as producing these two products.

Impact of Idaho's Grape and Wine Industry

First we examine the impacts from the grape and wine industry as an agribusiness industry that produces commercial wine as the end product followed by an analysis of the wine industry as a producer of tourism. The economic analysis of a wine and grape industry as a tourist attraction is a relatively new concept. While Michaud, Segarra, and Dodd (1997) mentioned that "tourism expenditures associated with the Texas wine and wine grape industry may be the most promising area of future economic impact researched," previous impact studies of grape and wine industries have focused solely on agribusiness impacts. This study recognizes the potential that tourism has on the grape and wine industry, and, as a result, we have analyzed the impacts at both the state and county level.

Because the majority of grape production and wineries are in Canyon County, we used this county as our model site. Thus, impacts will be assessed separately for Idaho and for Canyon County. County and state agribusiness and tourism impacts will then be compared and contrasted.

Exports, which generate the new money coming into an economy, are the "engine" that

drives an economy. The exports of the grape and wine complex determine the industry's impact on both the Idaho and the Canyon County economies. Impacts are determined by the interrelationships between "non-base" and "base" industries in an economy. Some businesses exist entirely to service other businesses. These businesses are the non-basic industries for the economy. Grape production is an example of a non-basic industry, as vineyards provide grapes to wineries, and thus exist almost entirely to service the wineries. If vineyards were not planted in Idaho, very few wineries would exist in the state. Wineries, whose sales are largely exported outside Idaho, are the export base of the wine and grape industry. In economic base studies, we attribute the impact portion of the non-basic business to the existence of the exporting business.

Economic impacts are partitioned into two levels. The first level is the direct impact of the grape and wine complex – the jobs, value added, and sales that are directly created by growers and wineries as export businesses. Direct impacts are similar to the "economic size" measures described earlier. The second

part is the impact on other Idaho businesses that provide goods or services to the grape and wine complex – the indirect impacts of the industry. The indirect impacts are the so-called “ripple” or multiplier effects of the grape and wine industry in Idaho and Canyon County. The multiplier or ripple effects are driven by the exports of an economy. Exports, the new money coming into an economy, set off a web of transactions as each business seeks to fulfill the demands of their customers. Industry’s impact upon the economy is thus comprised of two parts: the magnitude of the multiplier and the magnitude of the exports. The sum of the two, direct and indirect, measures the total impact of an industry on an economy.

The grape and wine complex buys goods and services from other Idaho businesses for operation and production purposes. Other businesses, in turn, buy wine from Idaho-based wineries to provide the goods and services demanded by the grape and wine complex. Numerous rounds of inter-industry transactions occur, resulting from direct purchases by the grape and wine industry. These transactions create a multiplier effect; a change in the output of the grape and wine complex generates or induces changes in the outputs of many other industries in Idaho’s economy. Therefore, total economic activity or output increases by a multiple of the initial change in output. This multiplier, or impact, is captured in the popular economic multiplier concept (see cautionary note about interpreting multipliers).

The tool used for measuring these economic impacts is called Input-Output (I/O) analysis. I/O analysis is a way of examining relationships within an economy both between businesses and between businesses and final consumers. First, I/O is an accounting framework that accounts for all market transactions between businesses and consumers in an economy over a given time period. Second, I/O is an economic model of a regional economy that links simultaneous changes in these transactions, to examine the affects of a change in one or several economic activities on an entire economy (impact analysis).

Input-output (I/O) modeling was used in previous impact studies of grape and wine industries and will be used to measure impacts for this study (Appendix A). This study used the IMPLAN database for an Idaho state level I/O

model and a second county level I/O model for the Canyon County economy. Significant modifications were made to the IMPLAN (I/O) database. First a “Wine Grape” sector was developed from primary data. In view of the fact that the IMPLAN defined Fruit sector encompasses all fruit, it was necessary to isolate the wine grape sector. To construct the new wine grape sector, information was needed on sales and purchases involving other sectors of the state’s economy. This was done by constructing grape enterprise budgets based on the typical cultural practices and inputs of an Idaho vineyard (see Appendix). In contrast to the Grape sector, the production recipe from the IMPLAN database was used for the wine sector. Second, the trade flows between the Wine Grape sector and Winery sector and wine production, total production, and export sales were replaced with primary data on wine and grape sales (see Appendix).

