DIRECT SHIP BLOWOUT: HOW THE SUPREME COURT'S GRANHOLM DECISION HAS LED TO A FLOOD OF NON-TAXED WINE SHIPMENTS

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Abstract

This paper seeks to address the realized decline of tax revenue while the gross revenue sales of wine through direct shipping has increased. The Supreme Court ruling in Granholm v. Heald rendered opinions against state restrictions on out-of-state winery shipments direct to consumers on the basis that the structuring of the state tax policy violated Commerce Clause provisions and blocked ease of entrance into the state market. Based on the model, the interstate sale of wine in the United States rose from 6.2 percent of the market to about 10.4 percent. The evidence presented in the interstate demand model used in this analysis confirms declining tax revenue in opposition to the Court's conclusions.

Introduction

Based on the Commerce Clause of the United States Constitution, the Supreme Court in *Granholm v. Heald* ruled the state licensing authorities in New York and Michigan discriminated against out-of-state wine producers under the existing structures of the three-tier alcohol distribution system. Traditionally, state liquor laws have required that producers (in this case wineries) sell their products only to wholesalers, who in turn sell the product to retailers. Many states; however, have allowed local wineries (often called farm wineries) to sell directly to in-state consumers, while restricting out-of-state producers to sell through the traditional three-tier system.[1]

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[1]   During the later 19th and early 20th century, laws that restricted or outright banned alcohol importation into a state on the basis of controlling consumption were struck down by the Court as long as the production and

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Following *Granholm*, state governments have been developing a range of laws that allow for at least the limited shipment of wine from both in-state and out-of-state wineries directly to consumers. While these laws are designed to ensure that all wine shipments are properly handled, taxed and limited to legal-age adults, research on the taxable sales of viniferous liquors shows that there may be a substantial amount of "leakage," particularly from the state excise tax system. This paper uses an interstate demand model of wine in order to estimate this leakage and to see if it has increased following the *Granholm v. Heald* decision.

The first section of the paper examines the historical Court interpretation of the alcohol-control powers granted to the states following the Twenty First Amendment which repealed Prohibition in 1933, versus the Commerce Clause powers provided to the Federal government. This section examines the effect of the recent *Granholm v. Heald* decision. The second section examines the ruling in comparison with other examples of interstate trade regulation where state laws or taxes surrounding the traded products differ greatly (interstate ammunition shipments, cigarette shipments, Internet commerce, border sales-tax, and beer). Section three uses an interstate demand model which includes a number of factors (including differential pricing mainly due to excise and sales taxes, taxable sales volumes at both the state and federal level, state populations, population density, and distance functions) to determine both in-state and interstate flows of wine. The model estimates both imports and exports between each of the 2,601 state pairs as well as flows from non-tax reported sources for the years 2005 and 2008.[2] The final section estimates the loss of state excise tax revenue due to the growth in non-taxed interstate wine sales at the expense of state tax authorities.

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distribution of alcohol was permitted in the state. The concept of equal discrimination was allowed under Commerce Clause protections mandating states treat all similar products equally, whether produced in-state or out-of-state. This argument would later serve to uphold the constitutionality of Prohibition.

[2] Non-tax reported sources include Native American reservations, military commissaries and duty-free purchases.

The Twenty-First Amendment and State Regulation

Prior to the passage of the Volstead Act in 1918,[3] state restriction of alcohol sales were

developed in response to a widespread temperance movement. There were limited forms of

regulation set up to monitor the distribution of alcohol, and no efficient state apparatus for

collecting excise taxes. The temperance movement changed this and encouraged tight

restrictions on the sale of beverage alcohol products as part of a social policy objective. Prior to

1918, legal opinions favored the interstate commerce of beverage alcohol sales. The concept of

non-discrimination held that restriction of beverage alcohol sales and marketing was acceptable

only if both in-state and out-of-state producers were treated as identical entities. This led to the

Webb-Keyton Act in 1913 that granted dry states authority to restrict and control interstate

shipments.[4] This means that the intent to prohibit beverage alcohol sales was the original

motivation for state laws restricting interstate shipments. Following the repeal of prohibition

under the Twenty-First amendment in 1933, regulatory authorities were set up in all states to

control the sale and distribution of alcohol and to collect excise taxes.[5] Section 2 of the

amendment stated, "The transportation or importation into any State, Territory, or possession of

the United States for delivery or use therein of intoxicating liquors, in violation of the laws

thereof, is hereby prohibited."[6] This language empowered the states to establish significant

alcohol control regulations and structures.

Challenges to state regulatory authority have mainly sought clarification from the courts

over the scope of Section 2 of the Twenty-First Amendment. The Supreme Court rendered an

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[3]   The 18th Amendment to the Constitution banned the manufacture and sale of all intoxicating beverages and
        spirits in the United States.
[4]   States where all beverage alcohol sales were prohibited.
[5]   The system established was the three-tier system of distribution where the state licensed agents (most often
        wholesale distributors) to collect taxes and control supply to retailers. The other form of regulation was the
        retention of the control state system where the state itself served as the distributor and tax collector.
[6]   U.S. Const. am. 21. § 2.

opinion in *State Board of Equalization of California v. Young's Market Co.*[7] in support of the

Twenty First Amendment's control practices in 1936. It was accepted that the amendment

specifically granted the states the ability to regulate alcohol on an interstate level based on

taxation and control authority granted to the states, as long as state produced and out-of-state

produced beverages were treated the same. Based on pre-prohibition rulings, the Court also

found state beverage alcohol excise taxes to be constitutional, providing the tax laws treated in-

state and out-of-state producers and suppliers of beverage alcohol products equally. The Court

also upheld the licensing authorities set up after the repeal to be constitutional under the

provisions that delegated responsibility for alcohol control to the state. *Craig v. Borden*[8]

confirmed that systems of distribution under a state-by-state licensing authority did not violate

equal protection of interstate commerce. State authorities could maintain laws governing

beverage alcohol distribution and could mandate the collection of excise taxes. Later Court

opinions would confirm this reasoning.

