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CHANGES IN THE DEMAND FOR  
MERLOT AND PINOT NOIR WINES

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## **The Sideways Effect: A Test for Changes in the Demand for Merlot and Pinot Noir Wines**

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### **Abstract**

This paper examines the effect of the movie *Sideways* on US wine consumption. Specifically, we examine the effects of the movie on the consumption of Merlot, which is derided in the movie and the effect on Pinot Noir, which is praised. We examine the trends in consumption before and after the movie and perform statistical tests for structural changes in consumption. We also estimate demand functions for both Merlot and Pinot Noir and test for differences in their demands before and after the movie. Finally, we test for changes in consumption of each varietal by price point.

**Key words:** *Sideways*, Chow Test, Demand Estimation.

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## **INTRODUCTION**

This paper investigates the power of popular culture to influence consumer behavior. Specifically, we test the so-called “Sideways Effect.” In the movie *Sideways*, there is a memorable scene in which the lead character adamantly refuses to drink Merlot, which is derided in the movie. The same character goes on to praise Pinot Noir in other scenes. While the line refusing to drink Merlot in the movie is memorable and has often been mimicked by wine consumers, the effect of the movie has become folklore in the wine industry. For example, George Schofield in the April 2008 issue of *Wine Business Monthly* refers to the “debacle following the release of the *Sideways* motion picture” when discussing the effects of the movie on Merlot. Unfortunately, much of the conventional wisdom surrounding the “Sideways Effect” is supported by scant anecdotal evidence at best. Our approach is simple: Changes in the demand for either Merlot or Pinot Noir should be reflected in the price, quantity or both of each varietal. Thus we examine the trends in price and cases sold of Merlot and Pinot Noir for periods before and after the movies release. We also estimate demand functions for each varietal before and after the movies release and test for statistical difference. Finally, we re-analyze the data by price to test for any differential effects of the movie.

## **THE MOVIE**

*Sideways* was released on October 22, 2004, nominated for 5 Academy Awards on January 25, 2005, winning one (best adapted screenplay), and closed in theaters on May 19, 2005. In the 30 weeks the movie was in theaters, gross domestic ticket sales were over \$70 million with worldwide sales reaching just over \$100 million making it the 40<sup>th</sup>

highest grossing movie of the year. The number one grossing movie of the year Shrek 2, grossed over \$440 million and nearly a billion dollars worldwide that same year. The movie was released on DVD in the USA and Canada in April 2005.

Table 1-Sideways Theater Showings and Ticket Sales		
	Pre-Nomination 10/22/04 – 1/25/05	Post Nomination 1/25/05 – 5/19/05
Number of Theaters	699	1,229
Gross Domestic Ticket Sales	\$32,428,941	\$39,074,652

Source: Boxofficemojo.com

## THE DATA

To examine the effect of the movie on wine consumption, we use annual scan data from U.S. retail chains from the years 1999 through early 2008. The data set contains approximately 100,000 wine purchases in the U.S. and includes the price paid, quantity sold and varietal of each purchase. For uniformity, we concentrate on wine purchases of standard 750 ML glass bottles (approximately 84% of all purchases) and exclude boxed or larger 1.5 liter bottles. Annual data was used because it allowed us to examine a period sufficiently previous to the release of the movie in late 2004. Monthly or weekly data was not available for periods long enough to examine the trends in wine consumption prior to 2004. In addition to Merlot and Pinot Noir, we also examine a subset of “non-Sideways” red wines consisting of Cabernet Sauvignon and Syrah as controls. Finally, to control for the effects of promotion which may have occurred as a result of the movie, we include variables for promotion. Promotion in the data set is defined as one of four types: (1) Features, which includes such things as mailers and newspaper advertisements. (2) In store displays. (3) A combination of features and

displays. (4) Temporary price reductions of 5% or more. For our purposes, we only distinguish between promoted and non-promoted price and sales.

## **ANALYSIS**

As noted above, we rely on economic theory to hypothesize that any changes in the demand for either Merlot or Pinot Noir caused by the movie *Sideways* should be reflected in the price, quantity or both of each varietal. For Merlot, a reduction in demand resulting from the negative portrayal in the movie should reduce price and/or quantity. Conversely, for Pinot Noir, an increase in demand should increase price and/or quantity. Thus we examine the trends in price and cases sold of Merlot and Pinot Noir for periods before and after the movie's release.

