Do Expert Reviews Affect the Demand for Wine?

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Do expert reviews affect the demand for wine?

Richard Friberg and Erik Grönqvist

Web Appendix

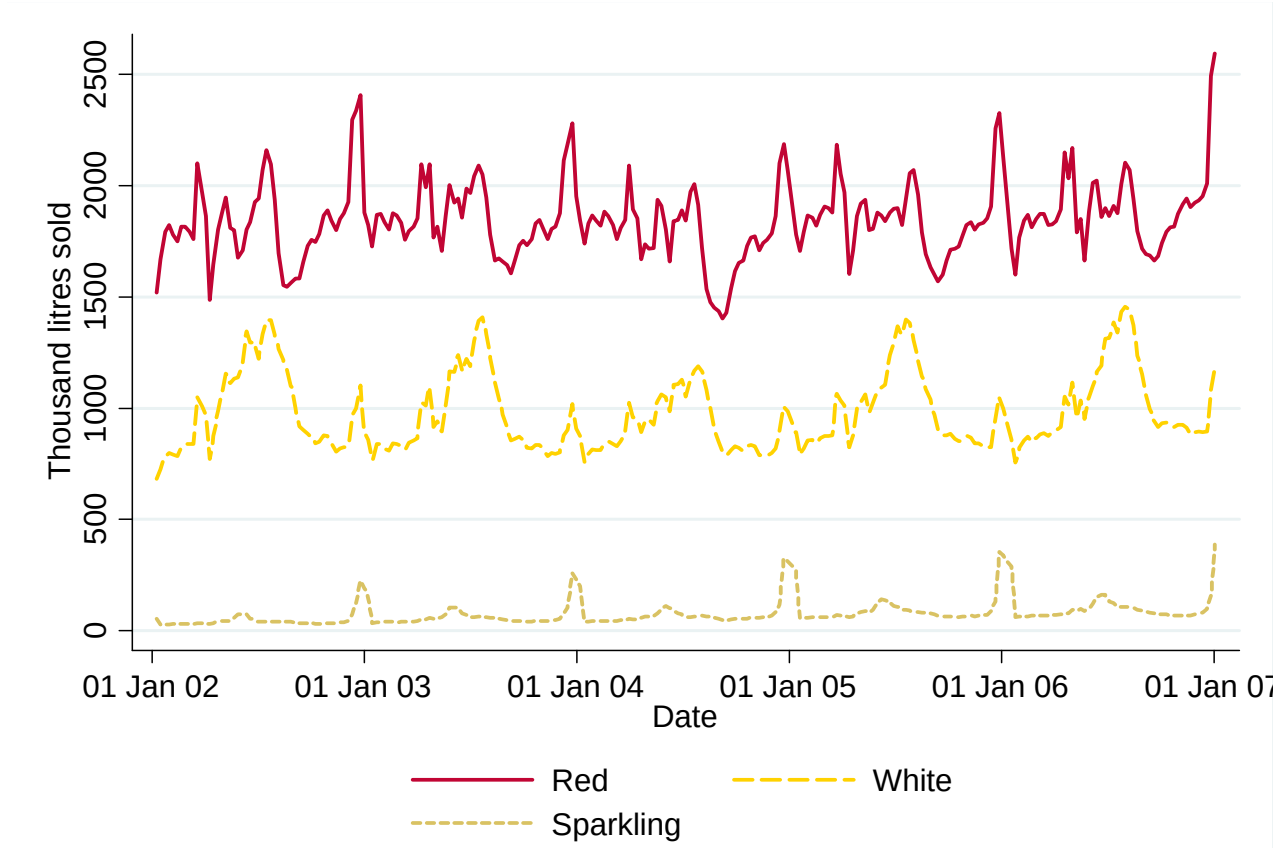
The following appendix reports additional results for Friberg and Grönqvist (2011).

1. Sample

As noted in the text, the data set includes prices and quantity of sales of all wine via the state monopoly retailer, Systembolaget. It has 6 distribution levels for the wines that are part of their regular assortment. One set of wines are distributed in all 420 stores and a second tier is distributed in 325 stores. Together these two categories make up 77.4 percent of the volume. Lower tiers have distribution in 195, 95 and 45 stores respectively. The analysis in the paper is for the wines that are distributed in at least 325 stores. We include wine sold in 3 liter boxes and 750 ml bottles only which account for more than 96 percent of the retail market. Boxes and bottles with volume greater than 3 liters make up 1.2 percent of volume. Magnum bottles (1.5 liters), 375 ml and 250 ml bottles together make up 1.5 percent of volume.

The dataset includes prices and quantities of all wines. We have ancillary information (on vintage, distribution level etc) only for the wines that were sold in 2006 however and these are the ones we include in the main analysis. The wines for which we lack this ancillary information make up 7.9 percent of volume in 2002, 2.1 percent in 2005 and zero in 2006. Systembolaget also carry some wines on a temporary basis, these would frequently run out of stock.

