

Odd prices for odd bottles at VDP auctions

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1. Introduction

In a typical supermarket in Europe soft drinks or water of identical brands are usually offered in a variety of package volumes – 0.375 liter, 0.5 liter, 0.75 liter, 1 liter, and sometimes even 1.5 liters. Wine, in contrast, is mostly offered in either 0.75 liter or 1.0 liter bottles, and only occasionally in smaller 0.375 liter bottles – and rarely is the same wine available in different bottle sizes.

Why this low level of variety in wine container size? Because people tend to empty the whole bottle once it is opened? If this was true we would probably observe more bottle size variety with expensive wines than with cheap ones because more people are likely to empty on a day or a sitting a small bottle of Petrus, Stags Leap, or Grange than a standard sized bottle. Or is bottle size variety reduced because opening wine bottles is an annoying task which is better spread over many servings than few? Not very credible either – if this was the case we would observe more bottle size variation with screw-top bottles than with corked ones.

Euro-skeptics would probably discard our everyday-economics reasoning out of hand and suspect some sinister harmonization scheme of the European Commission behind the uniformity. The suspicion is, in this case, misplaced. Bottle sizes permitted by the OIV and the EU for still wine range from 0.1 liter over 0.25 l, 0.375 l, 0.5 l, 0.75 l, 1.0 l, 1.5 l, 2.0 l, 3.0 l, 4.0 l, 5.0 l, 6.0 l, 8.0 l, 9.0 l, up to 10 liters (Robinson 2006; OIV n.d.).

Perhaps buyers impose constraints on wine bottle size. The encounter between a wine buyer and a 6 liter Methuselah or a 9 liter Salmanzar is likely to be awkward: How to move a 13 kg or 20 kg wine bottle from the counter to the car? Where to store it in the cramped cellar with its standardized shelves? Where to put it during dinner? How to pour the wine gracefully into delicate wine glasses? How to sustain a conversation with people sitting on the other side of the table when eye contact is obstructed by a monstrous bottle? And what a shame when its content is tarnished by trichloroanisole (TCA)!

We suspect that consumers derive higher benefits when a wine is in a standard 0.75 liter bottles than when it is filled into a bottle of odd volume and that the demand for odd-volume bottles is low. A unique dataset of bids from auctions, where both standard 0.75 liter bottles as well as non-standard bottles were auctioned, allow us to test our hypothesis.

The remainder of our paper consists of four parts. First, we provide some background on bottle sizes, on wine auctions, and on wine auctions conducted by the Association of German Prädikat Wine Estates (Verband Deutscher Prädikatsweingüter, VDP), which are the auctions from which we obtained our wine price data. Section 3 of our paper presents summary statistics from six VDP-auctions conducted in 2007 and 2008 by the Mosel-, Rheingau-, and Nahe-branches of the VDP. In Section 4 we report statistical results from tests of our hypotheses concerning the impact of bottle size on the price of wine. Section 5 discusses the results and closes the paper.

2 The economic and institutional environment of VDP auctions

2.1 Selling wine in bottles of standardized volumes

Few would expect a book with the title "Bottled Poetry" (Lesley 1996) to be about coke, vodka, or schnapps. Most people, at least in the civilized parts of the West, would guess correctly that the book is about wine, confirming the mysterious poetic relationship between wine and its fragile container. The intimate relationship between wine and bottle is much younger than either. Bottles are known since Roman times but their use for decanting wine began only in the early 16th century in England at the tables of the rich (Phillips 2000). Bottles' popularity was boosted in the 1630s when Kenelm Digby, a colorful Englishman with interests in alchemy, invented a method for producing a new type of glass bottle that was much sturdier and only about half the price of its predecessors (Taber 2007). The bottles were globe-shaped, had a long neck with a collar for tying down a stopper with a twine, and they varied in size because they were blown individually by humans.

Being better and cheaper than their predecessors, the new "English bottles" were a huge success among the wine drinking classes, but the bottles were nevertheless far from perfect. Globe-shaped and long-necked are useful features for a decanting-bottle standing on a table but they are highly undesirable features for storage or transport in bins. Moreover, stoppers had to be fitted individually to the neck of a bottle and they could not be pushed into the neck all the way because there were no cork-screws. As a matter of principle, the evolution of the design of useful things tends to be driven by perceived shortcomings of available designs and their failures to function properly. (Petroski 1992). Gradually, wine bottles lost the bulbous shape of their youth, their bodies stretched and straightened until the middle of the 18th century when they assumed a cylindrical shape that allowed the convenient storage of several rows of bottles on top of each other, all properly corked with no protruding stubs (Phillips 2000).