State authority over the sale and distribution of beverage alcohol products was

significantly limited in 2005 with the *Granholm v. Heald* decision.[9] *Granholm* held that laws in

New York and Michigan discriminated against out-of-state wineries by allowing only in-state

wineries to ship directly to consumers. The combined lawsuit presented to the court argued a

challenge against Section 2 of the Twenty First Amendment on the grounds that state laws

restricting the direct sale of wine only to in-state wineries was discriminatory based on the

Commerce Clause of the US Constitution. The Supreme Court found that non-discrimination

was violated by both the Michigan and New York structures restricting out-of-state wine

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[7]   299 U.S. 59 (1936)
[8]   429 U.S. 190 (1976)
[9]   544 U.S. 460 (2005)

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shipments. The Michigan statute allowed direct shipment to consumers from in-state producers but required out-of-state wineries to both register and also have an in-state production facility. New York permitted wineries to ship from out-of-state so long as they registered as a producer in state and kept a warehouse within the state.[10]

The tax collection structures in Michigan and New York were also found to be discriminatory against out-of-state producers, and the Court's opinion was rendered on the grounds that the dormant Commerce Clause present in the Article 2 of the constitution was violated by the state statutes. The Court found that the Twenty-First amendment intended a return to the pre-1919 system governing trade of alcohol between states, allowing for regulation, as long as those regulations did not grant the states the ability to restrict interstate commerce. The Federal power to regulate trade between the states overruled state regulatory structures that the Court found were barriers to trade. To satisfy non-discrimination, laws that allow in-state (or farm) wineries to direct-ship had to grant the same privileges to out-of-state producers. This has led to legislation being passed in all but 12 states allowing at least a limited amount of interstate shipment of wine between producers and consumers.[11]

Both New York and Michigan argued two points that the Court rejected on the basis that the arguments were not convincing enough to warrant discriminatory state statutes. The Court rejected the assertion that non-discrimination would result in a rise of teen alcohol consumption based on evidence that teenagers were not likely to buy online and that they had easier access

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[10]   Justice Stevens, in rendering the Court's opinion found: *"States have broad power to regulate liquor under §2 of the Twenty-first Amendment. This power, however, does not allow States to ban, or severely limit, the direct-shipment of out-of-state wine while simultaneously authorizing direct-shipment by in state producers. If a State chooses to allow direct-shipment of wine, it must do so on evenhanded terms. Without demonstrating the need for discrimination, New York and Michigan have enacted regulations that disadvantage out-of-state wine producers. Under our Commerce Clause jurisprudence, these regulations cannot stand."*

[11]   544 U.S. 460, 484-485 (2005) and 544 U.S. 460, 514 (2005) (Thomas, J., dissenting).

through other channels.[12] The second argument rested on the loss of tax revenue. The Court

found that the tax revenue loss was likely not substantial, arguing that other states provided for

some sort of direct ship from out-of-state wineries. Further, the Court argued that as New York

relied on wholesalers to collect taxes and in the Court's opinion the wholesalers were tantamount

to a state monopoly.[13] The concluding remarks did, however, suggest more work needed to be

undertaken on the tax collection issue.

Interstate Commerce in Other Products

Granholm v Heald stands as one of the Supreme Court's most stringent rulings of the

Twenty-First Amendment to date. While the evidence the Court rested on for rejecting the teen

consumption increase is based on behavior studies, the assertion that there is little leakage from

tax revenue collections presents a need for economic analysis.

The Court in *Granholm* rejected the argument that tax collections would decline, but did

confirm that the states had the authority to collect taxes in both *Scripto, Inc. v. Carson* and *Tyler

Pipe Industry v. Washington Dep't of Revenue.*[14]

Tax collection mandates for interstate ammunition shipments upholds the importance for

states to maintain control over product flows. The Bureau of Alcohol, Tobacco and Firearms in a

2004 report confirms that it is the burden of the state to collect taxes from the consumer, in effect

mandating the reporting of taxes for interstate ammunition sales.[15] Rudolph (2008) shows that

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[12]   The Court's opinion was based on behavioral studies that provided significant data that underage drinkers
         would seek instant gratification before waiting and dealing with the complexity of ordering online.
[13]   Justice Thomas wrote the main dissent on the grounds that the 21st Amendment's scope in granting
         absolute power to states meant that no interpretation was necessary and that Congress had authorized
         discriminatory state laws when it passed the Webb-Kenyon Act, which has language substantially the same
         as the Amendment.
[14]   362 U.S. 207 (1960) and 483 U.S. 232 (1987). Where *Scripto* upheld states' ability to require out-of-state
         wholesalers without offices or infrastructure in a state to bear responsibility for tax collections, and *Tyler*
         affirmed states' ability to tax out-of-state wholesalers without any property or employees in state.
[15]   The ATF was also granted further ancillary mandates regarding the enforcement of interstate cigarette tax
         collection from Internet sales under the Jenkins Act (see below.)

interstate ammunition sales are only permitted under state licensing guidelines. In comparison to

direct shipment of beverage alcohol from wineries, the Commerce Clause upholds the ability of

the state to require licensing for tax collection and control, short of restricting interstate sales.

Direct-ship tobacco sales have been particularly problematic for state tax collections, as

many sellers and consumers do not report tax due. Cross-border sales from other states where

taxes are lower or from state-tax-exempt Native American reservations have had a significant

impact on tax collections.[16] Goolsbee and Slemrod (2004) found that the tax increases of 2001-

2003 would have generated about 25 percent more revenue had the Internet merchants not

existed, with some state estimates as high as 40 percent.[17] The study showed that tax increases

from 1990-2000 had led to declining rates of consumption but tax receipts fell more sharply with

the rise of Internet sales than they did singularly from rising tax rates. Even with the passage of

the Jenkins Act to strengthen tax collection, the Government Accountability Office (2002) found

that states utilizing the resources provided to them still failed to collect the total revenues lost

through out-of-state vendor sales in-state.[18] Even so, the Supreme Court held in

Rowe v. New Hampshire Motor Transport and *Hemi v. New York City* [19] that Internet tobacco

sales have legitimate protections under Commerce Clause guidelines and thus as for the case of

direct-ship wine, had found less than substantial burden of proof of revenue leakage.

