Wine Tourism and Hotel and Restaurant Revenue in Walla Walla

by Karl Storchmann[a], Wynn Aulde, Matthew Bingham, Carl Brodersen, Meghan Bunch, Samuel Clark, Kaitlin Coleman, Hayley Hillman, Andrew Jesaitis, Sophia Kittler, Greatjoy Ndlovu, Jia Ooi, Sarah Stellberg, Drew Stillman, Lisa Taylor and Sina Yeganeh

I. Introduction

Wine grapes have been cultivated in Washington State and in the Walla Walla Valley since the mid 1800s (Irvine and Clore, 1997). However, a 'wine industry' did not develop until the mid 1970s when a few pioneer wineries started making premium wine in Walla Walla. In 1984, the Walla Walla Valley was granted "American Viticultural Area (AVA)" status. In the early 1990s, the number of wineries started to increase and has soared since the late 1990s. As of 2007, there are about 100 wineries in the Walla Walla AVA.

According to an article in the Seattle Times, "*wine is pouring money into the valley. While most of Eastern Washington — and the state — struggles with an economic downturn, Walla Walla is enjoying the best economy in the state. Accommodations and eating places, a direct tie to wine tourism, boasted nearly 6,000 jobs in Walla Walla County in the fourth quarter of 2002, with an economic impact worth $18.5 million.*" (Mapes, 2003).

In fact, as shown in Table 1, eating and drinking places as well as hotels exhibit above-proportional growth rates with respect to both employment and annual payroll.[1] While the overall county employment between 1993 and 2002 grew by 7.6%, eating and drinking place employment grew by 14.4%. During the same time, hotel employment increased by almost 40%. Hotel payrolls increased even by 158%, compared to an overall increase of 45%. However despite these growth rates the employment share of the accommodation and food and drinking service industry is still below 10%. Due to below-average wages, the payroll share is even below 4%. This paper wants to examine whether and to what extent the Walla Walla wine industry influenced this growth.

[a] Economics Department, Whitman College, Walla Walla, WA 99362, email: storchkh@whitman.edu

[1] However, given the county's population of approximately 55,000 in 2002, 6000 accommodation and eating place jobs, as claimed in the Seattle Times, appears to be unrealistic.

Table 1

Hotel and Restaurant Employment, Payroll and Establishments in Walla Walla County 1993 and 2002[a]

	1993	2002	Change in %	Share 1993 in %	Share 2002 in %
			Employees[1]		
Total	15800	16995	7.56		
Eating and Drinking Places[2]	1251	1431	14.39	7.92	8.42
Hotels[3]	123	172	39.84	0.78	1.01
			Annual Payroll ($1,000)		
Total	298743	434549	45.46		
Eating and Drinking Places[2]	9296	14620	57.27	3.11	3.36
Hotels[3]	952	2458	158.19	0.32	0.57
			Number of Establishments		
Eating and Drinking Places[2]	87	88	1		
Hotels[3]	16	16	0		

Source: Bureau of the Census (1995, 2004). [a] All figures are nominal. [1] Number of employees for week including March 12; [2] NAICS code 722; [3] NAICS code 72111.

There are numerous studies analyzing the impact of the wine and wine grape industry on local, regional or national economies (e.g., Folwell et al., 1999; MFK, 2001; MFK, 2007). Most of them employ input-output models that aside from the direct effect also compute indirect and induced effects.[2] For instance, a recent study estimated the economic impact of Washington State's wine and wine grape industry at $2.4 billion (MFK, 2001). Although regional input-output models provide very detailed information regarding the proliferation of economic impulses, they draw on a number of major assumptions. (1) The supply of labor and other intermediate resources is not limited so growth does not increase wages or prices, (2) the percent of imported supplies remains constant, (3) household consumption of each item increases proportionally to income, (4) there is no underemployment and (5) no economies of scale, and (6) there will be no substitution between inputs due to price changes. Since most of these assumptions do not hold the impacts are likely to be overestimated.

In contrast to input-output analyses, this study is aimed at quantifying the wine industry's effect on hotels and eating and drinking place revenue only. Secondary effects, although not explicitly modeled, are to a certain extent covered implicitly. We will isolate the wine sector's role regarding the growth of these two industries employing a quarterly cross-

[2] All of these studies use the IMPLAN model which uses input-output tables for over 500 industries on the county level.

section time-series model (panel model) comprising all Washington State counties from 1995 to 2006. Compared to a pure time-series model for Walla Walla county, a panel model has the advantage of also encompassing non-wine counties. Hence, it allows us to separate the impact of wine indicators from universal factors that affect each county, e.g., the time trend. That is, while time trend variables affect all counties to a certain degree, wine-related variables can only affect wine counties.