Agribusiness Impacts

No industry exists in isolation. In the production of a good or service, an industry must purchase raw inputs that add value to their good or service. This process is analogous to a chain, with each link in the chain being a separate industry. The entire chain of industries forms an industrial complex of linked buyers and sellers. From any one link in the chain the industries that supply inputs are labeled the backward linked industries and the industries to which the processed goods are sold are labeled forward linked industries. Notable national examples would be the health-care industry or the automotive industry.

Idaho’s grape and wine industry is an agribusiness industrial complex. At the center of the industry is the grape grower. Backward linked to the growers are those industries that supply inputs: fertilizer, equipment, retail trade, workers, etc. Forward linked from the grape growers are those industries that use grapes as inputs in their production process: the wineries. We draw the line on inclusion of forward linked agribusinesses in our impact analysis based upon the degree of import substitution. Wine distributors are agribusinesses. Wine distributors in Idaho would sell wine even if Idaho did not produce it. If wine production suddenly disappeared from Idaho, wine distributors would continue to sell other wines in the state, and thus the loss of Idaho wine

would have negligible impact on wine distributors. Thus, the wine distributors are agribusinesses, but not included in the impacts of the wine industry on agribusiness in Idaho.

Motto, Kryla, and Fisher (2000) report impacts of the California and Washington grape and wine industries. The impact of the wine and grape industry in California was \$33 billion in fiscal 1998 (Motto, Kryla, and Fisher 2000). In Washington, a \$2.4 billion impact was estimated for fiscal 1999 (Steward 2001). These impacts estimate the direct and indirect backward linkages of wages and employment, and other purchases suppliers make, plus the forward linkages of restaurant and hotel trade, and induced retail activity with other merchants. A study conducted in Texas in 1997 estimated the economic impact of the Texas grape and wine industry on the Texas economy from the vineyard to the final consumer. Results showed that the total core economic impacts of the Texas grape and wine industry were \$86 million in output impacts, 1,200 jobs, \$30 million in income impacts, and \$47 million in total value added impacts in 1996. Many of these economic impacts were attributable to the wine and wholesale trade sectors (Michaud, Segarra, and Dodd 1997).

The first step in measuring the grape and wine industry's impacts as an agribusiness is to calculate multipliers for both grape and wine production sectors (see Appendix for a complete list of Type I and Type II multipliers). Multipliers determine how the direct change in final demand of a single industry ripples throughout all the other industries in a regional economy. A multiplier measures the direct and indirect impact or the total change in business sales that occurs in response to a \$1 change in exports. Type I multipliers measure just the changes in business sales. Type II assumes wages, salaries, and proprietor's profits circulate through the economy, along with business transactions. Wine production in the entire state has the greatest Type I multiplier, \$1.68 (table 4). For every dollar of wine exported from Idaho, \$1.68 in sales is created in Idaho wine production. Wine production in Idaho buys a significantly larger portion of inputs within Idaho to create exports than the other sectors in table 4.

Job multipliers measure the direct and indirect impact or total change in employment that

occur in response to a \$1 million change in exports. Grape production in Idaho has a job multiplier of 22.75. Thus, for every \$1 million in grape exports, close to 23 jobs are created in Idaho's economy. And for every \$1 million in wine exports from Idaho, close to 18 jobs are created.

Table 5 summarizes the total sales and job impacts that the grape and wine industry has on both the Canyon County economy and Idaho's economy. This table emphasizes the fact that the county impacts are much greater than the state impacts. This occurs because businesses whose sales are largely exported are the export base of the Idaho economy. In our example of the Idaho grape and wine industry, grape production is a non-basic business, while wineries are considered the export base of the industry. Canyon County wineries export \$12 million in wine sales compared to the state of Idaho, which exports only \$7 million in wine. The \$5 million difference consists of exports from Canyon County to other counties within Idaho. These sales are exports from the Canyon County perspective, but are not exports from Idaho. They are Idaho produced wine consumed within Idaho. Within-region purchases are not exports and thus do not drive statewide impacts.