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[16]   See Fleenor, Tax Foundation Background Paper No.31, 1999.

[17]   Goolsbee and Slemrod found in their estimates that the elasticities were negative as Internet sales increased
versus declining revenues and concluded that tax revenue leakage was significant based on increasing
usage of the Internet for tobacco purchases.

[18]   The Jenkins Act was an attempt to reconcile the various state tax collection policies for Internet direct-ship
tobacco sales by extending enforcement authority to the ATF for tax collection. With respect to direct-ship
wine, there were no further provisions made to reconcile tax collection inter-state given the similarities in
the two industries and collections issues.

[19]   552 U.S. 06-457 and 08-969: *Rowe* affirmed Internet cigarette sales transportation rights under Commerce
Clause provisions against undue taxation procedures. *Hemi* was argued on grounds of collusion and
racketeering by City government.

Further analysis of a state's ability to utilize regulation when dealing with interstate commerce issues prevails in Internet-related commerce. Armond (2001) addressed state Internet regulation under the "dormant Commerce Clause" provision rendered by the Court since *Ogden v. Gibbons.*[20] Citing *American Libraries Association v. Pataki,*[21] Armond details the Court's opinion on four points used to test whether a state statute harmed interstate commerce.[22] The restriction of material by a state through statute directly constitutes a violation of Commerce Clause guidelines but since *American Libraries,* the Court may have to consider the loss of sales tax revenue due to online commerce as district courts have ruled in favor of states' ability to impose sales taxes over on-line purchases.[23] The Court further ruled that states mandating out-of-state retailers to be responsible for tax collections created an undue burden to business. The result has been a complicated, multiple collection schedule across the states and has spurred the passage of the Sales Tax Fairness and Simplification Act which provides for on-line sellers to collect sales taxes for the state to which products are shipped.[24] This recognition from the federal government acknowledges that tax leakages exist when out-of-state retailers are allowed to directly sell products to consumers.

The National Conference of State Legislatures has analyzed the realized loss to states along the borders where sales taxes were lower in neighboring states in multiple studies. Revenue leakage was observable as consumers displayed a propensity to shop out-of-state in the lower-tax or sales-tax-free border towns. Revenue leakages have been estimated at an average of

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[20] 22 U.S. 1 (1824)

[21] 969 F. Supp. 160 (S.D.N.Y. 1997).

[22] One of the key tenets in the opinion rendered was the scope of the state to regulate business that wholly occurs outside the state's borders. By the Court's previous precedent, the assumed windfall in tax revenue for Michigan and New York would have not met the Court's four points.

[23] After a recent 2nd District Court ruling over New York State imposing sales tax on Amazon orders shipped into the state, the scope of state tax collection under the dormant Commerce Clause provisions will likely go before the U.S. Supreme Court.

[24] This bill is still under legal challenges on grounds of undue business hardships.

4 percent of total sales tax collections.[25] Vedder (1993) estimated Oregon's imposition of a 5

percent sales tax in the mid 1990's would cost $3 billion annually in state revenue. Card et al

(1992) study of states in New England found that higher sales taxes in Connecticut and

Massachusetts led to hundreds of millions of dollars in lost revenue and significant job losses

from consumers shopping in neighboring New Hampshire, Maine and Vermont. The steepest

declines in revenues were from excise-tax sensitive goods like cigarettes, beer and spirits. This

again confirms that revenue leakages are directly associated with the consumer having the ability

to avoid state taxes by making purchases in other markets.

A study by the Tax Foundation (1999) found leakage from excise revenues when

consumers are able to switch beer purchases to out-of-state markets. On average, about 15

percent is lost from cross border shopping in states with higher excise taxes.[26] The data from the

various literatures confirms that the tax revenue loss from interstate commerce represents a

significant threat to the state's ability to manage collection structures.

Data and Description of Model

The interstate demand model for the wine industry was developed by the New York City

based consulting firm, John Dunham and Associates, for the Wine and Spirits Wholesalers of

America, a Washington DC based trade group. The model was first completed using data from

2005, and was later updated with data from 2008. While the two model years span the period

during which the *Granholm* decision was being implemented, it should not be taken as providing

any causal relationship as to the individual effects of the court decision.[27]

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[25]   Data based on analysis of the National Conference of State Legislatures. (need full cite here)
[26]   Based on analysis of Tax Foundation data from 1999.
[27]   *Granholm* is not included as a predictive factor in the model; however, the level and nature of interstate
wine sales are predicted by the model.

This model is designed to measure cross-border sales of wine (table, strong, vermouth, and coolers) among the 50 states and the District of Columbia, motivated by price differentials resulting from different tax rates, pricing and regulations. The model estimates in-state demand of own-state taxed sales of wine, exports to and imports from other states. Using these changes, the model calculates the impact on in-state taxable sales, tax revenues and economic impact given a potential tax increase or change in direct shipment laws in one or more states.

The general model is a two-stage estimation of a demand equation linked to a non-linear programming model of import and export patterns and was constructed in 2005. Data on wine sales and prices in the individual states had to be derived based on available sources including *The Wine Handbook*, and the *2004 State Data Book*.[28] Since source materials are limited, many of the main variables used in the model had to be derived separately. In fact, both volume and price data are not directly available, and these are the most important factors driving sales differentials.