This paper is organized as follows. Section 2 describes the model and the data. Section 3 compares the results of several models. Section 4 summarizes the main findings results and discusses further research.

II. Economic Trends in Walla Walla County

In contrast to common beliefs, Walla Walla County's prosperity is below the state's average. As shown in Figure 1, median household income lags behind other counties. In 2006, the median household income in Walla Walla county was approximately 70% of the state's average and 62% of King county's income. The gap has widened particularly since 2000, i.e., during the time of assumed wine induced prosperity (Figure 2). In fact, since 2000, real incomes in Walla Walla County have experienced a real decline and, even in 2007, are still 8% below the 2000 figures (Figure 3). .

Figure 1

Median Household Income in Washington State in 2006 by county in $1000

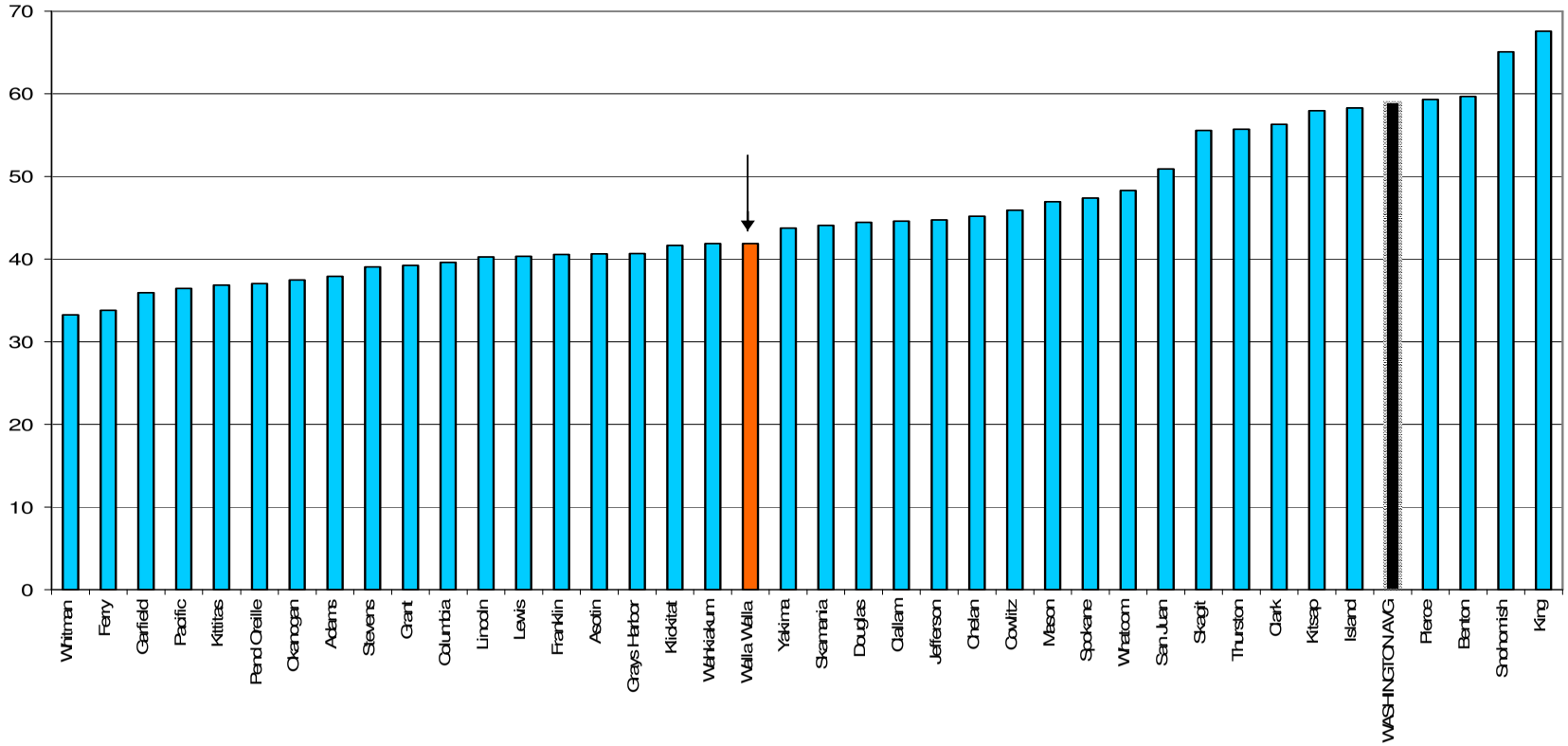


Figure 2

Median Household Income in
King County, Walla Walla County and Washington State 1990 to 2006