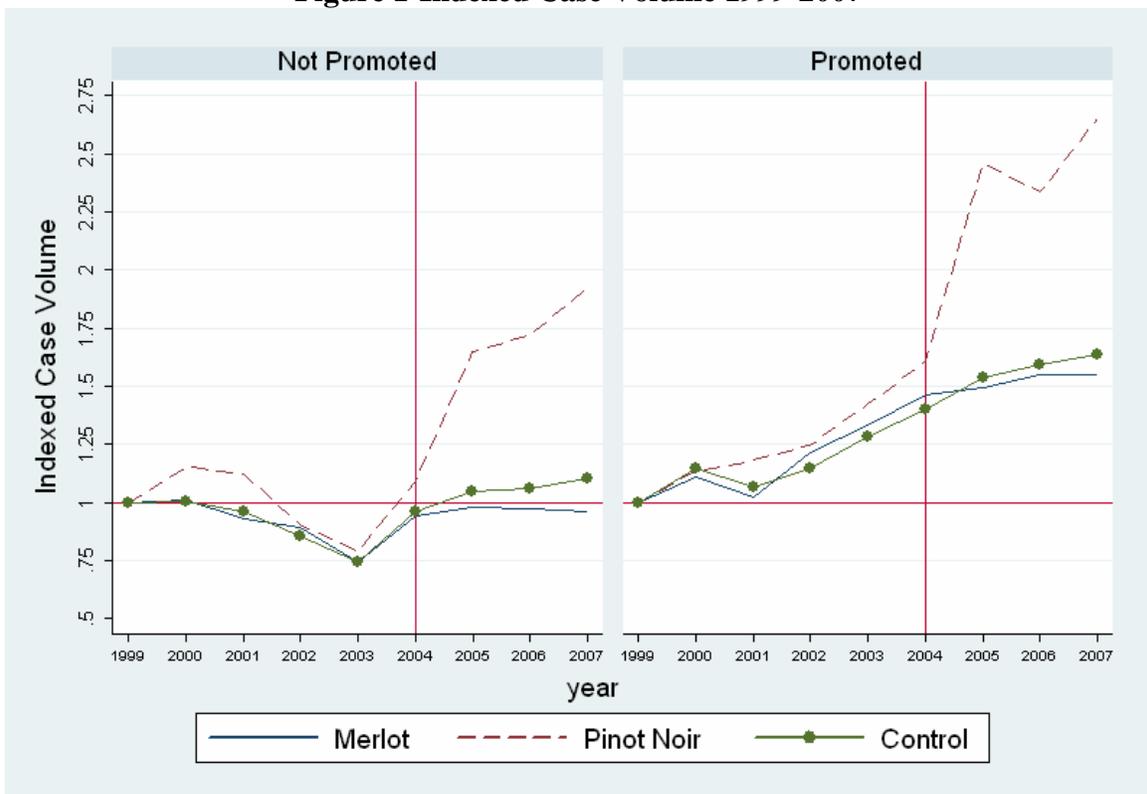
We chose the end of 2005 as the period in which we expect the effects, if any, of the movie *Sideways* to begin to manifest themselves on wine consumption. Recall that the movie was released in October 2004, nominated for an Academy Award in January of 2005 and was released on DVD in April 2005. Furthermore, as Table 1 shows, the number of theaters the movie was shown in nearly doubled once the Academy Award nominations were announced. Because the wine data is end of year data, we feel that the end of 2005 is the most reasonable choice.

## **CASE VOLUME**

We begin by examining annual case volume of the three groups: Merlot, Pinot Noir and the control group of non-*Sideways* red wines consisting of Cabernet Sauvignon and Syrah. The largest seller by volume in the U.S. is Merlot, followed by Cabernet Sauvignon, Syrah and Pinot Noir with Merlot and Cabernet Sauvignon selling almost

twice as much as Syrah and Pinot Noir. To adjust for the differences in volume we index annual case volume to one in 1999 thus allowing us to examine the relative growth rate of each group. Figure 1 shows index average annual case volume of Merlot, Pinot Noir and the control group from 1999-2007. Because the data set is for year end annual case volume we include only up to 2007. Figure 1 shows an interesting pattern of growth of the three groups. Prior to 2004, the three groups appear to move similarly with Pinot Noir consistently at a higher growth rate than Merlot and the control. This is true of both promoted and non-promoted case volume. However, after 2003 and especially 2004 the patterns of growth appear to diverge. While it is difficult to attribute any change in the growth rate of case volume to the movie, we do observe relative growth of Pinot Noir and a stagnant and even declining growth in case volume of Merlot since 2004.

**Figure 1-Indexed Case Volume 1999-2007**



To investigate further, we estimate the following equation:

$$\text{Cases}_{it} = \beta_0 + \beta_1 \text{Time}_{it} + \beta_2 \text{Time}_{it}^2 + \beta_3 \text{D2005} + \beta_4 \text{D2005T}_{it} + u_{it} \quad (1)$$

Where:  $\text{Cases}_{it}$  represents the annual case volume of wine  $i$  sold in year  $t$ .

$\text{Time}_i$  is a linear time variable representing the years 1999-2008.

$\text{Time}^2$  represents the square of time.

D2005 represents a dummy variable which equals one for the years 2005-2008 and zero for years prior.

D2005T is the interaction of D2005 and time.

Equation 1 examines the time trend before the movie and a set of dummy and interaction variables to examine the trend after the movie. Because the trends in sales prior to 2005 were non-linear, we include the square of time. Table 2 shows the regression results for indexed case volume. The regression results are generally consistent with Figure 1 and support the hypothesis that the movie Sideways did have a negative impact on the growth rate of annual sales of Merlot. The effects on Pinot Noir are mixed showing a statistically insignificant effect on non-promoted Pinot Noir and a statistically significant effect on promoted Pinot Noir. For the control group, both non-promoted and promoted annual case volumes show a small but statistically significant effect.