The first step in developing the model is creating an estimation of demand for a standardized unit of "wine" in each state. This is based on a weighted average of table wine, "wine coolers", champagne/sparkling wine, "dessert and fortified wine", and vermouth and aperitif wines.[29]

The only source available with volumes in each state by each beverage type is the *Wine Handbook*, produced by Adams Media. Values for "consumption" by state for 2003 are the basis for the weights.[30] Volumes by type in each state were divided by 0.8734 to bring all volumes to 2005 levels which are estimated to be 295,682,659 9-liter cases – reflecting the 703 million

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28   *Wine Handbook 2004*, Adams Beverage Group, Norwalk, CT, 2004 and *2004 State Data Book*, Distilled Spirits council of the United States, Office of Economic and Strategic Analysis, 2005.

29   This is because tax rates (and as such prices) vary for all of these product categories across states.

30   We later found that what Adams reports as consumption is really shipments to wholesalers. We later had to modify our volume data; however, we continue to use these shipment numbers for the price calculations.

gallons of wine that the Wine Institute says was purchased by consumers in 2005.[31] All wine

types were adjusted using the same factor.

Calculating an average price in each state was slightly more complicated. The Wine

Institute claims that total wine sales in the United States in 2005 were $26 billion.[32] We used

this number as the basis for our analysis. The Wine Institute also published sales figures and

volumes for California wines by retail price range.[33] Using these, we can calculate volumes and

average winery price by category range. These calculations are presented in Table 1 below.

Table 1
Estimate of Winery Sales Volumes and Dollars

Range	9 Liter Cases (Millions)	Winery Price (Millions of $)	$/Per Liter	Percent of Volume	Total Estimated Volume Liters	Total US Winery Sales ($)
Over $14	20.5	$2,640	$14.31	12.42%	330,426,715	$4,728,057,058
$7-$14	37.6	$2,350	$6.94	22.77%	606,050,950	$4,208,687,154
$3-$7	54.5	$1,740	$3.55	33.01%	878,451,510	$3,116,219,425
$2-$3	6.6	$120	$2.02	4.00%	106,381,284	$214,911,684
Under $3	45.9	$730	$1.77	27.80%	739,833,474	$1,307,379,414

Based on these values, we were able to calculate a weighted average price for wine in

each state. In doing this we made the following assumptions: All vermouth and aperitif wines

would sell for a winery price of over $14 per gallon, half of champagne and sparkling wines

would sell for a winery price of over $14 per gallon, the remainder would sell for between $7

and $14 per gallon, wine coolers would sell for $2 to $3 per gallon, table wines would reflect the

California distribution, adjusted for the other products.

Since the winery price should include all manufacturers' markups and the federal excise

tax, winery prices in each state would be the weighted average of the above products and price

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31   See: *Wine Consumption In The U.S.*, The Wine Institute, June 2006, at:
         www.wineinstitute.org/industry/keyfacts/ us_wine_consumption.php. The data from Adams were adjusted
         so that the total volume (gallons) would equal the appropriate Wine Institute valuations in 9 liter cases.
32   See: *2005 California Wine Sales Continue Growth Trend As Wine Enters Mainstream U.S. Lifestyle*, The
         Wine Institute, April 3, 2006. On-line at: www.wineinstitute.org/industry/statistics/2006/wine_sales.php
33   Ibid.

categories. These "winery" prices were then adjusted to reflect state excise taxes, and a wholesale/retail markup of either 14.236 percent (the national average), or the specified markup in control states. Retail markups of 150 percent on on-premise sales and 30 percent on off-premise sales were then added to the weighted average (all-in) wholesale prices.[34] These calculations produce an average retail price across all states and categories of $9.77 per liter.

Other variables that we used in the analysis and their expected signs were:

Population: Reflects the 2004 population in each state over the age of 21. This variable is expected to have a positive influence on overall demand – in other words, the more drinking age people in the state, the more wine would be consumed.

Wineries (Adjusted): The number of wineries in each state. This is based directly on data provided to John Dunham and Associates, by Dun & Bradstreet, Inc. as of July 2006. Dun & Bradstreet data is recognized nationally as a premier source of micro industry data. The D&B database contains information on over 15 million businesses in the United States.[35] 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, warehouse and sales office would have three facilities, each with separate employment counts. Since this is facility count data it was adjusted to reflect the fact that about 70 percent of wine production in the US occurs in California. As such, the winery data were adjusted to place 70 percent of facilities (about 2059) in that state. The number of wineries is expected to have a positive influence on overall demand reflecting a greater understanding and acceptance of the product in states where it is produced.

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[34]   Retail margins based on the IMPLAN Input-Output model.   On-premise share from *The Wine Handbook*.
[35]   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.

Percent of Population with A College Degree or Higher: This represents the

percentage of the population aged 25 or higher with at least a BA degree. Data are from the

Bureau of the Census and compiled by Caliper Corporation. This variable is expected to have a

positive influence on demand – the more educated a population, the greater the consumption of

wine.

Number of Cruise Ship Passengers: In doing the initial analysis the state of Florida

had a very high number of shipments to distributors in relation to estimated demand. This could

be due to a number of factors but two are particular to the state of Florida. First, Florida has a

large share of duty-free sales – a factor that also seems to be reflected in shipments along the

Canadian border (see below). Also, Florida is home to over 62 percent of the nation's cruise

ship passengers. Since beverage alcohol is likely as important as fuel on most cruise ships,[36] this

may be an important factor in overall demand as reflected in shipments to wholesalers. Total

cruise ship embarkation data were added to the analysis. Data come from the International

Council of Cruise Line's 2004 economic impact analysis.[37] This variable is expected to have a

positive influence on overall demand in a state.

Canada Border Dummy Variable: As was the case of Florida, the States of Idaho and

Montana had particularly high shipments in comparison to initial estimates of demand. A

dummy variable for small population states bordering Canada was therefore included. In this

case, a small population state like Idaho would be providing wine products to a larger population

in southern Alberta or British Columbia. This variable is expected to have a positive influence

on demand, reflecting the greater population area being served by local retailers and wholesalers.