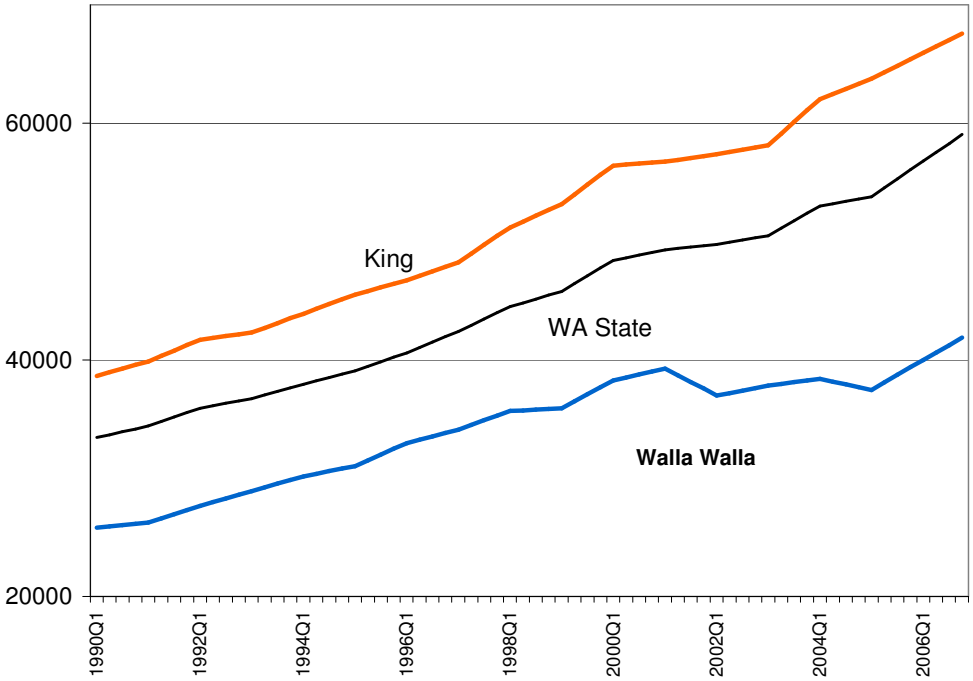
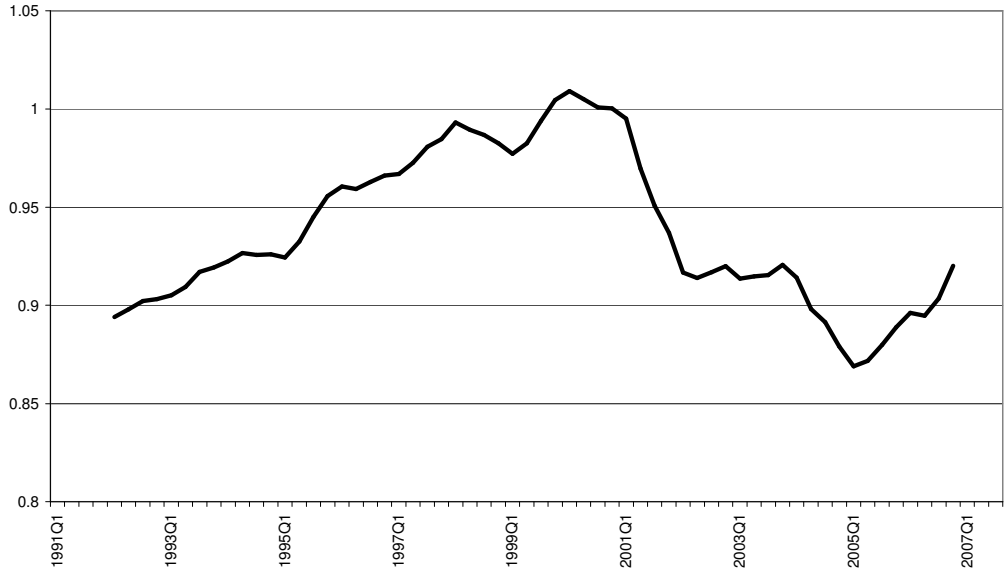


Figure 3

Real Median Household Income in Walla Walla County
1st Quarter of 2000 = 1



The below-average income situation in Walla Walla County is reflected by below-average taxable sales. As reported in Table 2, per capita sales in Walla Walla county are approximately 20% lower than in Benton and Spokane and almost 50% lower than in King county. Many industries, such as retail or service, grow significantly slower in Walla Walla than in other counties. This is especially true for the segments retail and service, as well as for the restaurant sector, one of the suspected beneficiaries of wine induced tourism. Restaurants' nominal revenue growth in Walla Walla has hardly exceeded 1% per quarter.