**Table 2-Regression Results for Case Volume**

	Non Promoted Merlot	Promoted Merlot	Non Promoted Pinot Noir	Promoted Pinot Noir	Non Promoted Control	Promoted Control
Time	-0.137 (60.42)**	-0.013 (8.07)**	-0.157 (26.44)**	-0.055 (9.87)**	-0.164 (99.02)**	-0.048 (6.76)**
Time Squared	0.015 (48.22)**	0.015 (66.96)**	0.019 (23.69)**	0.024 (31.76)**	0.02 (90.68)**	0.012 (12.15)**
D2005	0.83 (44.45)**	1.237 (91.57)**	0.572 (12.13)**	2.036 (46.79)**	0.806 (61.35)**	0.711 (12.67)**
D2005*Time	-0.112	-0.197	-0.005	-0.218	-0.116	-0.109

	(38.01)**	(92.56)**	(0.73)	(31.62)**	(55.75)**	(12.31)**
Constant	1.174	1.012	1.27	1.101	1.158	0.834
	(321.68)**	(379.64)**	(130.59)**	(119.65)**	(427.41)**	(70.89)**
Observations	7845	6665	3809	3190	15012	12649
R-squared	0.55	0.97	0.95	0.99	0.76	0.22
SideWays Effect						
F-Statistic	7490.88	21149.15	26355.75	1026549.4	1826.73	54.97

Absolute value of t-statistics in parentheses  
\* significant at 5% level; \*\* significant at 1% level

Following Chow (1960), we test for a structural change in the growth rate of case volume by performing an F-test of joint significance on the post Sideways subset of dummy and interaction terms. These results are shown in Table 2 as the Sideways Effect F-statistics.

Based on the F-tests, we see that all three groups show a statistically significant structural change in the growth rate of case volume following the movie Sideways. The F-tests confirm that Pinot Noir increased in promoted case volume while Merlot and the control group experienced small but statistically significant declines in their growth rates. However, from Figure 1, you could clearly see the similarity in the growth rates of Merlot and the control group. What we would like to know is whether Merlot behaved differently than the control group. To answer this, we perform an F-test to see if the growth rate of Merlot differs significantly from the growth rate of the control group. Table 2 shows these results along with the result for Pinot Noir for comparison.

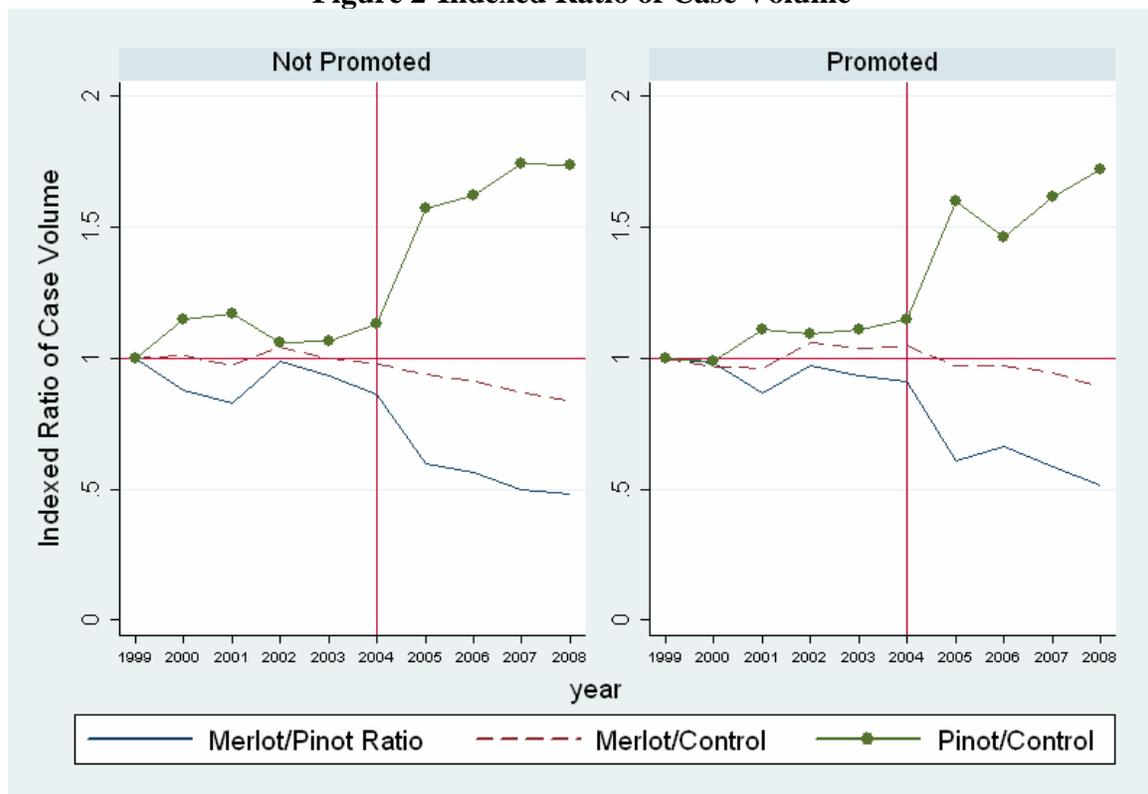
<b>Table 3-Testing for Differences with the Control Group</b>				
	Non-Promoted		Promoted	
	R-Squared	F-Statistic	R-Squared	F-Statistic
Merlot	.6883	15.66	.6868	15.31
Pinot Noir	.5752	38.49	.6382	40.94

From Table 3, we see that the growth rate of Merlot was indeed less than that of the control group, while the growth rate of Pinot Noir was greater than that of the control

group. All results are statistically significant and hold for promoted and non-promoted case volume.

While the results so far appear to coincide with conventional wisdom regarding the effect of Sideways on wine consumption, it is possible that much of the growth in annual wine sales are confounded by the increased coverage of the Nielsen data since 1999. To correct for this we construct three new variables examining the ratio of case volume among the three groups. We examine the ratio of Merlot to Pinot Noir, Merlot to the control group and Pinot Noir to the control group. Figure 3 shows a graph of all three of the new variables. Once again we index the ratios to one for ease of interpretation. Consider first the ratio of Merlot to Pinot Noir. If the move Sideways induced a decrease in Merlot consumption while simultaneously increasing Pinot Noir consumption, then we would expect the ratio of the two to decrease.