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[36]   This analyst knows from personal experience!
[37]   *The Contribution of the North American Cruise Industry to the U.S. Economy in 2004*, BREA, August
        2005. On-line at: www.cruising.org/Press/research/2004_economic_study.pdf

Percent of the Economy from Tourism: Total demand for wine in a state will be driven by both the local population and by visitors. The case of Utah is a perfect example. Most of the population of Utah (over 72 percent) is of the Mormon faith. Mormons tend to abstain from drinking alcohol and the high prices and sales restrictions in Utah reflect this fact. However, Utah is also home to some of the nation's largest ski areas, and a number of important national parks. These facilities would obviously have beverage alcohol consumption patterns that would be different than the general population of the state. The same could likely be true for states like Idaho or Colorado. This variable should have a positive influence on demand.

Direct Ship Dummy Variables: A series of variables was established to allow for the effect of direct shipments by local retailers or wineries to other states. Four variables were created reflecting specific states. They are listed in the table below.

<p align="center">Table 2
States by Direct Shipment Restrictions (2005)</p>

Direct Out	Direct In	Non-Direct In	Non-Direct Out
Texas	Minnesota	Kansas	Pennsylvania
Virginia	Missouri	Vermont	
California	Colorado	Maryland	
Oregon	Nebraska	Tennessee	
Washington	North Dakota	Oklahoma	
New York	Louisiana	Kentucky	
	Ohio	South Dakota	
	Michigan	South Carolina	
	Wisconsin	Indiana	
	District of Columbia	Georgia	
	Alaska	New Mexico	
	Wyoming	Montana	
	Hawaii	Mississippi	
	Connecticut	Rhode Island	
	North Carolina	Arkansas	
	Florida	Delaware	
	Iowa	Utah	
	West Virginia	Maine	
	Arizona	Alabama	
	New Hampshire	New Jersey	
	Idaho		
	Illinois		
	Nevada		
	Massachusetts		

Four separate dummy variables were included and as is necessary for regressions with classified dummies, only three were included in the analysis – the fourth being considered the base case. The first variable labeled **Direct Out** consists of those states that allow for direct ship, and also have large in-state wine production industries. These are states with at least 40 wineries.[38] The second dummy variable, labeled **Direct In** consists of those 24 states that allow for direct ship, but have only limited in-state wine production. The third dummy, labeled **Non-Direct In** consists of those states that do not allow for direct ship and have limited wine production. The last dummy, **Non-Direct Out** consists solely of the state of Pennsylvania. As a control state with state monopoly control of all retail distribution, Pennsylvania does not allow for the direct shipment of wine, however, it is also a large wine producing state. The "Direct" variables are assumed to have a positive influence on overall sales, the "Non-Direct" are assumed to have a negative effect.

These variables were regressed against a proxy for supply from *The Wine Handbook*, and the *2004 State Data* Book, put out by the Distilled Spirits Council of the United States (DISCUS).[39] We initially used *The Wine Handbook* data as a proxy for demand; however, the model could not solve, reflecting the fact that shipments to distributors do not necessarily match sales in a given state. Therefore, the percentages from the DISCUS publication (where available) were applied to total shipments from *The Wine Handbook*. The resulting product serves as a proxy for sales in each state.

The results of a multiple linear regression analysis are shown below.[40]

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[38]   Adjusted winery data – see above.
[39]   *Wine Handbook 2004*, Adams Beverage Group, Norwalk, CT, 2004 and *2004 State Data Book*, Distilled Spirits council of the United States, Office of Economic and Strategic Analysis, 2005.
[40]   The regression had an adjusted R-squared statistic of 0.942 and an F-statistic of 144.6219, suggesting that the equation explained 94 percent of the variance between the states, and was statistically significant. Much of the predictive power of the equation is due to dummy variables which is problematic. Only the

Table 3
Regression Results

Variable	Coefficient	t Stat	P-value
Intercept	86,282.22		
Price	(375,189.68)	(3.466)	0.001
21 + Population	1.08	13.621	0.000
Adjusted Wineries	8,776.28	9.312	0.000
College or higher	121,251.83	3.550	0.001
Cruise	1.21	3.613	0.001
Canada	623,477.24	0.916	0.365
Tourism	13,704,912.76	1.390	0.172
Direct Out	1,341,242.28	1.058	0.296
Direct In	356,590.52	0.323	0.748
Non Direct In	146,413.65	0.136	0.893

The resulting equation is shown below.

Sales = 86,282.22 - 375,189.68(Price) + 1.08(Population) + 8,776.28(Wineries) + 121,251.83 (College Grad Rate)

+ 1.21(Cruise) + 623,477.24(Canada) + 13,704,912.76(Tourism-.63) + 1,341,242.28(Direct Out) +

356,590.52(Direct In) + 146,413.65(Non Direct Out)

All of the signs of the coefficients are what we expected except for the **Non-Direct In**

dummy variable which we thought would be negative. The equation suggests that even those

states that do not allow for direct shipment will have higher sales than the base state of

Pennsylvania.

In short, the analysis suggests that demand in a state would equal 86,282 9-liter cases just

because a state is a state. For every dollar the average price in the state rises, sales will fall by

nearly 375,200 cases. Each additional person above the age of 21 will increase sales by just over

1 case. States with more wineries (particularly California) will see sales increase by 8,776 cases

for each additional winery. In addition, the level of education in a state will positively impact

tourism variable was not significant at the .10 level; however, this variable was kept in the analysis and
used to create an intercept point of 86,282 cases based on the minimum value. The tourism coefficient was
applied to the differential between a given state's tourism percentage and the minimum providing a floor
value for sales.

sales, with an increase of 121,250 cases for each additional percentage of the population with a college degree.