2. Additional description of the market alluded to in the paper



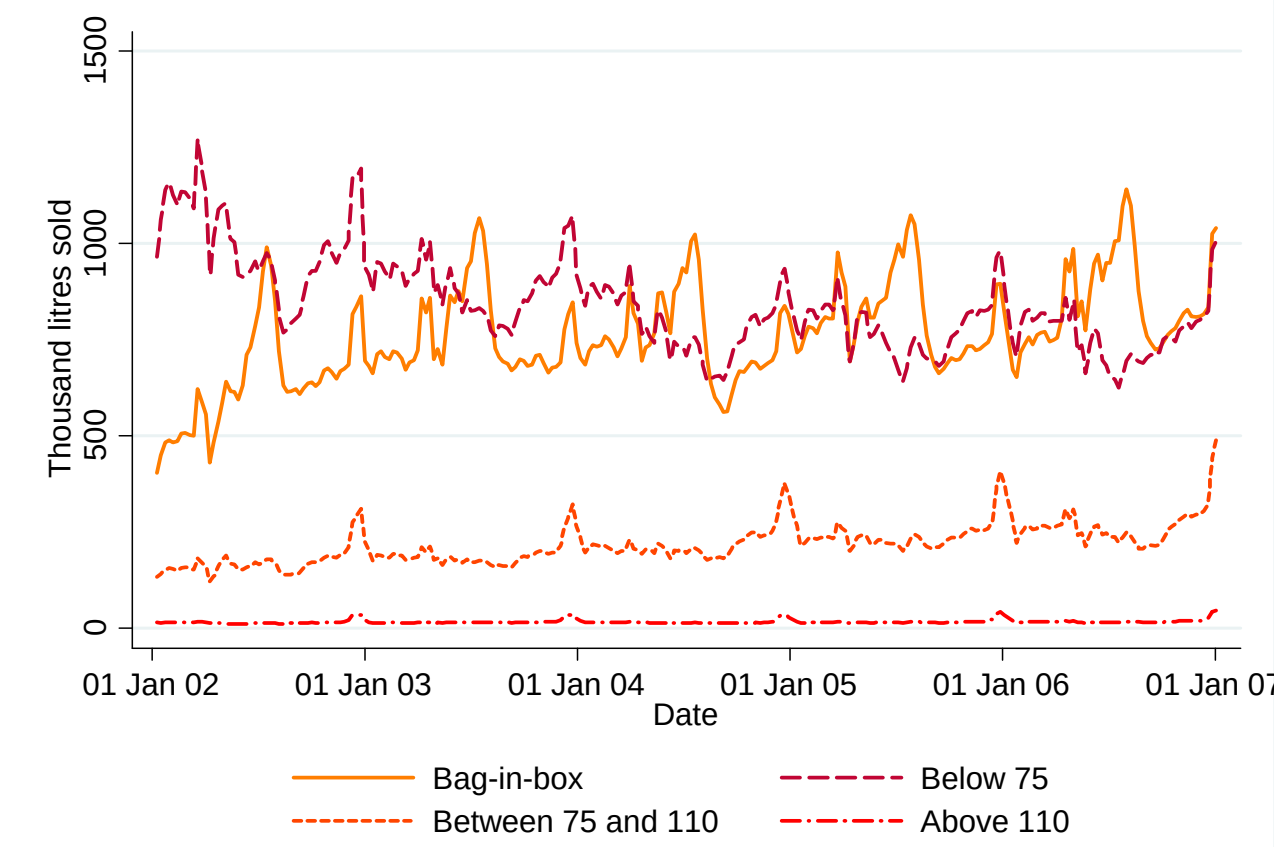


Figure A1a and A1b. Sales of wine by main segment (red/white/sparkling) and sales of red wine for different segments (bag-in-box, bottles in low/median/high price), Sweden Jan 2002-Jan 2007. *Note:* The figures show 5 week moving averages of liters sold per week by Sweden's government owned monopoly retailer.

Table A1. Correlation between mean value of reviews of particular wines in different media.

	Aftonbladet	Dagens Nyheter	Dagens Industri	Expressen	Svenska Dagbladet	Allt om Mat	Market share in segment	Price
Aftonbladet	1							
Dagens Nyheter	0.55*	1						
Dagens Industri	0.38*	0.52*	1					
Expressen	0.62*	0.45*	0.56*	1				
Svenska Dagbladet	0.15*	0.21*	0.21*	0.16*	1			
Allt om Mat	0.43*	0.63*	0.59*	0.52*	0.25*	1		
Market share in segment	0.04*	0.09*	0.05*	0.01*	-0.03*	0.10*	1	
Price	0.21*	0.06*	-0.00	0.21*	0.40*	0.09*	-0.13*	1

The table reports correlation between mean grade in review for a given wine across the different sources. Two last rows show correlation with mean market share in color and price- segment and mean real price (Jan 2004). * denotes significant correlation at 5 % level.

3. Regressions reported or mentioned in paper

3.1 Different versions of baseline regression.

In Table A2 we report estimates for the first four lags of some different variations of Equation 1. The first column reports a specification where we do not estimate a separate effect of good and bad reviews. As seen, reviews generate an increase in sales. In column 2 we include dummies for good and bad reviews. In column 3 we report the baseline specification that we illustrate in Figure 1 in the paper. The difference relative to the specification in column 2 is that we now include 4 leads. The point estimates of coefficients are almost identical in columns 2 and 3; thus adding leads to the model does not impact the coefficients of interest, suggesting that wines are not reviewed as a result of idiosyncratic trends. The following 2 columns are the yearly *AoM* reviews and their complement as reported in the lower two panels of Figure 1 in the paper.