**Figure 2-Indexed Ratio of Case Volume**



This is in fact what we observe in Figure 3 for both promoted and non-promoted case volume. The ratio of Merlot to the non-Sideways control appears to be relatively stable prior to the movie, then decreases slightly after.

Conversely, the growth in the ratio of Pinot Noir to the control group increases precipitously after the movies release. Table 4 shows the regression results for the three series and are consistent with the previous results. The regression results show a small and mostly statistically significant decrease in both Merlot/Pinot Noir and Merlot/Control and a large and statistically significant increase in PinotNoir/Control.

**Table 4-Regression Results for Case Volume Ratios**

	Non Promoted		Promoted		Non Promoted	
	Merlot/Pinot	Merlot/Control	Merlot/Pinot	Merlot/Control	Pinot/Control	Pinot/Control
Time	-0.018 (23.80)**	0.001 -1.83	0.024 (84.40)**	0.025 (60.11)**	0.053 (68.69)**	-0.024 (21.85)**
Time Squared	0.001 (11.39)**	-0.002 (19.19)**	-0.004 (96.56)**	-0.001 (23.66)**	-0.006 (60.28)**	0.007 (50.32)**
D2005	0.007 (1.02)	-0.215 (33.69)**	-0.043 (17.75)**	0.128 (35.42)**	-0.306 (46.25)**	0.638 (66.92)**
D2005*Time	-0.043 (40.93)**	-0.004 (3.66)**	0.003 (7.87)**	-0.029 (50.45)**	0.115 (110.35)**	-0.051 (33.64)**
Constant	0.963 (759.97)**	0.969 (790.96)**	0.974 (2122.49)**	0.945 (1354.76)**	1.006 (799.77)**	1.045 (569.97)**
Observations	45997	38480	45997	38480	45997	38480
R-squared	0.96	0.96	0.95	0.84	0.98	0.96
SideWays Effect						
F-Statistic	59863.36	54640.21	3740.98	9758.88	160000	44534.60

Absolute value of t-statistics in parentheses

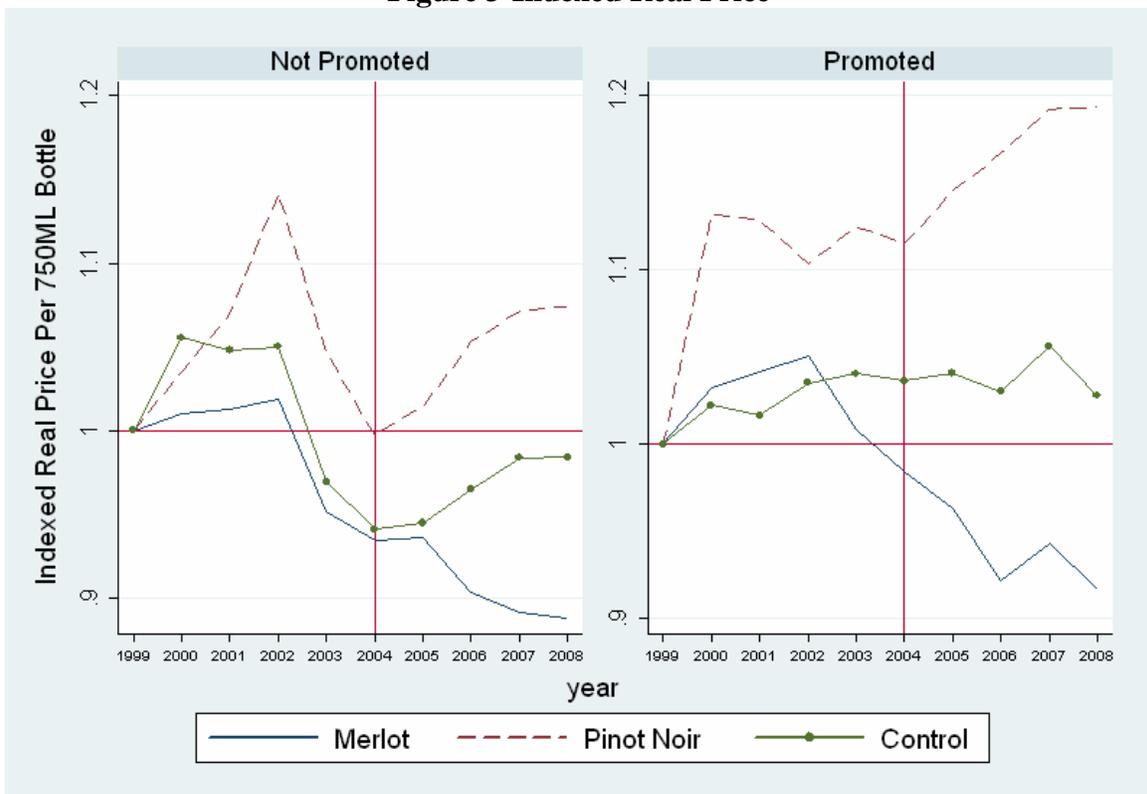
\* significant at 5% level; \*\* significant at 1% level

## PRICE

The next variable we examine is price. Conventional economic theory posits that as long as supply is not perfectly elastic, any change in demand should result in a price change. If the demand for Merlot fell due to the negative publicity surrounding the

movie Sideways, then we expect observe a decrease in the price of Merlot. Similarly, if the demand for Pinot Noir rose as a result of the movie Sideways, we expect observe an increase in the price of Pinot Noir. Figure 3 shows a graph of the real price of Merlot, Pinot Noir and the non-Sideways red wine control group of Cabernet Sauvignon and Syrah. All prices are indexed to one in 1999. From Figure 3 we can see that indeed both the price of Merlot and Pinot Noir move consistent with a predicted Sideways effect. For Merlot, both promoted and non-promoted price falls while for Pinot Noir both promoted and non-promoted price rises following the movie Sideways. How these changes resonate within each varietal are examined later, for example how Merlot and Pinot Noir are affected at different price segments, but clearly these results are consistent with a decrease in demand for Merlot and an increase in demand for Pinot Noir.