The difference between state and county

Table 4. Output and job multipliers.

	Type I Multiplier	Type II Multiplier	Job Multipliers
Canyon County			
Grape Production	1.58	1.89	19.65
Wine Production	1.55	1.86	11.62
Idaho State			
Grape Production	1.58	1.93	22.75
Wine Production	1.68	2.10	17.03

Source: I/O models

Table 5. Sales and job impacts.

	Sales impact	Job impact
Canyon County		
Grape Production	\$252,000	3
Wine Production	\$22,300,000	139
Total	\$22,600,000	142
Idaho State		
Grape Production	\$344,000	4
Wine Production	\$14,800,000	120
Total	\$15,200,000	124

Source: I/O models

exports and multipliers has some implications for industry and state and local development goals. It is a direct illustration of the fact that growth in a local area has potentially two impacts from the overall state perspective. On the one hand, the regional growth contributes to overall growth in the state. On the other hand, some of the growth in one region may come at the expense of growth in another region. Overall however, while local regions may compete to some degree, the lesson of the state multiplier is that all may benefit from increased economic activity, although some regions will benefit more than others.

Tourism Impacts

The spin-offs from wine tourism benefit local economies. Winery visitors not only purchase wines, but also make other purchases in the local economy. Tourist dollars not only stimulate lodging, restaurants and other tourist-related businesses, they also ripple to the backward linked businesses that supply inputs to the tourism-related businesses (Zhang and Rassing 2000).

In contrast to the straightforward evaluation of the impacts of the grape and wine industry as an agribusiness, tourism impact assessment is complicated by several problems (Loomis and Walsh 1997). Tourism is not an industry, it is a category of final demand or exports. Since tourism is not an industry (in the standard industry definitions of an I/O model), a tourism multiplier, analogous to the multiplier for grapes or wine industries, does not exist. As shown in Fig. 3, tourism expenditures are spread across several industries. To estimate impacts we must synthesize a multiplier for tourism. A tourism multiplier is synthesized by computing the weighted average of the multipliers of the respective sectors in the expenditure pattern.

The second complication in accurately assessing the impact of tourism is price consistency. Transactions in an economy are denominated in purchaser prices, i.e., we pay a total price of \$1.50 per gallon for gas at the service station, not just the service station markup. The purchaser or total price is the sum of the prices of all the things that have gone into producing the good. Transactions in an I/O model are denominated in producer prices to avoid double counting. For those trade sectors, the trans-

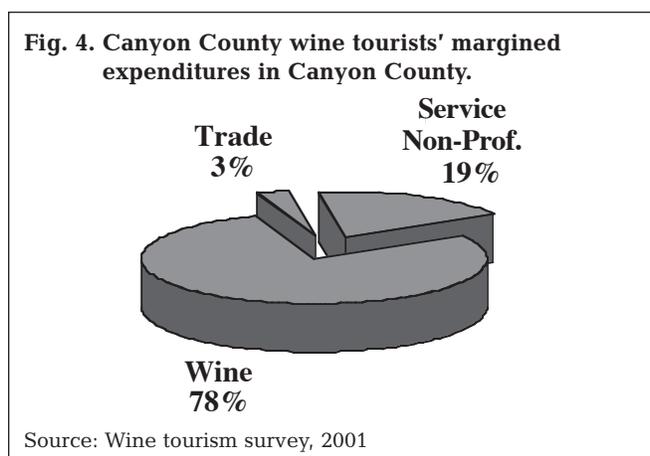
actions in the I/O table record only the markup or the margin. Thus, to be consistent, the changes in final demands that drive impacts must also be denominated in producer prices. The expenditure pattern of wine tourists, which is denominated in purchaser prices (prices paid by final consumers), needs to be converted or allocated to the producer prices before impact analysis. The process of converting from purchaser to processor prices is called margining. For example, assume that a consumer spends \$1 at a retail store. A portion of that dollar, 20 cents in this case, is the margin or markup retained by the retailer. A portion, 20 cents, of the dollar is paid to the wholesaler and so forth until the dollar is fully allocated or margined (IMPLAN Group Inc. 1999).