Storability in stacks of rows depends on bottles having a certain shape, but the bottles need not have the same volume. Evolutionary pressure towards uniform bottle volume presumably was low and a process to standardize size and volume for bottles was patented only in 1821. Because variation in bottle size invites fraud, a law prohibiting the sale of bottled wine was passed in 1636; this law was repealed as late as in 1860 (Phillips 2000, p. 136).

Today, most wine sold to consumers is in bottles of regulated volume. The OIV, as the relevant international regulating body, has defined two lists of volumes for "pre-packaged" wines for sale in the Member countries of the OIV. The short list allows bottles of 0.187 liters, 0.375 liters, 0.75 liters, and 1.5 liters. This list is supplemented by a longer one of "complementary" and "optional" permissible volumes which allows bottles of 0.05 liters volume all the way up to 10 liters (OIV n.d.). Bottle sizes permitted by EU for still wine range from 0.1 liter over 0.25 l, 0.375 l, 0.5 l, 0.75 l, 1.0 l, 1.5 l, 2.0 l, 3.0 l, 4.0 l, 5.0 l, 6.0 l, 8.0 l, 9.0 l, and 10 liter (Robinson 2006).

Bottle sizes actually observed do not exhaust the permissible EU list: Small 0.187 liter, 0.375 liter and 0.5 liter bottles are seen in trains and airplanes, and when they contain very expensive wines, such as "Grosses Gewächs", "Beerenauslese" or "Eiswein" from Germany. From the permissible volumes beyond the standard 0.75 liter bottle, the 1 liter bottle dominates sales of ordinary vintners' wines but volumes beyond 1 liter are rare. Corresponding with their rarity are the prices of the empty bottles: Whereas a standard 0.75 liter burgundy bottle costs about 0.25 €, the 1.5 liter "Magnum" sells for 0.85 to 1.10 € per bottle and a 3 liter bottle sells for about 10 € a bottle (Reis Flaschenhandel GmbH). Hence packing a liter of wine in a standard 0.75 liter bottle costs 0.33 €; this cost about doubles to 0.67 € per liter for the "Magnum", and it jumps to 3.50 € per liter wine packaged in a 3-liter "Double-Magnum". Odd-sized bottles are expensive packaging.

Why are wine bottle volumes regulated by the state? Historians of the wine industry, such as Phillips (2000), suggest that selling wine in bottles of non-standardized volumes was prohibited in order to protect buyers from fraudulent merchants. Since then other means for protecting consumers against fraud have evolved, such as posting unit prices together with the package price. Where unit prices are posted, standardized volumes would appear to be an outdated and superfluous means for protecting intelligent consumers from fraud. To answer the question we have to ask the more general question first, "Why are there standards?" Kindleberger (1983, p. 378) distinguishes two types of standards, "those designed to reduce transactions costs, and those in which there are physical economies external to the firm." And with regard to government involvement Kindleberger (1983, p.378-379) observes, "Some standards are imposed by government in the interests of the consumer, notably in the testing of drugs and inspection of meat. For the most part, however, standardization was originally undertaken by merchants."

Because bottles of a given volume can be of many shapes and sizes, the impact of standardized volumes on the physical economies of producing, storing, and handling of wine bottles is likely to be small over wide variations of volumes. Evidence of this is the considerable variety of well-established bottle types that all comply with volume regulations: the popular "Bordeaux" bottle, the "Burgundy" bottle, the "Schlegel" on the Rhine, or the "Bocksbeutel" in Franken. We are therefore led to believe that volume standards serve to reduce transaction costs: Buyers and tax collectors do not have to inspect actual volumes of wine offered for sale, or substitute trust and reputation for measurement. Moreover, standardized bottle volumes facilitate, but are not strictly necessary, for contractual exchanges which, in turn, facilitate trade among strangers along an extended supply chain (Barzel 2002).