Tourism is also a very important factor in the level of wine sales, particularly cruise ship tourism. Sales will increase by 1.2 cases for each additional cruise passenger embarking in a given state. The actual variable for **Tourism** is somewhat problematic – reflecting both the nature of the tourism variable and the relative importance. The measure of tourism used in this analysis is equal to the percentage of Gross State Product coming from the amusement and accommodation industry. There is not a great deal of variation between the states in this variable (except for Nevada where almost 15 percent of the economy comes from tourism) and in many ways, it is reflecting the "base sales" of wine in a given state. We attempt to control for this by pulling an intercept out of the equation based on the minimum level of tourism, however, the coefficient is still rather large and not statistically significant. That said, our equation predicts that sales rise in states with higher degrees of tourism.

The Canada dummy variable has the proper sign and a fairly large value (nearly 623,500) meaning that those states along the northwestern tier generally gain significant sales from Canadian shoppers.

Finally, the model includes three dummy variables representing the "direct sales status" of each of the states. The states that allow for direct ship all have positive coefficients on their dummy variables, suggesting that by allowing for direct shipments of wine, the state increases overall sales; however, the same is also true for states that do not allow for direct shipment. Those states that would be considered to be *wine exporting states*, namely those with significant production,[41] should see sales increase by over 1.34 million cases. This is likely a California

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[41]   California, Washington, New York, Oregon, Virginia and Texas.

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effect which will be controlled for in the subsequent model. States that allow for direct ship but are not significant producers should see sales rise by 356,590 cases. Interestingly, the model also has a positive coefficient for the non-direct ship states. This is likely because the base case dummy (non-direct exporting states) includes only Pennsylvania. Pennsylvania has a high degree of control in wine sales and distribution, and as such has fairly high prices. Significant sales occur in the border areas of this state and as such, overall wine sales are likely depressed relative to any predicted level. As such, the base case for the model (that with no direct ship dummy variable) is likely to be low, giving this variable a positive coefficient.

The Cross-Border Demand Model:

A non-linear programming model is used to determine consumption and trade patterns based on the expected values developed above. The model contains a series of matrices that are multiplied together to produce a trade flow matrix. The first matrix is a distance matrix that contains adjusted centroid distances among all 51 states. These are adjusted by a function that "stretches" the actual distance.[42] In addition, the following adjustments are made reflecting the "ease" of travel between state pairs:

- States in the North Eastern Region: all distances are multiplied by 1.5.

- South Atlantic states: distances are multiplied by 1.05.

- East North Central states are as is.

- Western South Central, East South Central, and Pacific states: distances are multiplied by 0.9 except for AK and HI.

- West North Central states: distances are multiplied by 0.8.

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[42]   Generally the model is solved by adjusting this factor; however, since the sales data being used is suspect, we set this to a fairly high distance to encourage trade. This model adjusts the "sales" data to solve for this system.

- All distances to Montana are multiplied by 0.7.

- The distances were not provided for AK and HI therefore approximations are used. Hawaii is 3000 miles away from the West region and its distance to other states outside the west region is estimated by adding 3000 to the distance between a given state and the western states. The same method is applied to Alaska, which is approximately 2525 miles away from the Western states.

The next matrix contains population data – given price differentials and distances between states, the volume of trade is adjusted by the number of people living in a state. The fourth matrix contains the price differentials between each state pair, and the last matrix is a calculated matrix containing expected consumption and trade patterns. The import (or export) values in this matrix are calculated according to the formula:

$$\text{Import}_{(ij)} = \text{Price}_{(ij)} * \text{Pop}_{(i)} * 1/(1+\text{EXP}^{(-U*\text{Distance}(ij))})$$

where i denotes the importing state and j is the exporting state. Price(ij) is the price differential, Pop(i) is the population of the importing state, and distance ij is the distance between the pair. The term u is the parameter to be estimated for the distance function in the shape of a sigmoid.

A bounded solution is obtained through the use of an iterative "solver" program. Again, in the case of this model, where we are not sure that the "sales" data are accurate, rather than adjusting the "stretch" between the states, we hold that constant (u = -16.719) and adjust the state sales to solve to demand.[43]

The 2008 update of the model begins with the structure described above. New data for population were obtained from the Bureau of the Census. In addition, new price and volume estimates were developed as part of the Economic Impact Analysis of the Wine Industry,

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[43] This value for µ is about double that of other models that we have conducted for similar industries.

developed for the Wine and Spirits Wholesalers of America by John Dunham and Associates (2009). These volumes and prices reflect total wine industry sales adjusted for excise taxes. Sales are distributed across states based on data from the Distilled Spirits Council of the United States, and the Alcohol and Tobacco Tax and Trade Bureau of the US Department of Treasury, as well as data from the Internal Revenue Service.[44] States allowing for direct ship were also updated, as were the number of wineries (which is used to distribute state unallocated sales).

Total 2008 data were taken from the IRS excise tax data and distributed across products based on TTB reported volumes through September. State volume distributions and pricing were based on the DISCUS volume percentages.

Once the data in the model were updated, the trade matrices were reconstructed using a bounded solution obtained through the use of an iterative "solver" program. Since we are basing the 2008 update on the earlier 2005 model, we simply adjust the "stretch" between the states by modifying the μ coefficient. This increases it slightly to $\mu = -17.500$, which slightly reduces overall interstate trade.

Results and Interpretation

The solved model for 2005 suggests that about 6.2 percent of wine sales are due to some form of cross-border trade – that is sales in one state made to consumers in (mostly) surrounding states, or sales that are not reflected in the state excise tax systems. States with relatively high prices like Pennsylvania, Ohio, Alabama and New Hampshire, import wine in from other states. Others with lower prices, like New York, Washington DC, and Vermont export wine to surrounding states. Appendix A shows estimated exports and imports by state for 2005. Of this,

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[44]   *2007 State Data Book*, Distilled Spirits Council of the United States, Office of Economic and Strategic Analysis, 2008, *Statistical Report – Wine (September 2008)*, US Department of Treasury, Alcohol and Tobacco Tax and Trade Bureau, March 2009, *SOI Bulletin Historical Table 20*, US Department of Treasury, Internal Revenue Service.

only a tiny percentage (just 85,700 cases appears to be outside of the excise tax system completely, and much of this is likely due to sales on military bases or Native American reservations).