Tourism impact studies are plagued with defining the degree of substitution that an individual has for other recreational expenditures, or for that matter, any other expenditure. For example, a resident of Canyon County may decide to go to a movie rather than visit the wineries. The money that would have been spent on the winery trip is instead spent at the movie theater. Money not spent on tourism is not necessarily "lost" to the economy, but is merely spent elsewhere. However, all resident expenditures would not be offset by expenditures elsewhere in the economy, i.e. they may decide to just stay home. For this reason, expenditures made by residents of Canyon County were excluded from this study. Only "true" tourist expenditures were used, as their money is "new" to the economy. To ascertain place of residence, individuals' zip codes were surveyed.

The first step in calculating a tourism multiplier is to incorporate the sectors from Fig. 3 into actual IMPLAN sectors. Gas and the "other" category were combined into Trade; food and lodging were grouped into Service Non-Professional; and wine stayed within its own sector. The next step is to purge the sectors of imports. Given that the purpose of I/O modeling is to capture impacts of local economies (Darden, Harris, and Rimbey 1999), the portion of each item that is met by local demand and the amount that must be imported must be calculated. For this study, the majority of imports came from the transportation sector. This process will not change the value of production for the I/O account; it is simply a transformation of the sector into local purchases and

imports of all other services (Darden, Harris, and Rimbeby 1999). The amount met by local production is seen in Fig. 4. For example, of the \$125 the average tourist spends per trip, 78 percent of this is met by wine produced locally. The last step is to multiply the percentages of each sector (Fig. 4) by their respective sector multipliers (table 7 – Appendix). These amounts are summed up to reveal a tourism multiplier for Canyon County (table 6). Idaho's larger tourism multiplier is due to the fact that the size of the multiplier depends on the marginal propensity to consume: the higher the marginal propensity to consume, the higher the multiplier (DeLong 1998).

The job multipliers were found by multiplying the percentages by their respective job sector multipliers (Appendix tables 7 and 8). With the



resulting wine tourism multipliers (table 6), we are able to create scenarios and forecast wine tourism impacts. The wine tourism multiplier for Canyon County is 1.89. Thus, for every dollar (margined dollar) a wine tourist from outside Canyon County spends, \$1.90 is created in Canyon County's economy. Likewise, for every million dollars (margined dollars) wine tourists from outside Canyon County spend, 1.89 million dollars are created in Canyon County. Since each type of tourism will have a different expenditure pattern, every type of tourism will have a different multiplier – e.g. the wine tourism multiplier will be different from a multiplier for salmon fishing.

From our survey, we found that 81 percent of the Canyon County wineries' visitors are from outside the county, leaving 19 percent as county residents. To calculate the impact of a winery tourism scenario, we simply multiply the number of non-resident visitors by their expenditure pattern and tourism multiplier. For example,

Table 6. Tourism multipliers.

	Output multiplier	Job multiplier
Canyon County	1.89	17.51
Idaho	2.12	24.88

Source: I/O models

suppose the Canyon County wineries decide to hold a Spring Barrel tasting to signify the beginning of the tourist season. If 650 carloads visit the area, we can estimate that 81 percent or 527 groups are non-resident visitors. This would have an impact of \$125,000 on the county's economy and generate 1.2 jobs. If that same festival were held on the state level, the sales impact would be \$82,000 because only 40 percent of the visitors will be from outside the state.

Agribusiness versus Tourism Impacts

The two impacts resulting from the grape and wine industry as an agribusiness are the backward linkages from wine exports and the backward linkages from grape exports. However, when we assess the industry as a tourist attraction, we see that the backward linkages from wine sales impact the wineries, but the backward linkages from all other sales (gas, food, lodging, and miscellaneous) impact a large portion of the Canyon County economy. Tourism "spins-off" or creates ancillary expenditures in other businesses in addition to simply the wine sales, and wine money as well as these other expenditures circulate throughout the economy.