2.2 Wine auctions

Most exchanges that involve physical goods are made either on the basis of posted prices, or they are by private treaty on terms that are not made public. Some physical goods are, however, traded in public auctions where prices are determined cooperatively by many buyers. Typically, auctions are used to price goods in markets with one or several of four characteristics: (i) Absence of a reliable reference price statistic which could guide price negotiations (e.g. unique works of art, rare bottles of old wine, radio frequencies); (ii) markets with rapidly changing supply and demand conditions where reported aggregate price statistics quickly lose their information value (e.g. stock and futures markets); (iii) markets for perishable goods (e.g. flowers or fish) where the speed of price negotiations is important; (iv) markets with geographically dispersed supply, or demand, or both, which are concentrated at the auction (e.g. livestock auctions) (Ashenfelter 1989; Cassady 1967; McAfee and McMillan 1987). Moreover, auctions are often used by government agencies for purchasing or for selling public property. Finally, auctions may also be conducted for the thrill of auctioning.

Wine is not perishable, timely wine price statistics are available in most wine producing regions, and changes in wine supply and demand tend to be gradual. Most wine is therefore traded by other means than auctions. Auctions are, however, used for buying and selling of expensive, rare wines (Ashenfelter 1989). At these auctions small numbers of rare and expensive bottles change hands. Moreover, the auctions are "dry" in the sense that none of the wines put up for sale may be tasted.

Wine auctions have a tradition in Germany that goes back to the beginning of the 19th century when princely estates began selling wine by the barrel at auction (Bassermann-Jordan 1975/1923; VDP 2009 [a]). The practice was also adopted by large privately-owned wine estates and culminated in the foundation in 1910 of the "Verein der Naturweinversteigerer" (association of

auctioneers of natural wines). This association eventually morphed into the "Verband Deutscher Prädikatsweingüter" (VDP) whose regional Mosel-, Rheingau- and Nahe-branches still conduct annual wine auctions.

Early wine auctions in Germany differed markedly from today's auctions for old wines. For one, they were an unsuitable source of wine supplies for most individual consumers because the wine was auctioned unbottled in barrels of 600 liter or 1,200 liter capacity (VDP 2009 [a]). More importantly, however, wine auctions in Germany were - and many still are - "wet auctions" where the people attending the auctions were allowed to taste the wine before and during the auction. At large auctions wetness was carried to extremes and more than 1,000 liters of wines were needed for the tastings. Apparently, this attracted many non-buyers and attendance was restricted, or for a fee. Occasionally, wine buyers were no match for the rigors of wet auctions and auction rules allowed winning bidders to renege on their bids within two days because of drunkenness (Bassermann-Jordan 1975/1923).

2.3 VDP auctions

We obtained our data from VDP auctions and we need to provide some background on the VDP and its auctions. The VDP is an association of nearly 200 wine estates from all of the 13 wine growing regions in Germany. Membership is by invitation and an excellent reputation of the winery apparently is a prerequisite for membership. The VDP is small in comparison to the size of the wine industry in Germany. The Association claims that its members cultivate about 4,000 ha of vineyard area or 4 percent of Germany's total vineyard area; from this area the VDP estates produce about 2.5 percent of Germany's total wine production. Because VDP estates tend to produce wine in the higher price ranges - the average price is 8.90 € per bottle - the share of VDP estates in total sales of German wine is at 12 percent significantly higher than the shares in either total national area or production (VDP 2009 [b]). The main grape produced by VDP estates is Riesling (55 percent of VDP vineyard area compared to 21 percent nation-wide) and the Association encourages organic wine production. VDP members produce some 35 million bottles of wine annually of which about half are sold directly to consumers. Most VDP wines are consumed within Germany and only one out of five bottles is exported (VDP 2009 [b]).

The primary purpose of the VDP is to promote wine sales of its members by promoting wine quality among all its members. To this end, the VDP has defined a range of quality standards and it monitors members' adherence to the standards, similarly to how certification agencies define and monitor product and process standards. Moreover, the Association promotes its brand label, the "Grape Eagle" and it has evolved a new grade of wines, the "Erste Lage", which are wines from grapes that have been hand-harvested from distinguished, named vineyards, filled into a special type of bottle, and mostly priced above 15 € per bottle. In addition, the Association organizes a range of collective marketing activities for its members, such as promotion tours and wine shows abroad, various wine events, and annual wine auctions in three wine regions: the Mosel, the Nahe, and the Rheingau. The auctions are held at one weekend in September immediately after the traditional auction by the Kloster Eberbach estate and before the grape harvest begins. Usually, the auctions are held in Trier for the Mosel-Saar-Ruwer region, at Kloster Eberbach for the Rheingau, and in Bad Kreuznach for the Nahe and Ahr regions. Several estates from Rheinhessen and Pfalz also offer wines at the Nahe auction.