**Figure 3-Indexed Real Price**



The test used to examine the effects of the movie on price is analogous to what we used to examine the effect on quantity, but here we replace cases in Equation 1 with price and estimate the follow equation by OLS:

$$\text{Price}_{it} = \beta_0 + \beta_1 \text{Time}_{it} + \beta_2 \text{Time}_{it}^2 + \beta_3 D2005 + \beta_4 D2005T_{it} + u_{it} \quad (2)$$

Table 5 summarizes the regression results and indicates that for all three groups, the movie Sideways induced statistically significant changes. While directionally, all the coefficients move consistent with theory that the movie Sideways decreased the demand for Merlot and increased the demand for Pinot Noir, the magnitude of the changes differs between Merlot and Pinot Noir. While the price of Merlot continues a decline started in 2003, well before the movie began, Merlot does exhibit a small statistically significant decrease in price. For non-promoted Pinot Noir, however, price in 2005 reverses a downward trend beginning in 2003. For promoted Pinot Noir, price increases following the movie after being stagnant from 2001-2004. Results for non-promoted and promoted Pinot Noir are statistically significant.

Consistent with an overall increase in the demand for wine following the movie, it appears that the movie sideways resulted in an increase in non-promoted price of the non-Sideways red wine control group while producing a small but statistically significant increase in the promoted price of the control group.

Table 5-Regression Results for Price

	Non Promoted	Promoted	Non Promoted	Promoted	Non Promoted	Promoted
	Merlot	Merlot	Pinot Noir	Pinot Noir	Control	Control
Time	0.023 (42.88)**	0.043 (73.08)**	0.115 (107.19)**	0.074 (66.71)**	0.059 (163.59)**	0.023 (76.03)**
Time Squared	-0.005 (74.58)**	-0.007 (85.47)**	-0.016 (112.39)**	-0.008 (57.44)**	-0.011 (223.05)**	-0.002 (54.74)**
D2005	-0.328 (70.95)**	-0.418 (81.32)**	-1.15 (125.58)**	-0.544 (57.97)**	-0.876 (285.25)**	-0.087 (34.42)**

D2005*Time	0.052 (71.47)**	0.061 (75.07)**	0.179 (123.74)**	0.087 (59.05)**	0.137 (283.47)**	0.013 (33.78)**
Constant	0.989 (1140.60)**	0.971 (999.63)**	0.892 (499.46)**	0.97 (519.21)**	0.967 (1609.09)**	0.979 (1952.80)**
Observations	8832	7484	4441	3725	17238	14484
R-squared	0.93	0.92	0.79	0.88	0.91	0.58
SideWays Effect						
F-Statistic	2553.86	4495.87	7931.76	1767.65	40684.89	599.98

Absolute value of t-statistics in parentheses  
\* significant at 5% level; \*\* significant at 1% level

## DEMAND

Next we estimate demand functions for Merlot, Pinot Noir and the control group for the years before and after the movies release. The following model is estimated,

$$\text{Cases}_{it} = \beta_0 + \beta_1 \text{Price}_{it} + \beta_2 \text{Income}_{it} + \beta_3 \text{D2005} + \beta_4 \text{Price05}_{it} + u_{it} \quad (3)$$

As with all demand estimations, we are concerned about issues of endogeneity and identification. Tests for endogeneity (Hausman 1978), indicate the presence of simultaneity between the price per bottle of wine and the number of cases sold. To correct for this endogeneity we instrument the price of wine using grape prices. Grape prices appear to be the most obvious choice of instruments for the price of wine satisfying the conditions needed for a valid instrument: Grape prices appear uncorrelated with the error term in the demand for wine and as the primary ingredient in a bottle of wine, should be highly correlated with wine prices. Unfortunately, correlations between the price of wine and the price of grapes show little relationship. This is not too surprising given the variation in the price of wine across varietals as well as the variation in price within varietals. In addition, while grapes are the primary ingredient in a bottle of wine, grapes do not constitute the primary cost in producing a bottle of wine,

accounting for only about 10% of the price of the average bottle of wine.<sup>1</sup> Nevertheless, of the costs associated with the production of wine, grapes seem a logical choice and appear to be the most tractable. Following Cuellar and Huffman (2008) we correlate the price of grapes using the “bottle price” rule where the price per ton of grapes is roughly 100 times the price of a 750 ML bottle of wine.<sup>2</sup>

The instrument we use is defined as,

$$Price_{it} = \alpha_0 + \alpha_n \sum_{n=1}^3 PriceGrapes_{i,t-n} + v_{it} \quad (4)$$

Where: Price<sub>it</sub> represents the price of a bottle of wine of type i in year t.

PriceGrapes is the current and lagged price of grapes per ton for each varietal. Lagged price is included because wine sold today may be influenced by the price paid for grapes used at the time of production.

The results for the estimated demand functions for Merlot, Pinot Noir and the control group are shown in Table 6 along with the F-statistics testing for changes in demand.