The Grape and Wine Industry are unique among agribusiness industries. At the county level, the grape and wine agribusiness sector must export \$12 million in wine sales to produce an impact of \$22 million. However when the wineries, as tourist attractions, sell only 75 percent of that amount (\$9 million), an equal impact is generated. Thus, the tourism impact of the grape and wine industry has a significant advantage over other agribusinesses such as dairy or sugar. By taking advantage of the opportunity to market wineries tourism potential rather than just an agribusiness industry, economic impact increases significantly. The spin offs of wine tourism provides the opportunity for county and state officials to work cooperatively with the grape and wine Industry, to the economic benefit of many other businesses in Idaho and Canyon County.

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Regional models can be categorized as non-structural or structural. Nonstructural models lack economic behavioral structure. Thus, these models base regional changes upon trends to predict future changes. The second type of regional model, structural, is behavioral. The structural model predicts agent behavior as the effect or impact response from a specific stimulus. Advantages of structural models for policy analysis are that the policy changes are first specified and the structural model then estimates the impacts on the various agents in the economy. The model of choice for regional impact analysis is regional Input/Output (I/O).

Input/Output (I/O) modeling translates exogenous shocks to an economy through the model to estimate output, income and employment impacts. In addition to the general limitations of I/O in impact analysis, non-survey based I/O models have the inherent drawbacks stemming from the use of secondary or national data combined with an identical algorithm to estimate an I/O model for every county in the U.S. (A discussion of the limitations of I/O impact analysis can be viewed in Maki and Lichty 2000, and Miller and Blair 1985). Survey-based I/O models are typically prohibitively time consuming. Prior to commercially available I/O databases for impact studies, Brown (1985) and Folwell et al. (1987) used a survey based I/O model for analyzing the Washington grape and wine industry. Upon the availability of the IMPLAN database, several studies such as Johnson and Wade (1993) and Michaud, Segarra, and Dodd (1997) used state models to estimate grape and wine impacts. A hybrid of primary and secondary data has proven to be the best compromise to estimate regional I/O models. The Idaho State and Canyon County I/O models developed in this study start with the IMPLAN database. The second step substitutes primary data obtained from surveys or other primary sources for the IMPLAN primary data. Those industries targeted for direct analysis, the grape and wine industries in this study, are particularly important to verify with reliable primary data.

An Input/Output model for both Canyon County and Idaho was constructed to measure indirect economic impact, or the multiplier effect, that the grape and wine complex and winery tourism have on other industries in

these economies. Three general modifications, based on primary data, were made to the secondary data of the Idaho State and Canyon County IMPLAN models. The first modification was to construct a wine grape industry, which was absent in the IMPLAN data. The second adjustment was to balance the total output columns with total input columns for both the grape and wine sectors. The third modification was to correct the export versus import sales between the two sectors. Each of these revisions is discussed in detail below.

The wine grape industry, obviously of vital importance to this study, is not a separate sector in the IMPLAN data, but rather is aggregated into the Fruit sector. Farm enterprise budgets, as primary data, modify and complement regional I/O accounts to improve the accuracy of regional models relating to the agriculture sectors (Coupal and Holland 1995). The general procedure is to use crop enterprise budgets, whereby each production cost is allocated to the I/O industry where it is purchased. By using margining techniques and regional purchase coefficients, the I/O accounts are converted to producer prices and purged of all imports. The commodity accounts can then be expanded by multiplying value of production estimates by the technical coefficients derived from the cost and return estimates (Darden, Harris, and Rimbey 1999).

The procedure for the wine grape industry in the Idaho and Canyon County model started with the budget since these cost and return estimates are the cornerstone of an accurate and precise I/O account (Darden, Harris, and Rimbey 1999). In the spring of 2001, grower surveys were conducted in order to formulate crop enterprise budgets for wine grapes in Idaho (Woodall, Smathers, and Taylor 2002). The information contained in the budgets subsequently prepared was used in this study.

The first step of the procedure was to calculate transaction costs for each input by multiplying the opportunity cost (grower out-of-pocket expense) by the actual value of the input. Items such as overhead, equipment, and the trellis and irrigation systems were aggregated because they are made up of so many inputs. To make the model more precise, the retail

trade sectors are converted from producer prices to purchaser prices. The producer price is the price paid for a commodity at the factory door. The purchaser price is the price paid for a commodity at a retail outlet (Darden, Harris, and Rimbey 1999). This is called margining and it will make the I/O model more accurate in terms of the impact wine grape trade has on the local economy. For our study, we used three margins: trade, retail, and wholesale.