Following German tradition, the VDP auctions are wet auctions: Before the auctioning begins, wines may be tasted during a "pre-tasting" which is meant to allow bidders to compare directly the wines that are up for auctioning. During the auction proper, each wine is offered again for tasting before the auctioneer calls for bids. Some wines are, however, auctioned dry. In

particular, rare wines and unique bottles are not for tasting. Also following tradition - as well as economic sense – entry to the auctions is for a fee of € 30 per person at the Nahe auction, € 40 per person at the Rheingau auction, and € 70 per person at the Mosel auction (VDP 2009 [c]).

The wines offered at auction are exceptional wines of VDP estates which are exclusively sold at auction. This does not imply that all wines are exceptionally expensive and the asking price for some wines may be below 10 € per bottle. Wines auctioned at the Rheingau auction – and presumably at the other auctions as well – are inspected by a committee of wine brokers and estate representatives for their suitability for the auction. This committee also fixes the asking or reserve price. There are no restrictions on the size of the consignments that a seller offers for auction and consignments may be split into lots of different sizes. Only wine commissioners or wine brokers may bid in the ascending, English auctions. Ordinary wine buyers must submit their orders to any one of the eleven VDP-registered brokers (VDP 2009 [d]). Bid increases tend to increase in discrete steps with the level of the last bid, but sometimes there are exceptions. Occasionally, bidding may be interrupted for a short time to allow wine brokers to consolidate or merge their order books for a specific lot.

Auctioneers and brokers usually require a fee for their services and wherever transactions are conducted the grabbing hand of the state is never far. To the knock-down price buyers have to add a 19 percent value-added tax. The fees for the auctioneer vary among the VDP-branches: At the Mosel, where prices tend to be high, the auctioneer receives 2 percent of the knock-down price, at the Nahe 5 percent, and 7.5 percent at the Rheingau auction. At the Mosel auction, and perhaps at the other auctions as well, brokers collect a 5 percent commission, 3 percent from the seller and 2 percent from the buyer (VDP 2009 [e]).

3. VDP auction data

3.1 Auction sales and prices

We obtained data from the six wine auctions that were organized in 2007 and 2008 by the Mosel-, Nahe-, and Rheingau-branches of the VDP. The VDP makes the data of all six auctions available on its website, free of charge. The dataset includes information about the wineries involved, the vintage, the grape variety, the quality category (according to German wine law), the size of the lot, the shape of the bottle of the offered wine and various information of a descriptive nature that is contained on a wine's label. Furthermore, the dataset also includes information on prices: the initial starting bid (reservation price; "tax" price), the final price for which the wine is auctioned off (knock-down price), as well as the final price including the value-added tax and the auction fee.

We now describe the data in more detail.

3.1.1 Lots and wines offered at auction

The biggest auction in terms of quantity of wines offered was the Mosel with 61 and 83 lots offered for auction in 2007 and 2008, respectively. The number of lots must not be confused with the number of wine offered because, in some instances, the same wine is offered in two different bottle sizes, with each bottle size offered in a separate lot. The number of wine lots offered in the Rheingau region were 50 and 55 for 2007 and 2008, respectively, and 39 in both years at the Nahe auction. Therefore, a total of 334 wine lots are in our database. Most wines are from the 2006 vintage (37 percent) or the 2007 vintage (37 percent); 11 percent of the wines are from the 2005 vintage, and 15 percent from other vintages.

The volume of wine offered in 2008 was in all regional auctions substantially higher than in 2007

(Table 1). Moreover, the average lot size has increased, which may suggest that the auctions are growing in popularity among VDP estates as a means for marketing their wines.