**Table 6-Estimated Demand Functions**

	Merlot		Pinot Noir		Control	
	Non-Promoted Cases	Promoted Cases	Non-Promoted Cases	Promoted Cases	Non-Promoted Cases	Promoted Cases
Price	-0.686 (10.52)**	-1.256 (16.51)**	-1.143 (11.05)**	-1.564 (12.79)**	-0.765 (16.85)**	-1.265 (22.77)**
D2005	0.009 (0.04)	-1.109 (4.25)**	0.018 (0.05)	-0.477 (1.11)	-0.276 (1.82)	-0.632 (3.76)**
Price*D2005	0.076 (0.84)	0.477 (4.54)**	0.236 (1.77)	0.391 (2.54)*	0.113 (1.89)	0.375 (5.26)**
Income	-3.267 (3.63)**	0.767 (0.76)	-2.469 (1.95)	0.307 (0.22)	-1.593 (2.25)*	1.897 (2.39)*
Constant	37.748 (4.45)**	0.453 (0.05)	31.059 (2.60)**	5.177 (0.39)	6.917 (60.86)**	7.553 (58.72)**
Observations	8832	7484	4441	3725	14575	12174

<sup>1</sup> This is according to a wine industry report published by Gomberg-Frederickson which breaks down the cost of a \$13 bottle of wine as follows: Grapes 11%, bottling and packaging 5%, wine making 10%, winery profit, marketing and overhead 19%, distribution 23% and retail markup 32%.

<sup>2</sup> See Cuellar and Huffman (2008) for a complete discussion of the bottle price rule.

R-squared	0.03	0.05	0.06	0.08	0.04	0.07
Sideways Effect						
F-Statistic	1.69	10.47	10.21	7.72	3.82	14.10
Absolute value of t-statistics in parentheses						
* significant at 5% level; ** significant at 1% level						

From Table 6 you can see that non-promoted demand for Merlot does show a slight decrease, as would be expected if the move had a negative impact, but these affects are statistically insignificant. Promoted demand for Merlot does however indicate a statistically significant change, although the results can be best interpreted as mixed.

While the demand for both non-promoted and promoted Pinot Noir increase, as expected if the movie Sideways had a positive effect, Table 6 shows that only promoted Pinot Noir increased significantly. F-test, however, indicate that both promoted and non-promoted demands increased significantly.

The results for the control group wines are once again best described as mixed. From Table 6, you can see that both promoted and non-promoted demands pivot causing demand to become more inelastic. Also, Table 6 indicates that the affect on the promoted control group is greater than the affect on the non-promoted control group demand. However, non-promoted demand for the control group does not shift in a statistically significant way, while promoted demand does show a statistically significant shift. While the F-tests show that the changes are statistically significant, the effects on the non-promoted demand are economically small and significant at the 5% level of significance but not 1%.

## **ANALYSIS BY PRICE**

Finally we examine whether the movie Sideways had different effects on different price segments of wine consumers. For example, we want to know if low end wine consumers were more affected by the movie Sideways than high end wine consumers. This might be true if high end wine consumers are more representative of core consumers than low end wine consumers, and if core wine consumers are less susceptible to events such as movies and promotion than casual wine consumers, then we would expect the movie Sideways to have a larger effect on consumers of lower priced wines than on consumers of higher priced wines. To investigate whether the effects of the movie differ by price we re-examine the data segmenting the wines into three categories: Less than \$10, \$10-less than \$20, and \$20-\$40.

The results for annual cases sold of Merlot are shown graphically in Figure 4 and regression results are shown in Table 7. Figure 4 and Table 7 indicate that promoted and non-promoted volume for the lowest priced Merlot (under \$10 per bottle) result in a small but statistically significant decrease after the movie Sideways. For the middle priced segment, the results are mixed: Non-promoted Merlot indicates a small but statistically significant increase while promoted Merlot indicates a small and statistically significant decrease in case volume.

**Figure 4-Merlot Case Volume by Price**



For the highest priced segment of Merlot (\$20-\$40), the results are mixed with volume decreasing for non-promoted Merlot but increasing for higher priced Merlot.