Table A2 Baseline Effects of Reviews and Advertising on Demand for Wine

	(1) All	(2) All	(3) All	(4) AoM yeartest	(5) Non-AoM yeartest
Review	0.0174	0.0115***	0.0120***		0.0150***
	(0.0028)**	(0.0036)	(0.0038)		(0.0042)
Lag 1	0.0358	0.0201***	0.0206***		0.0239***
	(0.0035)**	(0.0036)	(0.0038)		(0.0042)
Lag 2	0.0243	0.0149***	0.0155***		0.0177***
	(0.0028)**	(0.0035)	(0.0037)		(0.0041)
Lag 3	0.0206	0.0096***	0.0102***		0.0110***
	(0.0026)**	(0.0033)	(0.0036)		(0.0039)
Lag 4	0.0158	0.0081***	0.0087***		0.0103***
	(0.0024)**	(0.0031)	(0.0034)		(0.0037)
Good Review		0.0208***	0.0199***	0.0360***	0.0150**
		(0.0052)	(0.0056)	(0.0139)	(0.0061)
Lag 1		0.0530***	0.0522***	0.0653***	0.0475***
		(0.0066)	(0.0069)	(0.0131)	(0.0077)
Lag 2		0.0343***	0.0335***	0.0560***	0.0289***
		(0.0054)	(0.0057)	(0.0137)	(0.0064)
Lag 3		0.0339***	0.0330***	0.0570***	0.0291***
		(0.0046)	(0.0049)	(0.0121)	(0.0057)
Lag 4		0.0265***	0.0257***	0.0534***	0.0203***
		(0.0047)	(0.0050)	(0.0139)	(0.0055)
Bad Review		-0.0111**	-0.0120**	-0.0138	-0.0126**
		(0.0047)	(0.0053)	(0.0093)	(0.0064)
Lag 1		-0.0179***	-0.0189***	-0.0179*	-0.0197***
		(0.0054)	(0.0060)	(0.0098)	(0.0075)
Lag 2		-0.0148***	-0.0157***	-0.0178*	-0.0137*
		(0.0052)	(0.0057)	(0.0097)	(0.0071)
Lag 3		-0.0053	-0.0062	-0.0113	-0.0020
		(0.0049)	(0.0054)	(0.0094)	(0.0069)
Lag 4		-0.0071	-0.0080	-0.0108	-0.0051
		(0.0047)	(0.0052)	(0.0092)	(0.0068)
Marketing	0.0002	0.0002***	0.0002***	0.0002***	0.0002***
	(0.0000)**	(0.0001)	(0.0000)	(0.0000)	(0.0000)
Lag 1	0.0002	0.0002***	0.0002***	0.0002***	0.0002***
	(0.0000)**	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Lag 2	0.0001	0.0001*	0.0001*	0.0001	0.0001*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Lag 3	0.0001	0.0001**	0.0001**	0.0001*	0.0001**
	(0.0000)*	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Lag 4	0.0001	0.0001**	0.0001**	0.0001**	0.0001**
	(0.0000)**	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Leads	No	No	Four	Four	Four
Observations	64863	64863	64863	64863	64863
# Wines	526	526	526	526	526
# Reviews	5093	5093	5093	1218	3869
Adj. R-squared	0.99	0.99	0.99	0.99	0.99

Note: The dependent variable is wine sales in log liters. The models in columns 1-3 estimate effects for all reviews in all wine segments; column 4 only for reviews in *Allt om Mat*'s yearly specials; column 5 for all reviews not in *Allt om Mat*'s yearly specials; columns 4 and 6 for all reviews in the red and white wine segment respectively. All models include fixed effects for each wine×vintage×price combination, and separate week effects for each color×price-segment. The model in column 1 includes 25 week lags of the effect of a review and of marketing expenditures (only 4 lags are displayed); column 2 includes 25 week lags of the effect of a review, a good review, a bad review, and of marketing expenditures (only 4 lags are displayed); columns 3 and 5-7 includes 25 week lags and 4 week leads of the effect of a review, a good review, a bad review, and of marketing expenditures (only 4 lags are displayed); column 4 include 25 week lags and 4 week leads of a good review, a bad review, and of marketing expenditures (only 4 lags are displayed). Robust standard errors clustered on brand in the parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

3.2 Competitor effects

In an additional regression we include competing reviews and competitor advertising in the baseline specification. Let wine i belong to taste-segment *c*. Define R_{cit}^{good} as the number of good reviews of competing wines in color × price-segment × taste-segment in week t. R_{cit}^{bad} is defined analogously for bad reviews and R_{cit} is also analogous for reviews. $ADVERT_{cit}$ is the sum of advertising of competing wines in color × price-segment × taste-segment in week t. Taste segments are described in Table A4. We thus estimate

$$\ln Q_{ijkt} = \alpha_j + \delta_{kt} + \sum_{l=-4}^{25} \alpha_{t-l}^{good} R_{it-l}^{good} + \sum_{l=-4}^{25} \alpha_{t-l} R_{it-l} + \sum_{l=-4}^{25} \alpha_{t-l}^{bad} R_{it-l}^{bad} + \sum_{l=-4}^{25} \gamma_{t-l} ADVERT_{it-l}$$
$$+ \sum_{l=-4}^{25} \beta_{t-l}^{good} R_{cit-l}^{good} + \sum_{l=-4}^{25} \beta_{t-l} R_{cit-l} + \sum_{l=-4}^{25} \beta_{t-l}^{bad} R_{cit-l}^{bad} + \sum_{l=-4}^{25} \kappa_{t-l} ADVERT_{cit-l} + \upsilon_{ijkt}$$

(A1)

Results on the coefficients of interest are reported in Figure A2. Counterfactual referred to in the text compares predicted values from A1 with predicted values from A1 having set