However, Table 3 also shows above-proportional growth for the finance (banking, insurance, real estate) and the hotel sector, the other potential wine tourism beneficiaries. In fact, with a nominal rate of 2.75% per quarter, Walla Walla's hotel revenue growth rate belongs to the highest in the state. Only Asotin (4.75%) and Wahkiakum (3.07%) counties exhibit stronger growth.

Table 2
Per Capita Taxable Sales In Selected Counties
4th Quarter 2006 in $

	Counties			
	Walla Walla	Benton	Spokane	King
Retail	1330	2214	2218	2779
Services	251	321	399	714
Contracting	519	566	492	953
Wholesale	287	235	317	531
Transportation	103	159	164	260
Finance	61	94	46	79
All	**3169**	**3636**	**3782**	**6162**
Hotel	66	63	82	167
Eating & Drinking Places	217	285	309	499

Table 3

Average Quarterly Growth Rate of Nominal Taxable Sales in Selected Counties [a]

3rd Quarter 1995 to 3rd Quarter 2006

	Counties			
	Walla Walla	Benton	Spokane	King
Retail	1.03	1.61	1.10	1.16
Services	0.14	1.15	0.66	0.81
Contracting	1.55	1.49	0.97	1.74
Wholesale	0.56	-0.56	-0.54	0.81
Transportation	0.94	1.89	1.80	1.02
Finance	2.46	3.77	1.89	1.74
All	**1.23**	**1.53**	**0.89**	**1.00**
Hotel	2.70	1.19	1.14	1.06
Eating & Drinking Places	1.01	1.46	1.09	1.40

[a] Computed by regressing taxable sales on a trend variable and a constant term

III. Model and Data

In order to quantify the impact of the wine industry on restaurant and hotel revenue we employ a formal econometric panel model. The model draws on quarterly taxable revenue data on a county basis. It comprises all 39 counties in the state of Washington for the time period from the 3rd quarter of 1995 to the 3rd quarter of 2006. A panel model has the particular advantage of not only tracing revenue over time but also across counties, wine and non-wine counties alike. Wine induced revenue should, therefore, not only change over time (with the wine variable) but should also vary across counties. Thus, the wine variable should only impact wine counties and leave non-wine counties unaffected.

We estimate real per capita retail revenue R_{it} of each industry, i.e., hotels and eating and drinking places (restaurants), in county i at time t as a function of a vector of socio-economic variables X_{it} and a wine-related variable W_{it}:

$$(1) \quad \ln(R_{it}) = \beta_0 + \alpha \sum X_{it} + \beta_1 W_{it} + \beta_2 C_i + \beta_3 T_t + \gamma \sum Q_t + \varepsilon_{it}$$

The trend variable T captures time effects that are identical for all counties. The fixed effect C_i denotes a county-specific but time-invariant constant term. It captures county-specific characteristics related to the county's geography, climate, infrastructure or socio-economic environment. Since hotel and restaurant revenue follow a pronounced seasonal pattern with peaks in the 2nd and 3rd quarter and troughs in the 1st and 4th quarter, we also included several quarter dummy variables (Q_t).

Nominal taxable revenue by industry and county is provided by the Department of Revenue on a quarterly basis (Department of Revenue, 1996-2007). We computed per capita real revenue by dividing the revenue figures by the county population as provided by the Office of Financial Management (2007) and the CPI for the West (1982-84=100) (Bureau of Labor Statistics, 2007). The Office of Financial Management also provides median income data on a county basis (Bureau of Labor Statistics, 2007).

Wine related data for Washington State, such as wine production or acreage under vines, are available only at the state level. Crush and acreage data on a district or county level, as available for California or Oregon (California Department of Food and Agriculture, 2006 and 2007; National Agricultural Statistics Service, 2007), do not exist for Washington State.