**Table 7-Merlot Case Volume Regression Results by Price**

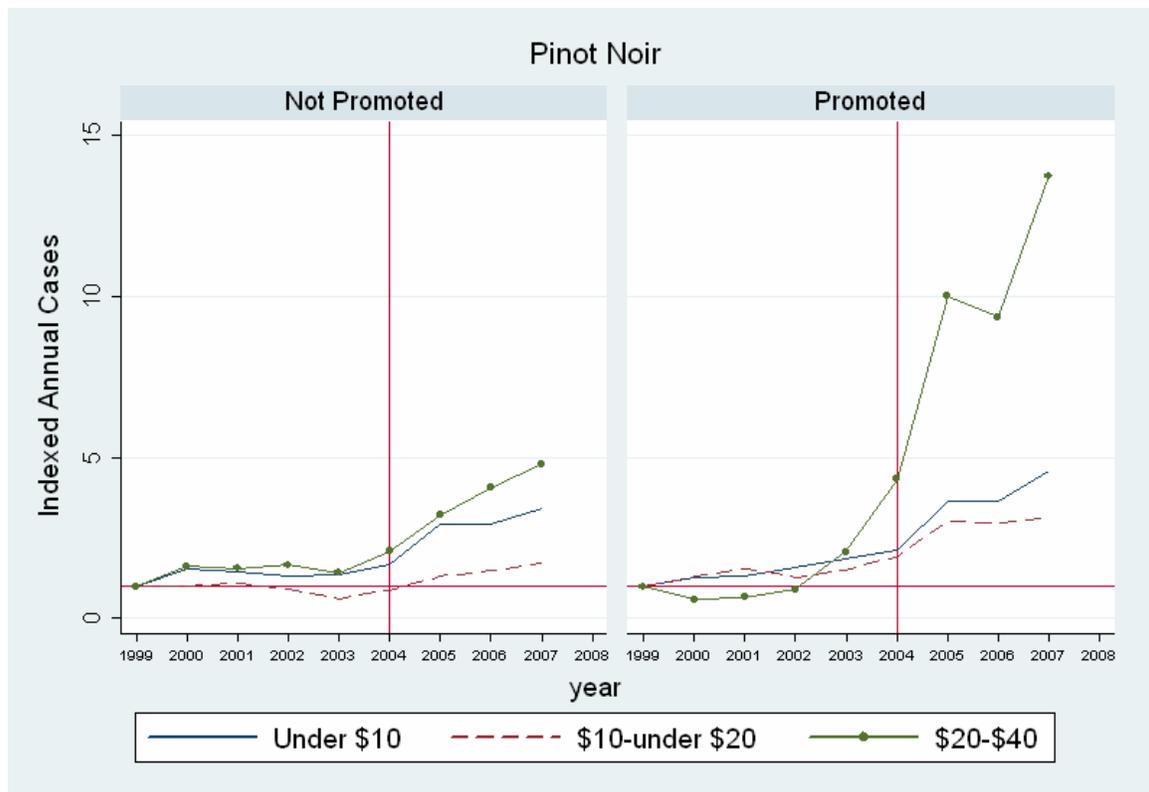
	Not Promoted Under \$10	Not Promoted Under \$10	Not Promoted \$10- <\$20	Not Promoted \$10- <\$20	Not Promoted \$20-\$40	Not Promoted \$20-\$40
Time	-0.064 (7.70)**	0.344 (29.79)**	0.35 (47.37)**	0.334 (8.63)**	0.761 (18.60)**	4.011 (20.66)**
Time Squared	0.007 (6.32)**	-0.033 (21.37)**	-0.059 (58.87)**	-0.016 (3.13)**	-0.091 (16.77)**	-0.491 (19.72)**
D2005	2.276 (31.13)**	0.827 (8.19)**	-2.949 (45.58)**	4.417 (13.22)**	-1.413 (4.07)**	-16.846 (10.92)**
D2005*Time	-0.278 (24.20)**	-0.064 (4.05)**	0.504 (49.26)**	-0.514 (9.74)**	0.342 (6.24)**	3.288 (13.61)**
Constant	1.019 (74.93)**	0.554 (29.69)**	0.672 (55.97)**	0.503 (7.85)**	0.574 (8.26)**	-4.031 (11.58)**
SideWays Effect	2066.68	633.91	1608.56	513.90	184.81	388.72

F-Statistic						
Observations	4749	4815	3036	2136	934	490
R-squared	0.56	0.61	0.85	0.61	0.62	0.75

Absolute value of t-statistics in parentheses  
\* significant at 5% level; \*\* significant at 1% level

The results for Pinot Noir are shown in Figure 8 and Table 8 and are consistent with a positive impact of the movie Sideways. For all three price points of promoted and non-promoted Pinot Noir, case volume increased after the movie's release. The results are statistically significant for all but the lowest price segment and generally increase as the price point increases. Contrary to our initial hypothesis, the results are greatest for the highest priced segment and can best be described as drastic for promoted \$20-\$40 Pinot Noir.

**Figure 5-Pinot Noir Case Volume by Price**



**Table 8 –Pinot Noir Case Volume Regression Results by Price**

	Not Promoted Under \$10	Promoted Under \$10	Not Promoted \$10- <\$20	Promoted \$10- <\$20	Not Promoted \$20-\$40	Promoted \$20-\$40
Time	0.712 (12.21)**	0.912 (12.29)**	0.324 (13.67)**	0.77 (17.56)**	2.079 (17.02)**	7.551 (11.51)**
Time Squared	-0.087 (10.93)**	-0.097 (9.56)**	-0.052 (16.40)**	-0.084 (14.48)**	-0.259 (16.30)**	-0.825 (10.33)**
D2005	-0.053 (0.1)	1.384 (2.11)*	-1.379 (6.79)**	1.052 (2.89)**	-8.459 (8.45)**	-23.382 (4.83)**
D2005*Time	0.329 (4.06)**	0.178 (1.72)	0.372 (11.62)**	0.137 (2.40)*	1.778 (11.28)**	5.011 (6.67)**
Constant	0.241 (2.61)**	-0.187 (1.57)	0.579 (14.72)**	0.006 (0.07)	-1.892 (8.66)**	-13.247 (10.33)**
SideWays Effect						
F-Statistic	600.66	535.56	975.75	1279.13	402.97	204.30
Observations	994	1215	2190	1829	1164	647
R-squared	0.71	0.71	0.51	0.75	0.59	0.65

Absolute value of t-statistics in parentheses

\* significant at 5% level; \*\* significant at 1% level

Finally, we estimate demand functions for Merlot and Pinot Noir at each of the three price points. The regression results for the estimated demand functions for Merlot are given in Table 9.

For the lowest priced segment of non-promoted Merlot, we obtain a demand function that is positive, though statistically insignificant, in price. This is clearly problematic and may be an issue of future research in itself. However, ignoring the issues associated with the positive price coefficient we do observe changes in demand due to the movie Sideways. For the lowest priced segment, the regression results show

that the demand for non-promoted Merlot does decrease but the affects are marginally significant while the effect on promoted demand is statistically insignificant.