R_{it}^{good}=R_{it} = R_{it}^{bad}=R_{cit}^{good}=R_{cit}=R_{cit}^{bad}=0

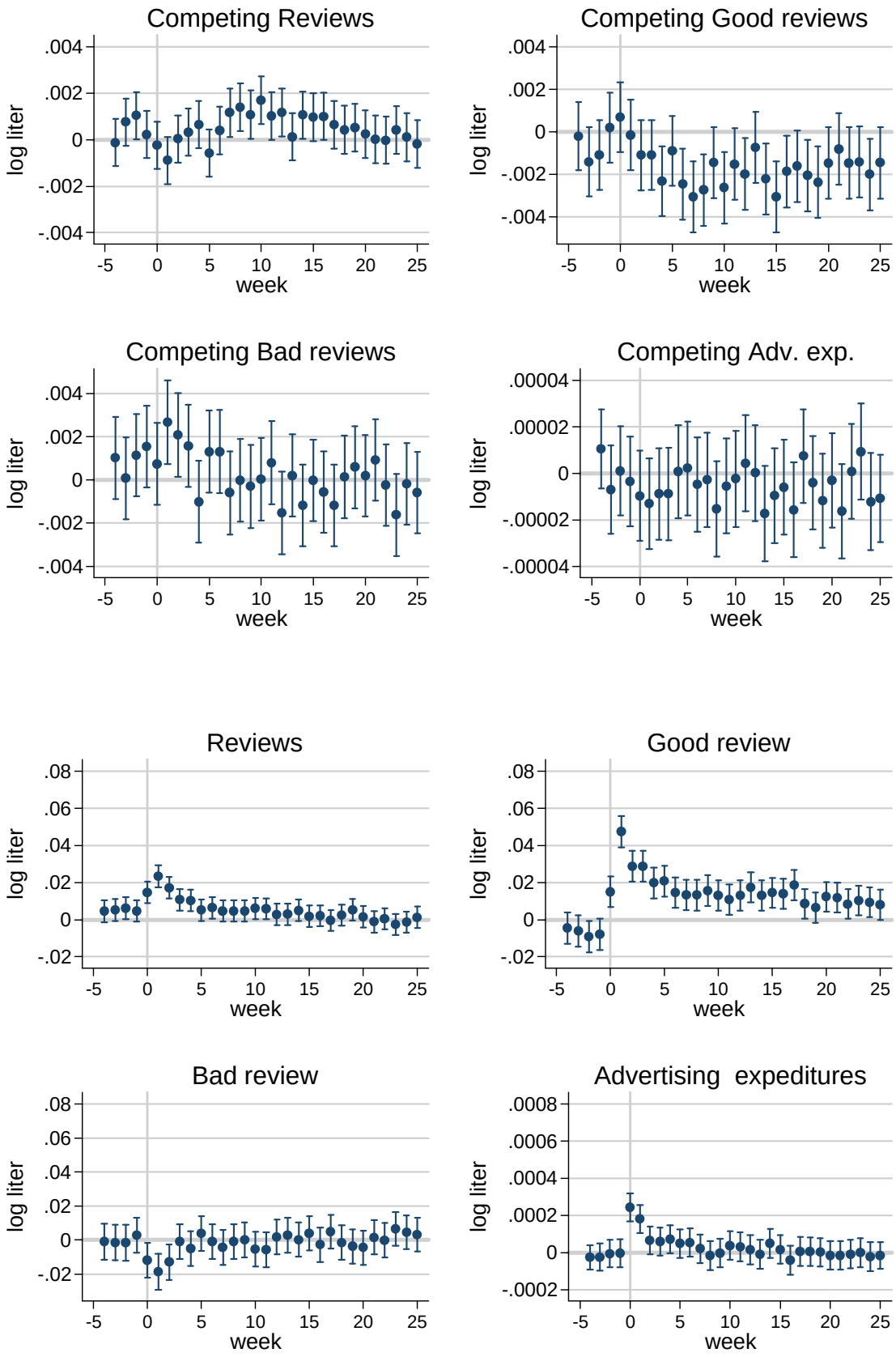


Figure A2. Competitor and own effects of reviews and advertising. *Note:* The figure display estimated coefficients (and 95 percent confidence intervals) from equation A1, and include fixed effects for each wineXvintageXprice, and separate week effects for each segment. Number of observations 64683, number of wines 526 and adjusted R-square is 0.99 in all panels. Estimations use the 3869 reviews published in weeks when the AoM yearly reviews did not appear. Standard errors are robust and clustered on brand.

3.3 Other heterogeneous effects

Table A3. Differential Impact of Reviews on Demand for Wine

	(1) Reviews in weeks with high vs low sales	(2) Multiple reviews in the same week	(3) Wines retailed 2002-2007 vs shorter	(4) Regions with low quality variation
	× High sales week	× Multiple reviews	× Wines sold all five years	× Low quality variation
Review	0.0022	0.0138**	0.0004	-0.0093
	(0.0090)	(0.0066)	(0.0055)	(0.0190)
Good Review	-0.0083	0.0080	-0.0040	0.0121
	(0.0083)	(0.0128)	(0.0060)	(0.0238)
Bad Review	0.0042	-0.0208	0.0040	-0.0144
	(0.0086)	(0.0137)	(0.0072)	(0.0212)
Observations	64863	64863	64863	64863
# Wines	526	526	526	526
# Reviews	5093	5093	5093	5093
Adj. R-squared	0.99	0.99	0.99	0.99

Note: Reported coefficients are interactions effects from estimating Equation (2), allowing for a differential effect for 10 weeks following the review. The interaction terms are defined as follows: *High sales week* are weeks with the 10 percent highest sales by year and color segment; *Multiple reviews* are when the same wine is reviewed in several media in the same week. *Wines retailed 2002-2007* are wines that are retailed at Systembolaget throughout the whole observation perod; *Advertising legal* corresponds to reviews after May 15 2003 when wine advertising become legal in Sweden; *Low quality variation variation* indicates that the wine comes from a region (by year) with the 10 percent lowest standard deviation in terms of price worthiness among the vines retailed on the Swedish market. The dependent variable is wine sales in log liters. All models estimates effects for all reviews in all wine segments, and include fixed effects for each wine×vintage×price combination and separate week effects for each color×price-segment. They also include 25 week lags and 4 week leads of the effect of a review, a good review, a bad review, and of marketing expenditures (only 4 lags are displayed). Robust standard errors clustered on brand in the parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