Table 3.1:

Auction	No of wineries	No of lots	Volume (liters)	Average lot size (liters)	Biggest lot size (liters)
Mosel 2007	22	61	5,193	77.5	360
Mosel 2008	27	83	7,713	91.8	450
Rheingau 2007	18	50	2,334	46.7	225
Rheingau 2008	21	55	2,839	51.6	270
Nahe-Ahr 2007	20	39	2,798	71.8	450
Nahe-Ahr 2008	20	39	2,971	76.2	360
Total		334	23,848		

The predominant grape variety in all auction lots was Riesling at 93 percent of all lots, followed by the Späetburgunder (Pinot Noir) at 6 percent of lots offered. Regarding the quality of the wines offered for auction, many were in the higher quality levels, as defined by German wine law (Table 2). More than two-thirds of the wines offered were in the Auslese category or higher. Of the 20 wines that are in the Späetburgunder and not in the Riesling category, only 2 wines rank in a category higher than "Auslese".

Table 3.2: Distribution of Quality Levels in Dataset

Quality level, high to low	Frequency.	Share	Cumulative share.
	No.	%	%
Eiswein	9	2.7	2.7
Trockenbeerenauslese	35	10.5	13.2
Beerenauslese	36	10.8	24.0
Auslese	147	44.0	68.0
Spätlese	63	18.9	86.9
Kabinett	9	2.7	89.6
QbA	5	1.5	91.1
No quality mark provided	30	9.0	100.0
Total	334	100.0	

3.1.2 Prices

Because the wines for auction are offered in various bottle sizes, and the starting price is always given per bottle, we converted the starting price into prices per liter in order to facilitate price comparisons. Table 3 shows the mean and median starting prices and knock-down prices. As was to be expected, for all auctions the median price is substantially lower than the mean price, suggesting price distributions that hint at the fact that more wines with a higher starting price are offered for auction.

Table 3.3: Mean and median starting and knock-down prices at the auctions, (in € per liter)

	Median price			Mean price		
	Starting	Knock-down	Change,%	Starting	Knock-down	Change,%
Mosel 2007	93.3	176.6	89.3	123.5	325.0	163.2
Mosel 2008	66.7	156.0	133.9	161.9	450.7	178.4
Rheingau 2007	37.3	96.3	158.2	120.8	394.9	226.9
Rheingau 2008	33.3	48.0	44.1	72.0	306.0	325.0
Nahe 2007	33.3	133.3	300.3	83.9	276.6	229.7
Nahe 2008	33.3	100.6	202.1	65.5	201.0	206.9

With regard to the individual auctions, the differences between starting and knock-down prices vary considerably. At the Mosel auction, in both 2007 and 2008, the mean starting prices were already clearly higher than the starting prices at the auctions in the other regions. Although the knock-down prices for both years were also higher in the Mosel in absolute terms, the relative increase during bidding is smaller than at the Rheingau and Nahe auctions, where the mean knock-down price is at least three times as high as the mean starting price. For Mosel, the mean knock-down price is only two times as high as the starting price.

Another interesting aspect worth investigating is an examination of the prices obtained for the different quality levels. Table 4 presents the average knock-down prices per quality category for the six auctions.

Table 3.4: Average knock-down prices by quality category and auction, (in € per liter)

	Mosel 07	Mosel 08	Rheingau 07	Rheingau 08	Nahe 07	Nahe 08
Eiswein	1,705 (2)	-	-	148 (4)	240 (1)	113 (2)
Trocken-beeren- auslese	976 (3)	2505 (6)	941 (11)	1,812 (7)	1,556 (3)	797 (4)
Beeren-auslese	620 (6)	853 (5)	770 (9)	106 (4)	278 (9)	280 (2)
Auslese	240 (46)	191 (56)	133 (12)	146 (18)	177 (5)	124 (10)
Spätlese	66 (10)	59 (15)	31 (11)	27 (14)	49 (5)	197 (8)
Kabinett	-	-	13 (3)	13 (6)	-	-
QbA	-	-	-	-	-	98 (5)

Note: The numbers in brackets are the quantities of wines offered in the specific category at a specific auction. For example, at the Mosel 2007 auction two ice-wine lots were included, which sold for an average of 1,705 € per liter.

Eiswein, which is at least according to the wine law the highest German wine quality, only obtained the highest ending price per liter in the 2007 Mosel auction. However, Eiswein as a desert wine is really in a category on its own and can therefore not be directly compared to the other wines. Furthermore, only a few Eisweins were offered for auction (none in the 2007 Rheingau and the 2008 Mosel auctions) and therefore individual characteristics of the wine (such as producers) have probably more to influence in the ending price of the auction than just the quality category.