By 2008, the volumes had grown substantially. In total, about 11.5 percent of sales were now being sold through cross-border channels, with nearly 84 percent of this not being taxed at the state level. In other words, the market for wine not entering the state excise tax system increased to 9.6 percent of the total or about 32.8 million cases. Since prices and excise tax rates did not jump considerably during this three year period, it is likely that much of this is due to increased direct shipments of wine from producers to consumers. Table 4 below shows total wine sales volumes, interstate trade estimates and untaxed sales for both years.

Table 4
Wine Sales by Market

	2005		2008		Change	
	Volume	Percent	Volume	Percent	Volume	Percent
Total Sales	276,360,152	100.0%	342,809,936	100.0%	66,449,784	24.0%
Total Cross Border	17,124,888	6.2%	39,282,655	11.5%	22,157,768	129.4%
Not Taxed by any State	85,720	0.0%	32,822,127	9.6%	32,736,407	38189.8%

Based on this model it is not possible to know what percentage of the "unallocated" sales are being direct-shipped from one state to another because our initial "sales" data are skewed by the inclusion of shipments to wholesalers with multi-state territories. We do know, however, that certain states appear to be large exporters of product. These include New Jersey, New Hampshire, New York, Massachusetts, Illinois and Florida. Others, particularly Texas and Washington DC appear to be large importers.

Conclusions

Based on the analysis, there is likely significant leakage of revenue due to the accessibility of direct-ship wine. Producers at some wineries appear to be paying excise taxes

only for sales occurring within their home state. At the same time, consumers appear to be

failing to comply with use tax requirements in their states. The lost revenue is not accounted for

by either the producing or the receiving state. In general, we found that the casual cross-border

trade in wine outside of normal distribution channels is very small – probably less than 2 percent

of the total wine market. In addition, it is likely that as many as 32.8 million cases or 9.7 percent

of sales are purchased outside of the three-tier system. In other words, according to the model,

most of the growth in interstate sales has come at the expense of state tax authorities.

Since the Supreme Court left open the argument that states could be losing excise tax

revenues because of *Granholm* for further study, it opened the debate for wineries and

consumers to bring suits against state regulatory structures. Implicitly, it allows some less-than-

scrupulous wineries a way around state collection structures and the associated cost of business.

For consumers, it provides an outlet for tax evasion to access a product that states have been

explicitly granted the right to regulate for revenue purposes under the Twenty-First amendment.

The tax revenue loss is observably significant for a wide variety of products and the data

analyzed indicates wine is not an exception.

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Appendix A
Demand and Supply for Wine

State	Estimated Demand	Wholesale					Sales			
		Adams	Unallocated	Adams Plus Unallocated	Unallocated Percent		In State	Imports	Exports	Total
AL	1,317,322	2,277,900	(1,061,213)	1,216,687	-47%		1,216,687	100,635	0	1,317,322
AK	317,392	660,650	(343,258)	317,392	-52%		317,392	-	-	317,392
AZ	4,234,206	5,133,365	(898,154)	4,235,211	-17%		4,234,704	8	507	4,234,206
AR	906,147	1,046,650	(139,276)	907,374	-13%		906,462	596	912	906,147
CA	46,184,926	46,067,360	119,869	46,187,229	0%		46,186,077	1	1,152	46,184,926
CO	4,783,045	4,815,200	(30,921)	4,784,279	-1%		4,783,662	0	617	4,783,045
CT	3,756,324	4,771,700	(966,341)	3,805,359	-20%		3,767,511	26,662	37,848	3,756,324
DE	397,411	1,220,380	(836,705)	383,675	-69%		379,365	22,356	4,310	397,411
FL	18,611,323	20,587,700	(1,976,708)	18,610,992	-10%		18,609,195	3,925	1,797	18,611,323
GA	6,010,494	5,890,100	227,345	6,117,445	4%		6,061,371	5,197	56,074	6,010,494
HI	1,667,493	1,567,430	100,063	1,667,493	6%		1,667,493	-	-	1,667,493
ID	315,774	1,202,100	(886,613)	315,487	-74%		315,474	313	13	315,774
IL	9,809,455	11,352,900	(1,481,629)	9,871,271	-13%		9,837,330	6,067	33,941	9,809,455
IN	3,971,413	3,578,600	641,414	4,220,014	18%		4,095,582	263	124,433	3,971,413
IA	753,852	1,164,300	(439,660)	724,640	-38%		724,640	29,212	0	753,852
KS	2,361,053	1,081,520	1,281,896	2,363,416	119%		2,362,187	96	1,229	2,361,053
KY	2,345,437	1,683,500	724,648	2,408,148	43%		2,375,921	1,743	32,227	2,345,437
LA	3,506,772	3,041,900	473,299	3,515,199	16%		3,510,910	152	4,289	3,506,772
ME	660,187	1,410,500	(745,180)	665,320	-53%		662,725	57	2,595	660,187
MD	5,241,943	4,753,000	1,389,784	6,142,784	29%		5,690,879	2,969	451,905	5,241,943
MA	6,498,586	9,609,500	(2,930,900)	6,678,600	-31%		6,565,550	46,087	113,051	6,498,586
MI	7,590,960	7,174,290	437,677	7,611,967	6%		7,600,054	2,819	11,913	7,590,960
MN	5,216,675	3,853,950	1,372,995	5,226,945	36%		5,221,604	412	5,341	5,216,675
MS	1,080,967	888,860	210,202	1,099,062	24%		1,088,175	3,679	10,887	1,080,967
MO	4,787,790	3,946,400	856,447	4,802,847	22%		4,795,318	0	7,529	4,787,790
MT	1,054,263	822,200	232,120	1,054,320	28%		1,054,291	1	29	1,054,263
NE	1,085,362	825,890	259,961	1,085,851	31%		1,085,406	400	445	1,085,362
NV	3,216,151	3,591,100	(370,465)	3,220,635	-10%		3,217,832	1,122	2,803	3,216,151
NH	787,645	2,409,100	(1,823,293)	585,807	-76%		585,807	201,838	-	787,645
NJ	7,584,503	11,421,000	(3,558,409)	7,862,591	-31%		7,688,660	69,773	173,930	7,584,503
NM	891,007	1,182,200	(291,420)	890,780	-25%		890,777	233	3	891,007
NY	17,603,093	20,335,900	(1,983,919)	18,351,981	-10%		17,977,537	-	374,444	17,603,093
NC	6,038,097	6,079,630	301,177	6,380,807	5%		6,207,844	3,215	172,963	6,038,097
ND	1,032,967	292,600	740,535	1,033,135	253%		1,033,031	41	105	1,032,967
OH	7,609,791	6,653,450	759,679	7,413,129	11%		7,413,104	196,711	25	7,609,791
OK	1,970,144	1,422,380	548,770	1,971,150	39%		1,970,246	802	904	1,970,144
OR	4,270,929	4,540,470	(259,541)	4,280,929	-6%		4,275,922	15	5,007	4,270,929
PA	8,676,195	7,672,330	235,420	7,907,750	3%		7,902,738	778,468	5,012	8,676,195
RI	793,934	1,486,060	(667,728)	818,332	-45%		804,478	3,311	13,854	793,934
SC	2,699,829	2,539,860	170,147	2,710,007	7%		2,698,222	13,392	11,785	2,699,829
SD	289,542	324,100	(34,711)	289,389	-11%		289,374	184	16	289,542
TN	3,975,276	2,772,970	1,262,604	4,035,574	46%		4,000,895	9,061	34,679	3,975,276
TX	16,920,298	12,791,300	4,128,156	16,919,456	32%		16,919,428	898	29	16,920,298
UT	133,037	847,060	(717,520)	129,540	-85%		129,540	3,497	-	133,037
VT	1,529,577	863,350	737,260	1,600,610	85%		1,561,868	6,450	38,741	1,529,577
VA	6,820,787	6,714,300	(292,253)	6,422,047	-4%		6,418,655	405,525	3,392	6,820,787
WA	7,110,918	7,495,750	(389,699)	7,106,051	-5%		7,106,038	4,892	12	7,110,918
WV	176,956	508,105	(318,989)	189,116	-63%		182,102	1,868	7,014	176,956
WI	4,191,654	4,203,200	4,476	4,207,676	0%		4,199,665	0	8,011	4,191,654
WY	19,908	303,340	(283,440)	19,900	-93%		19,898	12	2	19,908
DC	2,994,725	1,372,600	2,021,286	3,393,886	147%		3,193,911	788	199,975	2,994,725
Total	251,803,534	258,250,000	(4,490,716)	253,759,284	-2%		251,803,534	1,955,750	1,955,750	251,803,534