4. Robustness

4.1 More finely defined fixed effects.

Table A4. Frequency of Wines by Taste Segment and Color

Taste Segment (rough translation)	**Taste Segment**	**Color**			
		Red	**White**	**Sparkling**	**Total**
Flowery, medium dry	Druviga & Blommiga, h	0	1,912	0	1,912
Flowery, dry	Druviga & Blommiga, t	0	1,758	0	1,758
Crisp and fruity, medium dry	Friska & Fruktiga, ha	0	1,747	0	1,747
Crisp and fruity, dry	Friska & Fruktiga, to	0	12,593	0	12,593
Fruity and rich	Fruktiga & Smakrika	14,471	0	0	14,471
Rounded and rich	Fylliga & Smakrika, t	0	3,538	0	3,538
Spicy and full bodied	Kryddiga & Mustiga	11,158	0	0	11,158
Light and well rounded, medium dry	Lätta & Avrundade, ha	0	2,491	0	2,491
Light and well rounded, dry	Lätta & Avrundade, to	0	1,389	0	1,389
Soft and berry-like	Mjuka & Bäriga	7,917	0	0	7,917
Sophisticated and nuanced	Strama & Nyanserade	9	0	0	9
Medium dry (sparkling)	halvtorra	0	0	1,143	1,143
Rosé (sparkling)	rosé	0	0	266	266
sweet	söta	0	1,007	464	1,471
Dry (sparkling)	torra	0	0	3,000	3,000
	Total	33,555	26,435	4,873	64,863

Table A5. Robustness: Baseline Effects within Taste Segment

	(1) All
Review	0.0081**
	(0.0033)
Lag 1	0.0182***
	(0.0035)
Lag 2	0.0123***
	(0.0035)
Lag 3	0.0070**
	(0.0034)
Lag 4	0.0065**
	(0.0032)
Good Review	0.0200***
	(0.0060)
Lag 1	0.0555***
	(0.0076)
Lag 2	0.0365***
	(0.0061)
Lag 3	0.0368***
	(0.0051)
Lag 4	0.0281***
	(0.0051)
Bad Review	-0.0054
	(0.0053)
Lag 1	-0.0134**
	(0.0059)
Lag 2	-0.0082
	(0.0058)
Lag 3	-0.0023
	(0.0059)
Lag 4	-0.0037
	(0.0056)
Marketing	0.0002***
	(0.0001)
Lag 1	0.0002***
	(0.0001)
Lag 2	0.0001*
	(0.0000)
Lag 3	0.0001*
	(0.0000)
Lag 4	0.0001**
	(0.0000)
Leads	
Observations	Four
# Wines	526
# Reviews	5093
Adj. R-squared	0.99

Note: The dependent variable is wine sales in log liters. The model estimates effects for all reviews in all wine segments, and include fixed effects for each wine×vintage×price combination, and separate week effects for each color×price×taste-segment. It also includes 25 week lags and 4 week leads of the effect of a review, a good review, a bad review, and of marketing expenditures (only 4 lags are displayed). Robust standard errors clustered on brand in the parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

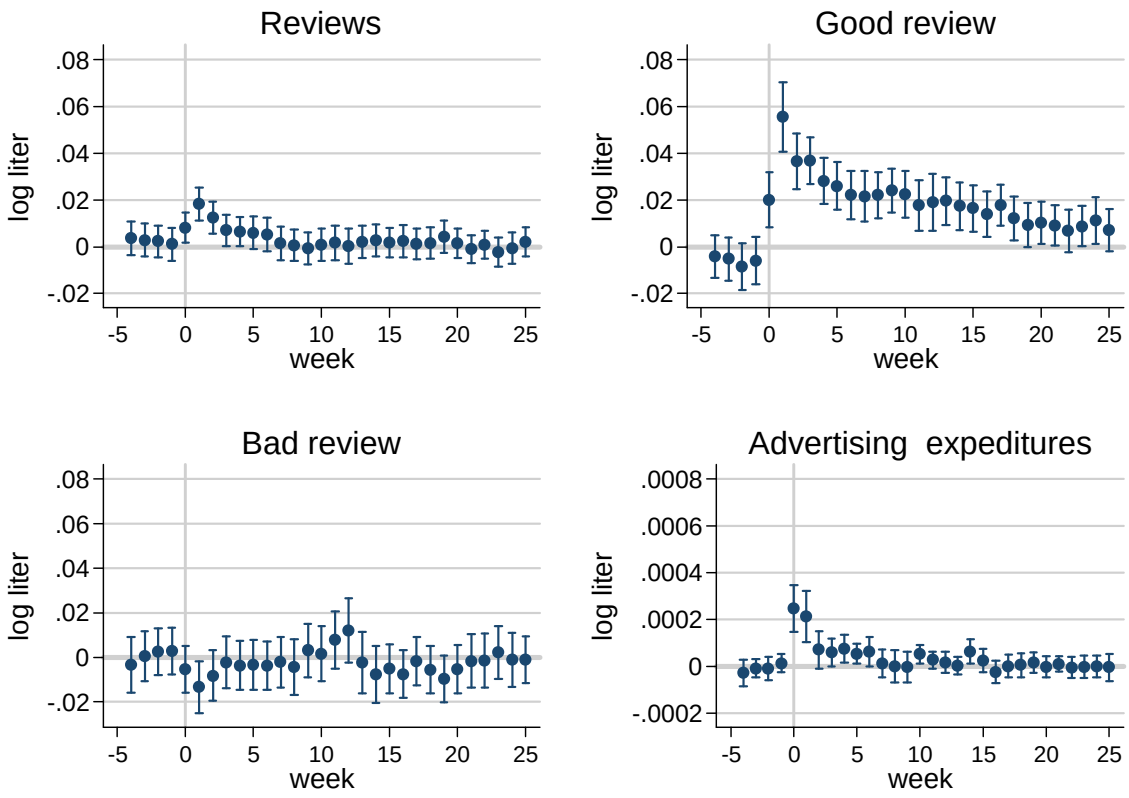


Figure A3 Robustness: Baseline Effects Within taste segment

Note: Estimated coefficients (and 95 percent confidence intervals) for all reviews in all wine segments, and includes fixed effects for each wine×vintage×price combination and separate week effects for each color×price×taste-segment. Regression results are also reported in Table A3. Standard errors are robust and clustered on brand.