However, we do not assume any positive impact of the sheer quantity of wine produced on local tourism. In fact, we assume that wine tourism is attracted by wine quality rather than quantity. Similar to the impact of producer and regional reputation on wine prices (Landon and Smith, 1998; Schamel and Anderson, 2003; Stanziani, 2004; Noev, 2005) we hypothesize that the regional reputation as high-end wine producing region influences regional (wine) tourism. This paper, therefore, draws on the following reasoning. As a region gets increasingly known for its high quality wine more wine tourists will stream in and the demand curve for local tourist service will shift outwards leading to an increasing quantity consumed, higher prices or a combination of both.

In order to quantify the "regional reputation" we draw on the national wine press. With a paid circulation of more than 200,000 copies per month, the *Wine Spectator* is by far the most widely distributed wine publication in the U.S. In each issue the *Wine Spectator* published the results of (blind) wine tastings and assigns points to wines coming from different regions and different vintages. The *Wine Spectator* employs a 100-point scale where 95-100 points means "classic" (exceptional), 90-94 "outstanding", 85-89 "very good", 80-84 "good", "75-79" mediocre and 50-74 "not recommended." Drawing on the *Wine Spectator Data Base* (Wine Spectator, 2007) we compute a wine point variable for all wines from Washington State by quarter and county. This variable comprises all wines with a minimum score of 91 points. Figure 4a shows the critical point variable for the three dominating quality wine counties in Washington State from 1990 to 2006. Accordingly, especially since the year 2000, Walla Walla County has established itself as the leading quality wine county in the state. In Figure 4b, the number of the wines that received 91+ points are linearly weighted giving more weight to higher scoring wines. Both Figures reflect the fact that Walla Walla not only is the county with the most 91+ point wines. Within this category it also has the highest ranked wines.

Figure 4a

Unweighted Wine 91+ Spectator Points in Walla Walla, King and Benton County

1991Q1 to 2006Q4, moving four quarter sum

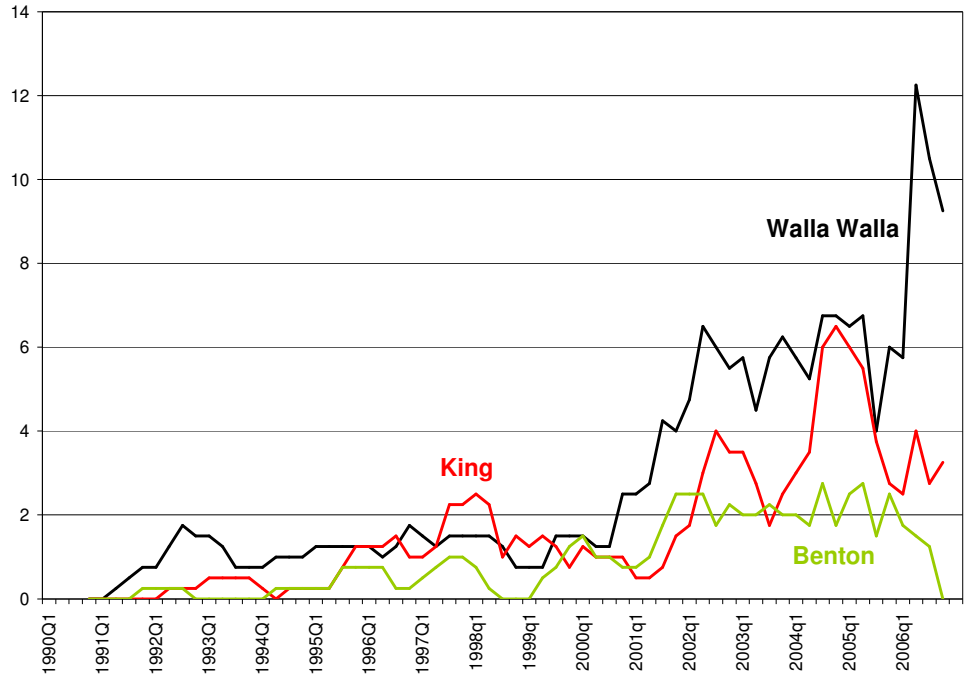
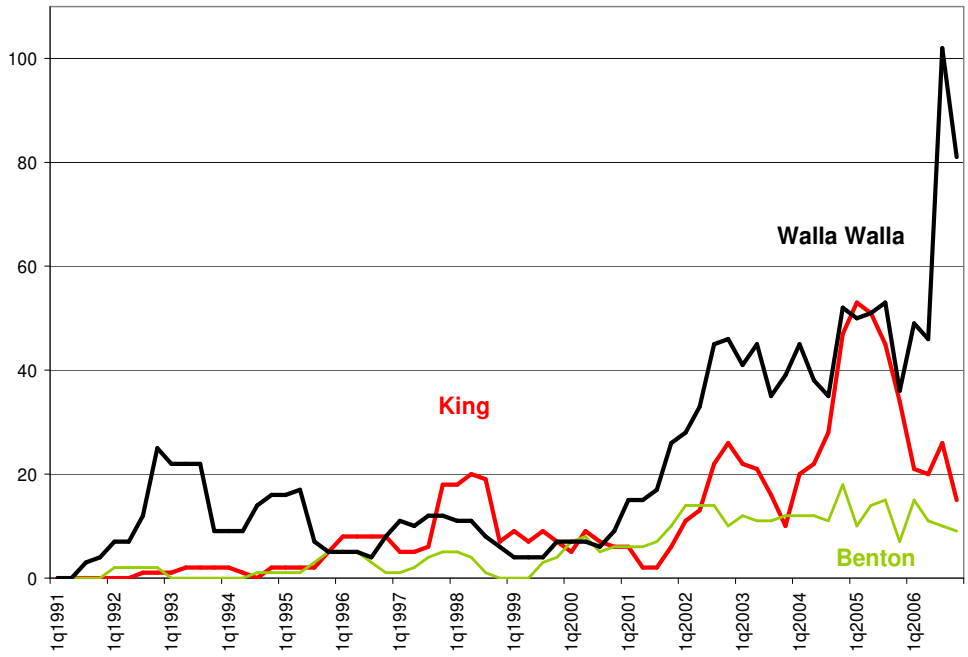