The remaining price categories of Merlot all result in conventional downward sloping demand functions. While all categories indicate a negative effect of the movie, only the \$20-\$40 promoted Merlot indicates a statistically significant decrease in demand. The F-tests on the subset of coefficients produce F-statistics that are consistent with the regression results and indicate a statistically significant effect for non-promoted Merlot under \$10 and statistically insignificant results for the remaining categories.

**Table 9-Estimated Demand Functions by Price-Merlot**

	Not Promoted		Merlot Not Promoted		Merlot Promoted	
	Under \$10 Cases	Under \$10 Cases	\$10- <\$20 Cases	\$10- <\$20 Cases	\$20-\$40 Cases	\$20-\$40 Cases
Price	0.17 (0.99)	-0.229 (1.42)	-0.786 (2.75)**	-0.445 (1.2)	-2.647 (4.69)**	-3.668 (5.16)**
D2005	-0.822 (1.76)	-0.498 (1.14)	-0.922 (0.86)	-1.215 (0.88)	-0.261 (0.1)	-6.031 (1.93)
Price*D2005	0.551 (2.38)*	0.205 (0.93)	0.411 (1.01)	0.421 (0.8)	0.059 (0.08)	1.935 (2.01)*
Income	-3.297 (2.63)**	-0.41 (0.32)	-3.172 (2.15)*	3.425 (1.89)	-1.793 (0.7)	4.514 (1.4)
Constant	36.408 (3.08)**	9.738 (0.81)	37.217 (2.67)**	-26.755 (1.56)	30.014 (1.24)	-27.857 (0.92)
Observations	4749	4815	3036	2136	934	490
R-squared	0.01	0	0.01	0.01	0.05	0.09
Sideways Effect						
F-Statistic	3.86*	0.71	0.82	0.46	0.03	2.19

Absolute value of t-statistics in parentheses

\* significant at 5% level; \*\* significant at 1% level

The regression results for the estimated demand functions for Pinot Noir are given in Table 10. Similar to low priced Merlot, the demand functions for low priced Pinot Noir result in positive price coefficients, although like the results for Merlot, neither price

coefficients are statistically significant. The remaining demand functions all produce negative and mostly significant price coefficients resulting in downward sloping demands.

Again, ignoring the price coefficient, the effects of the movie Sideways on the demand for Pinot Noir are mixed. For the lowest price segment, demand shifts but is only statistically significant for non-promoted demand. For the middle price segment (\$10-under \$20), the regression results indicate that demand became more inelastic for both promoted and non-promoted Pinot Noir. For the highest priced segment (\$20-\$40) we obtain similar results, but the effects are statistically insignificant.

**Table 10-Estimated Demand Functions by Price-Pinot Noir**

	Not Promoted	Promoted	Not Promoted	Promoted	Not Promoted	Promoted
	Under \$10 Cases	Under \$10 Cases	\$10- <\$20 Cases	\$10- <\$20 Cases	\$20-\$40 Cases	\$20-\$40 Cases
Price	0.546 (1.34)	0.315 (0.92)	-1.612 (4.57)**	-2.15 (5.15)**	-2.97 (5.61)**	-2.686 (3.27)**
D2005	-2.283 (1.97)*	-1.047 (1.03)	-2.745 (2.14)*	-1.052 (0.74)	-3.181 (1.51)	-0.205 (0.07)
Price*D2005	1.28 (2.32)*	0.647 (1.33)	1.395 (2.91)**	0.644 (1.2)	1.111 (1.72)	0.197 (0.21)
Income	-0.806 (0.29)	-0.169 (0.06)	-5.339 (3.08)**	-0.393 (0.2)	2.032 (0.89)	8.914 (2.84)**
Constant	11.855 (0.45)	6.008 (0.24)	59.579 (3.64)**	13.505 (0.74)	-5.705 (0.26)	-73.31 (2.49)*
Observations	994	1215	2190	1829	1164	647
R-squared	0.03	0.01	0.02	0.04	0.06	0.14
Sideways Effect						
F-Statistic	3.00*	1.11	13.92**	4.60**	2.62	0.73

Absolute value of t-statistics in parentheses

\* significant at 5% level; \*\* significant at 1% level

## CONCLUSIONS

This paper tests the so called Sideways effect. Specifically we investigate whether or not the movie Sideways had a significant effect on the consumption of Merlot, Pinot Noir and overall wine consumption. Our results are consistent with the theory that the movie Sideways had a small negative impact on the consumption of Merlot while increasing the consumption of Pinot Noir. However, far from having a “devastating” effect, the positive impact on Pinot Noir appears greater than the negative impact on Merlot. For example, while the sales of Merlot slow following the movie, sales of Pinot Noir increase significantly. We observe a similar effect with respect to price. Following the movie Sideways, the price of Merlot continues an already decreasing trend, while the price of Pinot Noir reverses a decreasing trend and increases following the movie. The estimated demands confirm these results showing a small decrease in the demand for Merlot and an increase in the demand for Pinot Noir. Furthermore, the paper shows that there appears to be a general increase in wine consumption, as measured by the control group red wines, as a result in the movies popularity.

Lastly, we examined whether the affects of the movie Sideways differed by price point. Our results show that the negative effects of Merlot were confined mostly to the lower priced segment, under \$10 per bottle and that the higher priced segments may have even increased, although the results are mixed. The effects on Pinot Noir, on the other hand, were positive across all price points, with the largest impact being on the highest price point of \$20-\$40 per bottle.

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