Once the margining was complete, the inputs were allocated into their corresponding I/O accounts and purged of imports. The sum of these new sectors was totaled to give a "New Margined Value." This new total was added to the import total and compared with the budget revenue. In order for the amounts to balance, some additional amounts were allocated (at our discretion) into dividends and proprietor's income.

The next step was to find the technical coefficients. Technical coefficients identify the percentage or portion of the total inputs of a sector that must be purchased from another sector. This was accomplished by dividing the margin totals for each sector (including imports, dividends, and proprietor's income) by the budget revenue. These coefficients were then multiplied by the value of grapes in Canyon County giving us accurate totals we can then bring into the I/O model for wine grapes. The last step was to subtract a proportion out of the fruit sector to make up for the amount aggregated to the new wine grape sector.

The second modification made was to balance the total output column with the total input for the wine grape and wine sectors. The IMPLAN database information is provided by national data and underestimated the value of both sectors. From our interviews with grape growers and wine producers, we were able to obtain the correct values for these sectors, which we then inserted into the column totals for the sectors.

The last modification made to our I/O model was to correct the export versus import sales. The I/O model must balance so that purchases equal sales. The column totals we imported into the county model for wine grapes totaled up to the value of wine grapes in Canyon County. The row total was found by allocating 95 percent of the value of wine grapes to the

wine sector and 5 percent to the export trade sector (Interviews with Idaho grape growers and wine producers 2001).

For Canyon County, the 1998 IMPLAN database reported a wine value of \$5 million. Our research shows a value closer to \$12.6 million at the county level. To correct for this error, we divided each sector amount by \$5 million to find a percentage for each sector in the input column. Then we applied this percentage to \$12.6 million to estimate more accurate figures. Having the right input total, we now turned to the outputs. Our research of the Canyon County wine industry shows that \$2.6 million of wine is sold out of the tasting room. The remaining \$10 million is sold at wholesale. Our survey reported that 19 percent of the individuals who visit Canyon County wineries are residents of the county, which suggested the wineries sell \$525,000 to households within the county. Thus, \$12 million is allocated to the export trade sector, \$525,000 to the household sector, and just a fraction to trade. These amounts sum to \$12.6 million, and, as a result, balanced the total output and total input columns.

Multipliers determine how the direct change in final demand of a single industry ripples throughout all the other industries in a regional economy. Multipliers for the industries in Canyon County and Idaho's economy are shown in tables 7 and 8. A multiplier measures the direct and indirect impact, or the total change in business sales, that occurs in response to a \$1 change in exports. Type I multipliers measure only the changes in business sales. Type II multipliers measure the change in gross sales plus wages, salaries, and proprietors' profits. Type II assumes wages, salaries, and proprietors' profits circulate through the economy, along with business transactions. The more labor-intensive trade and service industries have larger Type II multipliers.

Purchases are made from either Idaho businesses or imported from outside the state. The magnitude of the imports determines the self-sufficiency of the economy. The more self-sufficient an economy is, the greater are the multipliers for that economy. An industry with fewer imports circulates more of its purchases throughout the economy and thus has a larger multiplier. Imports are defined as purchases

Table 7. Canyon County multipliers.

Industry	Type I	Type II	Job
Agriculture	1.42	1.73	20.4
Fruits	1.32	1.92	20.8
Grape	1.58	1.89	19.6
Wine	1.55	1.86	11.6
Ag Process	1.54	1.93	13.2
Const & Mine	1.26	1.77	17.7
Manuf	1.24	1.69	14.1
High Tech	1.18	1.63	10.1
Tran&Comm&Util	1.36	1.91	16.6
Trade	1.12	1.92	26.6
FIRE	1.19	1.54	15.8
Service Prof	1.21	2.11	31.2
Service non-Prof	1.29	1.99	40.2
Households		1.66	9.4

Source: I/O models

Table 8. Idaho multipliers.