Figure 4b

Weighted Wine 91+ Spectator Points in Walla Walla, King and Benton County

1991Q1 to 2006Q4, moving four quarter sum



Weights 91=1, 92=2, etc.

IV. Results

Table 4 reports the results for the county panel model for Washington State. The dependent variable is real (in 1982-84 prices) per capita revenue for the restaurant and the hotel sector, respectively. The model relies on the wine quality variable, which is computed as the moving four quarter (one year) sum, a trend variable, quarterly dummy variables and county fixed effects. In addition, since most wine tourists originate from the Seattle metropolitan area (Tourism Development Associates, 2004) we also included the median household income in King county (Seattle).

In column 4 and 5, we estimated a basic equation where wine scores are not weighted, i.e., a wine that received 95 points has the same weight as one that got 91 points. In contrast, in column 1 and 2 we report the results using weighted point variable. Here, we aggregated all points within one county giving 91 points a weight of one, 92 points a weight of two, 93 points a weight of three etc. Both versions yield almost identical results. Alternatively, we also tried to include wine points as different variables (e.g., as pts96, pts95, pts94, etc) without any predetermined weight. The model would then assign a certain value to each point level. However, due to the sporadic character of some point variables this did not yield stable results.

The goodness to fit for all equations is higher than 90% and the wine point variable is significant at the 1% level in all specifications. The F-test for fixed effects indicates that county specific intercepts are significantly different from a common constant term.

Since the equation is specified log-linear, the coefficients represent percentage changes in revenue in response to a one unit change in the independent variable. For the unweighted equations, this means that one more wine with a score of 91 points or higher will increase per capita restaurant revenue by 0.4% and hotel revenue per capita revenue by 1.6%.

Table 4

Panel Estimates of Per Capita Restaurant and Hotel Revenue for all Washington Counties from 1995q3 to 2006q3

	Dependent Variable ln(retail revenue)			
	Restaurant (weighted)	Hotel (weighted)	Restaurant (unweighted)	Hotel (unweighted)
wine points	0.002***	0.008***	0.004**	0.016***
(moving 4 quarter sum)	(3.02)	(4.72)	(2.33)	(4.44)
median household income	0.016***	0.011	0.016***	0.011
King county (in $1000)	(3.96)	(1.16)	(3.83)	(1.25)
trend	-0.007***	-0.005	-0.007***	-0.005
	(-3.68)	(-1.10)	(-3.54)	(-1.19)
dummy first quarter	-0.064***	-0.221***	-0.064***	-0.221***
	(-6.16)	(-10.21)	(-6.51)	(-10.54)
dummy second quarter	0.096***	0.265***	0.096***	0.265***
	(12.10)	(14.47)	(9.69)	(12.71)
dummy third quarter	0.185***	0.577***	0.185***	0.577***
	(18.47)	(28.78)	(19.15)	(28.22)
Adj. R2	0.912	0.906	0.912	0.906
F statistic	412.10	371.68	412.12	371.96
F test for fixed effects	444.95	383.86	443.85	383.90
n	1744	1698	1744	1698