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Appendix B

Loss of Revenue due to Direct Ship in 2008

	Direct Ship	Percent of "Imports"	Lost Revenues
AL	-	0.00%	$ -
AK	130.93	21.64%	$ 327.33
AZ	6,915.64	2.85%	$ 5,809.14
AR	-	0.00%	$ -
CA	152.53	0.41%	$ 30.51
CO	241.62	3.50%	$ 77.32
CT	13,981.54	2.89%	$ 8,388.92
DE	-	0.00%	$ -
DC	739.62	22.73%	$ 221.88
FL	6,810.75	2.74%	$ 15,324.20
GA	4,548.00	2.79%	$ 6,867.48
HI	61.06	4.87%	$ 84.26
ID	12,978.27	2.90%	$ 5,840.22
IL	9,087.23	2.80%	$ 6,633.68
IN	523.00	3.09%	$ 245.81
IA	41,396.10	2.91%	$ 72,443.18
KS	277.00	8.70%	$ 83.10
KY	-	0.00%	$ -
LA	253.04	5.78%	$ 27.83
ME	-	0.00%	$ -
MD	-	0.00%	$ -
MA	-	0.00%	$ -
MI	1,600.19	2.72%	$ 816.10
MN	398.34	2.91%	$ 119.50
MS	-	0.00%	$ -
MO	332.88	4.80%	$ 116.51
MT	-	0.00%	$ -
NE	692.10	3.90%	$ 657.49
NV	6,348.02	2.89%	$ 4,443.62
NH	-	0.00%	$ -
NJ	-	0.00%	$ -
NM	1,880.00	2.83%	$ 3,196.00
NY	9,490.87	2.75%	$ 1,803.26
NC	2,523.74	2.93%	$ 1,993.75
ND	141.81	8.29%	$ 70.90
OH	219,039.95	2.91%	$ 70,092.78
OK	-	0.00%	$ -
OR	4,655.21	2.85%	$ 3,118.99
PA	-	0.00%	$ -
RI	3,597.00	2.89%	$ 2,158.20
SC	4,655.00	2.85%	$ 5,027.40
SD	-	0.00%	$ -
TN	-	0.00%	$ -
TX	425.34	2.03%	$ 85.07
UT	-	0.00%	$ -
VT	5,297.00	2.99%	$ 2,913.35
VA	169,912.39	2.91%	$ 256,567.71
WA	19,709.58	2.89%	$ 17,147.33
WV	1,893.18	2.96%	$ 1,893.18
WI	141.40	2.59%	$ 35.35
WY	251.53	4.63%	$ 70.43

Appendix C

2008 Totals of Direct Ship Wine

State	Direct Ship	Percent of "Imports"	Lost Revenues
Michigan	$ 160,019.49	2.72%	$ 81,609.94
New York	$ 949,086.52	2.75%	$180,326.44