With regard to the other quality category, the picture is fairly uniform, with Trockenbeerenauslese achieving a higher price than Beerenauslese, than Auslese, and so on. Outstanding is the 2008 Mosel auction where six Trockenbeerenauslese wines were sold for an average of 2505 Euro per liter, and five Beerenauslese wines were sold for 853 Euros per liter. Both ending prices are higher than any other wine in those categories in the sample considered here.

In most categories Mosel wines reached a higher ending auction price than wines from the same category in the Rheingau and Nahe auctions.

4. Is there a price premium for wine in odd-sized wine (OZWB) bottles?

4.2.1 Types of OZWB offered at the auctions

At all six auctions that make up the dataset, wine is offered in eight different bottles sizes. However, as table 5 shows, nearly half of all bottles used are in the standard 0.75 liters category and the three most frequently used bottle sizes are 0.375, 0.75 and 1.5 liters accounting for over 90 percent of all the bottles offered at the auctions. Six 0.5 liter, nine 3 liter and twelve 0.7 liter bottles are also included, while the rest consists of unique special sizes, such as a 0.35 liter and a six liter bottle.

Table 4.1: Distribution of Bottle Sizes in the Dataset

Bottle sizes <i>in liters</i>	Freq. <i>actuals</i>	Share %	Cum. %
0.35	1	0.3	0.3
0.375	112	33.5	33.8
0.5	6	1.8	35.6
0.7	12	3.6	39.2
0.75	164	49.1	88.3
1.5	29	8.7	97.0
3	9	2.7	99.7
6	1	0.3	100
Total	334	100	

4.2.2 Are there regional differences in the use of OZWB?

We then ask the question whether a particular bottle size is being predominantly offered in a specific auction. Table 6 shows that no particular distribution can be detected. The majority of bottles offered at any auction are of the standard 0.75 liter and 0.375 liter size. Contrary to the Rheingau auctions, both, the Mosel and Nahe auctions include 1.5 liter bottles. In addition, the Nahe auction in both years also includes about 10 percent of the bottles in 3-liter sizes.

Table 4.2: Bottle Sizes Offered by German Wine Region

	Mosel 07	Mosel 08	Rheingau 07	Rheingau 08	Nahe 07	Nahe 08	Total
0.35				1			1
0.375	30	32	14	16	11	9	112
0.5		1	2	2	1		6
0.7		1	6	2	1	2	12
0.75	31	41	27	34	15	16	171
1.5	6	8	1		7	7	29
3		1			4	4	9
6						1	1
Total	67	84	50	55	39	39	334

4.2.3 Which OZWB-type for which wine?

After identifying which bottle sizes are offered for auction in a specific German wine region, the next logical question to ask is whether certain types of wine are generally offered in specific bottle sizes. For example, are the more expensive wines or the higher quality ones (according to the German wine law) offered in smaller bottles? Table 7 provides an overview. Most wines are offered in either the standard 0.75 liter or the 0.375 liter category. Generally, the sample shows that the higher the wine quality the more wine bottles are offered in the smaller 0.375 category relative to the standard size. Of all quality levels, the sample contains slightly less than half of all wines in the Auslese category. In this category, about 44 percent are in the standard 0.75 liter wine bottle and interestingly slightly more, 45 percent in the 0.375 category. In the higher Trockenbeerenauslese more than half of the wines offered are in the 0.375 category, while the vast majority of the Spätlese wines are in the standard size bottle. In the lower quality Kabinett and QbA category, the few wines contained in sample are all offered in standard 0.75 liter bottles.

Table 7: German Wine Quality Levels and Bottle Sizes

	0.35	0.375	0.5	0.7	0.75	1.5	3	6	Total
Eiswein	0	5	0	0	4	0	0	0	9
Trockenbeerenauslese	1	20	1	4	7	2	0	0	35
Beerenauslese	0	17	2	2	13	2	0	0	36
Auslese	0	66	3	3	62	11	1	1	147
Spätlese	0	4	0	1	48	9	1	0	63
Kabinett	0	0	0	0	9	0	0	0	9
QbA	0	0	0	0	5	0	0	0	5
No quality mark	0	0	0	0	5	5	7	0	17
Total	1	112	6	10	153	29	9	1	321