4.2 Before and after advertising as well as no carry over of reviews from previous vintage or price

Endogenous advertising has the potential to create biased coefficient estimates. As argued in the paper, our rich set of controls and weekly data limit these concerns. Note that for the first 16 months of our data advertising of wine was not allowed and this concern is mute. We therefore estimate equation 1 separately for the periods before and after advertising was allowed and report results below. As seen, the estimated coefficients are very similar in both periods. We take this as support for endogenous advertising not being the cause of the impacts of reviews on demand that we document.

A price change, or the introduction of a new vintage, may be associated with a temporary demand shock. The specification in equation 1 allows reviews of a certain wine to have effect on the demand also for a new vintage, or after a price change. The fixed effects at the price-vintage level control for level differences in demand linked to a new vintage or price. Still, if for instance a new lower price is associated with a *temporary* increase in sales, and this lower price triggers a review to appear, we would erroneously ascribe the sales increase to the review in this specification. Most price changes are small and the median wine only changes price on two occasions. The wines are also in a price and quality range where we expect vintages to have a limited effect. Nevertheless, a price decrease or a new vintage may coincide with a new review and we risk spuriously assigning a demand increase to the review. As a check on robustness we therefore also estimate the equivalent of model 1 exclusively at the product/price/vintage level; thus only allowing a review to affect sales for the specific vintage and price. As new vintages come once a year we would restrict our sample greatly if we used 25 lags, and we therefore use 10 lags instead in this robustness check. By allowing reviews to affect the sales for a shorter window of time we believe that this model does a worse job at capturing the full effect of reviews over time, but is still useful as a specification test to examine if model 1 indeed captures the causal effect of reviews on demand. The difference with respect to equation 1 is thus that reviews and advertising now are sub-indexed by *j* (wine/price/vintage) rather than by *i*, (wine).

$$\ln Q_{(i)jkt} = \alpha_j + \delta_{kt} + \sum_{l=-4}^{10} \alpha_{t-l}^{good} R_{jt-l}^{good} + \sum_{l=-4}^{10} \alpha_{t-l} R_{jt-l} + \sum_{l=-4}^{10} \alpha_{t-l}^{bad} R_{jt-l}^{bad} + \sum_{l=-4}^{10} \gamma_{t-l} ADVERT_{jt-l} + \eta_{(i)jkt}$$

(A2)

Table A6. Effects before and after advertising is allowed, and results from a specification where no carry over from previous vintage×price combinations.

	(1) Full period	(2) Before May 15 2003	(3) After May 15 2003	(4)	(5)
		Before advertising	without advertising	with advertising	Each vintage×price treated as a new wine
Review	0.0094***	0.0028	0.0115***	0.0126	0.0033
	(0.0035)	(0.0000)	(0.0036)	(0.0000)	(0.0054)
Lag 1	0.0195***	0.0113	0.0220***	0.0229	0.0105*
	(0.0035)	(0.0000)	(0.0036)	(0.0000)	(0.0056)
Lag 2	0.0148***	0.0113	0.0160***	0.0170	0.0082*
	(0.0034)	(0.0000)	(0.0034)	(0.0000)	(0.0046)
Lag 3	0.0107***	0.0167	0.0101***	0.0109	0.0042
	(0.0032)	(0.0000)	(0.0034)	(0.0000)	(0.0039)
Lag 4	0.0083***	0.0117	0.0084***	0.0092	0.0041
	(0.0030)	(0.0000)	(0.0030)	(0.0000)	(0.0042)
Good Review	0.0190***	0.0195	0.0193***	0.0182	0.0236***
	(0.0054)	(0.0000)	(0.0052)	(0.0000)	(0.0076)
Lag 1	0.0496***	0.0384	0.0525***	0.0514	0.0460***
	(0.0068)	(0.0000)	(0.0063)	(0.0000)	(0.0093)
Lag 2	0.0309***	0.0299	0.0318***	0.0308	0.0257***
	(0.0052)	(0.0000)	(0.0050)	(0.0000)	(0.0068)
Lag 3	0.0296***	0.0263	0.0316***	0.0304	0.0311***
	(0.0045)	(0.0000)	(0.0049)	(0.0000)	(0.0053)
Lag 4	0.0227***	0.0266	0.0229***	0.0215	0.0240***
	(0.0044)	(0.0000)	(0.0044)	(0.0000)	(0.0055)
Bad Review	-0.0099*	-0.0106	-0.0080	-0.0087	-0.0040
	(0.0055)	(0.0000)	(0.0054)	(0.0000)	(0.0085)
Lag 1	-0.0191***	-0.0221	-0.0170***	-0.0176	-0.0114
	(0.0058)	(0.0000)	(0.0062)	(0.0000)	(0.0090)
Lag 2	-0.0183***	-0.0314	-0.0128**	-0.0136	-0.0123
	(0.0058)	(0.0000)	(0.0054)	(0.0000)	(0.0078)
Lag 3	-0.0085	-0.0252	-0.0028	-0.0037	-0.0022
	(0.0053)	(0.0000)	(0.0054)	(0.0000)	(0.0066)
Lag 4	-0.0081	-0.0182	-0.0049	-0.0052	-0.0063
	(0.0051)	(0.0000)	(0.0051)	(0.0000)	(0.0066)
Marketing	0.0002***			0.0002	0.0002***
	(0.0000)			(0.0000)	(0.0001)
Lag 1	0.0002***			0.0002	0.0002***
	(0.0000)			(0.0000)	(0.0001)
Lag 2	0.0001			0.0001	0.0001*
	(0.0000)			(0.0000)	(0.0001)
Lag 3	0.0001**			0.0001	0.0001**
	(0.0000)			(0.0000)	(0.0000)
Lag 4	0.0001*			0.0001	0.0000
	(0.0000)			(0.0000)	(0.0000)
Observations	70805	14081	55515	55501	46201
# Wines	555	309	509	509	547
# Reviews	5619	992	4557	4557	1228
Adj R-squared	0.99	0.99	0.99	0.99	0.99