*** 1%, **2%, *5% significance level.

However, there are two caveats to this model. First, the marginal effects do not have to be necessarily identical for all counties. In fact, it is conceivable that the wine-point induced percentage revenue increase for hotels and/or restaurants may differ among counties due to different revenue levels or industrial structures. In order to test this hypothesis we included a slope dummy variable for each of the two leading wine counties, i.e., Walla Walla and King county.

Second, predetermining the moving sum of four quarters of the wine point variable entails that the effect of a 91+ point wine stays constant for four quarters and then completely disappears in the 5th quarter. This appears to be little realistic. In fact, we assume that the impact of the wine point variable is the strongest immediately after publication in the *Wine Spectator* and slowly wears off thereafter. In order to quantify the duration of the impact and the slope of its decline we employ a distributed lag model with a geometrical lag structure (Koyck lag model).

These modifications yield equation (2):

$$\ln(R_{it}) = \beta_0 + \lambda \ln(R_{it-1}) + \alpha \sum X_{it} + \beta_1 W_{it} + \beta_2 DUMMY_i * W_{it} + \beta_3 C_i + \beta_4 T_t + \gamma \sum Q_t + \varepsilon_{it} \quad (2)$$

The results of OLS estimates of equation (2) are shown in the first two columns of Table 5. Although the model generally confirms the signs as well as the magnitude of the wine-point variable, the Durbin h statistics indicate that both models suffer from severe serial correlation due to the inclusion of the lagged dependent variable.

Thus we estimate the Koyck model using instruments (IV). In particular, for both restaurant and hotel revenue the lagged endogenous variable is regressed on all exogenous variables plus a variable that denotes all real taxable per capita revenues per county. The results of the IV estimates are reported in the last two columns of Table 5 and are virtually identical with the OLS estimates.

For both restaurant and hotel revenue the wine-point variable has a significantly positive impact. Although the short run average marginal effect per wine above 90 points is 2.9% for restaurants and 4.7% for hotels, respectively, the impact in Walla Walla County is somewhat smaller. Accounting for the negative estimate for the slope dummy, the marginal effect for Walla Walla's eating and drinking places is equal to 0.34% per quarter. For hotels this effect is equal to approximately 2%.[3] Both figures are almost identical with those reported in Table 4 indicating a high robustness of the model.

The long-run multiplier effect of a marginal wine having 91+ points, calculated as $(\hat{\beta}_1 + \hat{\beta}_2)(\frac{1}{1-\hat{\lambda}})$, equals 0.55% for restaurants and 3.28% for hotels, respectively. That is, although the biggest impact of a *Wine Spectator* notation occurs immediately after its publication, i.e., in the same quarter of the publication, the effect carries on for a few more quarters before phasing out.

Table 6 shows that the reputation effect of a high *Wine Spectator* score wears off relatively quickly and disappears after about one year after publication.[4]

Nevertheless, given the steady production of high-end quality wines in Walla Walla and their recognition in the wine press, the wine sector plays an important role for the tourism industry. For instance, between the 3rd quarter of 2005 and the 3rd quarter of 2006, 51 Walla Walla wines were rated 91+. For the 3rd quarter of 2006, this led to an increase in revenue of 4.6% for the restaurant sector and of 28.1% for the hotel sector, respectively. This makes the wine sector the driving force behind Walla Walla's "hotel boom".

[3] Note, however, that the slope dummy variable for hotel revenues is not significant.

[4] The slope coefficient for each lag is calculated as $(\hat{\beta}_1 + \hat{\beta}_2)\hat{\lambda}^z$, where z stands for the number of lags.