4.3 Does OZW-Bottling pay for VDP wineries?

4.3.1 Sample price impact of OZWB

This section includes the various models we use to estimate the effects of bottle size on price. As a price variable we use the final auction price per liter (which includes taxes and fees). We group the six different bottle size into 4 categories: bottles of less than 0.75 liters, exactly 0.75 liters, 1.5 liters and more than 1.5 liters.

a. *Basic regression of bottle size on wine price:* $P = a + b_1S_1 + b_3S_3 + b_4S_4 + e$, where S_2 , S_3 and S_4 correspond to bottle sizes less than 0.75, 1.5 and more than 1.5 liters, respectively and e stands for the error term. The standard bottle size of 0.75 liters is the reference category here, as we have created dummies. The results are presented in table 4.3.

Table 4.3: Results of Regression a.

RHS	Coef.	Std. Err.	t	P>t
Bottle=0.75	-503.572	119.063	-4.230	0.000
Bottle=1.5	-509.258	208.520	-2.440	0.015
Bottle=>1.5	-640.385	333.347	-1.920	0.056
_cons	774.424	88.774	8.720	0.000

All coefficients on the size variables are negative and significantly different from zero, indicating a negative correlation between price and bottle size. The larger the container, the cheaper the wine gets. This model of course ignores all other factors that may influence price. In particular, bottle size may well capture wine quality (good quality wine tends to be sold in smaller containers).

b. *Regression of bottle size on wine price, controlling for indicators of wine quality and other variables:* $P = a + b_1S_1 + b_3S_3 + b_4S_4 + c'X + e$,

where X is a vector of control variables. It includes dummies for the wine quality categories listed in table 2, dummies for vintage year and a continuous variable for lot size. Lot size is included under the premise that larger quantities have a bulk characteristic and may fetch a lower price.

Table 4.4: Results of Regression b.

	Coef.	Std. Err.	T	P>t
Bottle<0.75	38.392	109.241	0.350	0.726
Bottle=1.5	3.194	185.044	0.020	0.986
Bottle>1.5	-136.376	324.786	-0.420	0.675
Auction Volume	0.166	0.532	0.310	0.755
Vintage 2006	386.398	176.840	2.190	0.030
Vintage 2007	389.587	180.432	2.160	0.032
Vintage Other	1073.705	191.662	5.600	0.000
Auslese GK	119.195	157.293	0.760	0.449
Auslese LGK	227.815	175.278	1.300	0.195
Beerenauslese	384.404	175.311	2.190	0.029
Eiswein	42.307	297.369	0.140	0.887
GG	75.798	263.452	0.290	0.774
Kabinett	17.712	303.134	0.060	0.953
QbA	-12.590	390.569	-0.030	0.974
Rotweiß-Edelbeerenauslese	3301.639	825.882	4.000	0.000
Spätlese	-121.990	164.438	-0.740	0.459
Trockenbeerenauslese	1976.717	189.434	10.430	0.000
_cons	-297.063	193.260	-1.540	0.125

Thus, when we control for quality characteristics, the bottle size effect largely disappears. While the coefficient on larger bottles remains negative, it is not significantly different from zero. In only one instance does the data suggest that bottle size has a significant effect on the auctioned wine price and that is for bottles of 1.5 liters. Relative to the standard bottle size of 0.75 liters, the 1.5 liter bottle receives a premium of 3.2 Euros per liter that is statistically significant. We believe that this may be due to the association with better quality and thus higher willingness to pay for such “Magnum” bottles. However, in our database, there are only 29 1.5 liter bottles, less than 10 percent of all bottles included.

c. Sensitivity analysis

In order to see whether bottle size does have an effect on price for some wine qualities (although it has no effect on average for all qualities); we run the model from section b for the six quality levels with at least 33 observations. Bottle size seems to matter only for one quality level, Spätlese. For that category there seems to be a price premium for wines sold in smaller bottles than the standard 0.75 liter bottle.

We did not include the grape variety as an explanatory variable, because of the overwhelming presence of Riesling (>93 percent) in the sample. When included, it is not significant. Furthermore, when replacing the final auction price per liter with the initial call price per liter, the results are qualitatively the same.

4.3.2 Matched-pair price analysis

Same winery, same wine, different size bottles....