Industry	Type I	Type II	Job
Agriculture	1.49	1.87	21.0
Fruits	1.30	2.11	24.8
Grape	1.58	1.93	22.7
Wine	1.68	2.10	17.5
Ag Process	1.59	2.09	15.1
Const & Mine	1.29	1.91	18.6
Manuf	1.26	1.76	13.2
High Tech	1.20	1.76	11.6
Tran&Comm&Util	1.32	1.85	14.4
Trade	1.16	2.03	29.2
FIRE	1.24	1.72	17.9
Service Prof	1.26	2.26	29.2
Service non-Prof	1.33	2.15	40.1
Households		1.84	11.2

Source: I/O models

from outside Idaho, both foreign (outside the U.S.) and domestic (from within the U.S.).

In summary, the impacts of the agribusiness industry are modeled by setting the final demands of the production agriculture and agricultural processing sectors to zero and assessing the impact with respective multipliers of grapes and wine. An industry's impact upon the economy is thus comprised of two parts - the magnitude of the multiplier and the magnitude of the exports.

The following table describes the sectors that made up our I/O models for Canyon County and Idaho. The high tech industry was defined as the SIC codes represented by high tech industries trade association. The exception was that telephone communications was aggregated with the Transportation and Communications industry.

Cautions on Using and Interpreting Multipliers

The concepts of total economic impacts and multipliers are extremely useful tools in understanding the significance of a particular activity to the overall local economy. However, caution is advised in using these tools because of the complex tangle of relationships that constitute an actual economy. In order to make some sense of this tangle, simplifying assumptions must be made in measuring economic impacts.

1) The production "recipe" is assumed constant. Thus, if a recipe dictates the amount of grapes, casks, labor, and equipment used in making Y gallons of wine, I/O assumes that this relationship will stay in the same proportions whether we double or halve the amount of wine produced. If, in fact, larger wineries are "more efficient" in the sense that they use fewer and bigger machinery inputs, Input/Output and multiplier analysis would over or underestimate machinery inputs when wine producing expands or contracts.

2) Input/Output assumes prices remain constant whereas in the real economy changes in demand or supply lead to changes in price.

3) A multiplier says that exports from industry A will create additional jobs, but in reality those additional jobs exist if supported by the whole infrastructure of the economy ("agglomeration economies"). Thus, jobs in industry A are also "created by" the other features of the local economy that support the business and the labor.

4) One must be careful not to confuse measuring economic impact with predictions about the actual economic effect of changes in the economy. Multipliers are good measures of economic impact or importance, but may be poor predictors of economic consequences. Thus, a job multiplier of two does not necessarily mean that an increase of (x million dollars) in industry A will create two times the jobs in the economy. As a simple example, suppose that industry A purchases 50 percent more from business B. The input business B might choose to work its employees overtime or purchase more highly automated equipment instead of simply increasing its employment in the same proportion. Even if business B does increase its employment, it may do so by "robbing" another business of its employees rather than attracting new employees or hiring unemployed people.

5) Measuring economic impacts requires a lot of data – data about all the inputs required for producing each item in the study. It is rarely practical or financially feasible to collect all this data. Instead, most studies, including this one, use estimates of the inputs and sales relationships from other studies and supplement these data with information from local sources. In sum, estimates are only as good as the data.

Table 9. I/O sector or industry delineation.

Sector or industry	Example businesses
Production Agriculture	Crops and livestock
Fruit	Fresh fruit
Grapes	Wine grapes
Wine	Wine production
Agricultural Processing	Canned, frozen, preserved fruits and vegetables Livestock feed Meats, cheese, fats, and oils
Mining & Construction	Metal, oil and gas extraction residential and nonresidential Building
Manufacturing	All manufacturing
Hi-Tech	Electronic computers Surgical and medical instruments Software
Transportation & Communications	Air, railroad, and motor transportation Telephone communications
Trade	Wholesale and retail trade
F.I.R.E.	F inancial institutions I nsurance R eal Estate
Service Professional	Health care services Legal services Education
Service Non-Professional	Hotel and lodging Repair services Food services



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