The analysis in column 1 covers the full sample period, 2002-2007; column 2 covers the period before May 15th 2003 when advertising was not legal on the Swedish wine market; columns 3 and 4 cover the period after May 15th 2003 when advertising of wines were legal. All models include 10 week lags and 4 week leads of the effect of a review, a good review and a bad review (only 4 lags are displayed), and fixed effects for wine, vintage, price, year, separate week effects for each segment, and an indicator for wage week. Columns 1 and 4 also include 10 week lags and 4 week leads of marketing expenditures. Column (5) reports results from a specification where each vintageXprice combination is treated as an entirely new product in all respects, it thus estimates equation 2. Robust standard errors clustered on brand in the parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

4.3 Ln(price) included as a regressor, rather than fixed effects at level of price.

The graph below reports the baseline but with with ln(price) as an independent variable and fixed effects at the wine × vintage level. As seen the effects of reviews and advertising are virtually identical as in the baseline specification. The coefficient on ln(price) is -1.77 with a standard error of 0.0406.

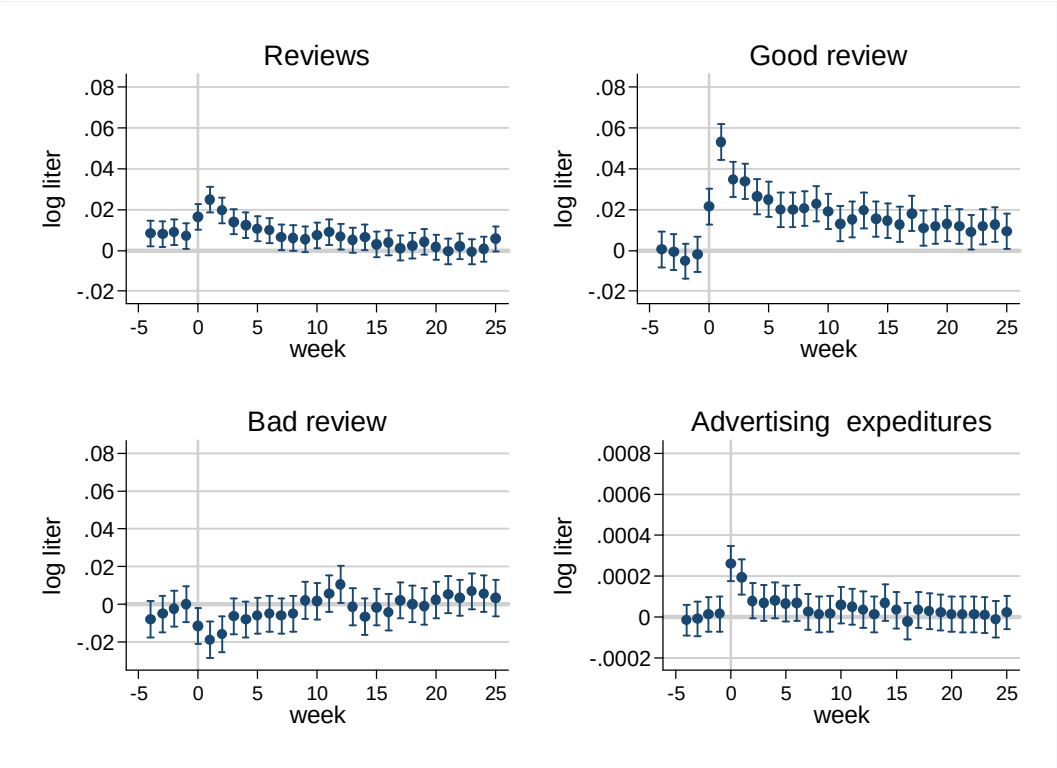


Figure A4. Robustness: Baseline with ln(price) and wine×vintage fixed effects

Note: Estimated coefficients (and 95 percent confidence intervals) for all reviews in all wine segments, and includes ln(price) as a control variable and fixed effects for each wine×vintage combination and separate week effects for each color×price×taste-segment. Standard errors are robust.

4.5 Do good reviews trigger price changes?

Table A7 Linear probability that wines with a Good review raise the price within 25 weeks relative to other reviewed wines

	(1) All	(2) AoM yeartest
Good review	-0.0216	-0.0063
	(0.0138)	0.0216
FE color×price×taste-segment	Yes	Non applicable
Observations	5094	946
Adj. R-squared	0.294	0.000

Note: The dependent variable is an indicator of whether the price was raised within 25 weeks of the review. In column 1 are estimates for all a panel of all observed reviews in and include a week effects for each color×price-segment; standard errors are robust and clustered on wine. In column 2 are estimates for the pooled cross section of reviews in *Allt om Mat*'s yearly specials; standard errors are robust. * significant at 10%; ** significant at 5%; *** significant at 1%.