Table 5

Panel Estimates of Per Capita Restaurant and Hotel Revenue for all Washington Counties from 1995q3 to 2006q3

	Dependent Variable ln(retail revenue)			
	Restaurant (unweighted)	Hotel (unweighted)	Restaurant (unweighted)	Hotel (unweighted)
	OLS	OLS	IV	IV
lagged dependent variable	0.327***	0.394***	0.391***	0.401***
	(14.21)	(16.95)	(5.63)	(17.32)
wine points	0.029***	0.047*	0.029***	0.047*
	(2.63)	(2.03)	(2.66)	(2.06)
wine points * dummy Walla Walla	-0.026*	-0.027	-0.026*	-0.027
	(-2.24)	(-1.12)	(-2.25)	(-1.14)
wine points * dummy King	-0.017	-0.026	-0.017	-0.025
	(-1.28)	(-0.93)	(-1.28)	(-0.93)
median household income	0.010**	0.005	0.010**	0.006
King county (in $1000)	(2.57)	(0.58)	(2.48)	(0.73)
trend	-0.004*	-0.002	-0.004*	-0.002
	(-2.26)	(-0.41)	(-2.25)*	(-0.56)
dummy first quarter	-0.006	0.005	0.007	0.014
	(-0.55)	(0.23)	(0.45)	(0.59)
dummy second quarter	0.178***	0.588***	0.195***	0.596***
	(16.36)	(21.97)	(10.11)	(22.38)
dummy third quarter	0.212***	0.695***	0.216***	0.700***
	(22.30)	(33.65)	(19.74)	(34.08)
Adj. R2	0.922	0.919	0.912	0.920
F statistic	429.15	397.80	331.79	401.21
Durbin's h	15.32	6.86		
n	1701	1648	1645	1645

*** 1%, **2%, *5% significance level.

Table 6

Distribution of the Percentage Impact of Wine on Restaurant and Hotel Revenue in Walla Walla County Over Time

	Percentage Impact of One Wine with 91+ Points	
Quarters after Publication	Restaurants	Hotels
0	0.34	1.96
1	0.13	0.79
2	0.05	0.32
3	0.02	0.13
4	0.00	0.05
5	0.00	0.02
6	0.00	0.00
Total Effect	0.55	3.28

References

Bureau of the Census (1995 and 2004), County Business Pattern, Washington. 1993 and 2002 Data. Bureau of the Census: Washington D.C.

Bureau of Labor Statistics (2007), Consumer price index for the west. Western BLS Information Office: San Francisco. Online at: http://www.bls.gov/ro9/ro9news.htm

California Department of Food and Agriculture (2006), Grape Graoe Acreage, 2005 Crop. Sacramento.

California Department of Food and Agriculture (2007), Grape Crush Report 2006. Sacramento.

Department of Revenue, Washington State (1996-2007), Quarterly Business Reviews, Olympia. Online at: http://dor.wa.gov/content/aboutus/statisticsandreports/stats_qbr.aspx#QBRTables

Folwell, R., Drei, G., Holland, D. and Wandschneider, P. (1999), Washington Wine Grape Industry Impacts on the State's Economy. Washington State University Pullman.

Irvine, R. and Clore, W.J. (1997), The Wine Project. Washington State's Winemaking History. Sketch Publications: Vashon, WA.

Landon, S. and Smith, C. (1998), Quality Expectations, Reputation and Price. *Southern Economic Journal*, 64(3), 628-647.

Mapes, L. (2003), Tasting Success. In wine, Walla Walla plants a new field of dreams. *Pacific Northwest, The Seattle Times Magazine*, November 2, 2003 (also online at http://seattletimes.nwsource.com/pacificnw/2003/1102/cover.html)

MFK (2001), Economic impact of the Washington State wine and wine grape industries. MFK: St. Helena, CA.

MFK (2007), The Impact of Wine and Wine Grape Products on the American Economy 2007. MFK: St. Helena, CA.

National Agricultural Statistics Service (2007), 2006 Oregon Vineyard and Winery Report. Portland.

Noev, N. (2006), Wine Quality and Regional Reputation: Hedonic Analysis of the Bulgarian Wine Market. *Eastern European Economics*, 43 (6), 5-30.

Office of Financial Management (2007), Total Resident Population by Year by County, Washington 1960-2006. Olympia. Online at: http://www.ofm.wa.gov/pop/coseries/default.asp

Schamel, G. and Anderson, K. (2003), Wine Quality and Varietal, Regional and Winery Reputations: Hedonic Prices for Australia and New Zealand. *The Economic Record*, 79, No. 246 (September), 357-369.

Stanziani, A. (2004), Wine Reputation and Quality Controls: the Origin of the AOCs in 19th century France. *European Journal of Law and Economics*, 18, 149-167.

Tourism Development Associates (2004), Tourism assessment and strategic plan. Study prepared for the City of Walla Walla, Tourism Commission. Falmouth, Maine.

Wine Spectator (2007). www.wine-spectator.com