We ask now whether for a given producer and a given wine type, the bottle size has an effect. The dataset includes a total of 49 cases, where the same winery offers for auction the same wine in differently sized bottle sizes. A descriptive analysis of the data reveals that in 31 out of 49 cases, a wine offered in a 0.375 liter bottle fetches a higher price per liter than the same wine offered in all other bottle sizes. However, in 12 cases it goes the other way, meaning that the 1.5 liter bottle receives a higher price per liter than all other bottle sizes. Only in 6 cases does the price per liter received for a standard 0.75 liter bottle is the highest.

We know turn to a regression analysis in order to investigate whether the bottle size in these matching of identical wines in differently sized bottles has indeed a significant effect. For this we run the following producer/wine fixed effects regression:

$$P = a + b_1 * year_{05} + b_2 * year_{06} + year_{other} + C_1 S_1 + C_5 S_5 + e,$$

Where $year_{05}$ and $year_{06}$ stand for the vintage in 2005 and 2006 and $year_{other}$ for the vintage prior to 2005 and after 2007. Bottle sizes are expressed through s_1 and s_5 stand for the bottle sizes of less than 0.75 liters and more than 0.75 liters, respectively. The results are presented in table 4.5.

We find that while the sign of the coefficients is as expected (smaller bottles yield a higher per liter price) they are not significantly different from zero. The only significant coefficients are for the year 2005.

Table 4.5

	Coef.	Std. Err.	T	P>t
Bottle<0.75	7.244533	101.8727	0.07	0.943
Bottle>0.75	-72.3181	167.4633	-0.43	0.667
Vintage 2005	1283.183	354.0459	3.62	0
Vintage 2006	-82.1563	168.7526	-0.49	0.627
Vintage Other	1956.034	282.0212	6.94	0
_cons	247.8888	115.3944	2.15	0.034

5. Results

Our empirical analysis finds that the bottle size, when controlling for the quality characteristics of the wine within, generally does have little effects on the price of wine sold at auction. In only one instance does the data suggest that bottle size has a significant effect on the auctioned wine price and that is for bottles of 1.5 liters? For such “Magnum” bottles the data suggest that the bottle size has a statistically significant effect. Relative to the standard bottle size of 0.75 liter, the 1.5 liter bottle receives a premium of 3.2 Euros per liter. Other bottle sizes, notably, the smaller 0.375 category so often associated with higher quality does not show a significant effect.

Some additional analysis in respect to the effect of the quality of the wine in the bottle tells a similar picture. The highest quality levels defined under the German wine law, Eiswein and Trockenbeerenauslese, do not show a significant effect on the price of the various bottle size (often smaller than the standard 0.75 liter bottle) in which they are offered for auction. In only one instance, does bottle size seem to matter? For Spätlese wines there seems to be a price premium for wines sold in smaller bottles than the standard 0.75 liter bottle. However, in the Spätlese category, only 5 of the 63 wines are offered in bottles of sizes smaller than the standard 0.75 liter category (which contains 48 out of the 63 wines). Therefore, the particular characteristics of the 5 wines that are offered in bottles smaller than 0.75 liters that is the name of the producer, the vintage or general reputation of the wine probably better serve to explain the significant effect than simply the size of the bottle.

At last we conduct a match-pair price analysis, thus an examination of the same wine from the same winery offered in different bottle sizes, but find no statistically significant effects with regard to price. Only wines from the vintage of 2005 show a significant coefficient compared to year 2007 and thus yield a higher price per liter in the auction.

6. Conclusion

This paper examines the impact of odd-sized wine bottles on the prices obtained in the wine auctions conducted by the Association of the German Prädikat Wine Estates (VDP) in 2007 and 2008. With odd-sized we define those bottles that differ from the standard 0.75 liter wine bottle. We provide some background on bottle sizes, on wine auctions in general and on the VDP auctions in particular before presenting the wine price data obtained from six VDP auctions that yield the data for the dataset examined here.

Our analysis finds little significance of the size of wine bottles offered for auction on the price obtained by the producers in those auctions. This evokes the questions of why VDP producers go the generally more expensive route and offer a wine in an odd-sized bottle if no significantly higher returns are to be had from that bottle. One possible answer may lie in the fact that the VDP auctions are a well documented public event and some product differentiation in the form of odd (or original) bottle sizes may have a clear advertising factor for a VDP winery.

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