4.6 Aggregation of review scores.

The reviews are from different media and one can argue that a 10 in a paper that gives few 10's is worth more than a 10 in a media that is more generous with grades. This concern is somewhat limited by that the differences in how the papers assign grades are relatively minor (as seen in Table 2). None of the papers publish any grade distribution – nor are such grade distributions available anywhere else (we had a research assistant write in all grades from the paper sources) such that it is hard to know if consumers indeed would weigh grades differently from different sources. Concerns may still remain however and we therefore run alternative regressions where we define good review as one above the 80^{th} percentile in that particular journal and bad review as one below the 20^{th} percentile, as well as one with good review defined as above the median review in the respective paper. These are given below for the benchmark regressions. As seen the picture painted is overall similar to the current benchmark.

Table A8 Robustness: Baseline Effects with Different Review Indicators

	(1)		(2)
Review	0.0133***	Review	0.0078**
	(0.0031)		(0.0037)
Lag 1	0.0333***	Lag 1	0.0114***
	(0.0036)		(0.0040)
Lag 2	0.0212***	Lag 2	0.0090**
	(0.0030)		(0.0036)
Lag 3	0.0168***	Lag 3	0.0082**
	(0.0030)		(0.0037)
Lag 4	0.0132***	Lag 4	0.0043
	(0.0028)		(0.0036)
Review>P80	0.0375***	Review>P50	0.0192***
	(0.0074)		(0.0045)
Lag 1	0.0446***	Lag 1	0.0472***
	(0.0083)		(0.0053)
Lag 2	0.0376***	Lag 2	0.0302***
	(0.0071)		(0.0048)
Lag 3	0.0352***	Lag 3	0.0242***
	(0.0068)		(0.0045)
Lag 4	0.0309***	Lag 4	0.0228***
	(0.0070)		(0.0046)
Review<P20	-0.0075		
	(0.0060)		
Lag 1	-0.0255***		
	(0.0069)		
Lag 2	-0.0174***		
	(0.0060)		
Lag 3	-0.0092		
	(0.0059)		
Lag 4	-0.0116*		
	(0.0061)		
Marketing	0.0002***	Marketing	0.0002***
	(0.0000)		(0.0000)
Lag 1	0.0002***	Lag 1	0.0002***
	(0.0000)		(0.0000)
Lag 2	0.0001*	Lag 2	0.0001*
	(0.0000)		(0.0000)
Lag 3	0.0001**	Lag 3	0.0001**
	(0.0000)		(0.0000)
Lag 4	0.0001**	Lag 4	0.0001***
	(0.0000)		(0.0000)
Leads			
Observations	64863		64863
# Wines	526		526
# Reviews	5093		5093
Adj. R-squared	0.99		0.99

Note: The dependent variable is wine sales in log liters. Column 1 defines *Good reviews* as being above the 80th percentile (by media) and *Bad reviews* as being below the 20th percentile; column 2 defines a *Good review* as being better than the median review (by media). Both models estimate effects for all reviews in all wine segments, and include fixed effects for each wine×vintage×price combination, and separate week effects for each color×price×taste-segment. They also includes 25 week lags and 4 week leads of the effect of a review, a good review, a bad review, and of marketing expenditures (only 4 lags are displayed). Robust standard errors clustered on brand in the parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

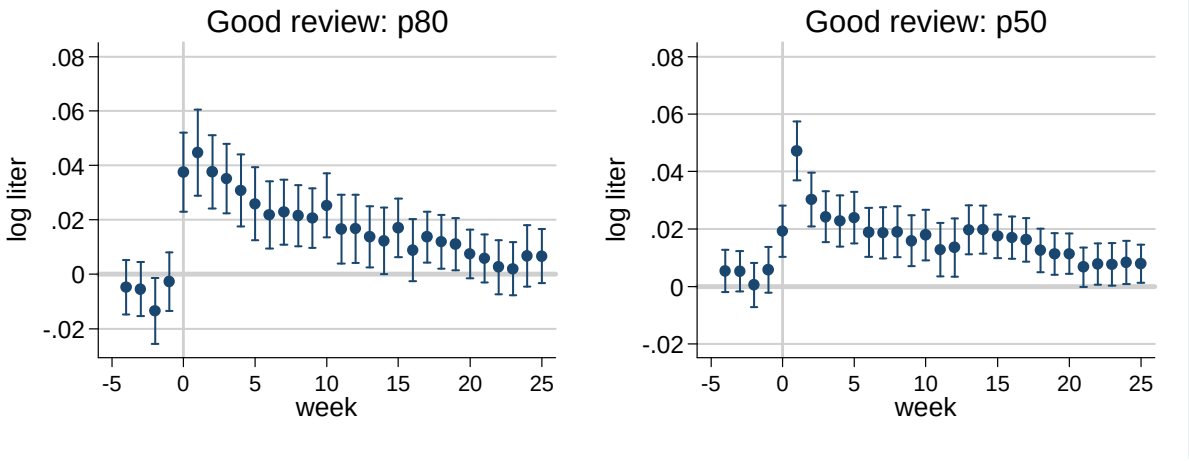


Figure A5. Robustness: Baseline Effects with Different Review Indicators

Note: Estimated coefficients (and 95 percent confidence intervals) for all reviews in all wine segments, and includes fixed effects for each wine×vintage×price combination and separate week effects for each color×price-segment. A *Good review* is defined as being above the 80th percentile and above the median (by media), respectively. Regression results are also reported in Table A8. Standard errors are robust.